



OmniScan MXE

Eddy Current Inspection Data Acquisition and Analysis Software

User's Manual

Software Version 3.0

DMTA-20042-01EN [U8779846] — Revision B
September 2022

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed. Keep this instruction manual in a safe, accessible location.

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This document was prepared with particular attention to usage to ensure the accuracy of the information contained therein, and corresponds to the version of the product manufactured prior to the date appearing on the title page. There could, however, be some differences between the manual and the product if the product was modified thereafter.

The information contained in this document is subject to change without notice.

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List of Abbreviations

ECA	eddy current array	NDT	nondestructive testing
ECT	conventional eddy current		

Important Information — Please Read Before Use

Intended Use

The OmniScan MXE software is designed to perform nondestructive inspections on industrial and commercial materials.

Instruction Manual

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

Safety Symbols

The following safety symbols might appear on the instrument and in the instruction manual:



General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.



High voltage warning symbol

This symbol is used to alert the user to potential electric shock hazards greater than 1000 volts. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety symbols might appear in the documentation of the instrument:



DANGER

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in death or serious personal injury. Do not proceed beyond a DANGER signal word until the indicated conditions are fully understood and met.



WARNING

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in death or serious personal injury. Do not proceed beyond a WARNING signal word until the indicated conditions are fully understood and met.



CAUTION

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.

Note Signal Words

The following safety symbols could appear in the documentation of the instrument:

IMPORTANT

The IMPORTANT signal word calls attention to a note that provides important information, or information essential to the completion of a task.

NOTE

The NOTE signal word calls attention to an operating procedure, practice, or the like, which requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

TIP

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or provides hints on how to effectively use the capabilities of the product.

Warnings



WARNING

General Warnings

- Carefully read the instructions contained in this instruction manual prior to turning on the instrument.
- Keep this instruction manual in a safe place for further reference.
- Follow the installation and operation procedures.
- It is imperative to respect the safety warnings on the instrument and in this instruction manual.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment could be impaired.

Warranty Information

Evident guarantees your Evident product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the Terms and Conditions available at <https://www.olympus-ims.com/en/terms/>.

The Evident warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Evident for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of your Evident product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Evident makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

Evident reserves the right to modify any product without incurring the responsibility for modifying previously manufactured products.

Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page on the Evident Scientific Web site.

Introduction

The OmniScan MXE software provides eddy current inspection functions suitable for numerous nondestructive testing (NDT) applications as it is equipped with both the conventional eddy current (ECT) and the eddy current array (ECA) modes. The OmniScan MXE software operates on the innovative and portable OmniScan MX instrument, outfitted with one of the ECT/ECA acquisition modules.

NOTE

Before reading this manual, make sure that you have read the *OmniScan MX and MX2 User's Manual* (part number DMTA-20015-01EN) and that you understand its contents, especially the sections pertaining to the OmniScan MX instrument and how to navigate through the OmniScan MXE software interface using the main controls of the instrument's front panel.

With the ECA/ECT module, you can perform inspections with a wide variety of probes. The array technology, when applied to eddy current techniques, increases scanning speed and improves flaw sizing. The intuitive software interface offers many powerful features, including:

- Real-time impedance plane view
- Real-time C-scan imaging
- Automatic probe recognition
- Normalization wizard
- Quick reporting

1. Setting Up the OmniScan MX Instrument

The operating procedures of the OmniScan MX instrument are described in detail in the *OmniScan MX and MX2 User's Manual* (part number DMTA-20015-01EN). To access the OmniScan MXE software, the following basic operating procedures are provided:

- “Connecting Probes to the OmniScan MX” on page 19
- “Starting the OmniScan MX Instrument” on page 21
- “Shutting down the OmniScan MXE Software” on page 22

The writing conventions that apply to this user's manual are also explained in section 1.4 on page 23.

1.1 Connecting Probes to the OmniScan MX

The OmniScan MXE software combines array (ECA) mode and conventional (ECT) mode for use of both ECA and ECT probes with the OmniScan MX.



CAUTION

Do not connect a conventional eddy current probe to the OmniScan MX instrument before starting the instrument. The probe can be damaged if the probe configuration currently stored in the instrument is not appropriate.

Connect an array probe to the ECA receptacle and ECT probes to the ECT receptacles (see the example in Figure 1-1 on page 20). For more information on connecting an ECA probe, see the *OmniScan MX and MX2 User's Manual* (part number DMTA-20015-01EN).

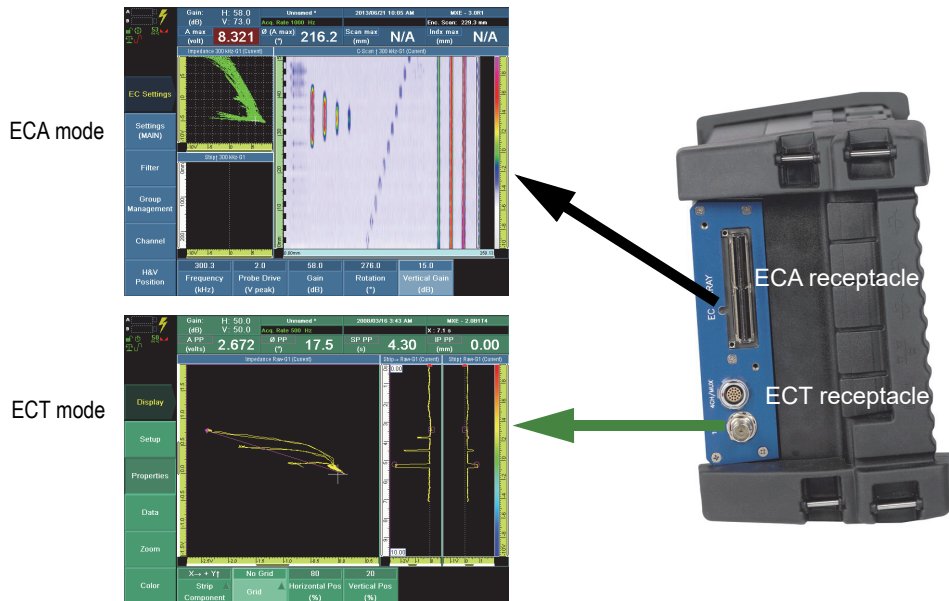


Figure 1-1 Connecting ECA and ECT probes to the OmniScan MX

TIP

When connecting an ECA probe, hold the probe connector in place by pressing it lightly into the ECA receptacle and maintaining pressure until the two retaining screws have been entirely screwed in.

In ECA mode, the OmniScan instrument automatically recognizes and configures eddy current array probes at startup, or when connected during operation.

In ECT mode, you need to manually configure the parameters for your conventional eddy current probe by selecting the appropriate choice in the **Probe > Settings > Select Probe** menu (see section 3.1.1 on page 46).

Several useful ECT adaptors are available (see Table 1 on page 21).

Table 1 Compatible cables and adaptors

Part Number	Item Number	Description
F19-L16	U8779805	Universal Nortec 16-pin Lemo adaptor
COS-TF-6	U8800284	Probe cable, Triax connector, bridge configuration
CROS-TF-6	U8800411	Probe cable, Triax connector, reflection configuration
COS-7L-6	U8801390	Probe cable, PowerLink (7-pin LEMO) connector
CROS-MSE-6	U8800654	Probe cable, dual Micro-dot connectors, reflection configuration
COS-4F-6	U8800282	Probe cable, 4-pins Fischer connector, bridge configuration


1.2 Starting the OmniScan MX Instrument



CAUTION

Do not connect a conventional eddy current probe to the OmniScan MX instrument before starting the instrument. The probe can be damaged if the probe configuration currently stored in the instrument is not appropriate.

To start the OmniScan instrument

1. On the front panel of the OmniScan MX, press and hold the Power key () for one second.
2. The power indicator light on the left-hand side of the Power key turns on. The system starts, performs a memory check, and displays the OmniScan logo and the software version.
3. If more than one application is available on your OmniScan MX, a series of buttons appears on the OmniScan MX splash screen offering to start the available applications. Choose the OmniScan MXE 3.0 software inspection application using the corresponding function key on the left-hand side of the screen.
4. If you always choose the same application, you can skip the operating mode selection by selecting the Auto Startup button in the lower-right corner of the screen. This function bypasses the operating mode selection in future restarts.
To regain the ability to choose an inspection application, select **Preferences > Instrument > Category = System**, and from the **Startup Mode** parameter, select **Manual** (see section 15.9.3.3 on page 366).


NOTE

At startup, the OmniScan MX instrument loads the OmniScan MXE software installed either on the storage memory card inserted in the built-in card reader on the right side of the instrument or, from an external card reader connected to one of the OmniScan MX USB ports (USB 1.0 only).

1.3 Shutting down the OmniScan MXE Software


The OmniScan MXE software automatically shuts down when you turn off your OmniScan MX instrument.

To turn off the OmniScan MX instrument

- ◆ On the front panel of the OmniScan MX, press and hold the Power key () for one second.

The power indicator light on the left-hand side of the Power key turns orange as the OmniScan MX shuts down.

IMPORTANT

If you press and hold the Power key () for more than four seconds, the OmniScan MX instrument shuts down without giving you the option to save the active setup.

1.4 Conventions

In a procedure containing several steps, the operations that the user has to execute are numbered 1, 2, 3... Procedures containing only one step or secondary step are preceded by the diamond symbol “◆”. Lowercase letters (a, b, c...) can also be used to indicate secondary steps in a complex procedure.

SMALL CAPITALS are used to identify any term marked as is on the instrument, such as the names of connectors, hardware keys, indicator lights, etc. SMALL CAPITALS are also used to identify key names of the computer keyboard.

All the terms that are used in the interface, such as the names of menus, commands, dialog boxes, text boxes, and options, are presented in **bold** print.

The abbreviation “N/A” is used to indicate either *not applicable* or *not available* at time of press.

Navigation through the OmniScan MXE interface is described according to a specific syntax. For example, instead of writing: “Press the Menu key, then select the **Alarm/Output** menu, then the **Alarm Setup** submenu, then the **Type** parameter button and then select the **Pie** option,” the following syntax is used: **Alarm/Output > Alarm Setup > Type = Pie**.

- The first element of a command sequence refers to a first-level command, that is, a main menu.
- A second element refers to a second-level command, that is, a submenu.
- A third element refers to a third-level command, that is, a parameter.
- A fourth element refers to a fourth-level command, that is, a choice from an option list (when applicable).

NOTE

The screen illustrations found in this manual were prepared with the software version available at time of press; they may slightly differ from what you see on the OmniScan MXE display screen according to the software version you are using. Furthermore, the screen illustrations are printed using the default OmniScan MXE color palette; their look may be different if you use another color palette.

2. Overview

This chapter presents the general features of the OmniScan MXE software user interface organized as follows:

- “About the User Interface Main Components” on page 27
- “About the Reading Fields” on page 28
- “About Navigating in the OmniScan MXE Software” on page 32
- “About the Status Indicators” on page 35
- “About the Online Help” on page 38
- “Operation Modes” on page 39
- “Selection Cursors” on page 40
- “Horizontal and Vertical Components” on page 42
- “Progress Indicators” on page 43

One distinct characteristic of the OmniScan MXE software user interface is that the color changes depending on the mode (see Figure 2-1 on page 26).

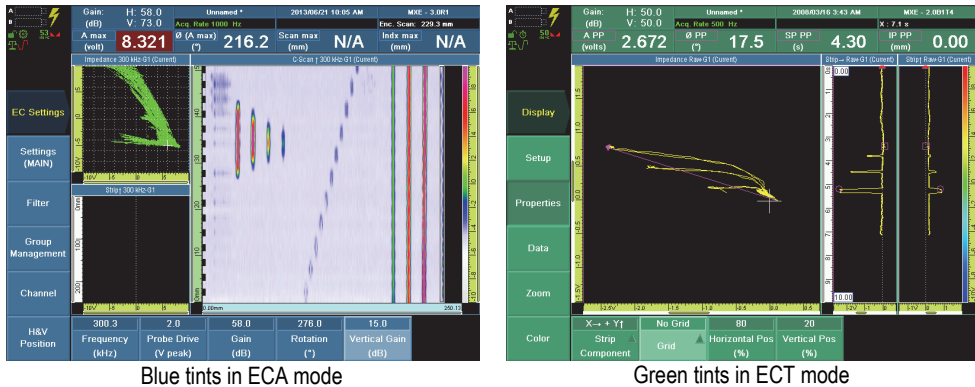


Figure 2-1 Appearance of the user interface in ECA and ECT modes

The user interface appears in blue tints when set in the eddy current array (ECA) mode and in green tints when set in the conventional eddy current (ECT) mode. Refer to section 6.1 on page 115 for the procedure to switch from one mode to the other.

NOTE

In this document, the user interface screens are displayed in the ECA mode (blue tints) when they are similar in both modes.

2.1 About the User Interface Main Components

Figure 2-2 on page 27 shows the OmniScan MXE software user interface and identifies its main components.

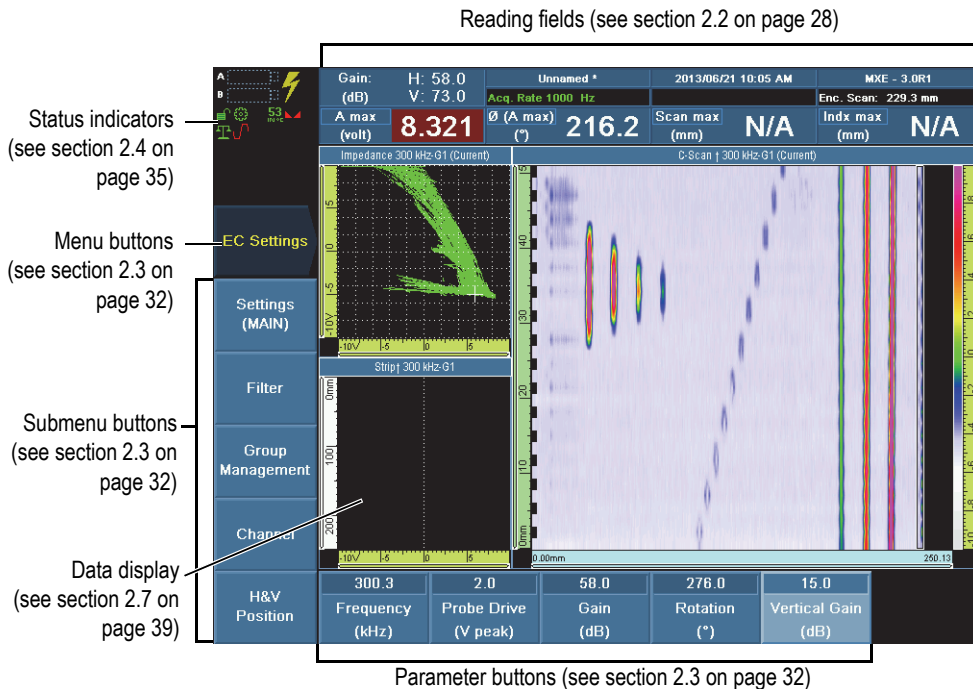


Figure 2-2 The OmniScan software window components shown in ECA mode

NOTE

The *OmniScan MX and MX2 User's Manual* (part number DMTA-20015-01EN) provides a description and instructions for use of the OmniScan MX instrument. Refer to that document to understand, in particular, how to navigate in the software user interface using the hardware keys of the instrument.

2.2 About the Reading Fields

The reading fields area is located at the top of the OmniScan software user interface. Figure 2-4 on page 30 identifies the various reading fields available and provides references to document sections where you can find more information. Figure 2-5 on page 30 identifies the information available in a reading field.

The default reading fields, when in acquisition mode, are as follows: **AMax (V)**, **°AMax (V)**, **S AMax (s)**, and **I AMax (mm)**. The numbers shown in these fields are measurements taken from data (C-scan or other views) and the measurement type is set in **Field 1** through **Field 4** in **Measurement > Reading**.

AMax

Shows the maximum amplitude vector measured for the last second.

°AMax

Shows the angle of the maximum amplitude vector.

S AMax

Shows the scan position of the maximum amplitude vector.

I AMax

Shows the index position of the maximum amplitude vector.

The default reading fields, when in analysis mode, are as follows:

A PP – Peak-to-Peak Amplitude

Used to calculate and display the largest amplitude vector illustrating the peak-to-peak position.

ø PP – Peak-to-Peak Angle

Used to calculate the angle on the peak-to-peak vector based on the horizontal axis.

SP PP – Peak-to-Peak Amplitude Scan Position

Used to calculate the scan position of the peak-to-peak amplitude.

IP PP – Peak-to-Peak Index Amplitude


Used to calculate the index position of the peak-to-peak amplitude on the index axis.

Other reading fields can be configured for acquisition mode and analysis mode. For more information, see section 15.2.1 on page 314.

In the upper-left corner of the display are two icons that show the status of the saturation and probe balancing (see Figure 2-3 on page 29).



Figure 2-3 The reading fields and icons at the top of the OmniScan MX display

Balance icon  (null function) (see Figure 2-3 on page 29)

- When the icon is green, it means that the probe is balanced and ready for inspection.
- When the icon is red, it means that the probe needs to be balanced.
- When the icon is yellow, it means that you have changed a parameter and the probe is not correctly balanced.

Saturation icon  (see Figure 2-3 on page 29)

- When it is highlighted green, it means that there is no saturation.
- When it is highlighted red, there is saturation and you must reduce the probe drive or the gain value (see section 15.1.1 on page 310), and rebalance the probe.

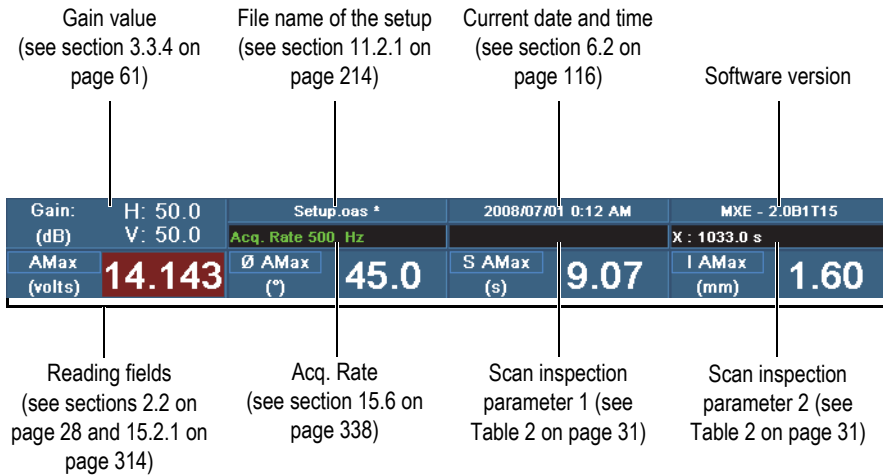


Figure 2-4 Information in the reading-field area



Figure 2-5 The information available in a reading field

Table 2 on page 31 shows the information that the scan inspection parameters 1 and 2 contain in relation to a selected scan inspection.

Table 2 Information in the scan inspection parameters 1 and 2

In the menu		Content	
Scan > Inspection > Type =	Scan > Inspection > Scan =	Scan inspection parameter 1	Scan inspection parameter 2
One-Line Scan	Time	N/A	X: Inspection duration [s]
	Encoder 1 and Encoder 2	N/A	X: Position on the scan axis [mm]
Raster Scan	Encoder 1 and Encoder 2	X: Position on the scan axis [mm]	Y: Position on the index axis [mm]

2.3 About Navigating in the OmniScan MXE Software

The OmniScan MXE software user interface provides access to parameters using three levels of buttons arranged on the left side and at the bottom of the screen. Figure 2-6 on page 32 outlines the syntax used throughout this document to specify the selection of menu, submenu, parameter buttons, and when to enter or select parameter values.

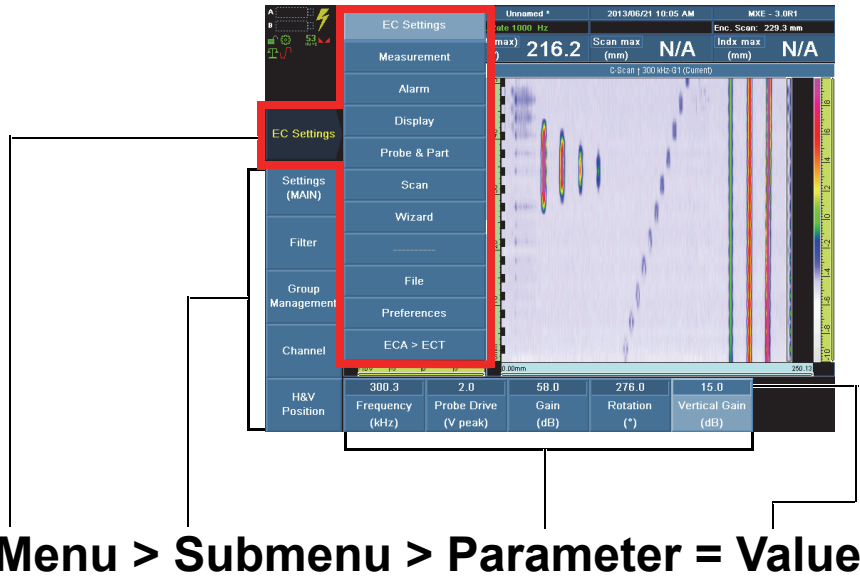


Figure 2-6 Menu, submenu, parameter structure, and navigation syntax

The navigation syntax outlined in Figure 2-6 on page 32 is a short expression of the procedure detailed in section 2.3.1 on page 32.

2.3.1 Navigating in the OmniScan MXE Software

Navigating the OmniScan MXE software is performed using the scroll knob and the hardware keys on the front panel of the OmniScan MX instrument. A mouse can also be connected to the OmniScan MX and used to navigate the menus.

NOTE

The *OmniScan MX and MX2 User's Manual* (part number DMTA-20015-01EN) provides a description and instructions for use of the OmniScan MX instrument. Refer to that document to understand, in particular, how to navigate in the software user interface using the hardware keys of the instrument.

To navigate in the OmniScan MXE software

1. Press the menu button, and then choose the desired item from the menu list that appears on the right of the button (see Figure 2-6 on page 32).
2. The software immediately reassigns the functions of the submenu buttons to those associated with the selected menu item.
3. Choose the desired submenu button.
4. The software immediately reassigns the functions of the parameter buttons to those associated with the selected submenu button.
5. Choose the desired parameter button and enter or select the desired value associated with the function of the button.

Some parameter buttons also provide access to dialog boxes or software tools, such as the File Manager.

2.3.2 Organization of the Menus

The order in which the menu items, submenus, and parameter buttons appear corresponds to their typical sequence of usage.

Consider the menus as being part of three groups:

- “Menus to Define the Setup” on page 34
- “Menus Used for Inspection” on page 34
- “Menus Used to Access Tools” on page 34

2.3.2.1 Menus to Define the Setup

To define your setup, use the following menus:

Probe & Part

Use this menu to fine-tune the parameters related to your probe. Refer to section 15.5 on page 336 for a complete description.

Scan

Use this menu to adjust the parameters related to the scan configuration that has been defined with the wizards. Refer to section 15.6 on page 338 for a complete description.

Wizard

Use this menu to activate the wizards that offer step-by-step instructions to configure specific aspects of your setup. Refer to section 15.7 on page 344 for a complete description.

2.3.2.2 Menus Used for Inspection

To perform your inspection, use the following menus:

EC Settings

Menu containing all parameters that you regularly modify during inspection. Refer to section 15.1 on page 310 for a complete description.

Measurement

Menu managing the options related to various measurement options and statistical tools. Refer to section 15.2 on page 313 for a complete description.

Alarm

Menu containing alarm conditions. Refer to section 15.3 on page 322.

Display

Menu managing the options related to the data views and other on-screen information. Refer to section 15.4 on page 329 for a complete description.

2.3.2.3 Menus Used to Access Tools

To configure the OmniScan software and hardware, use the following menus:

File

Menu to open and save files, and to format and build an inspection report. Refer to section 15.8 on page 355 for a complete description.

Preferences

Menu containing various system configuration parameters that you typically set during the initial setup, such as the measurement unit (mm or in.) and the date and time. Refer to section 15.9 on page 359 for a complete description.

ECT <_> ECA

Menu to switch between the conventional (ECT) and the array (ECA) eddy current operating modes. Refer to section 15.10 on page 369 for a complete description.

2.4 About the Status Indicators

The status indicators show the current status of the OmniScan MX instrument. They are located in the upper-left corner of the display screen.

Figure 2-7 on page 35 shows an example of some of the status indicator icons for the OmniScan MX instrument.

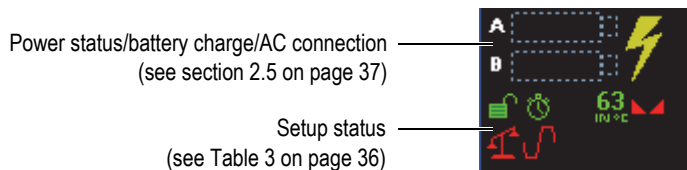


Figure 2-7 Examples of status indicators

Table 3 on page 36 presents a list of the status indicators and their meanings.

Table 3 The status indicators and their meanings









Indicator	Meaning
	The signal is balanced.
	The setup is locked.
	The setup is unlocked.
	The acquisition synchronization is set to clock mode.
	The signal is normalized (calibration status indicator).
	The acquisition synchronization is set to encoder mode.
	OmniScan internal temperature in degrees Celsius
	No saturation.

Table 4 on page 36 describes the meaning of the status indicator colors.

Table 4 Meanings of status indicator colors

Indicator Color	Meaning
Green	Parameter is OK
Yellow	Parameter requires attention
Red	Parameter needs corrective action

2.5 Battery Status Indicators

The battery status indicators, located in the upper-left corner of the display screen, indicate the amount of power left in each battery as shown in Figure 2-8 on page 37.



Figure 2-8 Battery charge status: charges remaining in both batteries

- The remaining estimated operational time is displayed inside the battery status indicator.
- The charge indicator (bar) inside the battery status indicator represents an approximation of the amount of power left in that battery.
- If you attempt to turn on the OmniScan MX with batteries that are too low to operate, the power indicator light blinks red rapidly for about three seconds. Replace the batteries or plug in the DC power adaptor to operate the OmniScan MX.

The battery that is currently being used is highlighted.

The OmniScan MXE software notifies the user regarding the status of the batteries. Table 5 on page 37 describes the various states of the battery status indicator.

Table 5 Battery status indicator variations









Indicator	Outline	Fill	Meaning
	Dotted	N/A	There is no battery in that compartment.
	Blue	Blue	The battery is functioning properly.
	Blue	Orange	The battery is too hot to operate.
	Yellow (blinking)	Blue	The battery is charging.

Table 5 Battery status indicator variations (continued)

Indicator	Outline	Fill	Meaning
	Orange	Blue	The battery is too hot to be charged.
	Red (blinking)	Light blue	The battery charge is critically low (less than 10 %). A beeping sound is heard if there is no other battery to switch to.
	N/A	Yellow	The OmniScan MX is being powered externally through the DC adaptor.
	N/A	Dark green	The external power supply is insufficient.

2.6 About the Online Help

The OmniScan MXE software offers various types of on-screen help information:

- Contextual help regarding the functions associated with each button. The content of this help system is the same as that of chapter 15 on page 309.
- Information related to the use of sample setup files.

2.6.1 Displaying Contextual Help

The OmniScan MXE software features contextual help related to each submenu and parameter button.

To display contextual help

1. Choose the submenu or parameter button for which you wish to consult the help information.
2. Press the Help key on the front panel of the OmniScan MX instrument.
The associated help information appears in the data display area.
3. To display help information on a different function, simply select the button associated with the function.

The contextual help information displayed is updated.

The help information disappears when you press the Help key again.

2.6.2 Displaying Help for a Sample Setup File

The OmniScan MXE software comes with sample setup files that provide configuration for some typical applications. Help information specific to each sample setup file is also available. For more details, refer to section 6.7 on page 127.

To display the help for a sample setup file

1. Load a sample setup file:
 - a) Select **File > Open > Open** to start the File Manager.
 - b) Select **File Type = Setup**.
 - c) Toggle **Listed Files** to show **Sample** files.
 - d) Select one of the available sample files, and then select **Open**.
2. Press the Help key on the front panel of the OmniScan MX instrument.
The associated help information appears in the full-screen mode.
3. Press the Help key again.
The sample setup file help clears and the data display area now shows the contextual help.
4. Press the Help key one more time to clear the contextual help and return to the normal display.

2.7 Operation Modes

The OmniScan MXE software has two operation modes: acquisition and analysis.

Acquisition

The inspection is in process and the OmniScan is acquiring data.

Analysis

The OmniScan is presenting previously acquired inspection data.

It is possible to switch between these modes by pressing the Freeze key



NOTE

Some software functions are only available in one of the modes, while others are available in both modes. These restrictions are listed in the descriptions of the function keys and parameter buttons in chapter 15 on page 309.

2.8 Selection Cursors

When in analysis mode, the OmniScan MXE software automatically displays two selection cursors to make sizing defects easier. The selection cursors can be shown or hidden from the **Preferences** menu. For more information, see section 15.9.2 on page 362.

The selection cursors are available for the following types of views used to display inspection data:

- C-scan
- Strip chart

By default, the selection cursors' parameters in a view are as follows:

- Scan start: first quarter of the view along the scan axis
- Index start: center of the view along the index axis
- Length selection: half the length of the view along the scan axis
- Angle selection: 0°, which orients the cursors on the scan axis

The selection cursors can be positioned using a mouse or the OmniScan MX instrument's front panel's main controls.

When using either the mouse or the menu commands to move the start point (✘) selection cursor, the end point moves with it in order to keep the selection cursor's defect sizing length and angle constant. However, if the end point (+) is moved, the start point remains at the same position; therefore, the **Length Selection** and **Angle Selection** values are readjusted in the **Measurement > Cursors** menu.

To move the selection cursors using a mouse

- ◆ Click and drag the start point (✘) or the end point (+) to the desired position.

To move the selection cursors using the OmniScan front panel main controls

1. Select **Measurement > Cursors > Scan Start**, enter the position of the start point (✕) on the scan axis, and then press the Accept key to confirm.
2. Select **Measurement > Cursors > Index Start**, enter the position of the start point (✕) on the index axis, and then press the Accept key to confirm.
3. Select **Measurement > Cursors > Length Selection**, enter the length of the line between the two selection cursors. The **Length Selection** parameter determines the location of the end point (+) on the scan axis, and then press the Accept key to confirm.
4. Select **Measurement > Cursors > Angle Selection**, enter the angle of the line between the two selection cursors. The **Angle Selection** parameter determines the location of the end point (+) on the index axis, and then press the Accept key to confirm.

Data located between the selection cursors is displayed in the impedance plane and strip chart views (see Figure 2-9 on page 41).

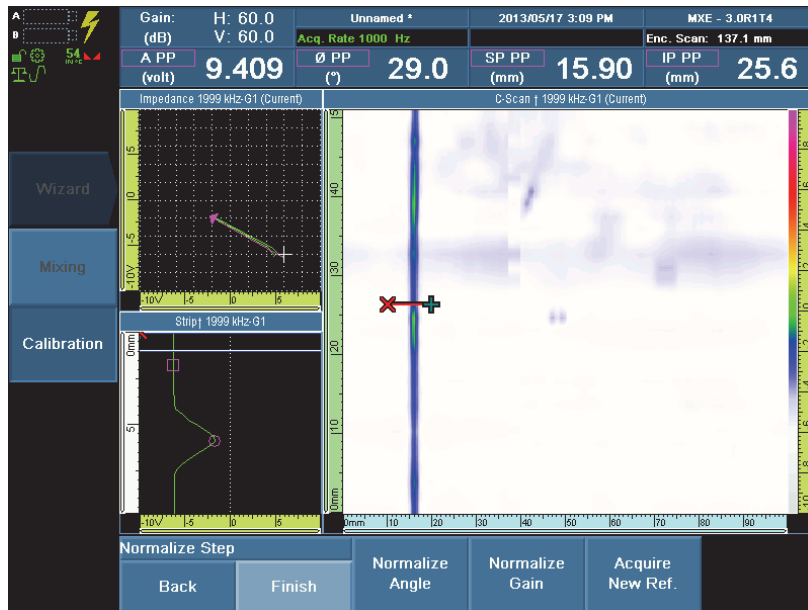


Figure 2-9 Data in the impedance plane and strip chart views (*left*) and cursor position in the C-scan view (*right*)

To change the data displayed in the impedance plane and the strip chart views, change the **Scan Start**, **Index Start**, **Length Selection**, and **Angle Selection** parameter values in the **Measurement > Cursors** menu using either the mouse or the menu commands.

2.9 Horizontal and Vertical Components

The interface of the OmniScan MXE software uses two specific symbols to refer to the horizontal and vertical components of an eddy current signal.

- Horizontal

The horizontal component is represented by \rightarrow .

- Vertical

The vertical component is represented by \uparrow .

The C-scan view shows only one component at a time and this is set to vertical \uparrow by default.

The strip chart view can show the horizontal component, the vertical component, or both at a time.

To change the component

- ◆ Select **Display > Setup > Acquisition = C-Scan, Strip Chart and Impedance Plane**, or **C-Scan, Strip Chart, and Impedance Plane**.

For more information on configuring the data component, see section 15.4.1 on page 329.

To change the component of the selected view

1. Select **Display > Properties > C-Scan Component** or **Strip Component**.
2. Select the **X \rightarrow** , **Y \uparrow** , or **X \rightarrow + Y \uparrow** item, and then press the Accept key to confirm.

For more information on changing the component of the selected view, see section 15.4.2 on page 331.

For more information on configuring the data display in the OmniScan MXE software, refer to section 6.4 on page 118.

2.10 Progress Indicators

Progress indicators show the proportion of a process that has been completed.

A progress indicator appears when data processing slows down or suspends other operations.

The software can display the three progress indicators shown in Figure 2-10 on page 43, Figure 2-11 on page 43, and Figure 2-12 on page 43.



Figure 2-10 Progress indicator displayed when saving data

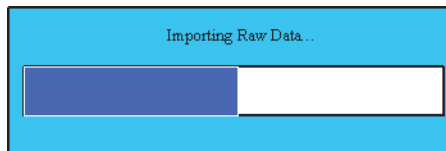


Figure 2-11 Progress indicator displayed when loading data

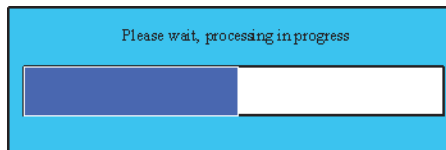


Figure 2-12 Progress indicator displayed when data is being processed by the digital signal processor

3. Basic Inspection Setup and Operation

This chapter presents the basic inspection setups and operations that are most often used by OmniScan MXE users, organized as follows:

- “Setting Up a Conventional Eddy Current Testing (ECT) Inspection” on page 45
- “Setting Up an Eddy Current Array (ECA) Inspection” on page 55

3.1 Setting Up a Conventional Eddy Current Testing (ECT) Inspection

This section presents the basic procedure used to set the instrument to perform conventional eddy current inspections. Each step of this procedure is itself a sub-procedure which is detailed in one of the subsections that follow.

To set up an ECT Inspection

1. Start the OmniScan MXE software. For more information, see section 1.2 on page 21.
2. Connect your probe. For more information, see section 1.1 on page 19.
3. Select a conventional probe. For more information, see section 3.1.1 on page 46.
4. Set the frequency. For more information, see section 3.1.2 on page 49.
5. Perform probe balancing. For more information, see section 3.1.3 on page 49.
6. Adjust the signal orientation. For more information, see section 3.1.4 on page 50.
7. Set the gain. For more information, see section 3.1.5 on page 51.

NOTE

The default setup is Default-BNC.oms and it contains the settings for an absolute probe equipped with a BNC connector.

3.1.1 Selecting a Conventional Probe

Different types of ECT conventional probes are available for different purposes (see Table 6 on page 46).

Table 6 Conventional probe types and adaptors

Probe Type	Cable/Adaptor	Select Probe Parameter	Frequencies
Absolute bridge with micro-dot	Micro-dot to BNC cable (9102894 [U8800041])	Absolute (BNC)	up to 2
Any Nortec ECT probe with attached cable (16-pin LEMO connector)	16-pin LEMO to 19-pin Fischer Adaptor (F19-L16 [U8779805])	Universal 1-Channel	up to 2
Any detachable Nortec PowerLink probe (7-pin LEMO connector)	Universal PowerLink probe cable for OmniScan MX EC (COS-7L-6 [U8801390])	Universal 1-Channel	up to 2
Absolute or differential bridge with Triax Fischer connector	Bridge cable for Triax Fischer probes on OmniScan MX EC (COS-TF-6 [U8800284])	Universal 1-Channel	up to 2

Table 6 Conventional probe types and adaptors (continued)

Probe Type	Cable/Adaptor	Select Probe Parameter	Frequencies
Reflection absolute or differential with Triax Fischer connector	Reflection cable for Triax Fischer probes on OmniScan MX EC (CROS-TF-6 [U8800411])	Universal 1-Channel	up to 2
Absolute or differential bridge with 4-pins Fischer	Bridge cable for 4-pin Fischer probes on OmniScan MX EC (COS-4F-6 [U8800282])	Universal 1-Channel	up to 2
Reflection absolute with dual micro-dot connectors (sliding probes)	Reflection cable for dual micro-dot sliding probes on OmniScan MX EC (CROS-MSE-6 [U8800654])	Universal 1-Channel	up to 2
Any of the above probes that is desired to be operated at more than 2 frequencies	Any of the above cables or adaptors except the BNC cable	(SPECIAL) 1CH 8FREQ	Up to 8
Special probe or probe arrangement	Contact your Evident representative	(SPECIAL) 4-Chan	Up to 2 per channel

To select a conventional probe

1. If you are using an absolute probe equipped with a BNC connector, connect it to the OmniScan MX 1CH receptacle using a BNC cable.

OR

If you are using a differential-bridge probe, an absolute probe, or a reflection probe, connect it to the OmniScan 4CH receptacle using the appropriate cable or adaptor.

NOTE

All Nortec probes are compatible with the OmniScan MX ECT, provided the appropriate cable or adaptor is used. However, Nortec conductivity probes will show signals but no conductivity readings. Additionally, rotary scanners are not supported on the OmniScan MX ECA.

2. If not already in ECT mode (green interface), select the **ECA > ECT** menu item to switch to ECT mode, and then press the Accept key to confirm.
3. Select **Probe & Part > Settings > Select Probe**, select the appropriate choice in the list, and then press the Accept key to confirm (see Figure 3-1 on page 48).

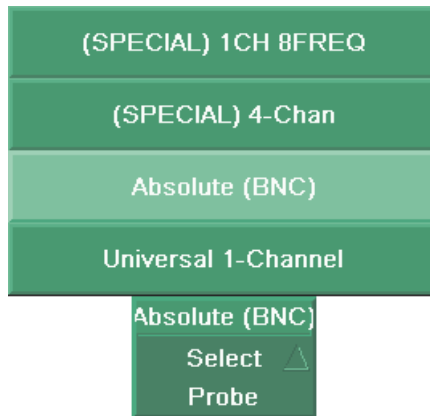


Figure 3-1 Available choices in the Select Probe parameter

3.1.2 Setting the Frequency

Setting the probe frequency is mandatory to obtain the best results for a given application.

To set the frequency


1. Select **EC Settings > Settings (Main) > Frequency**, and then enter the frequency corresponding to the probe that you are using and the material to inspect.

2. Press the Accept key .

3.1.3 Performing Probe Balancing

To perform probe balancing

1. Place the probe on a section of the calibration standard that is defect free.

2. Press the Set Balance key .
- OR

Select **Probe & Part > Settings > Balance**.

Balancing the probe automatically clears the data from the displayed views.

NOTE

If the balancing operation fails, make sure that you have selected the correct probe file. Reduce the probe drive if necessary (see section 15.1.1 on page 310).

3.1.4 Adjusting the Signal Orientation

This section presents the procedure to adjust the orientation of the lift-off signal.

To adjust the signal orientation

NOTE

The rotation function is used to set the lift-off signal on the x-axis of the impedance plane. Consequently, the defect signal will normally show up with a positive phase creating a signal variation on the y-axis.

1. Place the probe on the calibration standard.

2. Press the Phase Rotation key .

OR

Select **EC Settings > Settings (Main) > Rotation**.

3. Turn the Scroll knob while lifting the probe from the part surface several times to see the lift-off signal rotation in the impedance plane.

- Turn the Scroll knob until the lift-off signal is horizontal.

Figure 3-2 on page 51 presents the many positions of the signal being moved toward the x-axis.

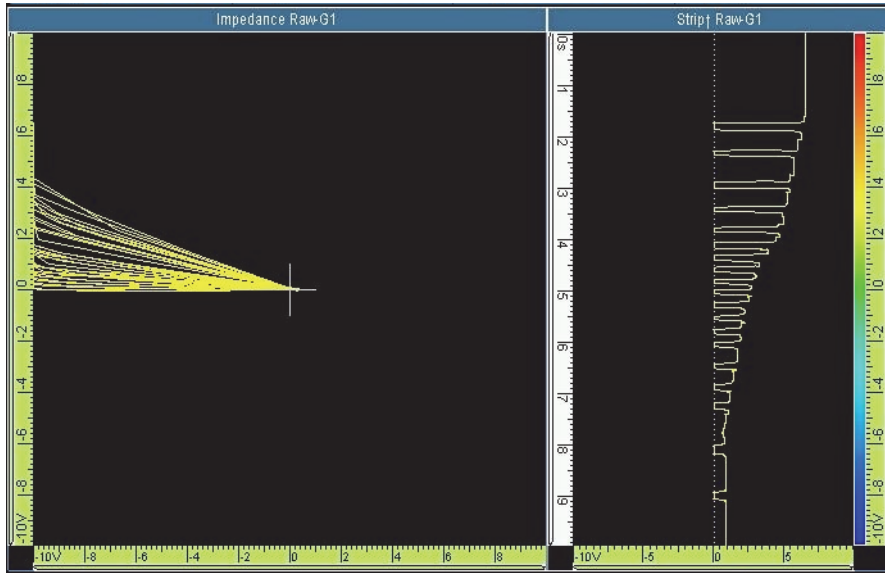


Figure 3-2 Signal positions toward the x-axis in the impedance plane view on the left

- Once the position of the lift-off signal is satisfactory, press the Accept key .

3.1.5 Setting the Gain

To set the gain

- Move the probe across the largest defect of the calibration standard.

- Press the Gain key .

OR

Select **EC Settings > Settings (Main) > Gain**.

3. In the **Gain** parameter button, enter a gain value that will give you the desired signal amplitude in the impedance plane view.

Make sure that the signal is not saturating. You may need to move the probe over the defect several times to get the best amplitude.

Figure 3-3 on page 52 presents how the signal amplitude increases.

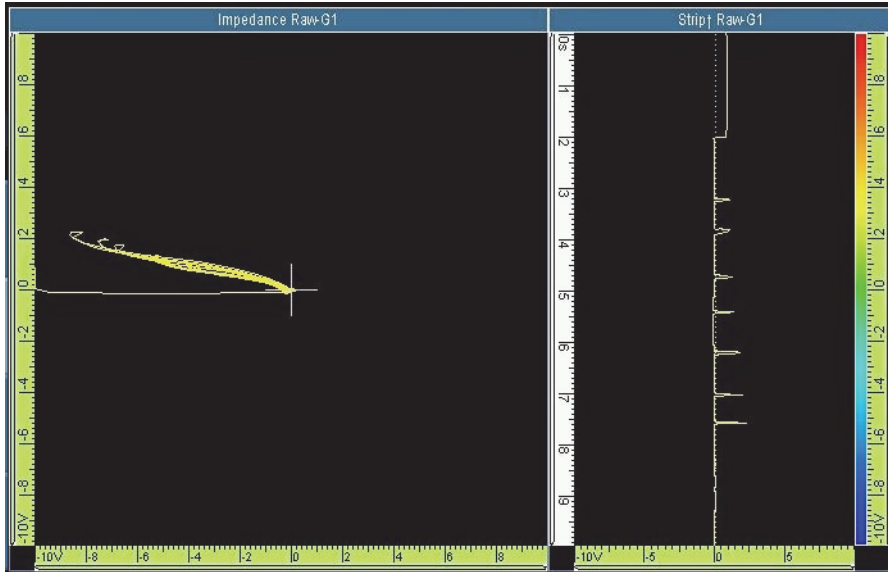



Figure 3-3 Signal amplitudes in the impedance plane view on the left

4. Once the signal amplitude is satisfactory, press the Accept key .
5. Select **EC Settings > Settings (Main) > Vertical Gain**, and then turn the Scroll knob to increase the amplitude of the signal on the y-axis only.

This is done to increase the phase shift between the lift-off signal (set on the x-axis) and the calibration defect signal (set on the y-axis) to make it easier to differentiate the two signals.

You need to move the probe over the defect several times while you make the gain adjustment.

Figure 3-4 on page 53 presents how the signal position changes in the impedance plane view as the gain is increased.

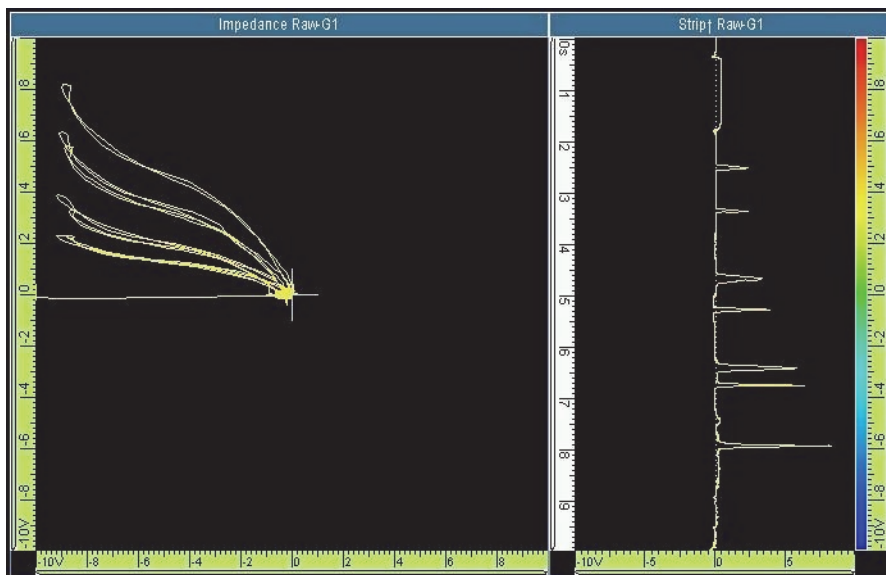



Figure 3-4 Signal positions in the impedance plane view on the left

6. Once the y-axis V-gain setting is satisfactory, press the Accept key .

3.1.6 Using a Filter to Improve the Signal

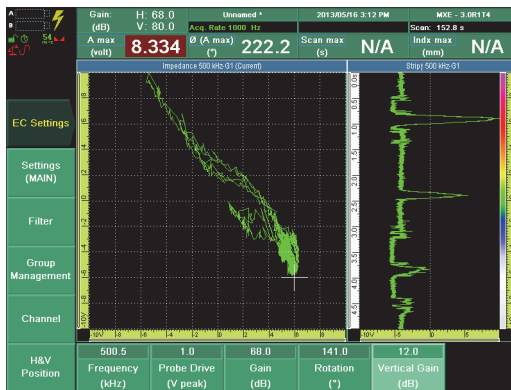
This section presents the procedure to add a filter to improve the signal along the impedance plane.

One way to improve the signal along the impedance plane is to add a low-pass filter in order to remove electronic noise. Using a low-pass filter is particularly useful when using an absolute bridge probe through the BNC connector.

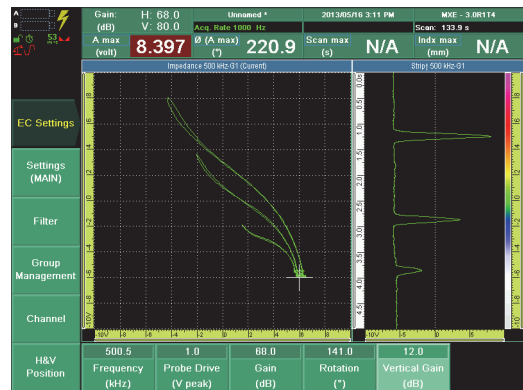
To add a filter to remove the electronic noise

1. Select **EC Settings > Filter > Select = Filter 1** or **Filter 2**, as applicable, and then press the Accept key to confirm.
2. In the **EC Settings > Filter > Type** list, select **Low-Pass IIR**.
3. Next to the **Type** list, select **Max. Freq.**, enter the cutoff frequency needed to remove the electronic noise and leave the signal to detect the smallest defect that can be encountered for your application, and then press the Accept key to confirm. Typical recommended low-pass filter values for manual scanning range from 30 Hz to 100 Hz.

All defects this size and larger will show up in the data views (see Figure 3-5 on page 54).



Noisy signal generated by an absolute bridge probe through the BNC connector.



Cleaner signal generated after applying the Low-Pass IIR filter.

Figure 3-5 The Low-Pass IIR filter applied to clean up the signal

When you are using a filter, there is a delay between the probe motion and the data display because data must go through a buffer before showing up in a view. Furthermore, as a result of this buffer delay, the beginning and the end of the scan are not displayed.

3.2 About Eddy Current Array (ECA) Probes

Eddy current array probes are made of many coils arranged in offset rows where the sensitivity zone falls in the middle of the coil rows.

Depending on the type of probe used, you will set the parameters for inspection either based on time or based on the encoder.

Eddy Current Array (ECA) Probe types

If the probe has only one row of sensors, a time-based acquisition is enough to represent the defect in the C-scan. However, you will not be able to measure the length of the defect on the scan axis because it is based on forward speed.

If the probe has two rows of sensors, you need an encoder-based acquisition to align the signal of each coil to display a C-scan. A time-based acquisition will not correctly represent the defect shape; therefore, detection will still work, but the analysis will be very difficult.

The encoder channels are used to record position data and synchronize data sampling according to probe position.

3.3 Setting Up an Eddy Current Array (ECA) Inspection

This section presents the basic procedure used to set the instrument to perform eddy current array inspections. Each step of this procedure is itself a sub-procedure which is detailed in one of the subsections that follow.

NOTE

The application example is focused on surface defect detection using the SBB-051-150-032 ECA probe. The probe features the following characteristics:

- Probe coverage: 51 mm (2.00 in.)
- Probe resolution: 1.6 mm (0.063 in.)
- Frequency range: 50 kHz through 500 kHz
- Number of coils: 32
- Cable length: 3 m (10 ft)

Operation mode: Absolute bridge mode

To set up an ECA Inspection

1. Start the OmniScan MXE software. For more information, see section 1.2 on page 21.
2. Connect your probe. For more information, see section 1.1 on page 19.
3. Adjust the frequency. For more information, see section 3.3.1 on page 56.
4. Balance the probe. For more information, see section 3.3.2 on page 58.
5. Adjust the phase rotation. For more information, see section 3.3.3 on page 58.
6. Set the gain. For more information, see section 3.3.4 on page 61.
7. Set scan parameters for a time-based or an encoder-based acquisition. For more information, see section 3.3.5 on page 63.
8. Optimize the display of colors in the C-scan view. For more information, see section 3.3.6 on page 66.
9. Improve the ratio and small-defect viewing. For more information, see section 3.3.9 on page 73.

3.3.1 Setting the Frequency

In order to obtain the best results for any given application, setting the probe frequency is necessary.

To set the frequency

- Adjust the display setup to present an impedance plane view and a strip chart view. Select **Display > Setup > Acquisition = Si**, and then press the Accept key to confirm (see Figure 3-6 on page 57).



Figure 3-6 The display set to the SI view

- Select **EC Settings > Settings (Main) > Frequency**, and then enter the frequency corresponding to the probe that you are using and the material to inspect.

- Press the Accept key



3.3.2 Performing Probe Balancing

To perform probe balancing

1. Place the probe on a section of the calibration standard that is defect free.



2. Press the Set Balance key

OR

Select **Probe & Part > Settings > Balance**.

Balancing the probe automatically clears the data from the displayed views and resets the encoder to its scan start value.

NOTE

If the balancing operation fails, make sure that you have selected the correct probe file. Reduce the probe drive if necessary (see section 15.1.1 on page 310).

3.3.3 Adjusting the Phase Rotation

This section presents the procedure to adjust the signal phase.

NOTE

Phase rotation is used to set the lift-off signal on the x-axis (usually) of the impedance plane to minimize the effect of that signal. Consequently, the defect signal will normally show up with a positive phase creating a signal variation on the y-axis.

If the inspection requires an encoder, you adjust the phase rotation without the encoder. The encoder is to be activated once the gain, rotation and vertical gain have all been adjusted.

To adjust the phase rotation

1. Place the probe on the calibration standard.


2. Press the Phase Rotation key .

OR

Select **EC Settings > Settings (Main) > Rotation**.

3. Repetitively and gently lift off and put down the probe on the calibration standard and generate the lift-off signal (see Figure 3-8 on page 61).

For some rare types of inspection, it is recommended to adjust the lift-off signal

rotation when the acquisition is stopped by pressing the Freeze key . For more information, see section 3.3.7 on page 66.

4. Turn the Scroll knob while repeatedly and gently lifting and putting down the probe from the part surface several times to see the lift-off signal rotation in the impedance plane view.

- Turn the Scroll knob until the lift-off signal is horizontal.

Adjust the phase rotation value carefully, up to the tenth of degrees if necessary, making sure the lift-off signal along the impedance plane is truly horizontal (see Figure 3-7 on page 60).

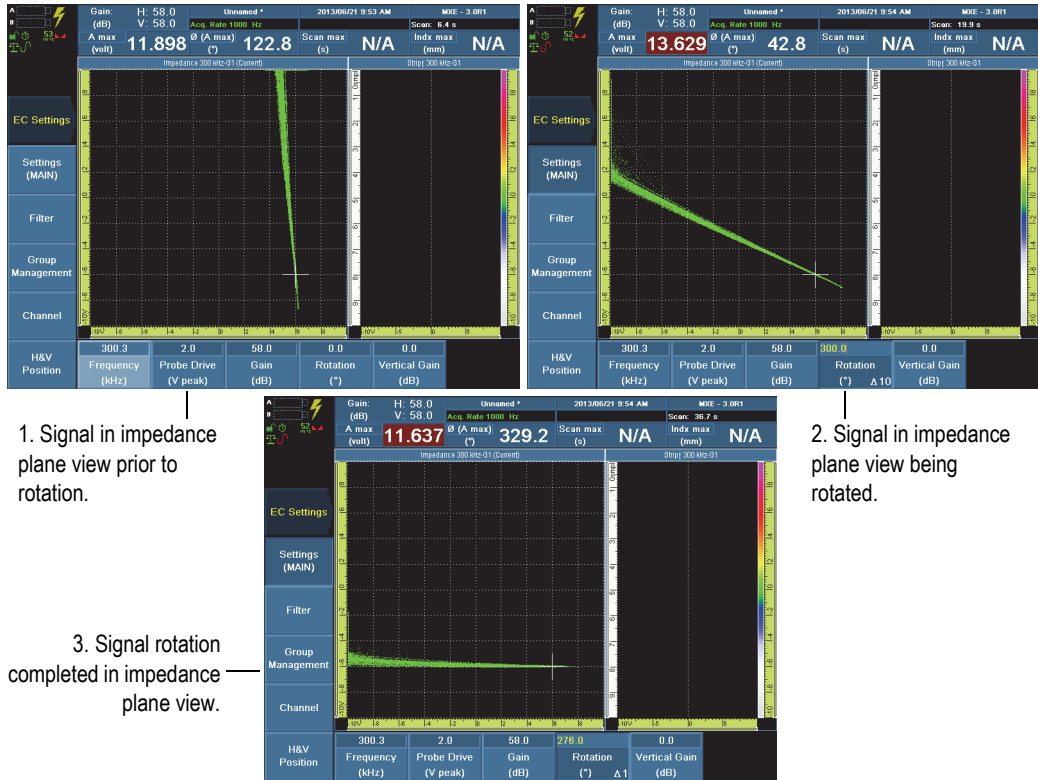



Figure 3-7 Progression of the signal rotation and its effect in the views

- Once the position of the lift-off signal is satisfactory, press the Accept key .

3.3.4 Setting the Gain


This section presents the procedure to set the gain. The probe must be balanced before proceeding with the gain adjustment (refer to section 3.3.2 on page 58).

If you are using an encoder, press the Start/Stop key  to reset it.

To set the gain

1. Scan the calibration standard.

Make sure that the scan covers the largest calibration defect.

2. Press the Gain key .
3. Turn the Scroll knob until the signal amplitude reaches approximately half the impedance plane view horizontally or almost the entire impedance plane view vertically (see Figure 3-8 on page 61).

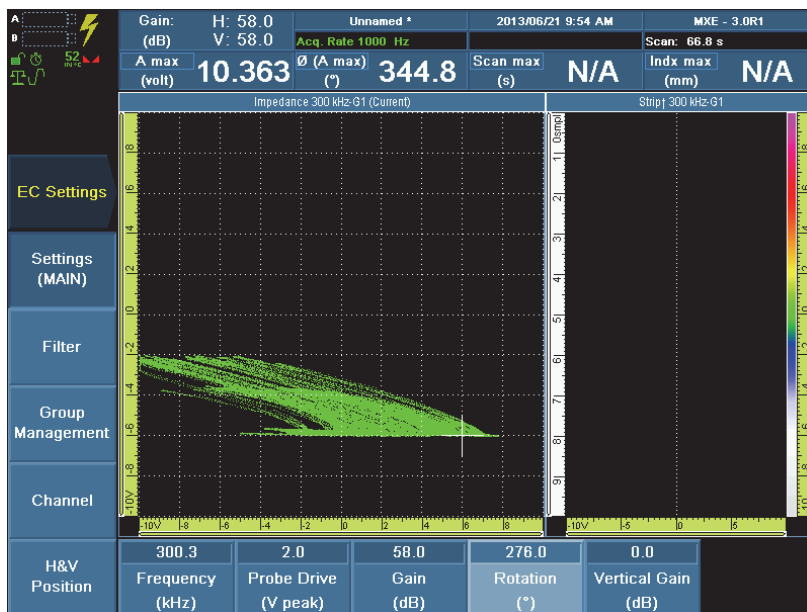


Figure 3-8 The signal amplitude reading field

- Select **Vertical Gain** and turn the Scroll knob to move the defect signal toward the y-axis.

This is done to increase the phase shift between the lift-off signal (set on the x-axis) and the calibration defect signal (set on the y-axis) to make it easier to differentiate the two signals (see Figure 3-9 on page 62).

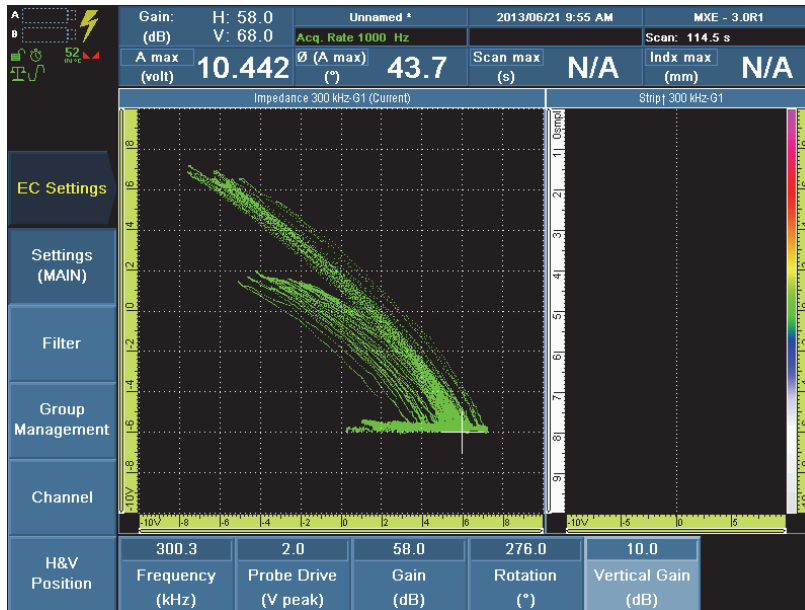


Figure 3-9 The increased phase shift between the lift-off and the defect signals

NOTE

As you increase the gain and the phase shift, you should have a better contrast on the defect signals in the C-scan view.

- Once the settings for the defect signal are satisfactory, press the Accept key



- Select **Display > Setup > Acquisition = CSI C-Scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm (see Figure 3-10 on page 63).

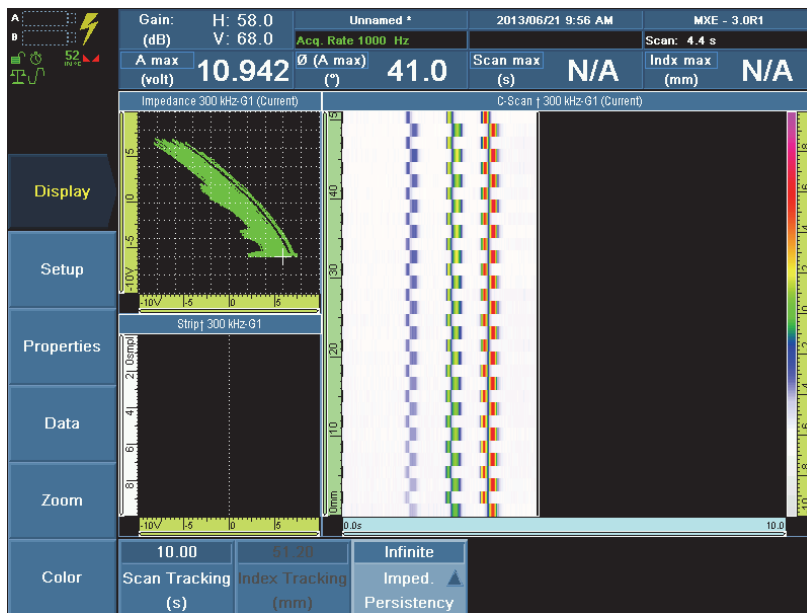


Figure 3-10 The increased phase shift viewed with an added C-scan view

3.3.5 Setting Scan Parameters for an ECA Inspection

The scan parameters for an ECA inspection can be synchronized according to time, or according to the probe position using an encoder. The scan parameters must be set as follows:

- For a time-based acquisition. For more information, see section 3.3.5.1 on page 64.
- For an encoder-based acquisition. For more information, see section 3.3.5.2 on page 64.

If the inspection requires an encoder-based acquisition, the scan parameters are first adjusted according to a time-based acquisition. The encoder is to be configured once the phase rotation, the gain, and the vertical gain have all been adjusted.

3.3.5.1 Setting Scan Parameters for a Time-Based Acquisition

To perform the ECA inspection according to time synchronization, the scan parameters must be set appropriately.

NOTE

The default scan parameters for a time-based acquisition are appropriate in 95 % of situations.

To set scan parameters for a time-based acquisition

1. Select **Scan > Inspection > Type = One Line Scan**, and then press the Accept key to confirm.
2. Select **Scan > Inspection > Scan = Time**, and then press the Accept key to confirm.
3. Select **Scan > Inspection > Acq. Rate**, enter the acquisition rate, and then press the Accept key to confirm.
Choose **Maximize** or an automatically determined acquisition rate value. By default, the **Maximize** option is selected for the **Acq. Rate** parameter.
4. Select **Scan > Area > Scan End**, enter the time, in seconds, required to complete your scan, and then press the Accept key to confirm.

3.3.5.2 Setting Scan Parameters for an Encoder-Based Acquisition

To perform the ECA inspection synchronized according to distance, the scan parameters must be set appropriately.

The encoder channels are used to record position data and synchronize data sampling according to probe position.

To set scan parameters for an encoder-based acquisition

1. Select **Scan > Inspection > Scan = Encoder 1**, and then press the Accept key to confirm.
2. Select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm.

3. Choose the polarity in the **Scan > Encoder > Polarity** list, and then press the Accept key to confirm.

For most encoders, the polarity is set to **Normal**.

NOTE

When you move the encoder forward and look at the X-value in the upper-right corner of the OmniScan MX instrument screen, if the value is negative, select **Inverse** for the polarity.



4. Select **Scan > Encoder > Resolution**, enter the encoder resolution, and then press the Accept key to confirm.

For most encoders, the resolution is written on the casing. It is usually either 12 steps/mm (304.8 steps/in.) or 27 steps/mm (685.8 steps/in.) for older encoders.

If you do not have the encoder resolution, you can determine it using the encoder resolution wizard by selecting **Wizard > Calibration > Type = Encoder**, select **Start** and then follow the instructions that appear on-screen. For more information, see section 10.2 on page 201.

5. Select **Scan > Area > Scan End**, enter the distance the scan will have covered when completed, and then press the Accept key to confirm.

NOTE

When in continuous encoder mode, the **Scan End** parameter is disabled. The scan data is automatically acquired using a 1:1 ratio.

NOTE

The higher the scan resolution (the smaller the value), the lower the maximum inspection speed. When an ECA probe is connected to the OmniScan MX instrument, its configuration is automatically downloaded into the OmniScan MXE software. The scan resolution is thus automatically configured.

3.3.6 Optimizing the Display of Colors in the C-Scan View

To optimize the display of colors in the C-scan view, change the color palette. A variety of palettes are available. For more information, see section 6.6.1 on page 123.

Once a color palette has been selected, the amplitude of the color palette can be adjusted to optimize the visualization of defects. For more information, see section 6.6.2 on page 125.

TIP

To change the contrast in the C-scan view, the null point of the impedance plane view can be moved vertically (horizontal position parameter). For more information, see section 15.1.5 on page 313.

3.3.7 Stopping the Acquisition to Adjust the Eddy Current (MAIN) Parameters

For some rare types of inspection, it is recommended to adjust the lift-off signal rotation, the gain, and the vertical gain, and to view the color change in the C-scan as you adjust the palette parameters during a pause in the acquisition using the Freeze



To stop the acquisition and adjust the eddy current (MAIN) parameters

1. Adjust the display setup to present a C-scan, an impedance plane, and a strip chart. Select **Display > Setup > Acquisition = CSI**, and then press the Accept key to confirm (see Figure 3-11 on page 67).

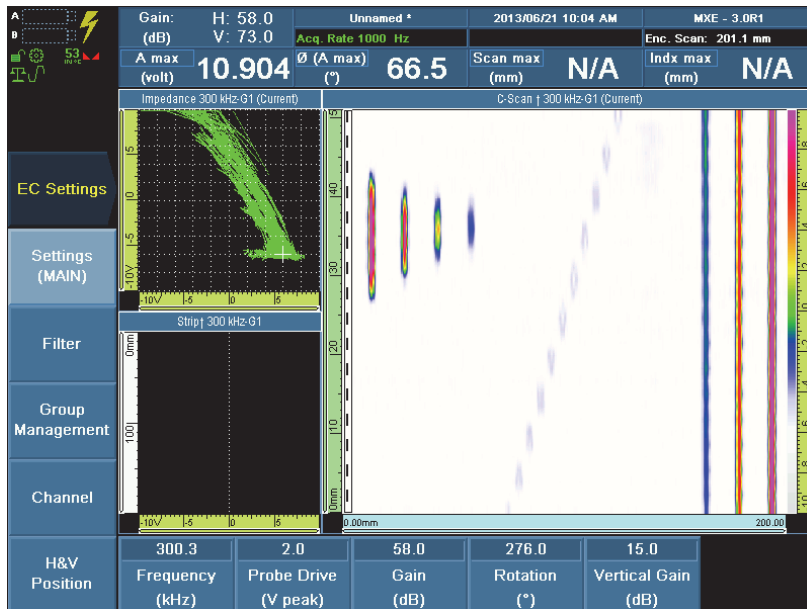




Figure 3-11 The display set to the CSI view

2. Lay a stripe of thin tape on the calibration standard in a defect-free area. Usually, 12.7 mm (0.5 in.) × 0.05 mm (0.002 in.) teflon tape produces good results for most ECA probes.
3. Place the probe on the calibration standard.
4. Scan the area of the calibration standard with the strip of tape and generate the lift-off signal.
5. At the end of the scan, press the Freeze key .
6. To obtain a good view of a signal, isolate it using the cursors. The impedance plane content is directly linked to the cursor selection in the C-scan. In this

example, you must isolate the lift-off signal for only one coil of the probe. To do so, proceed as follows:

- a) Press the Cursor key .
The buttons to enter the cursor positions appear at the bottom of the screen.
- b) In the C-scan view, set the vertical cursors on each side of the lift-off signal.
- c) Set the two horizontal cursors to isolate the signal from one coil. Select **Angle Selection = 0**, and then press the Accept key to confirm.

7. Press the Phase Rotation key .

OR

Select **EC Settings > Settings (Main) > Rotation**.

8. Turn the Scroll knob until the lift-off signal is horizontal.

9. Press the Gain key .

10. Turn the Scroll knob until the signal amplitude reaches almost the full impedance plane height.

The signal amplitude (peak-to-peak), in volts, is displayed in the first reading field at the top left of the screen (see Figure 3-12 on page 69).



Figure 3-12 The signal amplitude reading field

- Use vertical gain as needed. Select **Vertical Gain** and turn the Scroll knob to move the defect signal toward the y-axis.

This is done to increase the phase shift between the lift-off signal (set on the x-axis) and the calibration defect signal (set on the y-axis) to make it easier to differentiate the two signals (see Figure 3-13 on page 70).

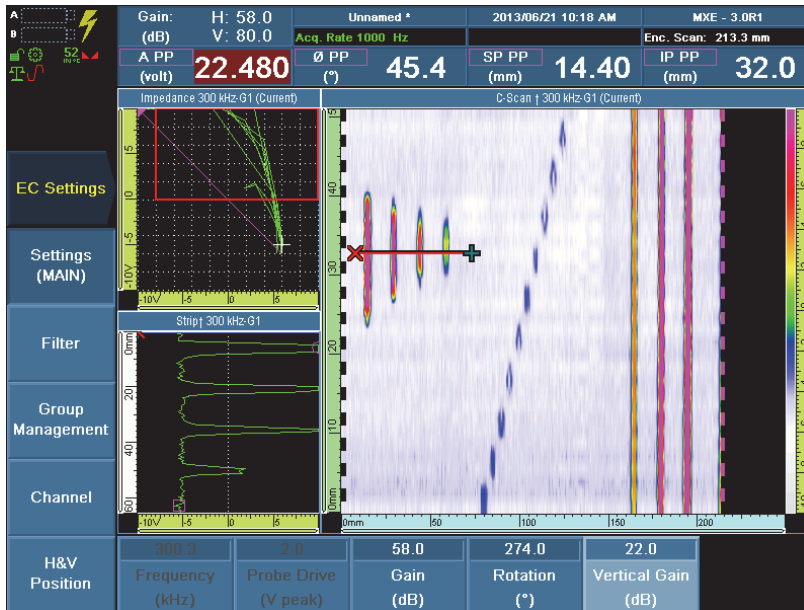


Figure 3-13 The increased phase shift between the lift-off and the defect signals

NOTE

As you increase the gain, the contrast of defect signals in the C-scan view should improve.

- Once the settings for the defect signal are satisfactory, press the Accept key



13. Optimize the visualization of defects in the C-scan view by changing the color palette. Choose a color palette that enhances the defects. For more information, see section 6.6 on page 123.

You should get a better contrast of the defects in the C-scan (see Figure 3-14 on page 71).

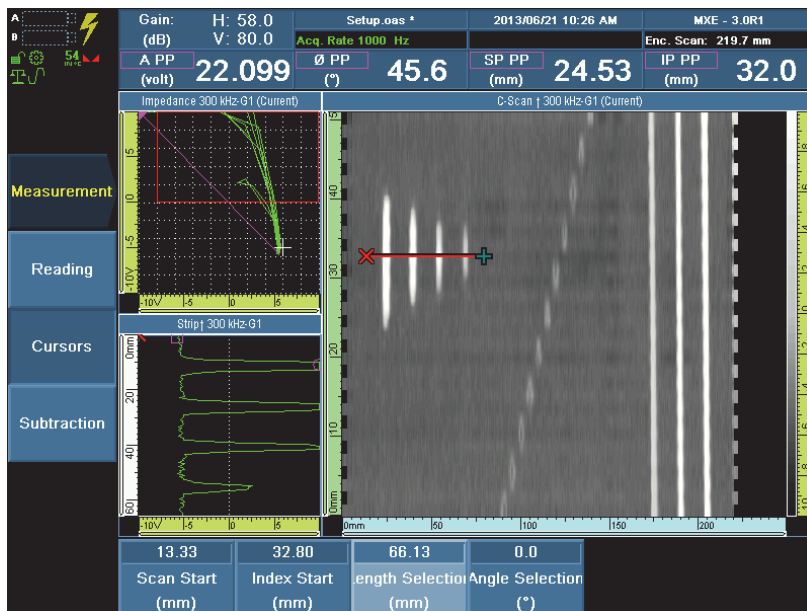



Figure 3-14 Initial color palette adjustment in the C-scan

14. If the background color is not uniform, or includes stripes, this means that the probe balance is not correct. To correct this situation, proceed as follows:

- Press the Freeze key  to return to the real-time data display.
- Redo the probe balancing procedure (see section 3.3.2 on page 58).
- Rescan the calibration standard making sure to maintain constant pressure on

the probe .

- d) Redo the lift-off angle adjustment procedure (see section 3.3.3 on page 58)
The background color should be uniform.

3.3.8 Using a Filter to Remove Background Noise

In ECA mode, to inspect carbon steel or austenitic stainless steel, a filter can be added once the encoder has been activated and adjusted.

Carbon steel and austenitic stainless steel often exhibit strong permeability variations which result in background noise in C-scans. This permeability can easily be reduced by adding a high-pass filter. The median high-pass filter available in the OmniScan MXE software often provides the best results.

IMPORTANT

A high-pass filter should only be used when you are looking for small defects. If you are looking for corrosion, which can be quite large, do not use a high-pass filter. High-pass filters also tend to eliminate longitudinal defects (parallel to scan motion) and enhance perpendicular or angled defects. Use high-pass filters with caution.

To add a filter to remove background noise

1. Choose **EC Settings > Filter > Select = Filter 1 or Filter 2**, as applicable, and then press the Accept key to confirm.
2. In the **EC Settings > Filter > Type** list, select **Med High-Pass**, and then press the Accept key to confirm.
3. In the **EC Settings > Filter > No. of Points** parameter button that appears next to **Type**, enter the number of acquisition points needed to detect the longest defect that can be encountered for your application, and then press the Accept key to confirm.

All defects this size and smaller will show up in the data views.

For example, if you enter 50 points and your scan resolution is 0.5 mm (one acquisition point taken every half millimeter) then it means that the longest defect possible is 25 mm. Signal transients occurring over more than 50 acquisition points will be attenuated by the filter.

When you are using a filter, there is a delay between the probe motion and the data display because data must go through a buffer before showing up in a view. Furthermore, as a result of this buffer delay, the beginning and the end of the scan are not displayed (see Figure 3-15 on page 73).

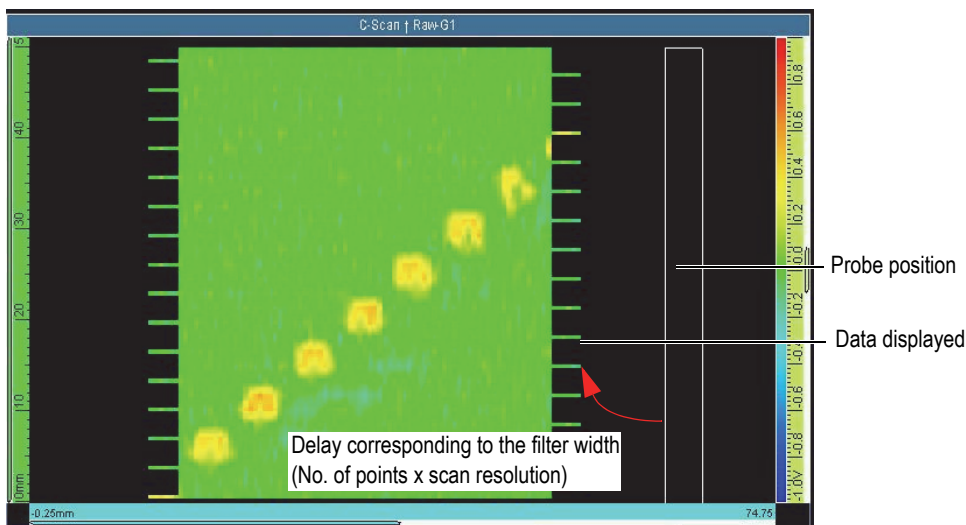


Figure 3-15 The filter delay in acquisition mode

For more information on filters, see chapter 7 on page 129.

3.3.9 Improving Ratio and Small Defect Viewing

This section presents the procedure to improve ratio and small defect viewing for a one-line scan inspection performed with one or two encoders.

By default, the C-scan in acquisition mode corresponds to the length specified by the **Scan > Area > Scan End** parameter. If this value is large, it may be difficult to see small defects while you are scanning the part, so the defect shape may not be accurate.

To override the **Scan End** parameter value limiting the maximum length of the acquisition data, the continuous acquisition mode can be activated, which enables continuous acquisition of data.

To improve ratio and small defect viewing

1. Ensure you are performing a one-line scan inspection. Select **Scan > Inspection > Type = One-Line Scan**, and then press the Accept key to confirm.
2. Ensure that in acquisition mode, the C-scan view is displayed. Select **Display > Setup > C-Scan**.
3. Ensure the probe encoder is active. Select **Scan > Inspection > Scan = Encoder 1** or **Encoder 2**, and then press the Accept key to confirm.
4. Ensure that you are in acquisition mode. Select **Scan > Start > Pause = Off**.
5. For the scan axis in the C-scan view, select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm.

As you are moving the probe in acquisition mode, the C-scan automatically scrolls the view. At the bottom of the C-scan, a scroll bar shows the location of the view in relation to the complete scan length (see Figure 3-16 on page 74).

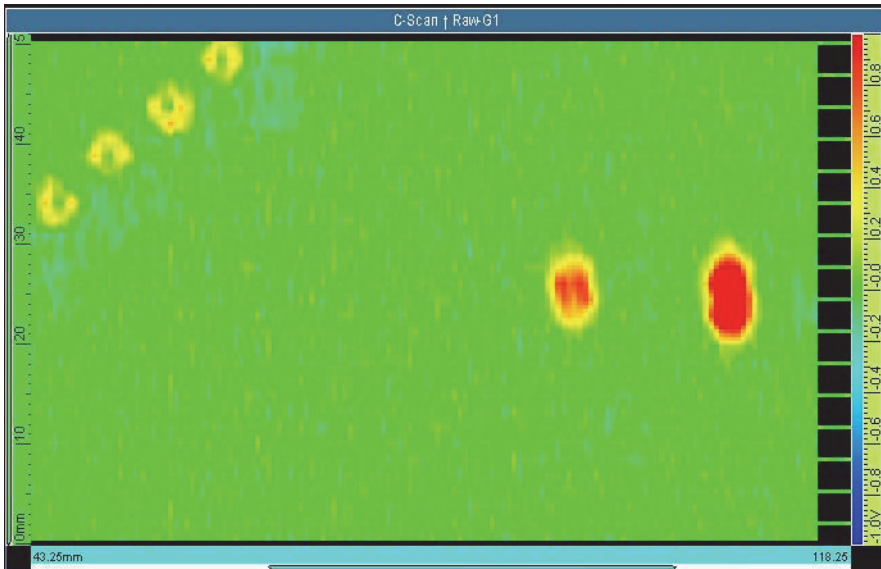


Figure 3-16 The C-scan view is scrolling when in the acquisition mode

4. Installing and Starting Up the Software

This section describes the procedures required to update the OmniScan MXE software for the OmniScan MX instrument.

The main procedures to follow are:

- “Backing Up Your Current OmniScan Software User Files” on page 97
- “Downloading the Latest OmniScan Software” on page 75
- “Installing the OmniScan Software on the Storage Card” on page 85
- “Recovering Your OmniScan Software User Files” on page 101
- “Loading the New Software in the OmniScan MX Instrument” on page 94

If needed, the section “Reinstalling the Original OmniScan Software” on page 96 also provides instructions on how to reinstall the original OmniScan software from the distribution disk included with your OmniScan MX instrument.

NOTE

You need an external USB storage card reader and a storage card to complete the software update.

4.1 Downloading the Latest OmniScan Software

If you have a distribution disk for the latest version of the OmniScan software, skip to section 4.2 on page 85. Otherwise, the next step consists of downloading the latest OmniScan software distribution file from the Evident website, and then unzipping it to a local folder of your choice.

To download the latest OmniScan software

1. In your browser URL box, type <https://www.olympus-ims.com/en/service-and-support/downloads/>, and then click the **Support** tab.
2. On the **Support** page of the Evident website, on the menu on the left, click **Software Downloads** (see Figure 4-1 on page 76).

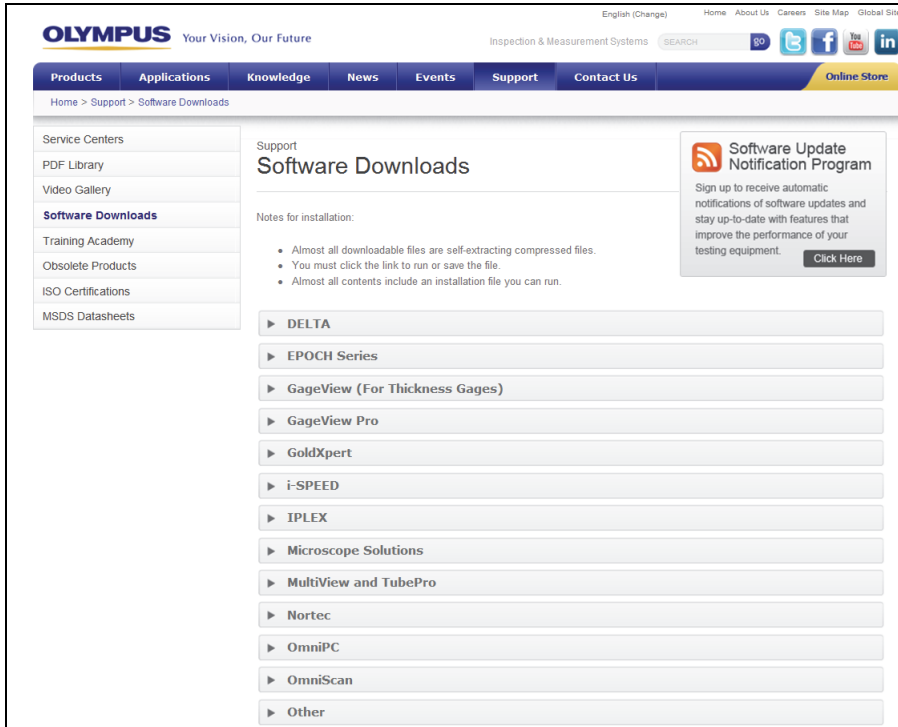


Figure 4-1 Selecting Software Downloads on the Support menu

- On the **Software Downloads** page, locate the latest version for the OmniScan MXE software and then click the associated language link in the **Last Version** column (see Figure 4-2 on page 77).

NOTE

To download previous versions of the software, click **View File History** in the **Last Version** column (see Figure 4-2 on page 77) to access the list of previous software versions.

OmniScan MX

The "Multilingual" zip file includes all languages and applications.
 Step 1: Click on the appropriate link to start downloading the zip file.
 Step 2: Enter your login to continue.
 Step 3: Save the zip file to your computer (NOT directly to the SD® card).
 Step 4: Extract the content of the zip file to a folder.
 Step 5: Execute the "InstallOmniScan.exe" application.

Compatible Module Part Number	Software version	
	MXU 2.0R27 and earlier	MXU-M 2.2R5 and earlier
All OMNI-M-PA (except OMNI-M-PA1664)	√	*
All OMNI-M-UT	√	X
OMNI-M-PA1616M	X	√
OMNI-M-PA1664M	X	√

√: recommended * : supported X: not compatible

OmniScan MX Software Compatibility		
Module	Acquisition	Analysis
UT	MXU 2.0R27 TomoView 2.10R6 with OSTV 1.7R7	OmniPC 3.1R3 ① TomoView 2.10R6
PA	MXU 2.0R27 TomoView 2.10R6 with OSTV 1.7R7	OmniPC 4.1R2 TomoView 2.10R6

① Not compatible with versions later than 3.1

OmniScan MX - 12027A			
Sub Product	Version	Languages	Release Notes
MXE	2.1R1	EN	
MXU	2.0R27	DE,EN,ES,FR,IT,JA,RU,ZH	Open

Last Version 12027A

- [Multilingual - 248.5 Mb](#)
- [English - 53.6 Mb](#)
- [Deutsch - 43.5 Mb](#)
- [Français - 44.6 Mb](#)
- [Español - 45.2 Mb](#)
- [日本語 - 60.3 Mb](#)
- [Italiano - 43.1 Mb](#)
- [Русский - 43.2 Mb](#)
- [繁体中文 - 63.3 Mb](#)

[View File History](#)

Figure 4-2 Selecting the latest OmniScan MXE software version

4. In the **Software Downloads Form** page that appears, to start the download, do one of the following:
 - a) Log in with your existing user name and password, and then click **Login**.
OR
 - b) Register as a new user by filling out the **Contact Information Form**, and then clicking **Submit Query**.
5. In the **File Download** dialog box, click **Save** (see Figure 4-3 on page 78).

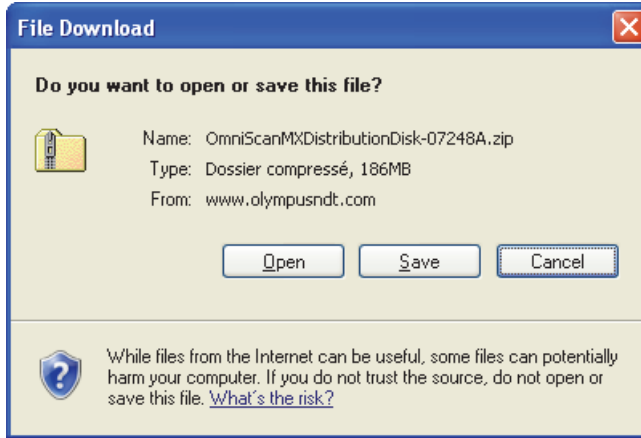


Figure 4-3 The File Download dialog box

6. In the **Save As** dialog box, in the **Save in** drop-down list box, select the folder where you want to save the ZIP file, and then click **Save** (see Figure 4-4 on page 79).

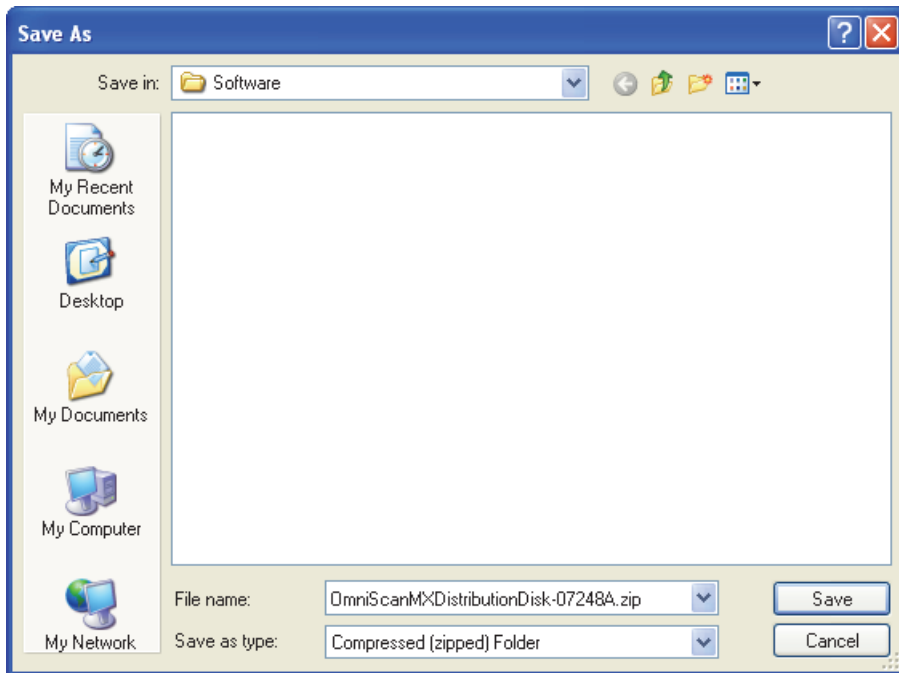


Figure 4-4 The Save As dialog box for the file download

Wait for the download to complete.

- In the **Download complete** dialog box, click **Open** (see Figure 4-5 on page 80).

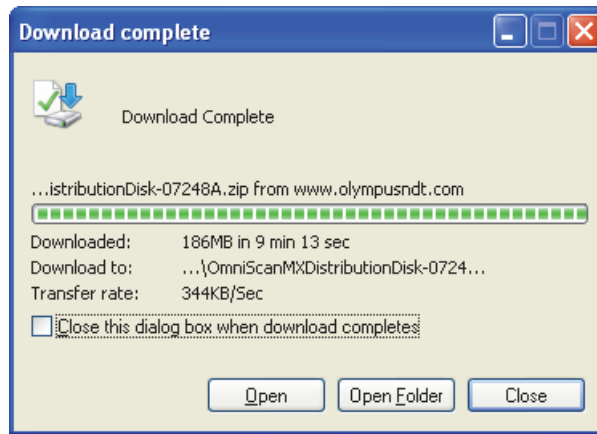


Figure 4-5 The Download complete dialog box

- In the zipped folder, under **Folder Tasks**, click **Extract all files** (see Figure 4-6 on page 80).

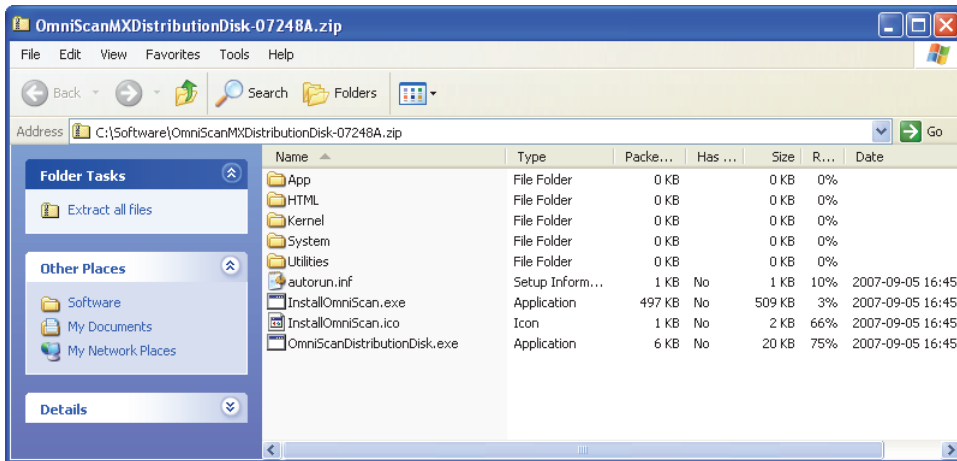


Figure 4-6 Zipped folder for the OmniScan software distribution

9. In the welcome page of the **Extraction Wizard** dialog box, click **Next**.
10. In the **Select a destination** page of the **Extraction Wizard** dialog box, click **Browse** (see Figure 4-7 on page 81).

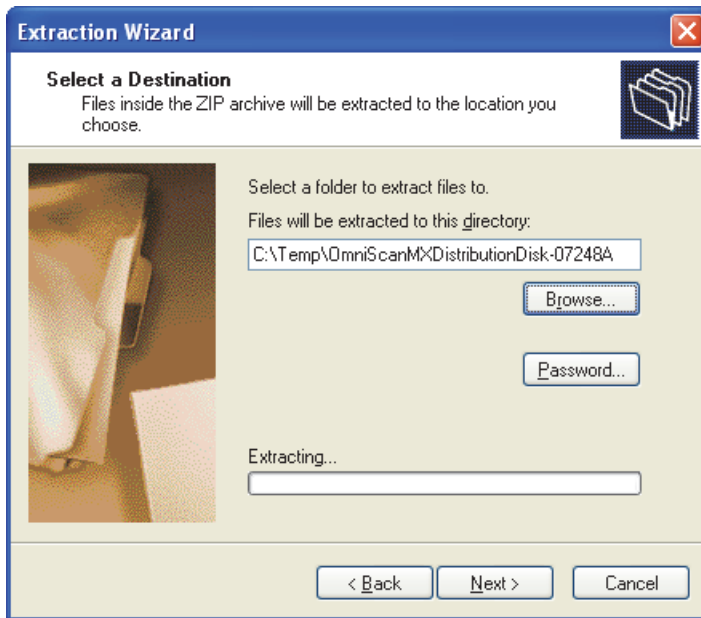


Figure 4-7 Select a Destination page of the Extraction Wizard

11. In the **Select a destination** dialog box, select a folder where you want to store the extracted files, and then click **OK** (see example in Figure 4-8 on page 82).

IMPORTANT

Do not extract the files to the desktop, to the **My Documents** folder, or to other folders with a long access path. If the path exceeds the maximum length that the unzip utility can manage, some zipped files may not be extracted.

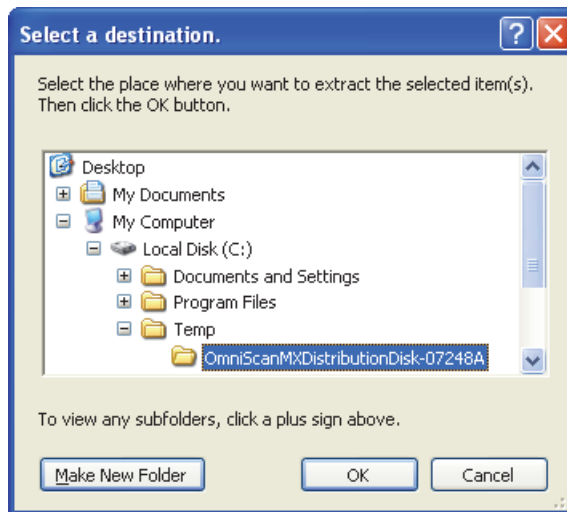


Figure 4-8 The Select a destination dialog box with an example of a destination folder

- Back in the **Select a destination** screen of the **Extraction Wizard**, click **Next** to start unzipping the files (see Figure 4-9 on page 83).

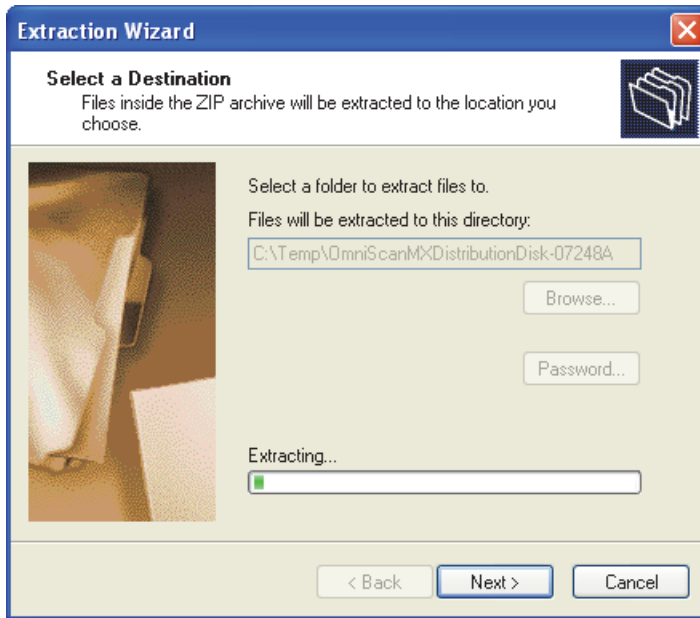


Figure 4-9 Extracting files

13. Wait until the **Extraction Complete** page of the **Extraction Wizard** dialog box appears (see Figure 4-10 on page 84), and then click **Finish**.

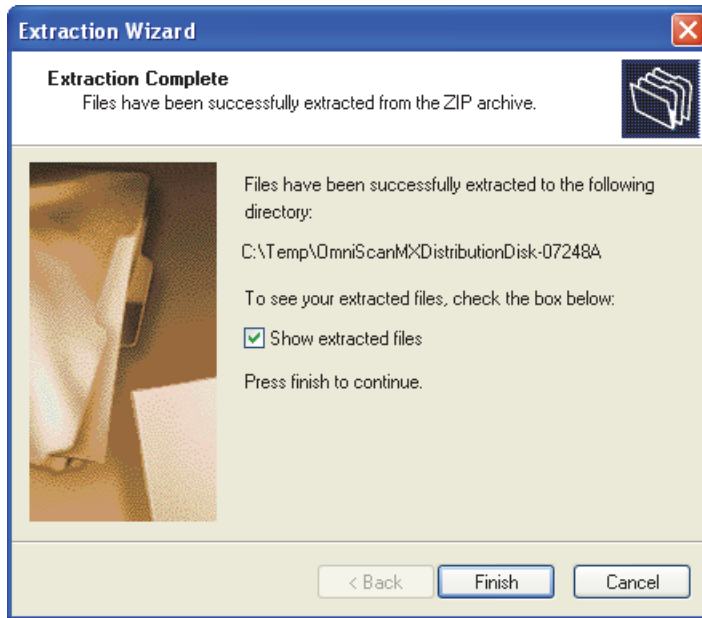


Figure 4-10 The Extraction Complete screen of the Extraction Wizard

The files needed for the installation of the OmniScan software are now in the folder that you selected in step 11. Refer to section 4.2 on page 85 for instructions on how to install the OmniScan software on the storage card.

4.2 Installing the OmniScan Software on the Storage Card



CAUTION

If the version of your current OmniScan software is lower than 3.0 (1.0 to 2.0), you need to back up your OmniScan software user files (see the procedure in section 4.5 on page 97) before installing the latest OmniScan software on the storage card. Otherwise, your user files will be lost as the installation overwrites them.

The following procedure describes how to install the latest OmniScan software from the distribution disk (or from the downloaded distribution files unzipped on your computer) onto the storage card of your OmniScan MX instrument.

Note that the installer overwrites any OmniScan software version already present on the storage card.

To install the OmniScan software on the storage card

1. Using your external USB storage card reader, connect the storage card of your OmniScan MX to a USB port on your computer (see Figure 4-11 on page 85).



Figure 4-11 Example of a storage card and reader

Windows automatically detects the USB storage device and makes it available as a drive.

2. Using Windows Explorer, start the installation as follows:
 - ◆ Select the folder where you unzipped the OmniScan distribution disk file, and then double-click the **InstallOmniScan.exe** file (see Figure 4-12 on page 86).

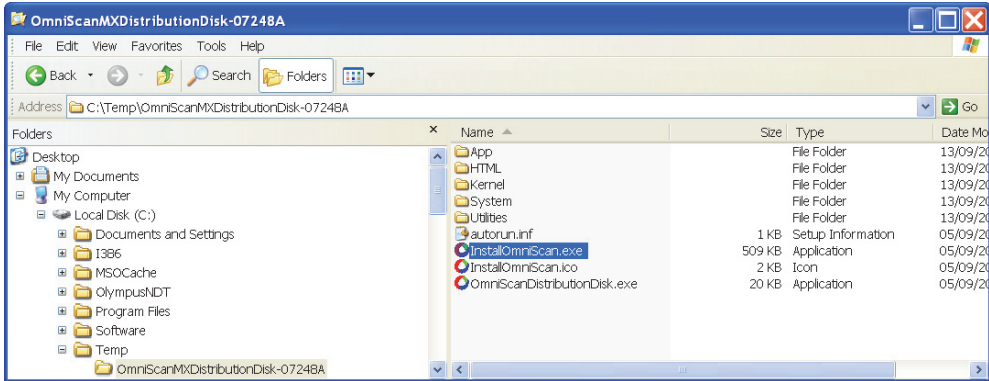


Figure 4-12 Double-clicking the InstallOmniScan.exe file

OR

Insert the distribution disk into the CD-ROM drive on your computer.

In both cases, the setup program for the OmniScan software starts.

3. In the first screen of the **OmniScan software** setup program, click **Next** (see Figure 4-13 on page 87).

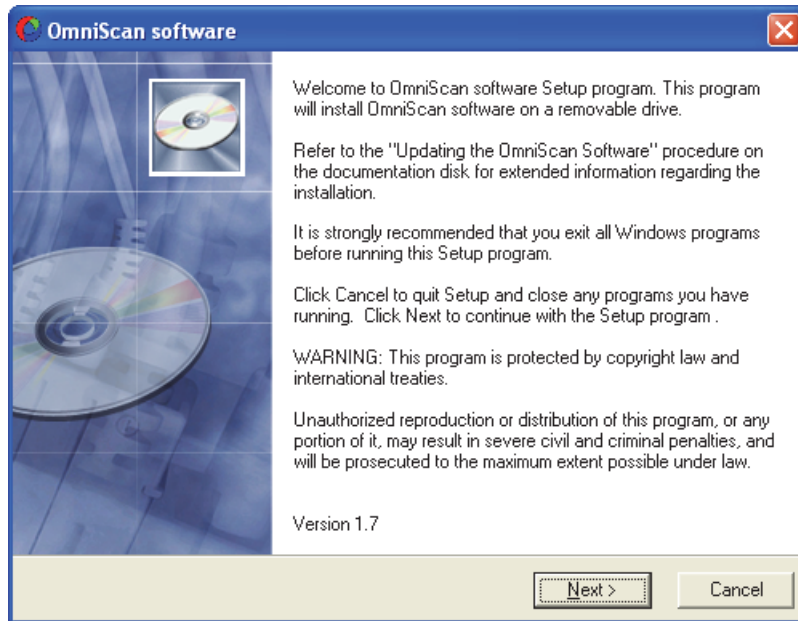


Figure 4-13 The OmniScan software welcome dialog box

4. In the next screen of the **OmniScan software** setup program, in the **Destination drive** drop-down list box, select the drive for your USB storage device, and then click **Next** (see Figure 4-14 on page 88).

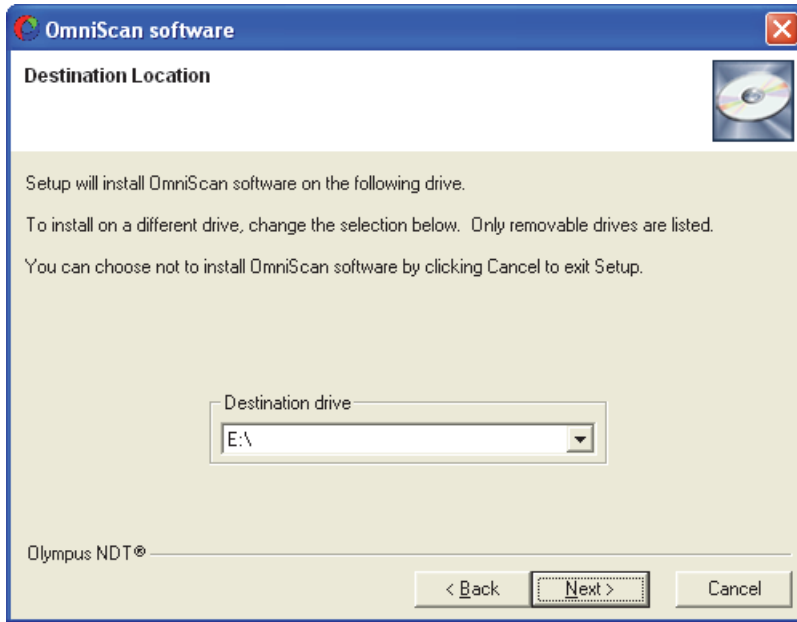


Figure 4-14 The OmniScan software Destination Location dialog box

**CAUTION**

If your storage card already contains OmniScan software, the **Confirmation** dialog box, shown in Figure 4-15 on page 89, appears. Refer to section 4.5 on page 97 of this manual for the procedure to back up and restore your OmniScan software user data.

Click **No** only after completing the backup of your data.

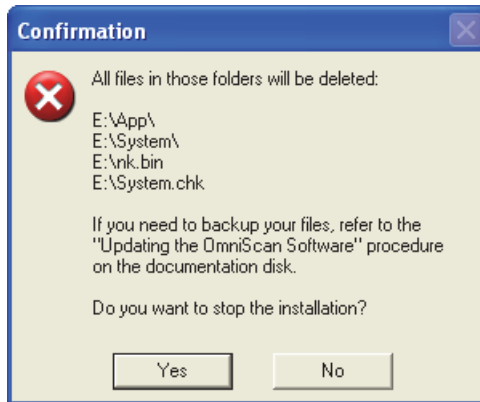


Figure 4-15 File deletion Confirmation dialog box

The **OmniScan software Select Application** dialog box appears (see Figure 4-16 on page 90).

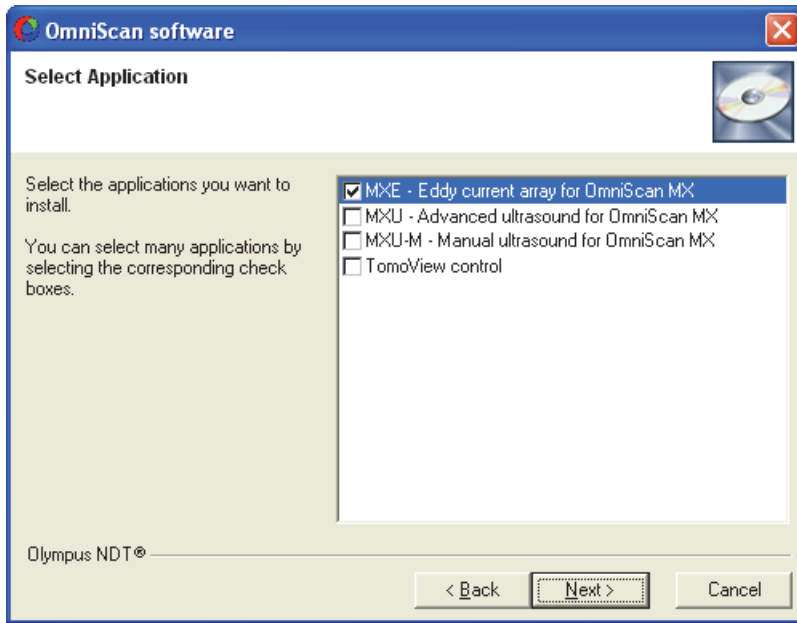


Figure 4-16 The OmniScan software Select Application dialog box

5. Select the **MXE - Eddy current array for OmniScan MX** check box to install the Eddy current array software.

- Click **Next** to continue.

The **OmniScan software Select Language** dialog box appears (see Figure 4-17 on page 91).

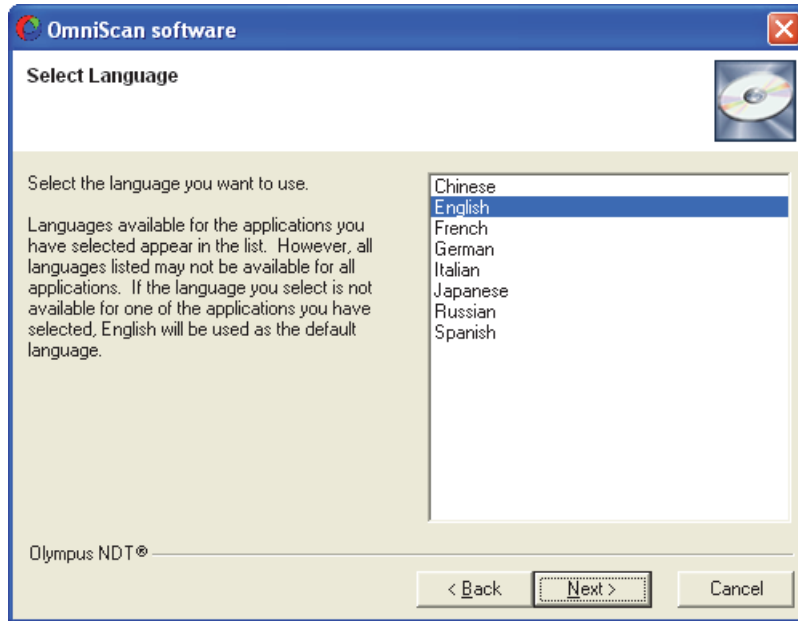


Figure 4-17 The OmniScan software Select Language dialog box

- In the list, select the desired language for the user interface of the OmniScan software, and then click **Next**.

NOTE

There is only one language allowed per storage card.

The **OmniScan software Start Installation** dialog box appears (see Figure 4-18 on page 92).

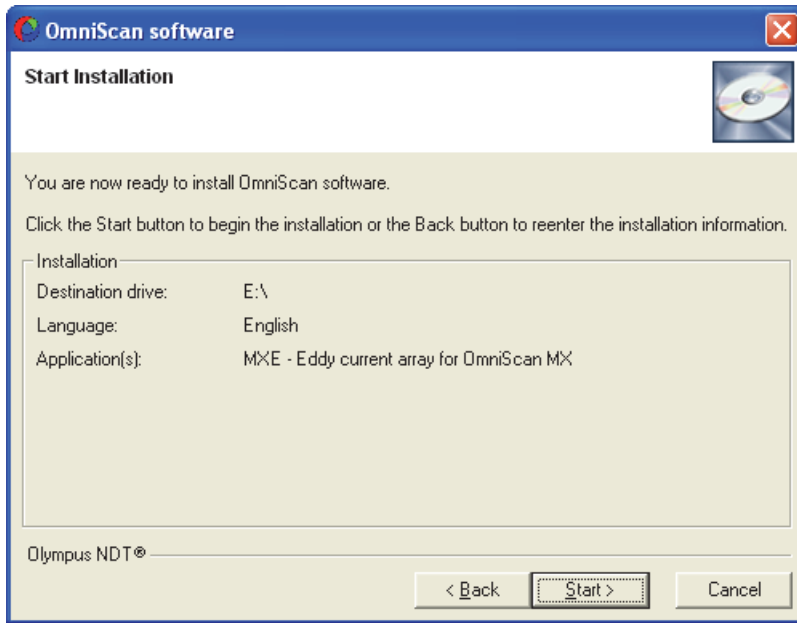


Figure 4-18 The OmniScan software Start Installation dialog box

- In the **OmniScan software Start Installation** dialog box, click **Start** to begin the installation (see Figure 4-18 on page 92).

NOTE

When you begin the installation, any information recorded on the storage card is deleted. Then, the selected programs are installed on the storage card.

The system installs the programs (see Figure 4-19 on page 93).

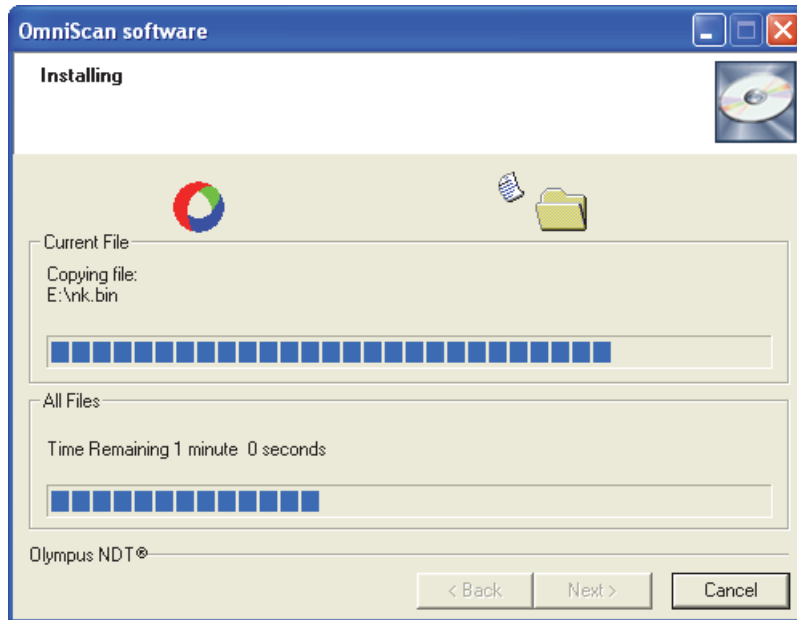


Figure 4-19 Installing the OmniScan software on your computer

9. Once the files have been installed, click the **Next** button.
The **OmniScan software** exit dialog box appears (see Figure 4-19 on page 93).

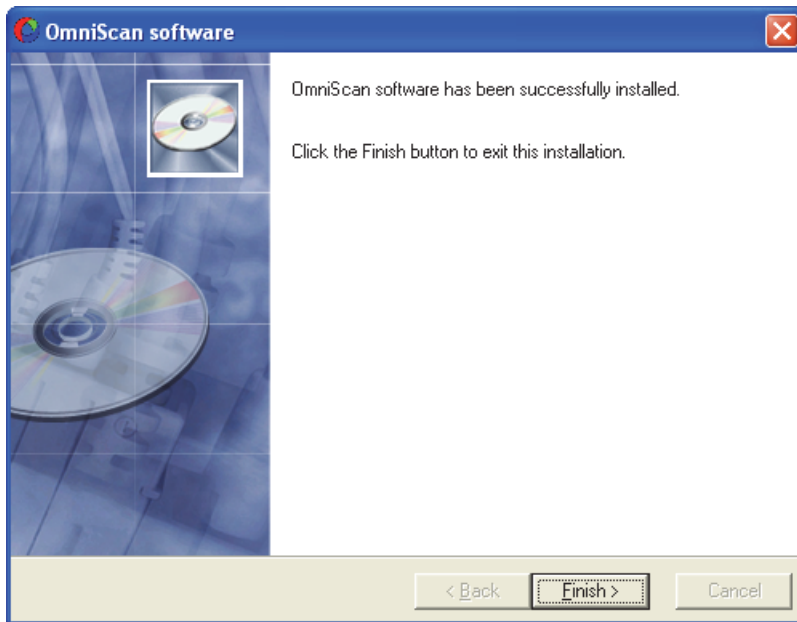


Figure 4-20 OmniScan software installation completed successfully

10. Once the installation is completed, click the **Finish** button to exit the installation program.

4.3 Loading the New Software in the OmniScan MX Instrument

NOTE

If you are updating from an OmniScan software version lower than 3.0 (1.0 to 2.0), and you backed up user files using the procedure described in section 4.5.1 on page 97, you need to recover your valuable user files (see section 4.5.2 on page 101) before proceeding with the procedure described in this section.

At this point, the latest OmniScan software is available on the OmniScan MX storage card.

The last step of the software update process consists of loading the new software into your OmniScan MX instrument.

NOTE

If for any reason you need to return to the previous version of the OmniScan software, refer to section 4.4 on page 96 for instructions.

To load the new software into the OmniScan MX instrument

1. Ensure that the power to your OmniScan MX instrument is turned off.
2. Insert the storage card containing the new software into the corresponding compartment on the right side of the OmniScan MX instrument (see Figure 4-21 on page 95).

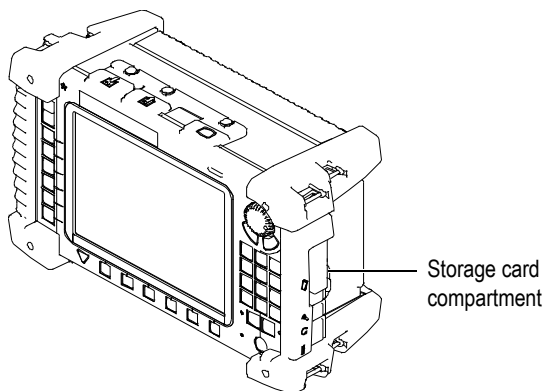


Figure 4-21 Inserting the storage card into its compartment

3. Turn on the OmniScan MX instrument.
During the startup process, the OmniScan detects that a more recent software version is present on the storage card, copies the appropriate files to its internal storage device, and automatically restarts.

4. Verify that the new OmniScan software works correctly and that your user files are available.

4.4 Reinstalling the Original OmniScan Software

Use the following procedure if, for any reason, you need to return to the original version of the OmniScan Software.

To reinstall the original OmniScan software

1. Ensure that you have a backup of your user files (for details, see section 4.5 on page 97).
2. Delete the OmniScan system files to allow the OmniScan MX instrument to automatically load a previous version of the software the next time the OmniScan instrument starts up. To do so:
 - a) Start up the OmniScan MX instrument with the current version of the software.
 - b) In the OmniScan software, select **Preferences > Tools > Win CE**.
 - c) In the dialog box that appears, type 2003 for the password and click **OK**. The OmniScan starts Windows CE Explorer.
 - d) In Windows CE Explorer:
 - (1) Select the **System** drive, and then the **System** folder.
 - (2) Select and delete the **App.sys** and the **Update.sys** files.
 - (3) On the **File** menu, select **Close**.Windows CE Explorer closes and the user interface returns to the OmniScan program.
 - e) Turn off the power of the OmniScan MX instrument.
3. Install the original OmniScan software onto the OmniScan MX storage card using the distribution disk received with your OmniScan MX instrument and following the procedure described in section 4.2 on page 85.
4. Recover your user files (for details, see section 4.5.2 on page 101).
5. Load the original OmniScan software onto your OmniScan MX instrument (for details, see section 4.3 on page 94).

4.5 Backing Up and Recovering Your Current OmniScan Software User Files



CAUTION

Failing to follow the procedures contained in this section might result in the loss of valuable user files.

This section provides procedures to back up (see section 4.5.1 on page 97) and recover (see section 4.5.2 on page 101) user files from OmniScan software prior to version 2.0.

User files contain data you created for focal laws, macros, palettes, probe and wedge definitions, reports, and screen captures.

4.5.1 Backing Up Your Current OmniScan Software User Files

Use the following procedure to back up your user files if you are upgrading from an OmniScan software version prior to version 2.0 (version 1.0 to 1.3). For these prior OmniScan software versions, the user files are located on the OmniScan MX storage card under the following path:

\User

The OmniScan software update overwrites these folders. You must follow the procedure below to back up your user files before proceeding with the software update. You will use the backup to recover your current user files later (see section 4.5.2 on page 101).

This procedure is not needed if you are updating from OmniScan software version 2.0, as the user files are not overwritten by the update process. In version 2.0, the user files are saved in the User folder which is located at the root of the storage card.

To back up your current OmniScan MX software user files

1. Ensure that the power to your OmniScan MX instrument is turned off.
2. On the right side of the OmniScan MX instrument, open the storage card compartment and remove the storage card (see Figure 4-22 on page 98).

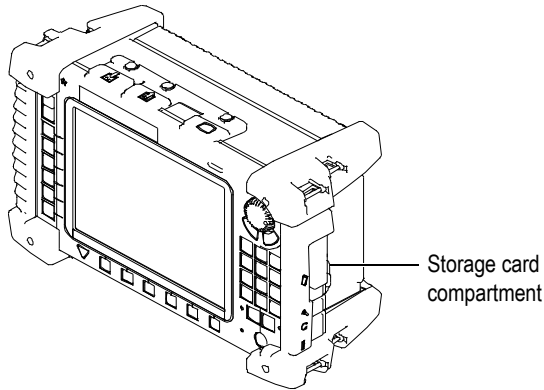


Figure 4-22 Removing the storage card from its compartment

3. Insert the storage card into your external USB storage card reader (see Figure 4-23 on page 98).



Figure 4-23 Storage card and reader

4. Connect the external storage card reader to a USB port on your computer.

Windows automatically detects the USB storage device and makes it available as a drive.

- Using Windows Explorer, create a backup folder on your computer (for example: C:\OmniScanBackup, as shown in Figure 4-24 on page 99).

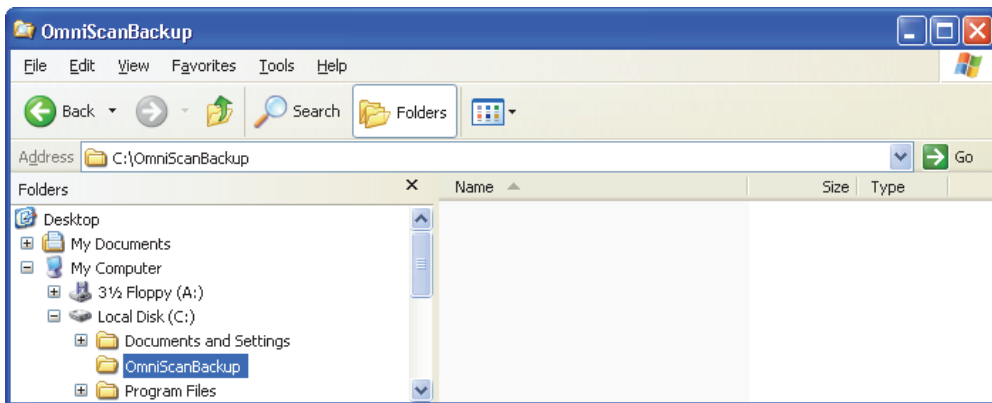


Figure 4-24 Creating a backup folder on your computer

- In the backup folder, create a folder for each application that you use on your OmniScan MX instrument (Figure 4-25 on page 99 presents an example for the MXE application).

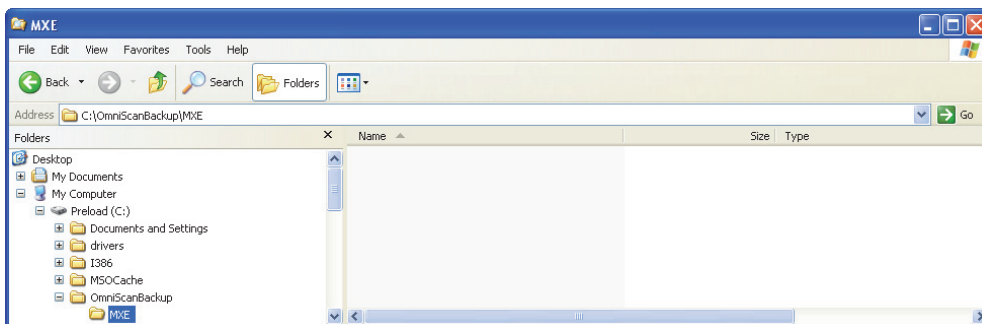


Figure 4-25 Creating a \MXE folder in the backup folder

- Using Windows Explorer, copy the **User** folder from the USB storage device (shown for E:\User in Figure 4-26 on page 100) to the backup folder you created in the previous step on your local drive (see Figure 4-27 on page 101).

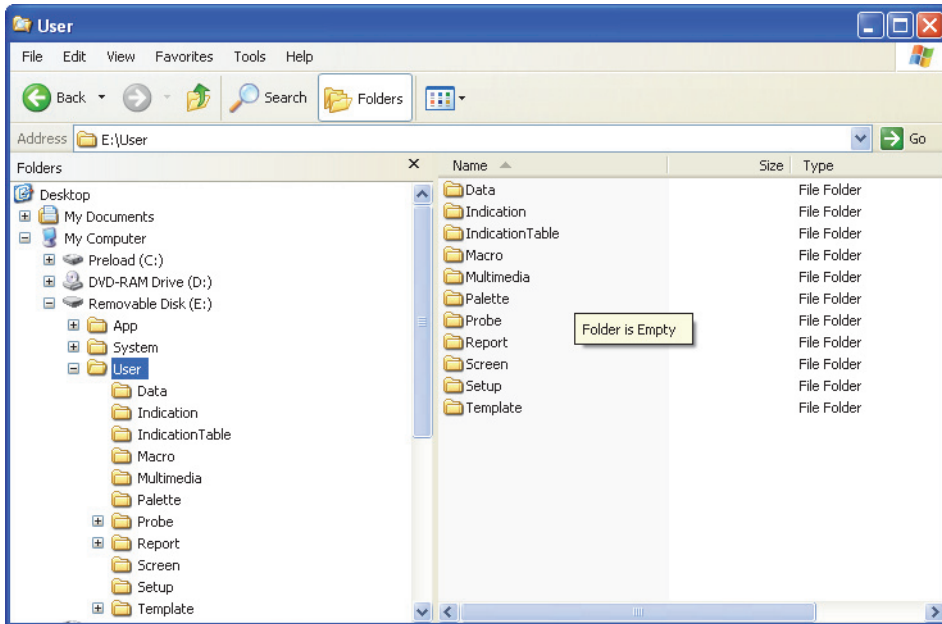


Figure 4-26 The User folder for the MXE application on the storage card

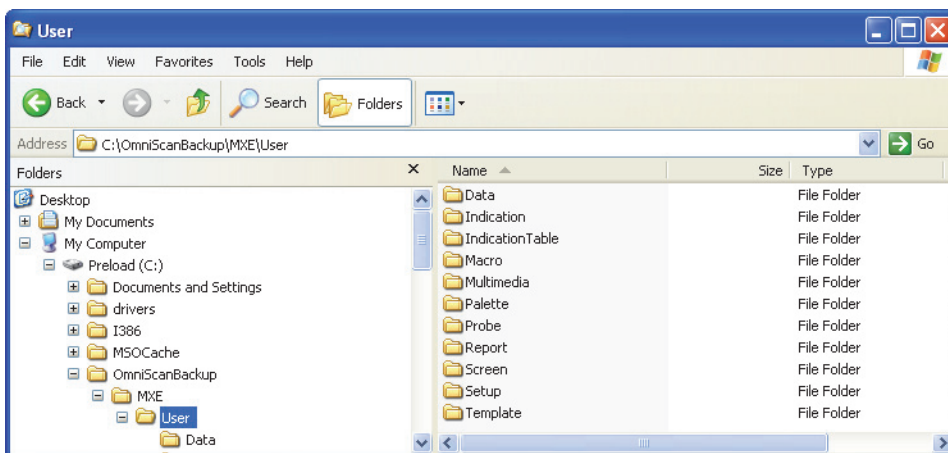


Figure 4-27 The User folder for the MXE application copied to the backup folder

8. Ensure that the transfer of your user files was completed successfully.
9. Eliminate old demonstration files provided by Evident in the User folder of your backup folder, under the Data, Law, Palette, and Setup folders, by deleting the files beginning with RD_.
10. Do not delete the backup folder until you have recovered your user files and validated that your OmniScan MX instrument is working correctly with the latest OmniScan software.

4.5.2 Recovering Your OmniScan Software User Files

After completing the procedure in section 4.2 on page 85, your OmniScan MX storage card contains the new OmniScan software, with factory default user files.

The following procedure describes how to copy, onto your OmniScan MX storage card, the user files from the backup folder that you created on your computer by following the procedure in section 4.5.1 on page 97.

If you use more than one OmniScan application, you need to separately recover the user files for each application to the \User folder located in the root folder.

To recover your OmniScan user files

1. If not already done, using your storage card reader, connect the OmniScan MX storage card to a USB port on your computer.
2. On your computer, using Windows Explorer, navigate to the backup folder you created using the procedure seen in section 4.5.1 on page 97, and then select the **User** folder corresponding to an application (**MXE** in the example of Figure 4-28 on page 102).

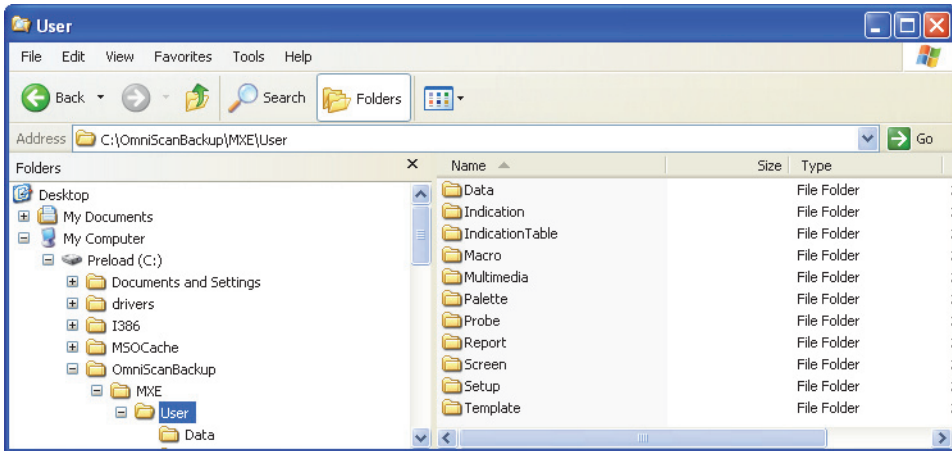


Figure 4-28 Selecting the User folder to recover

3. Using Windows Explorer, copy the **User** folder from the backup folder to the storage card as follows:
 - a) Right-click the **User** folder under the backup folder, and then click **Copy** on the shortcut menu that appears.
 - b) Select the root folder of the storage card [**Removable Disk (E:)** in the example seen in Figure 4-29 on page 103].

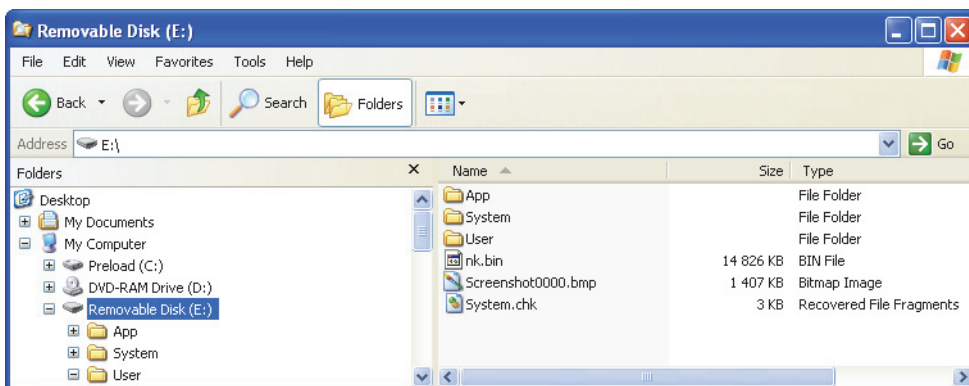


Figure 4-29 Pasting the User folder to the storage card

- c) Right-click the **User** folder of the root folder [**Removable Disk (E:)** in the example seen in Figure 4-29 on page 103], and then click **Paste** on the shortcut menu that appears.
4. If the **Confirm Folder Replace** message box appears, click **Yes to All** (see Figure 4-30 on page 103).

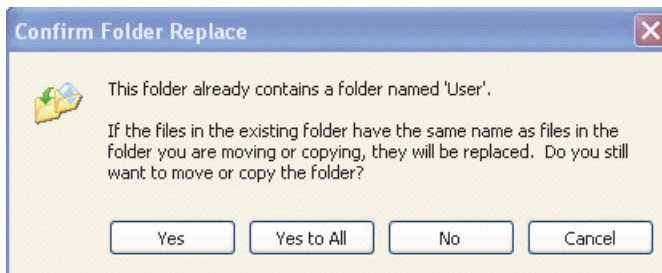


Figure 4-30 The Confirm Folder Replace message box

5. Wait for the folder copy operation to complete.
6. If you use your OmniScan MX for more than one application, repeat steps 2 to 5 for each OmniScan application.
7. Remove your storage card from the reader.

5. Using the OmniScan MX Instrument Front Panel Controls

This chapter features descriptions of the keys and controls available on the front panel of the OmniScan MX instrument. It is organized as follows:

- “Function Keys” on page 105
- “Function Key Description” on page 108
- “Scroll Knob, Accept key and Cancel Key” on page 110
- “Up and Down Keys” on page 111
- “Using Function Keys as Software Function Shortcuts” on page 111

5.1 Function Keys

There are 14 function keys on the OmniScan MX front panel. These keys have up to three types of information written on them, each of these types of information being color-coded as follows:

- White: primary function when connected to the ECA module
- Yellow: alphabetical characters and symbols
- Green: numeric characters and signs

Table 7 on page 106 lists the function of each key when the OmniScan MX is fitted with the ECA/ECT module.

Table 7 Function key chart















Function key	ECA/ECT function	Alphabetical characters and symbols	Numeric characters and signs	Computer-keyboard shortcut
	Gain	()	1	ALT+F1
	Phase Rotation	A B C	2	ALT+F2
	Frequency	D E F	3	ALT+F3
	Open File	G H I	4	ALT+F4
	Alarm/Type	J K L	5	ALT+F5
	Normalization	M N O	6	ALT+F6
	Cursor OR Zoom out of C-scan when you hold the key	P Q R S	7	ALT+F7
	Freeze	T U V	8	ALT+F8

Table 7 Function key chart (continued)

Function key	ECA/ECT function	Alphabetical characters and symbols	Numeric characters and signs	Computer-keyboard shortcut
	Best Fit OR Full scale in impedance plane view when you hold the key	W X Y Z	9	ALT+F9
	Group Selector	/ # %	+ - (positive, negative)	ALT+F10
	Balance in acquisition mode OR Center in analysis mode OR Full scale in C-scan view when you hold the key	N/A	0	ALT+F11
	Erase	: ° _	. (dot)	ALT+F12
	Start/Stop	N/A	N/A	N/A
	Store/Print	N/A	N/A	N/A

5.2 Function Key Description

This section presents a description of the function keys.



Gain key

Used to access the **Gain** (control) EC Settings edit button [**EC Settings > Settings (Main) > Gain (dB)**].



Phase Rotation key

Used to access the **Rotation** edit/cyclic button [**EC Settings > Settings (Main) > Rotation (°)**].



Frequency key

Used to access the **Frequency** edit/cyclic button [**EC Settings > Settings (Main) > Frequency (kHz)**].



Open File key

Used to access the **File** submenu (**File > Open > Open**).



Alarm/Type key

Used to access the **Type** list button (**Alarm /Output > Alarm Setup > Type**).



Normalization key

Used to normalize EC channels (**Wizard > Calibration > Normalization**). Available only in analysis mode. The **Select Calibration** step from the Normalization wizard is directly accessed.



Cursor key

Used to access the **Cursors** parameters (**Measurement > Cursors**) when used in analysis mode.



Freeze key

Used to pause the data acquisition process and proceed to analysis mode (either to process the current data or data from a file) or to restart the acquisition process. The equivalent command path is **Scan > Start > Pause = On or Off**.



Best Fit key

Used to perform a best fit in the impedance plane and strip charts views when used in analysis and acquisition modes. The equivalent command path is **Display > Zoom > Best Fit**.

Or

When you press and hold the Best Fit key, the impedance plane view returns to its full scale. The equivalent command path is **Display > Zoom > Full Scale**.



Group Selector key

Used to switch between groups of coils. The equivalent command path is **EC Settings > Group Management > Current Group**.



Set Balance key

Used to balance the probe in acquisition mode; in other words, return to zero. While in analysis mode, it is used to center data on the display screen. The equivalent command path is **Probe & Part > Settings > Balance**.

Balancing the probe in acquisition mode automatically clears the data from the displayed views. When inspecting using encoder-based acquisition, the encoder is also reset to its scan start value.

Or

When you press and hold the Set Balance key, the C-scan view returns to its full scale.



Erase/Clear key

Used to erase all previously stored acquisitions.



Start/Stop key

If selected, used to start an inspection. This key will reset the previously acquired data and/or encoder. The equivalent command path is **Scan > Start > Start**.



Store/Print key

Used to save the acquisition data and a screen capture simultaneously, or to print the current screen (if a printer is connected to the OmniScan MX). The equivalent command path is **File > Save > Save Data** (see section 15.8.2 on page 356).

5.3 Scroll Knob, Accept key and Cancel Key

The scroll knob is located in the upper-right corner of the OmniScan front panel, in the main control area. Refer to the *OmniScan MX and MX2 User's Manual* (part number DMTA-20015-01EN).



Scroll knob

Used to navigate through selections without the need for a keyboard or mouse. Turning the scroll knob in a clockwise direction shifts a selection to the right (horizontal list), or upward (vertical list).

The Accept and Cancel keys are located in the upper-right corner of the OmniScan front panel, immediately below the scroll knob in the main control area.



Accept key

Used to confirm a selection.



Cancel key

Used to cancel the current selection or to go back one level in the menu hierarchy.

5.4 Up and Down Keys

The Up and Down keys are located in the upper-left corner of the OmniScan front panel. Refer to the *OmniScan MX and MX2 User's Manual* (part number DMTA-20015-01EN). They can be used to navigate in the interface instead of using the Scroll knob

and the Accept key  in the main control area.



Up key

Moves the selection upward in a vertical list or to the right in a horizontal list.



Down key

Moves the selection downward in a vertical list or to the left in a horizontal list.

When these two keys are pressed simultaneously, they have the same effect as the

Accept key  from the main control area.

In the context of a function key popup dialog (see section 5.5 on page 111), the Up/Down keys change the increment/decrement step value.

5.5 Using Function Keys as Software Function Shortcuts

The primary function of the OmniScan function keys is to allow quick access to important frequently used parameters.

When pressed some of the function keys open a popup dialog box in the upper-left corner of the screen, below the status indicators (see example shown in Figure 5-1 on page 112). The popup dialog box allows you to quickly edit the parameter value without changing your current menu and submenu selection, helping you to avoid losing your current operation focus.




Figure 5-1 Example of the popup dialog box for the Gain function key

To edit the value of a parameter using the function key

1. Press the function key associated with the parameter you want to edit (see Table 7 on page 106 for available functions).

The associated popup dialog box appears in the upper-left corner (see example of Figure 5-1 on page 112), or the associated menu, submenu, and parameter is chosen.

2. To change the value, perform one of the following operations:
 - ◆ Type the desired value using the function keys as a numeric key pad.
OR
 - a) Rotate the Scroll knob clockwise to increment or counterclockwise to decrement the parameter value by the displayed increment/decrement step.
 - b) Note that once you use the Scroll knob to edit the value, the function keys go back to their primary function. They will not allow you to type numbers or characters.
 - c) If needed, change the displayed increment/decrement step using the up/down keys.

3. To abort editing the value, press the Cancel key .

4. To accept the edited value, perform one of the following procedures:

- ◆ Press the Accept key .

OR

If you used the Scroll knob to edit the value, press another function key.

This accepts the edited value and activates the associated software function.

6. General Setup

The next three chapters contain various procedures that explain tasks that are commonly performed with the OmniScan MXE software.

This chapter groups general procedures that affect the OmniScan MXE interface as a whole. They are:

- “Switching Between the ECT and ECA Modes” on page 115
- “Setting the Date and Time” on page 116
- “Changing the Unit of Measurement” on page 117
- “Configuring the Display” on page 118
- “Configuring and Activating the User Menu” on page 121
- “Changing the Color Palette” on page 123
- “Linking a Written Instruction to a Setup on the OmniScan MX” on page 127

6.1 Switching Between the ECT and ECA Modes

The OmniScan MXE software offers built-in user interfaces for both the conventional eddy current (ECT) and eddy current array (ECA) modes. You can switch from one user interface to the other without restarting the OmniScan MX.

To switch between the ECT and ECA modes

- ◆ Simply select the ECT <_> ECA menu.

OR

Press and hold the Menu key  for two seconds.

When the current mode is terminated, the other mode starts and loads the last setup file that was used in that mode.

IMPORTANT

When switching the OmniScan MXE software between ECT and ECA modes, the last used settings are recalled. This also applies when data files are loaded and analyzed.

For example, suppose a setup is saved in ECT mode and is named ECT-SURFACE.oes. Then, a data file is recalled from the instrument memory for some on-the-fly analysis. The instrument is then switched to ECA mode for ECA inspection, and later is switched back to ECT mode.

The recalled settings will be the default instrument settings that were used when the data file was analyzed, not settings saved in the ECT-SURFACE.oes setup file, because a data file was recalled in ECT mode just prior to switching to ECA and the last settings used were the default settings.

TIP

To improve productivity during inspection, when frequent changes between the ECT and ECA mode are needed, make sure to save both the ECT and ECA setups and perform the data analysis later.

6.2 Setting the Date and Time

This section describes how to set the date and time on the OmniScan MX.

To set the time

1. Select **Preferences > Instrument > Category = System**.
2. Modify the time parameters as follows:
 - a) To set the hour, select **Clock Set (HH:MM:SS)**, and then enter the desired value.
 - b) To set the minutes, select **Clock Set (HH:MM:SS)** a second time, and then enter the desired value.

- c) To set the seconds, select **Clock Set (HH:MM:SS)** a third time, and then enter the desired value.
- d) To set the half-day period, select **Clock Set (HH:MM:SS)** a fourth time, and then select either **AM** for midnight to noon or **PM** for 12:01 hours to 11:59 hours with the knob.

3. Press the Accept key



To set the date

1. Select **Preferences > Instrument > Category = System**.
2. Modify the date parameters as follows:
 - a) To set the year, select **Date Set (YYYY/MM/DD)**, and then enter the desired value.
 - b) To set the month, select **Date Set (YYYY/MM/DD)** a second time, and then enter the desired value.
 - c) To set the day, select **Date Set (YYYY/MM/DD)** a third time, and then enter the desired value.

3. Press the Accept key



6.3 Changing the Unit of Measurement

This section describes how to change the unit of measurement.

To change the unit of measurement

1. Select **Preferences > Instrument > Category = Unit**.
2. Choose the preferred unit of measurement (millimeters or inches), and then press the Accept key to confirm.

6.4 Configuring the Display

The procedures in this section explain the configuration of the various views of the data display. These include:

- “Changing the Display” on page 118
- “Configuring the Grid” on page 118
- “Configuring the Impedance Plane View” on page 119
- “Configuring the Strip Charts View” on page 120
- “Configuring the C-Scan View” on page 120
- “Configuring the Cursor Display” on page 121

6.4.1 Changing the Display

The views that are displayed in acquisition mode and analysis mode can be configured.

To change the display

1. Select **Display > Setup**.
2. Choose **Acquisition** or **Analysis**, select the desired item to display, and then press the Accept key to confirm. For more information about this option, refer to section 15.4.1 on page 329.

6.4.2 Configuring the Grid

In the impedance plane view and strip chart view, a grid can be displayed. The grid parameters can be configured in the **Preferences > Display > Category = Grid** menu. For more information on the grid preferences, see section 15.9.2.3 on page 364.

To configure the grid

1. Select **Display > Properties > Grid**.
2. Select the desired option: **Impedance**, **Strip Chart**, **Impedance & Strip Chart**, or **None**, and then press the Accept key to confirm.
A grid is displayed in the selected view or views, as configured in the **Preferences > Display > Category = Grid** menu.

6.4.3 Configuring the Impedance Plane View

In the impedance plane view, the offset null (the origin of the balanced signal) can be configured so that it is located in the optimal position. The horizontal position and the vertical position of the offset null can be configured separately for this purpose.

To configure the offset null of the impedance plane view

1. Select **Display > Properties > Horizontal Pos. (%)**.
2. Enter the appropriate value for the horizontal position of the offset null, and then press the Accept key to confirm.
3. Select **Display > Properties > Vertical Pos. (%)**.
4. Enter the appropriate value for the vertical position of the offset null, and then press the Accept key to confirm.

For more information about the offset null horizontal position and vertical position parameters, see section 15.4.2 on page 331.

Additional options are available to further configure the appearance of the impedance plane view. The [PP] cursor display, the maximum peak cursor display, and the grid parameters can also be configured in the impedance plane view.

To configure the appearance of the impedance plane view

1. Select **Preferences > Display > Category = View**, and then press the Accept key to confirm.
2. From the **Cursor** submenu, select the desired setting for the display of the **PP Cursor** and the **Max Cursor** options, and then press the Accept key to confirm (see section 6.4.6 on page 121).
3. Select **Preferences > Display > Category = Grid**, configure the **Grid Division (V)** parameter, and then press the Accept key to confirm (see section 6.4.2 on page 118).
4. Select **Display > Properties > Grid**, configure whether or not a grid is displayed in the impedance plane view, and then press the Accept key to confirm (see section 15.4.2 on page 331).

These parameters are in effect when the impedance plane view is displayed in acquisition mode and/or in analysis mode. For more information about displaying the impedance plane view in acquisition and analysis mode, refer to section 15.4.1 on page 329.

6.4.4 Configuring the Strip Charts View

There are several options that will allow you to configure the appearance of the strip chart views. The grid and the strip component parameters can be configured in the C-scan views.

To configure the strip chart view

1. Select **Preferences > Display > Category = Grid**, configure the **Grid Division (V)** parameter, and then press the Accept key to confirm (see section 6.4.2 on page 118).
2. Select **Display > Properties > Strip Component**.
3. Select the desired option: **X → , Y ↑ , or X → + Y ↑**. For more information about these options, refer to section 15.4.2 on page 331.
4. Select **Display > Properties > Grid**, configure whether or not a grid is displayed in the strip chart view, and then press the Accept key to confirm (see section 15.4.1 on page 329).

These parameters are in effect when the strip chart view is displayed in acquisition mode and/or in analysis mode. For more information about displaying the strip chart view in acquisition and analysis mode, refer to section 15.4.1 on page 329.

6.4.5 Configuring the C-Scan View

There are several options that will allow you to configure the appearance of the C-scan view, which is available in the ECA mode. The selection cursor, the text cursor, and the C-scan interpolations parameters can be configured in the C-scan view.

To configure the C-scan view

1. Select **Preferences > Display > Category = View**, and then press the Accept key to confirm.
2. From the **Cursor** submenu, select the desired setting for the display of the selection cursor and the text cursor, and then press the Accept key to confirm (see section 6.4.6 on page 121).
3. Select the **CScan Interpolation** submenu, activate or deactivate C-scan interpolation by choosing **On** or **Off**, and then press the Accept key to confirm.
4. Select **Display > Properties > C-Scan Component**.

5. Select the desired option: $X \rightarrow$, $Y \uparrow$, or $X \rightarrow + Y \uparrow$, and then press the Accept key to confirm. For more information about the C-scan component option, refer to section 15.4.2 on page 331.
6. Select **Display > Properties > Grid**, configure whether or not a grid is displayed in the C-scan view, and then press the Accept key to confirm (see section 15.4.1 on page 329).

These parameters are in effect when the C-scan view is displayed in acquisition mode and/or in analysis mode. For more information about displaying the C-scan view in acquisition and analysis mode, refer to section 15.9.2.2 on page 363.

6.4.6 Configuring the Cursor Display

To configure the cursor display

1. Select **Preferences > Display > Category = View**, and then press the Accept key to confirm.
2. Select **Cursor**.
3. Select the desired options for the selection cursors, and then press the Accept key to confirm. For more information about this option, refer to section 15.9.2.2 on page 363.

6.5 Configuring and Activating the User Menu

This section explains how to configure and activate a **User** menu, and also to restore the default EC Settings menu.

6.5.1 Configuring the User Menu

The **User** menu allows you to assign custom functions to the F2 to F6 function keys. This can greatly speed up the execution of inspection procedures.

To configure the User menu

1. Select **Preferences > Setup > Category = User Menu**, and then press the Accept key to confirm.
2. Proceed as follows:
 - a) Select **Select Key**, choose the key (F2 to F6) to which a submenu is to be assigned, and then press the Accept key to confirm.
 - b) Select **Assign Key** to associate an item to the key chosen in step 2.a, and then press the Accept key to confirm.
3. If necessary, repeat steps 2.a and 2.b to configure the five submenus available in the **User** menu.
Once the **User** menu has been configured, it is automatically saved.
4. To activate the **User** menu, select **Switch to User Menu**, and then press the Accept key to confirm.

6.5.2 Activating the User Menu

Once the **User** menu has been configured, it is automatically saved. It can be activated or reactivated.

To activate the User menu

- ◆ Select **Preferences > Setup > Category = Switch to User Menu**, and then press the Accept key to confirm.

6.5.3 Restoring the EC Settings Menu

When a **User** menu has been configured and activated, the **EC Settings** menu is replaced by the **User** menu. The **User** menu contains two commands: **User Menu** and **Restore Menu**. The **EC Settings** menu can easily be restored.

To restore the EC Setting menu

- ◆ Select **User Menu = Restore Menu**, and then press the Accept key to confirm.

6.6 Changing the Color Palette

To optimize the visualization of defects in the C-scan view, the color palette can be changed. Different color palettes are provided and can be loaded to adapt the display of data in C-Scan view to the type of inspection being performed or to enhance the type of defect to detect. The loaded color palette's amplitude axis start and end values can also be modified.

6.6.1 Loading a Color Palette

The visualization of defects can be optimized in the C-scan view by changing the color palette. Several palettes are available that are adapted for different types of inspection.

The prefix of each palette's file name indicates the typical usage for which it has been designed (see Table 8 on page 123).

Table 8 Palette file prefix per type of use

Palette file prefix	Type of use
1_	Go-no-go detection or noisy background signals. Also used to emulate traditional NDT method test appearance (patent rights protection by, but not limited to, the following: US D668,564; 13/967,690; CN201130084342.30). These palettes are designed to operate with a vertical position set to 20 %.
A_	Alarm-type for clear go-no-go representation. These palettes are designed to operate with vertical position set to 20 %.
D_	Differential-type. These palettes are designed to operate with vertical position set to 50 %.
Phase_	Special palettes for use with MXE software.

Table 8 Palette file prefix per type of use (continued)

Palette file prefix	Type of use
RAINBOW_ or SPECTRUM_	Offer a wide range of color separation for easier amplitude analysis. These palettes are designed to operate with vertical position set to 20 %.

To load a color palette

1. Select **Display > Color > Load Palette** to open the color palette manager (see Figure 6-1 on page 124).

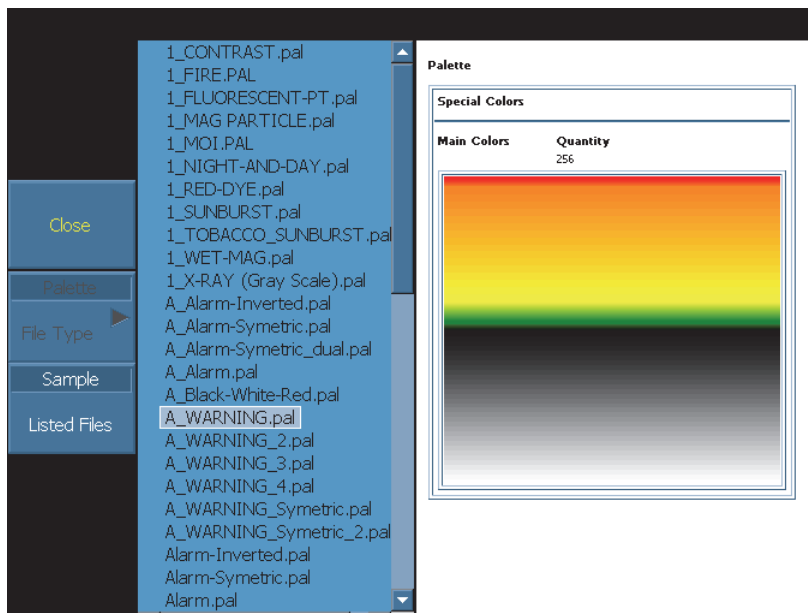


Figure 6-1 The color palette manager listing sample color palettes

2. Select **Listed Files** to toggle between the Evident **Sample** and the **User** list.
3. Choose the desired color palette in the list.
4. Select **Open** to load the chosen color palette and close the color palette manager.

6.6.2 Modifying the Amplitude of the Color Palette

Once a calibration standard has been scanned using a balanced probe, the visualization of defects can be optimized in the C-scan view by modifying the amplitude axis' start and end values for the color palette. This is sometimes useful when performing data analysis.

You can see the color palette scale on the right side of the C-scan or the strip chart view.

To modify the amplitude of the color palette

1. Select **Display > Color > Start**, enter the starting point in volts (between -10 V and +10 V) to set the beginning of the color palette, which will be in white, and then press the Accept key to confirm.
2. Select **Display > Color > End**, enter the last point in volts (between -10 V and +10 V) to set the end of the color palette, which will be in red, and then press the Accept key to confirm.

You should get a better contrast of defects in the C-scan (see Figure 6-2 on page 126).

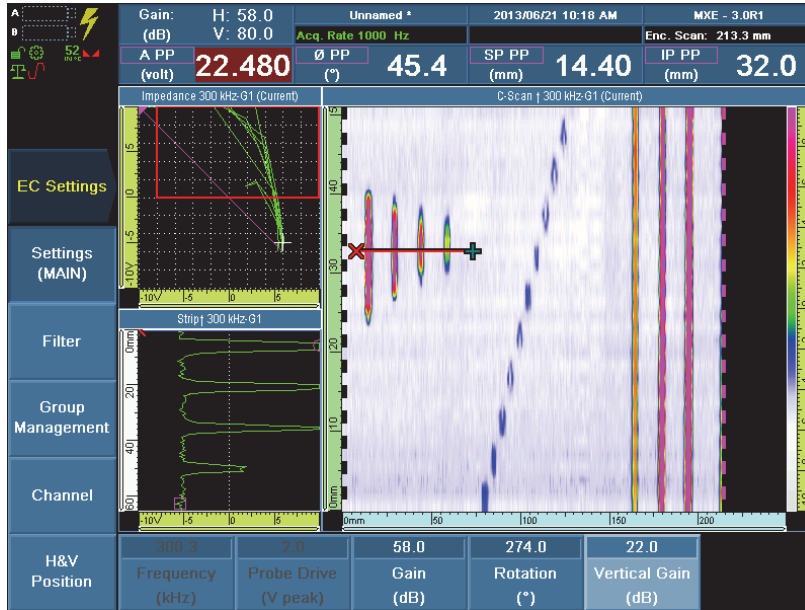


Figure 6-2 Initial color palette adjustment in the C-scan

3. If the background is not uniform, this means that the probe balance is not correct. To correct this situation, proceed as follows:
 - a) Redo the probe balancing procedure (see section 3.3.2 on page 58).
 - b) Rescan the calibration standard making sure to maintain constant pressure on the probe.

The background color should be uniform.

6.7 Linking a Written Instruction to a Setup on the OmniScan MX

This section describes how to link a procedure to a setup on the OmniScan MX.

To link a procedure to a setup

1. Create the setup to which you wish to attach an instruction procedure.
2. Save that setup and note its name (for details, see section 11.8 on page 224).
3. On a PC, write the instruction procedure in a program that allows you to save files in HTML format such as Notepad or Microsoft Word).
4. Save the procedure as an .htm file (Microsoft Word does this using the **Save As** command and the **Web page** save type).

IMPORTANT

The .htm procedure file must have the exact same name as the setup. Also, if an image folder is generated for the procedure, then its name must be left unchanged when it is transferred onto the OmniScan MX.

5. Connect a storage card reader to the computer.
6. Insert a storage card in the reader.
7. Transfer the .htm file to the storage card in the \User\Setup folder.
8. Insert the storage card in the slot on the OmniScan MX.
9. Restart the OmniScan MX.
10. Use the File Manager to load the setup.

From now on, pressing the instrument's Help key once will recall and display the procedure linked to this setup.

Pressing the key a second time brings up the standard OmniScan MX help.

Pressing the key a third time returns you to the display screen.

7. Using FIR/IIR Filters

This chapter describes the types and operating modes of the different digital filters used in the OmniScan MXE software: a finite impulse response filter (FIR), an infinite impulse response filter (IIR), and median and average filters.

The filters are presented as follows:

- “FIR Filters Specifications Relative to the OmniScan MXE Software” on page 129
- “IIR Filters Specifications Relative to the OmniScan MXE Software” on page 131
- “Median and Average Filters” on page 132

The procedure to set a filter is also provided in section 7.5 on page 135.

7.1 FIR Filters Specifications Relative to the OmniScan MXE Software

The FIR filters are a type of frequency filter that allows the operator to cut a range of frequencies on the eddy current signal. These frequency filters can be used for both time-based (clock) and distance-based (encoder) acquisition.

7.2 Acquisition Synchronized According to the Clock or to the Encoder

Whether the acquisition is clock-synchronized or encoder-synchronized, the available FIR filters are as follows:

- Low-pass filters
- High-pass filters

Figure 7-1 on page 130 shows the FIR-filtered responses in this case.

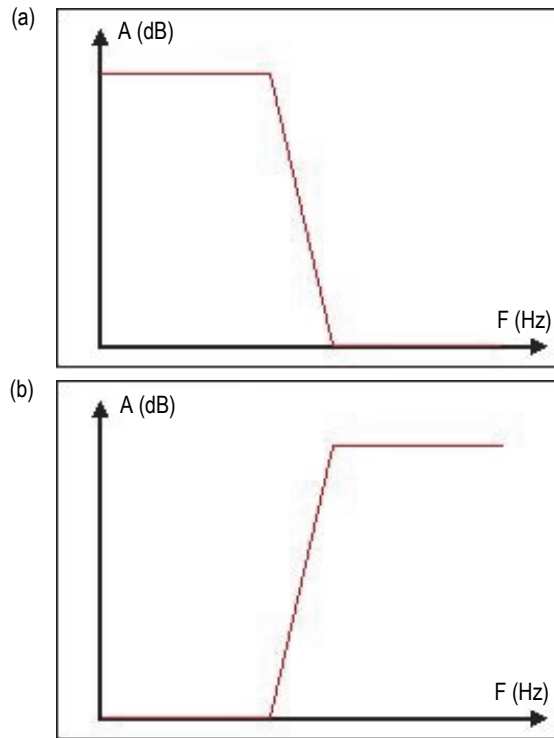


Figure 7-1 The FIR-filtered responses: (a) Low-pass filter and (b) High-pass filter

When using a FIR filter during data acquisition that is clock-synchronized, due to the filter configuration parameters, each filter can cover only a certain range of frequencies. Table 9 on page 131 shows the limit value of $F_{-3\text{ dB}}$ as a function of the F_{acq} acquisition frequency, and it appears as a PRF in the OmniScan MXE software.

Table 9 Filter range limits when the acquisition mode is clock-synchronized

Filter type	Lowest $F_{-3\text{ dB}}$	Highest $F_{-3\text{ dB}}$	Minimum plateau
Low-Pass	$F_{\text{acq}} \times 0.00537$	$F_{\text{acq}} \times 0.48486$	N/A
High-Pass	$F_{\text{acq}} \times 0.00928$	$F_{\text{acq}} \times 0.49463$	N/A

7.3 IIR Filters Specifications Relative to the OmniScan MXE Software

IIR filters smooth the EC signal and improve the signal-to-noise ratio. Compared to averaging filters, IIR filters provide less attenuation for frequencies within their band pass, and more attenuation for frequencies higher than the cutoff value (Figure 7-2 on page 131).

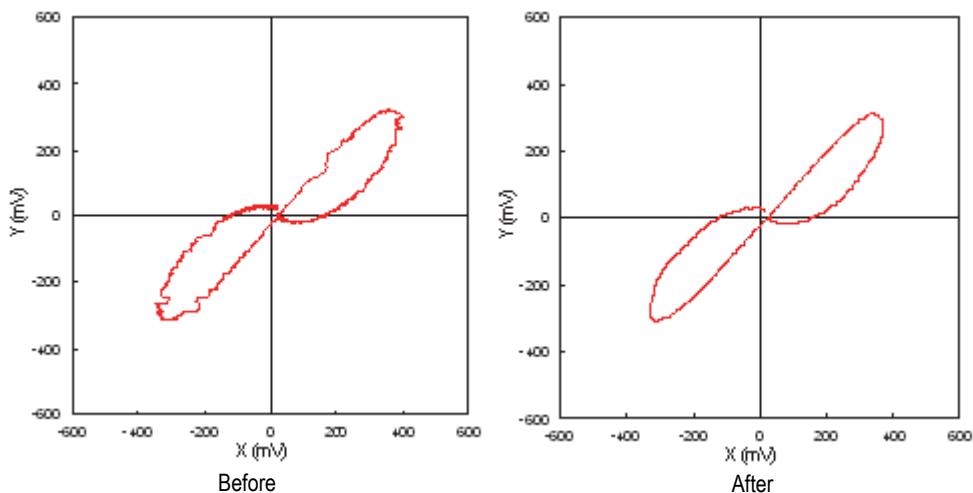


Figure 7-2 Effect of a low-pass, IIR type filter on the EC signal

7.4 Median and Average Filters

The median and average filters can be applied on real-time acquisition or when in analysis mode.

Median and average filters perform statistics calculation on a small area of the C-scan named a sliding pane. The width of that pane is defined by a number of data points (n). As the probe moves and collects data, the filter cumulates data points until the pane is filled, and then it starts to return a filtered value in the C-scan view.

For the **Median Low-Pass filter**, in the pane, the amplitude of the central pixel is replaced by the median amplitude value on the whole pane.

For the **Median High-Pass filter**, in the pane, the amplitude of the central pixel is replaced by the difference between the amplitude value of the central pane pixel and the median amplitude value on the whole pane.

For the **Average Low-Pass filter**, in the pane, the amplitude of the central pixel is replaced by the mean amplitude value on the whole pane.

For the **Average High-Pass filter**, in the pane, the amplitude of the central pixel is replaced by the difference between the amplitude value of the central pane pixel and the mean amplitude value on the whole pane.

Figure 7-3 on page 133 shows an example of the application of the sliding pane process used for a **Median Low-Pass filter** and a **Median High-Pass filter**.

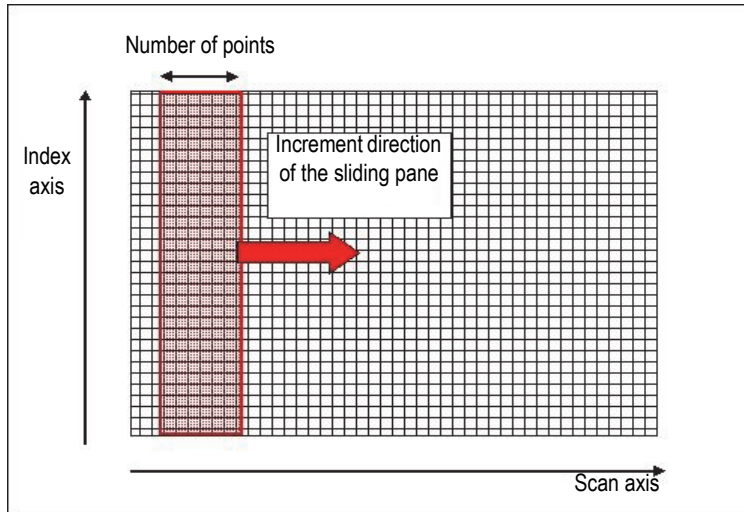


Figure 7-3 A C-scan matrix used for the acquisition points and a sliding pane illustration

After each return value, the sliding pane is moved from one pixel to the next, in the scan direction, until it reaches the end of the C-scan. Each time, it replaces the central pixel amplitude value by the filtered amplitude value. As the size of the sliding pane

is finite and is represented by the number of points n , the first $n/2$ points of the C-scan are not filtered. Indeed, the sliding pane needs to be completely filled with C-scan amplitude values before the filter result be relevant (see Figure 7-4 on page 134).

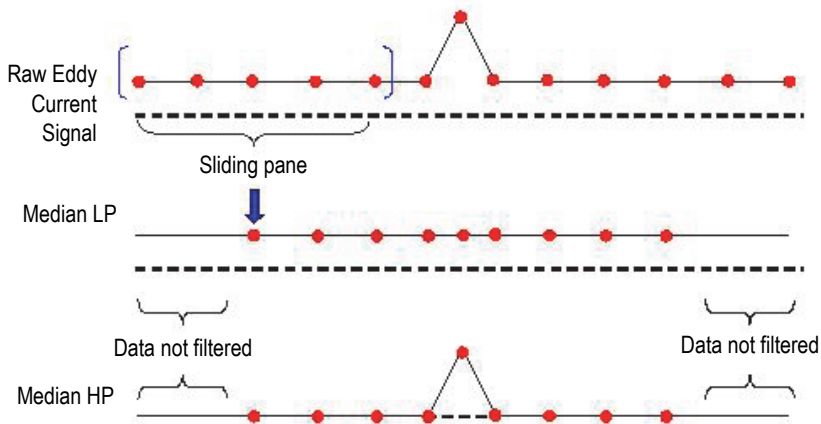


Figure 7-4 An example of Median LP and Median HP filters

7.5 Setting a Filter

This section describes how to set a filter so that it is configured for eddy current signals. These filters are only applied in the scan direction and on each coil of a specified group. See Figure 7-5 on page 135.

More information on filters and their options can be found in section 15.1.2 on page 311.

None	
Low-Pass IIR	Keeps long defects and filters high frequency noise. Simulates Analog LP filter.
High-Pass IIR	Keeps short defects and filters slow signal drift. Simulates Analog HP filter.
Avg Low-Pass	Keeps long defects and filters high frequency noise.
Avg High-Pass	Keeps short defects and filters slow signal drift.
Med Low-Pass	Keeps long defects and filters high frequency noise.
Med High-Pass	Keeps short defects and filters slow signal drift.

Filter 1	None
Select ▲	Type ▲

Figure 7-5 Filter List

To set a filter

1. Select **EC Settings > Filter > Select**, choose **Filter 1** or **Filter 2**, and then press the Accept key to confirm.
2. Select **Type**, choose the type of filter to apply, and then press the Accept key to confirm.
3. Then do one of the following:
 - If the chosen filter was a **Low-Pass IIR** or a **High-Pass IIR** enter, in the **Min. Freq.** or **Max. Freq.** the values of the cutoff frequency (minimum and/or maximum) in hertz (Hz) for time-synchronization, or the length (minimum and/or maximum) in millimeters for encoder-synchronization, and then press the Accept key to confirm.

- If the chosen filter was an **Average-** or a **Median-** type filter, enter, in **No. of Points**, the width of the window (in acquisition points) to which you want the filters to be applied, and then press the Accept key to confirm.


8. Setting an Alarm

This procedure describes how to set an alarm on a group of coils. For more information alarms, see section 15.3 on page 322.

To set and alarm on a group of coils

1. Select **Alarm > Alarm Output > Output**, choose on which group you wish to apply the alarm, and then press the Accept key to confirm.

OR

Press the Alarm/Type key .

2. Select **Alarm > Alarm Setup > Select**, choose an alarm number, and then press the Accept key to confirm.
3. Select **Alarm > Alarm Setup > Type** and then proceed as follows:
 - a) Choose the shape of the zone that will be defined, and then press the Accept key to confirm.

NOTE

To configure inverse alarms, select one of the shapes such as Pie Inverse, Rectangle Inverse, or Ring Inverse.

At any time, if the layout is a SI, 2 × SI, or CSI type of layout, the zone currently being defined will be shown on the impedance plane and drawn in solid lines for regular shapes, and in dotted white lines for inverted shapes.

According to the chosen **Type** option, the options that define the size and position of the zones will be different.

- b) In the remaining parameters, enter the appropriate values, and then press the Accept key to confirm.

4. Select **Alarm > Output > Select** and then proceed as follows:
 - a) Choose which of the three software alarms you want to set, and then press the Accept key to confirm.
 - b) Select **Alarm > Output > Raw-G1**, select the group of raw or mixed coils to which you would like the alarm to be applied, and then press the Accept key to confirm.

NOTE

The **Raw-G1** option is only active if more than one group exists.

- c) *Optional*: Select the number of the alarm type to be used for the currently defined alarm, and then press the Accept key to confirm.
This option is only valid if more than one alarm type was defined in step 2.
5. Select **Alarm > Output** and proceed as follows:
 - a) Select **Alarm > Output > Output**, choose the number of the alarm type to activate, and then press the Accept key to confirm.
 - b) Select **Alarm > Output > Alarm #**, select one or several of the software alarms specified in step 3, and then press the Accept key to confirm.
Once they are selected, the zone corresponding to the alarm will become highlighted in bold.
 - c) Select **Alarm > Output > Sound**, select a sound, and then press the Accept key to confirm (if applicable).
 - d) Select **Alarm > Output > Delay**, set a delay that will be applied to the TTL output, and then press the Accept key to confirm.
 - e) Select **Alarm > Output > Hold Time**, set a hold time that will be applied to the TTL output, and then press the Accept key to confirm. A hold time of 100 milliseconds is usually preferred.
 - f) *Optional*: Select **Alarm > Output > Alarm Highlighting** to display the signal in C-scan views according to the alarm colors configured in the **Alarm > Alarm Setup** menu (Alarm 1: red, Alarm 2: yellow, and Alarm 3: green), and with a grayscale color palette as the background, and then press the Accept key to confirm.
6. To ensure that all the alarms are configured correctly, perform a scan where the signal should trigger one or more of the enabled alarms. The chosen hardware outputs should activate when the alarm is triggered.

9. Mixing Signals Using the Mixing Wizard

The Mixing wizard walks you through step-by-step procedures to mix channels by attenuating a given signal, such as those caused by fasteners, lift-off, or pillowing, in order to enhance the signal of defects.

The following are some typical signal mixing procedures which can help to improve defect detection in ECA and ECT modes:

- “Mixing the Fastener Signal to Improve Crack Detection in ECA Mode” on page 140
- “Mixing the Lift-Off Signal to Improve Corrosion Detection in ECA Mode” on page 160
- “Mixing the Fastener Signal to Improve Crack Detection in ECT Mode” on page 179

NOTE

The **Mixing** submenu is only available when more than one group has been configured.

TIP

The mixing process can be interrupted at any time by pressing the Cancel key



9.1 Mixing the Fastener Signal to Improve Crack Detection in ECA Mode

Including the Mixing wizard in the calibration procedure makes it very easy to mix the fastener signal to improve crack detection in ECA mode.

The following example provides the complete procedure, using the following pieces of equipment:

- Probe model SAB-064-030-032
- Sample RSDT-10125

This sample consists of two 2024-T3 aluminium 0.91 mm (0.036 in) sheets.

The general procedure to mix the fastener signal is divided into four main subsections, or steps, each of which is a complete procedure. These procedures are to be performed in the following sequence.


To mix the fastener signal to improve crack detection in ECA mode

1. Add a frequency that detects the type of crack to inspect.
For more information, see section 9.1.1 on page 140.
2. Add a frequency that detects the fasteners on the parts to inspect.
Usually, that frequency is 3 times the configured frequency for crack detection.
For more information, see section 9.1.2 on page 145.
3. Mix the two frequencies to improve crack detection.
For more information, see section 9.1.3 on page 151.
4. Fine-tune parameters to enhance the signal of the defective fastener.
For more information, see section 9.1.4 on page 156.


9.1.1 Configuring a Frequency that Detects the Type of Crack to Inspect

The first step in the procedure for mixing the fastener signal to improve crack detection in ECA mode is to configure a frequency that detects the type of crack targeted by the inspection.

To configure a frequency that detects the targeted type of crack

1. Connect the probe model SAB-064-030-32 to the OmniScan MX instrument. For more information, see section 1.1 on page 19.
2. Press the Accept key .
The probe is detected and its configuration loaded.
3. Select **Display > Data > Imped. Persistency**, set the scan persistence to a value of 5.0, and then press the Accept key to confirm.
4. Select **Display > Setup > Acquisition = CSI C-Scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
5. Configure the first frequency. Select **EC Settings > Settings (MAIN)**, and then adjust the **Frequency (kHz)**, **Rotation (°)**, and **Gain (dB)** parameters.
Set these parameters according to the following criteria:
 - Obtaining optimal fastener signal amplitude without saturation
 - Positioning the fastener signal horizontally

Proceed as follows:

- a) Press the Set Balance key  to balance the signal.
- b) Scan the good fastener.

- c) Select **Frequency (kHz)**, set the value to provide the best detection for the sub-surface cracks, and then press the Accept key to confirm. In this example, the **Frequency (kHz)** value is set to 10.0 (see Figure 9-1 on page 142).

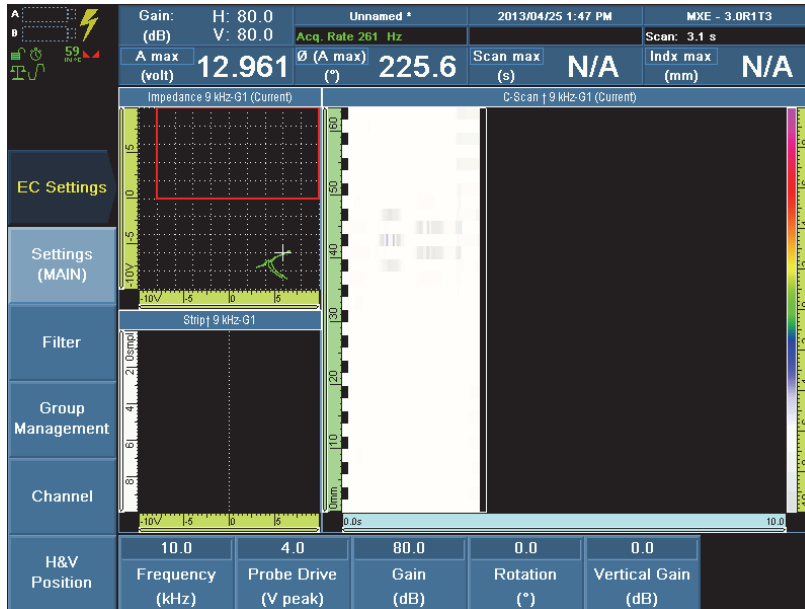


Figure 9-1 Configuring the Frequency parameter for mixing frequency 1

- d) Select **Gain (dB)**, set the value to expand the signal to ensure that it spans approximately 6 grid divisions in the impedance plane view, and then press

the Accept key to confirm. In this example, the **Gain (dB)** value is set to 69 dB (see Figure 9-2 on page 143).

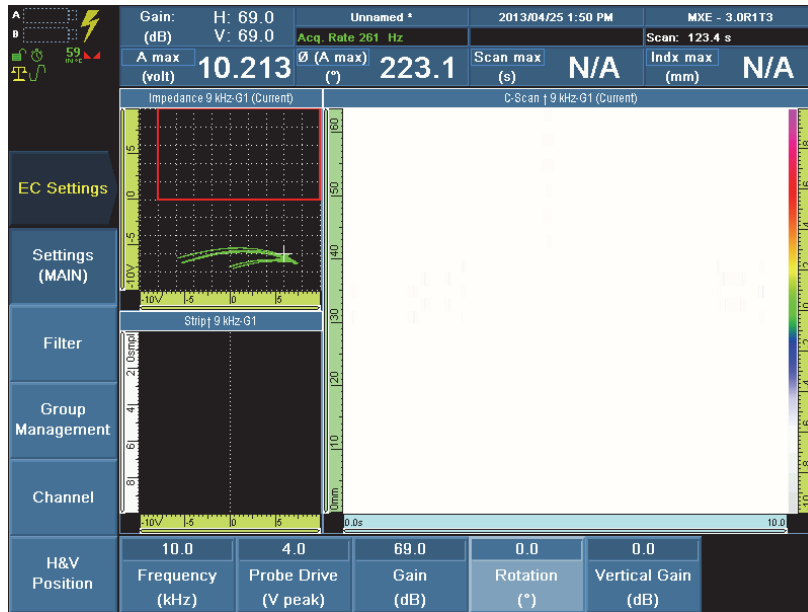


Figure 9-2 Configuring the Gain parameter for mixing frequency 1

- e) Select **Rotation (°)**, set the value to orient the signal horizontally, and then press the Accept key to confirm. In this example, the **Rotation (°)** value is set to 0.0.
6. Scan the good fastener, and then the defective fastener. In the impedance plane view, the good fastener's signal should be oriented horizontally in the impedance plane view, and the defective fastener's signal should show apparent vertical

deflection (see Figure 9-3 on page 144). If not, repeat steps 5.a to 5.e to orient both signals appropriately.



Figure 9-3 The defective fastener’s signal using mixing frequency 1

The first frequency for this mixing procedure is now configured. The next step is to configure the second frequency. For more information, see section 9.1.2 on page 145.

NOTE

Evident advises against configuring the vertical gain parameter for frequency 1 or frequency 2 when following the mixing frequency procedures.

9.1.2 Adding a Frequency that Detects Fasteners on the Parts to Inspect

The second step in the procedure for mixing the fastener signal to improve crack detection in ECA mode is to add a frequency that detects the fasteners on the parts to inspect.

To add a second frequency that detects fasteners on the parts to inspect


1. Select **EC Settings > Group Management > Add Group = Freq-2**, and then press the Accept key to confirm.
The displayed names of the views should now all end with **G2 (Current)**.
2. Configure the second frequency. Select **EC Settings > Settings (MAIN)**, and then adjust the **Frequency (kHz)**, **Rotation (°)**, and **Gain (dB)** parameters.

Set these parameters according to the following criteria:

- Obtaining optimal fastener signal amplitude without saturation
- Positioning the fastener signal vertically

Proceed as follows:



- a) Press the Set Balance key  to balance the signal.
- b) Scan the good fastener.
- c) Select **Frequency (kHz)**, set the value to three times the frequency set for the first frequency ($\text{Freq-1} \times 3$), and then press the Accept key to confirm. In this

example, the **Frequency (kHz)** value is set to 30.0 (see Figure 9-4 on page 146).

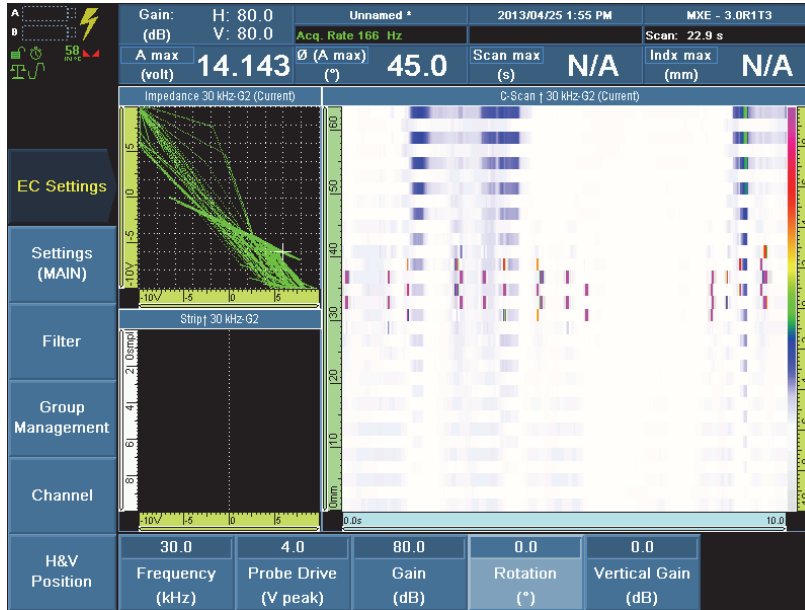


Figure 9-4 Configuring the Frequency parameter for mixing frequency 2

- d) Select **Gain (dB)**, set the value to expand the signal to ensure that it spans approximately 6 grid divisions in the impedance plane view, and then press the Accept key to confirm. In this example, the **Gain (dB)** value is set to 60.0.

NOTE

Evident advises against configuring the vertical gain parameter for frequency 1 or frequency 2 when following the mixing frequency procedures.

- e) Select **Rotation** ($^{\circ}$), set the value to orient the signal vertically, and then press the Accept key to confirm. In this example, the **Rotation** ($^{\circ}$) value is set to 30.0 (see Figure 9-5 on page 147).

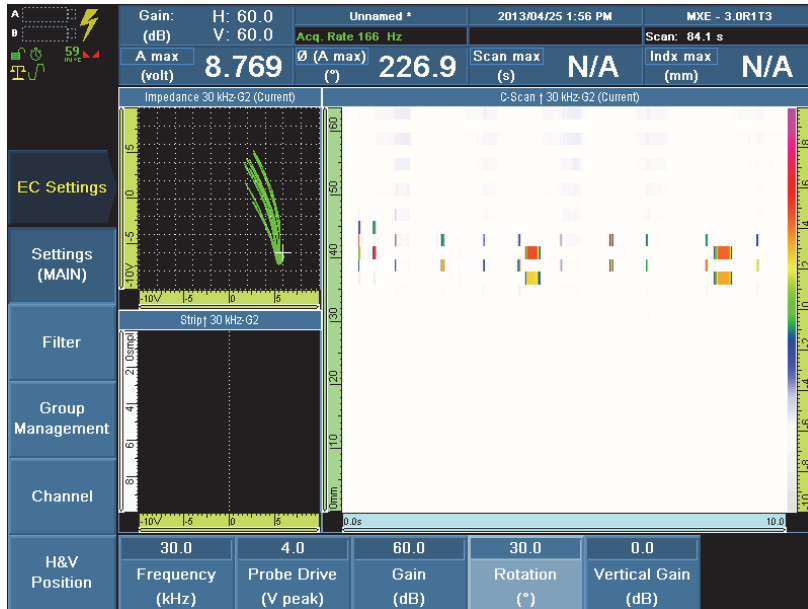


Figure 9-5 Configuring the Gain and Rotation parameters for mixing frequency 2

3. Activate the probe encoder. Select **Scan > Inspection > Time = Encoder 1**, and then press the Accept key to confirm (see Figure 9-6 on page 148).

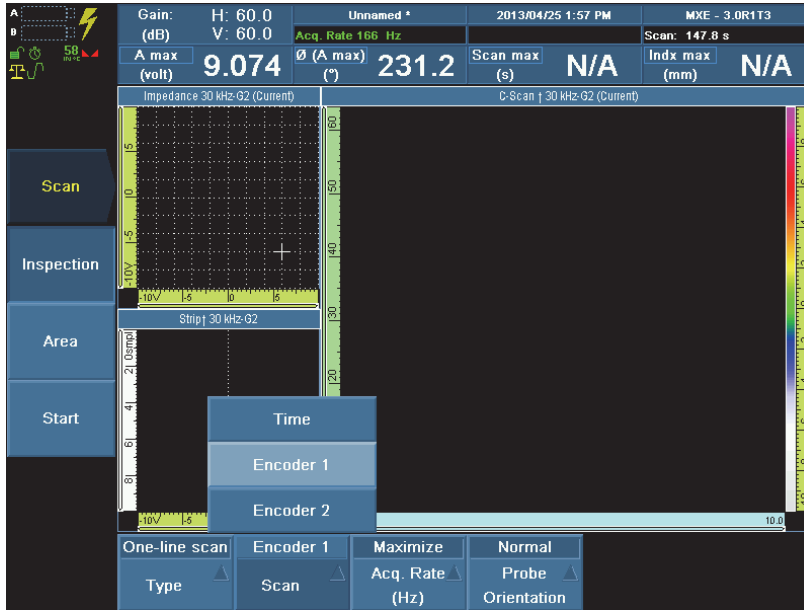


Figure 9-6 Activating the probe's encoder

- Set the encoder to Continuous mode. Select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm (see Figure 9-7 on page 149).

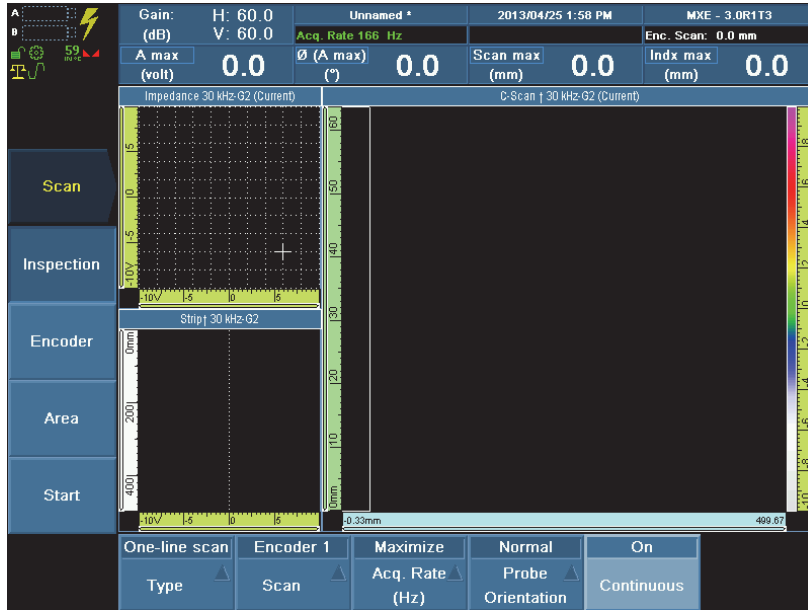


Figure 9-7 Setting the probe encoder to Continuous mode

- Set the **Scan End** parameter to display the data in the C-scan views with a 1:1 ratio between the scan axis and the index axis. Select **Scan >Area > Scan End = 70**, and then press the Accept key to confirm (see Figure 9-8 on page 150).

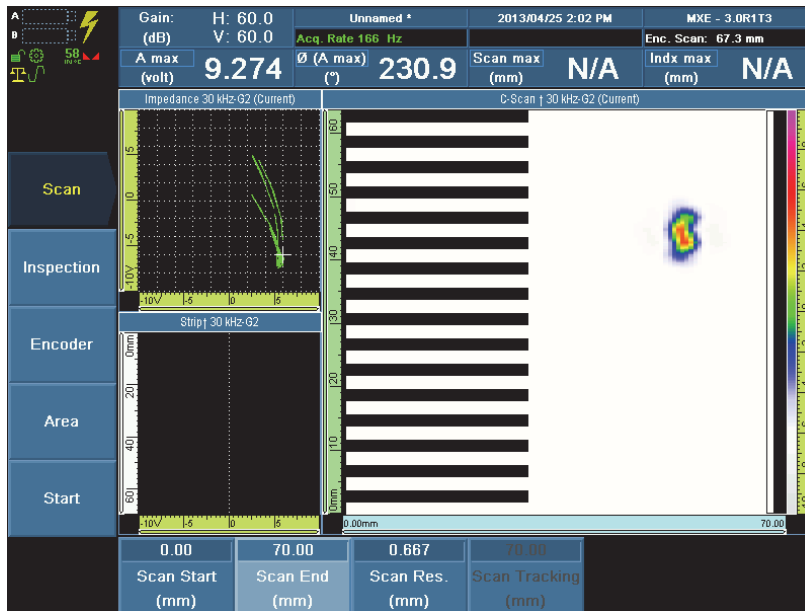


Figure 9-8 Setting the Scan End parameter for a 1:1 ratio in the C-scan view

For more information about setting the **Scan End** parameter appropriately to obtain a 1:1 ratio when displaying the data in the C-scan views, see section 12.4 on page 233.

- Scan the good fastener. In the impedance plane view, the good fastener's signal should be oriented vertically. If not, repeat steps 2.a to 2.e to orient both signals appropriately.

The second frequency for this mixing procedure is now configured. The next step is to mix the two frequencies to improve crack detection. For more information, see section 9.1.3 on page 151.

9.1.3 Mixing the Two Frequencies to Improve Crack Detection

The third step in the procedure for mixing the fastener signal to improve crack detection in ECA mode is to mix the two configured frequencies using the Mixing wizard.

To mix the two frequencies to improve crack detection

1. Select **Wizard > Mixing**.

The **Start** step activates the Mixing wizard (see Figure 9-9 on page 151).



Figure 9-9 The Start step commands

TIP

In the Mixing wizard, select **Back** to return to the previous step, or **Next** to go to the next step.

2. Select **Start**.

The **Mix Definition** step allows you to configure the two channels that are to be combined. For more information about the Mixing wizard, see section 15.7.1 on page 344.

Proceed as follows:

- a) Select **Group Reference = Freq 1**, and then press the Accept key to confirm. **Freq 1** contains the signal of the crack (the *keep* signal).
- b) Select **Group Subtraction = Freq 2**, and then press the Accept key to confirm. **Freq 2** contains the signal to be eliminated (better detection of the fastener as opposed to the crack).

- c) Select **Ref. Cal = Single**, and then press the Accept key to confirm (see Figure 9-10 on page 152).



Figure 9-10 Setting the Ref. Cal. parameter to Single

When the **Ref. Cal** parameter is set to **Single**, the mix coefficient is calculated from a single channel, and then the coefficient is applied to all channels in the group. For more information about the **Mix Definition** step, see section 15.7.1.2 on page 345.

3. Select **Next**.

The **Mix Acquisition** step allows you to configure the acquisition. For more information about the **Mix Acquisition** step, see section 15.7.1.3 on page 345.

- Select **Start**, and then scan the good fastener (see Figure 9-11 on page 153).

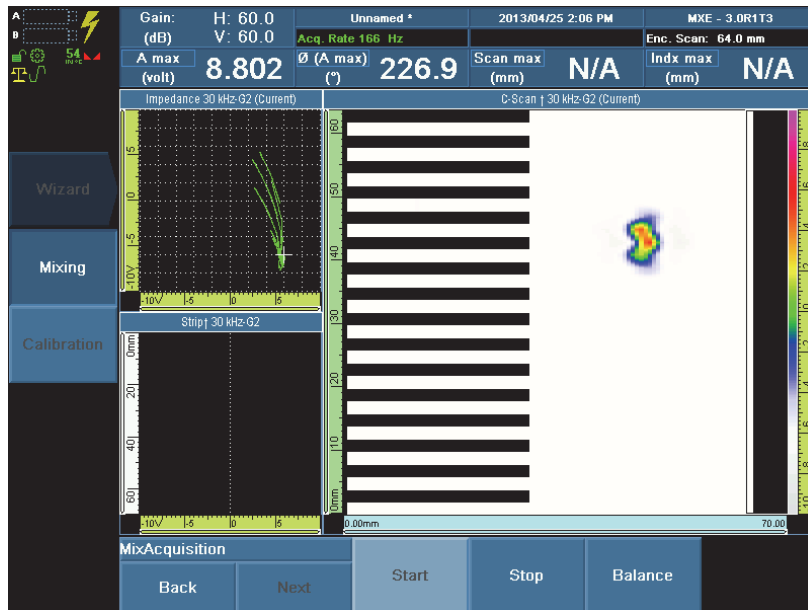


Figure 9-11 Scanning the good fastener in the Mix Acquisition step

- Select **Stop**.
The **Next** button becomes available.
- Select **Next**.
The **Mix and Finish** step allows for configuration of the scan start, scan length, and index start cursors that are used to define the data zone containing the defect for mixing, and it is also the step which finalizes the mixing procedure (see

Figure 9-12 on page 154). For more information about the **Mix and Finish** step, see section 15.7.1.4 on page 346.

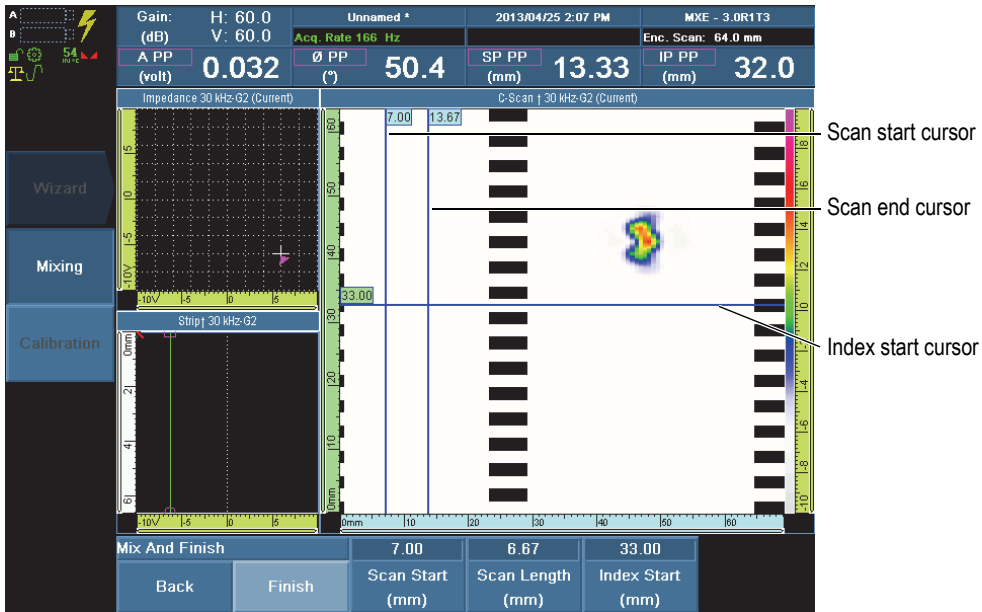


Figure 9-12 The Mix and Finish step

7. Configure the **Scan Start** parameter value to locate along the scan axis the beginning position of the data zone that contains the defect for mixing, and then press the Accept key to confirm. The scan start value should position the scan

start cursor before the defect, at a distance equal to the length of the defect (see Figure 9-13 on page 155).

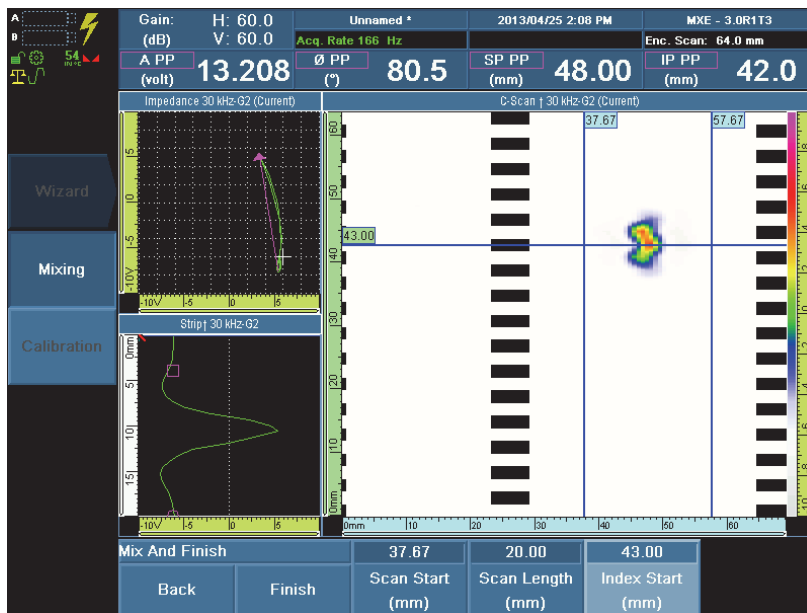


Figure 9-13 Positioning the measurement cursors in the Mix and finish step

8. Configure the **Scan Length** parameter value to define the length of the data zone that contains the defect for mixing, in relation to the **Scan Start** parameter value, and then press the Accept key to confirm. The scan length value should position the scan end cursor after the defect, at a distance equal to the length of the defect.
9. Configure the **Index Start** parameter value to locate the position of the index start cursor on the defect for mixing, along the index axis, and then press the Accept key to confirm. The index start value should position the index start cursor where the defect produces the strongest signal on the index axis.
10. Select **Finish**.

11. Scan the good fastener, and then the defective fastener on the calibration sample. The signal of both fasteners in the views should be weak (see Figure 9-13 on page 155).

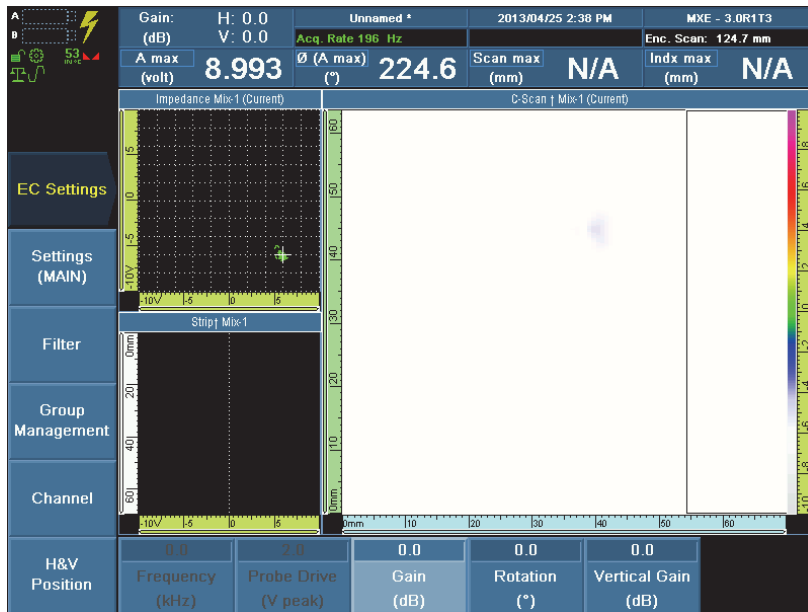


Figure 9-14 The signal resulting from mixing the frequency 1 and frequency 2 is weak

The two frequencies to improve crack detection are now mixed. The next step entails fine-tuning parameters in order to enhance the signal of the defect. For more information, see section 9.1.4 on page 156.

9.1.4 Fine-Tuning Parameters to Enhance the Signal of the Defect

This section is the fourth and final step in the fastener signal mixing procedure, aimed at improving crack detection in ECA mode. This step includes fine-tuning the gain, rotation, and vertical gain parameters to enhance the signal of the defect on the calibration sample.

Set the parameters according to the following criteria:

- Positioning the defective fastener signal vertically
- Positioning the good fastener residual signal horizontally

To fine-tune parameters to enhance the signal of the defect on the calibration sample

1. Select **EC Settings > Settings (MAIN) > Gain (dB)**, set the value to expand the signal to ensure that it spans approximately 6 grid divisions in the impedance plane view, and then press the Accept key to confirm. Typically, the **Gain (dB)** parameter value can be increased by 10 to 20 dB (see Figure 9-13 on page 155).

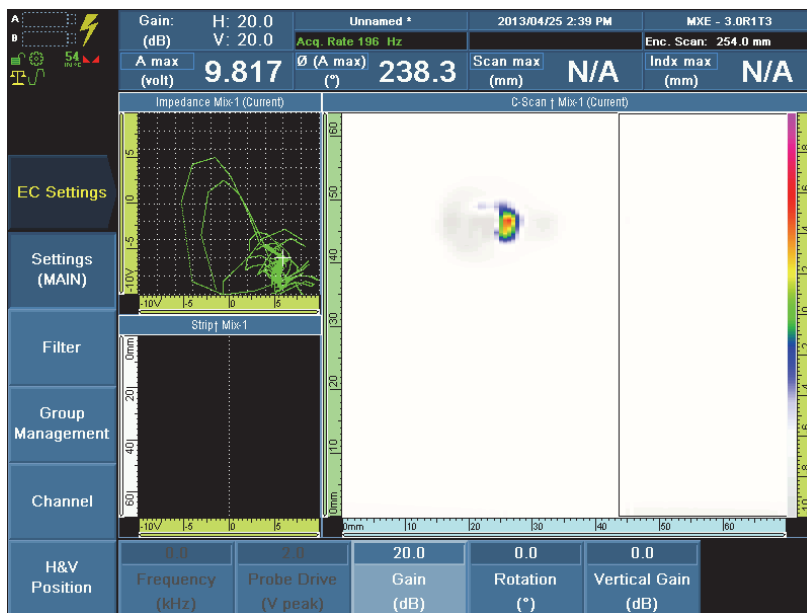


Figure 9-15 Fine-tuning the defect's signal to expand and rotate

2. Select **EC Settings > Settings (MAIN) > Rotation (°)**, set the value to vertically orient the defective fastener signal, and then press the Accept key to confirm. The good fastener's residual signal should be oriented horizontally.

3. Move the origin towards the center in the impedance plane view by using the **H&V Position** submenu parameters. Select **EC Settings > H&V Position > Gain (dB)**, and then change the parameters as follows (see Figure 9-13 on page 155):
 - **Horizontal Pos (%)** equals 50, and then press the Accept key to confirm.
 - **Vertical Pos (%)** equals 30, and then press the Accept key to confirm.

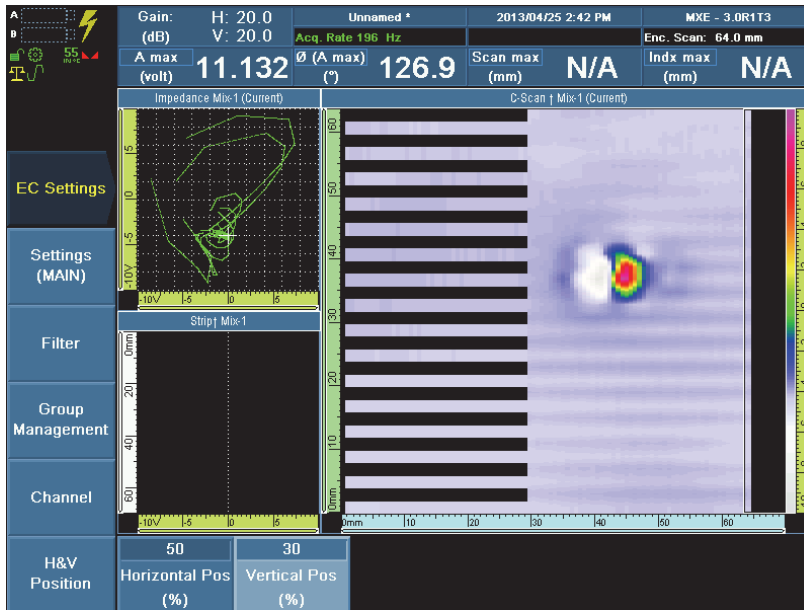


Figure 9-16 Moving the impedance plane view's origin using H&V Position submenu parameters

4. Select **EC Settings > Settings (MAIN) > Vertical Gain (dB)**, set the value to vertically increase the defective fastener signal, and then press the Accept key to confirm. The good fastener's residual signal should be oriented horizontally.

- Optimize the visualization of the defect in the C-scan view by changing the color palette. Select **Display > Color > Load Palette**, and then select the **A_Warning.pal** palette (see Figure 9-17 on page 159).

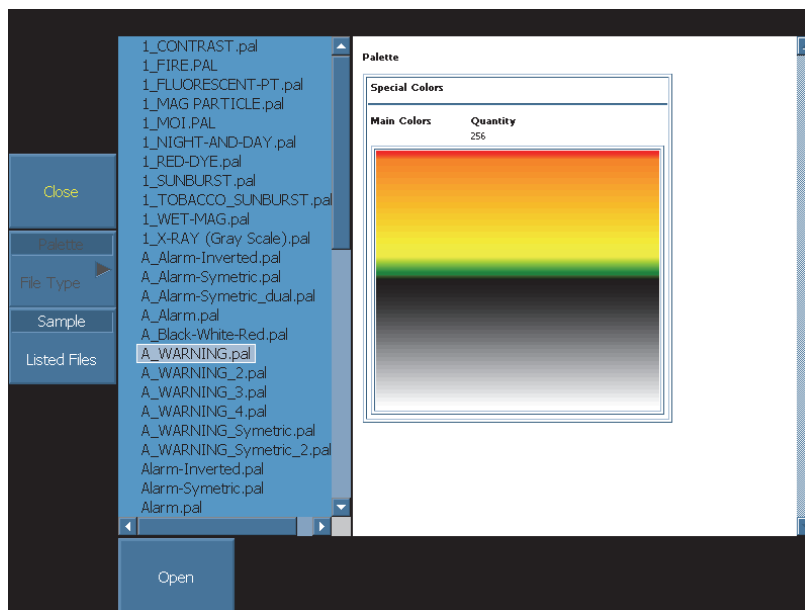


Figure 9-17 Loading the A_Warning.pal color palette

For more information about loading color palettes, see section 6.6.1 on page 123.

The A_Warning.pal palette has been designed to enhance acquisition data specifically for this type of inspection (see Figure 9-18 on page 160).

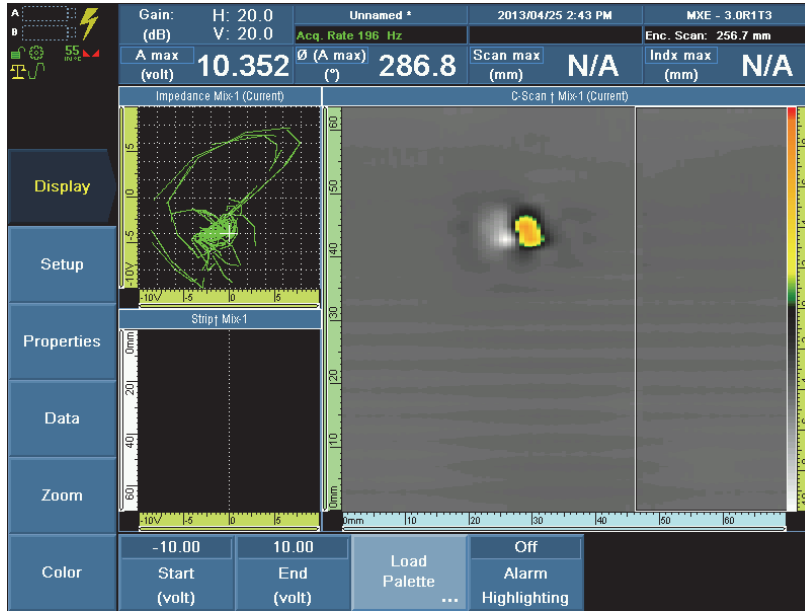


Figure 9-18 The defective fastener signal viewed using the A_Warning.pal palette

The procedure for mixing the fastener signal to improve crack detection in ECA mode is complete.

9.2 Mixing the Lift-Off Signal to Improve Corrosion Detection in ECA Mode

Including the Mixing wizard in the calibration procedure makes it very easy to mix the lift-off signal in order to improve corrosion detection between layers in ECA mode.

The following example provides the complete procedure, using the following pieces of equipment:

- Probe model SAA112-ENC (includes the probe model SAA-112-005-032 and an encoder)
- Sample CD-402040-B
This sample consists of two 2024-T3 aluminium 0.91 mm (0.036 in) sheets, with a strip of tape on one of the sheets to measure lift-off.

The general procedure to mix the fastener signal is divided into five main subsections, or steps, each of which a complete procedure. These procedures are to be performed in the following sequence.

To mix the lift-off signal to improve corrosion detection between layers in ECA mode

1. Add a frequency that detects the type of corrosion to inspect.
For more information, see section 9.2.1 on page 161.
2. Add a frequency that detects the lift-off of the probe.
Usually, that frequency is 3 times the configured frequency for corrosion detection. For more information, see section 9.2.2 on page 165.
3. Activate the probe encoder.
For more information, see section 9.2.3 on page 168.
4. Mix the two frequencies to improve corrosion detection.
For more information, see section 9.2.4 on page 172.
5. Fine-tune parameters to enhance the signal of the defective fastener.
For more information, see section 9.2.5 on page 177.

9.2.1 Configuring a Frequency that Detects the Type of Corrosion Targeted by the Inspection

The first step in the procedure for mixing the lift-off signal to improve corrosion detection in ECA mode is to configure a frequency that detects the type of corrosion targeted by the inspection.

To configure a frequency that detects the targeted type of corrosion

1. Connect the probe-encoder model SAA112-ENC to the OmniScan MX instrument. For more information, see section 1.1 on page 19.



2. Press the Accept key.
The probe is detected and its configuration loaded.
3. Select **Display > Data > Imped. Persistency**, set the scan persistence to a value of **5.0**, and then press the Accept key to confirm.
4. Select **Display > Setup > Acquisition = CSI C-Scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
5. Configure the first frequency. Select **EC Settings > Settings (MAIN)**, and then adjust the **Frequency (kHz)**, **Rotation (°)**, and **Gain (dB)** parameters.

Set the parameters according to the following criteria:

- Obtaining optimal tape signal amplitude without saturation
- Positioning the fastener signal horizontally, and the tape signal vertically

Proceed as follows:



- a) Press the Set Balance key to balance the signal.
- b) Scan the tape on the calibration sample.

- c) Select **Frequency (kHz)**, set the value to optimize the detection of sub-surface corrosion, and then press the Accept key to confirm. In this example, the **Frequency (kHz)** value is set to 10.0 (see Figure 9-19 on page 163).

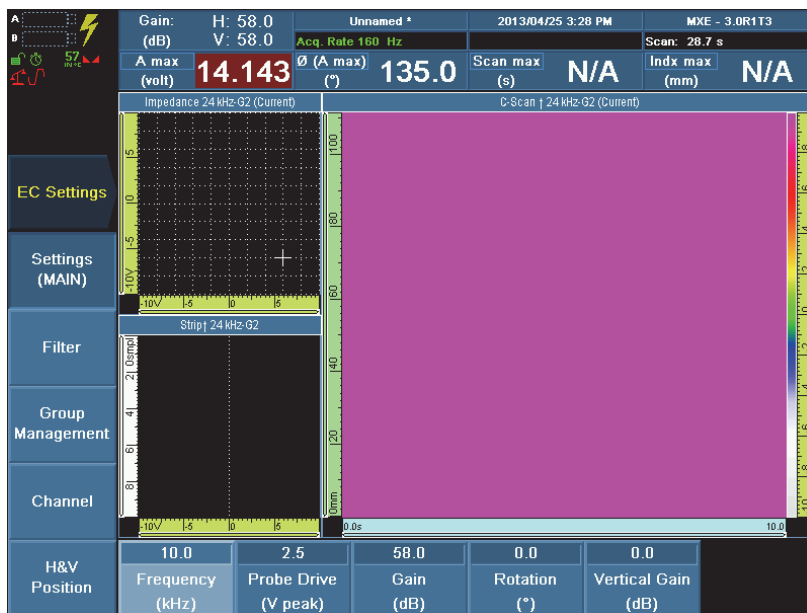


Figure 9-19 Configuring the Frequency and Gain parameters for mixing frequency 1

- d) Select **Gain (dB)**, set the value to expand the signal to ensure that it spans approximately 6 grid divisions in the impedance plane view, and then press

the Accept key to confirm. In this example, the **Gain (dB)** value is set to 68.0 (see Figure 9-20 on page 164).

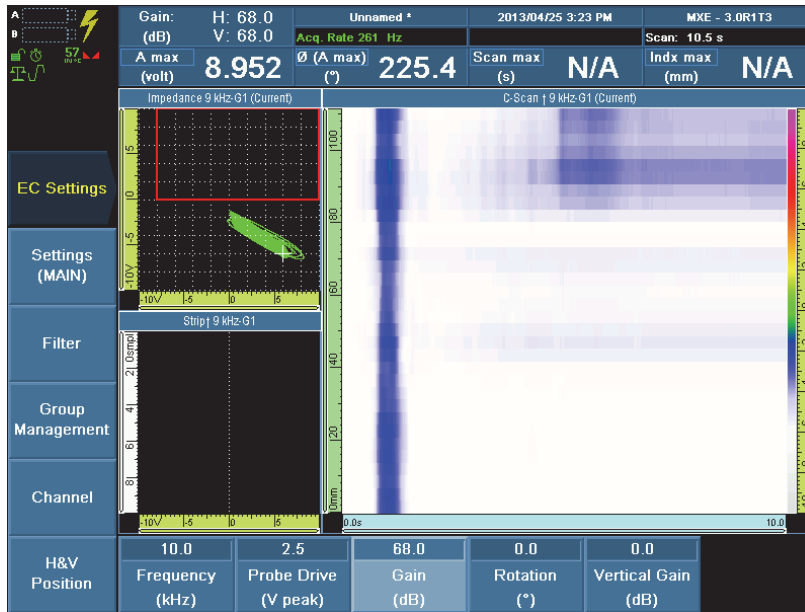


Figure 9-20 Configuring the Gain parameter for mixing frequency 1

NOTE

Evident advises against configuring the vertical gain parameter for frequency 1 or frequency 2 when following the mixing frequency procedures.

- e) Select **Rotation** (°), set the value to orient the signal horizontally. In this example, the **Rotation** (°) value is set to 320.0, and then press the Accept key to confirm (see Figure 9-21 on page 165).

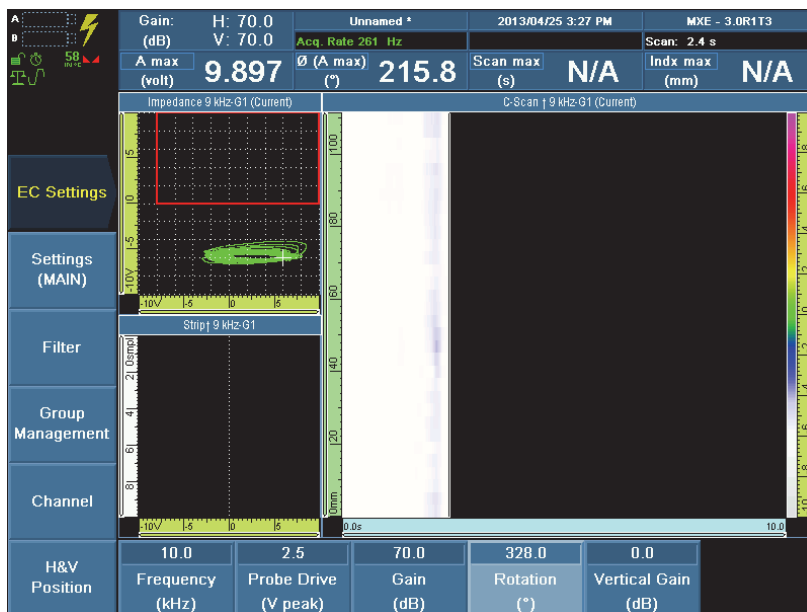


Figure 9-21 Rotation parameter set to orient the signal horizontally

- Scan a defect-free portion of the calibration sample, and then scan the portion that contains the corrosion defects.

In the impedance plane view, the signal of the lift-off generated from the portion of the sample that is defect-free should be oriented horizontally in the impedance plane view, and the defect signal should be oriented vertically. If not, repeat steps 5.a to 5.e to orient both signals appropriately.

The first frequency for this mixing procedure is now configured. The next step is to configure the second frequency. For more information, see section 9.2.2 on page 165.

9.2.2 Adding a Frequency for Lift-Off Detection

The second step in the procedure for mixing the lift-off signal to improve corrosion detection in ECA mode adds a frequency that detects the lift-off on the parts to inspect.

To add a second frequency that detects the lift-off on the parts to inspect

1. Select **EC Settings > Group Management > Add Group = Freq-2**, and then press the Accept key to confirm.

The names of the views should now all end with **G2 (Current)**.

2. Configure the second frequency. Select **EC Settings > Settings (MAIN)**, and then adjust the **Frequency (kHz)**, **Rotation (°)**, and **Gain (dB)** parameters.

Set the parameters according to the following criteria:

- Obtaining optimal lift-off signal amplitude without saturation
- Positioning the lift-off signal vertically

Proceed as follows:




- a) Press the Set Balance key  to balance the signal.
- b) Scan both the defect-free portions of the calibration sample, as well as the portion that contains the corrosion defects.
- c) Select **Frequency (kHz)**, set the value to three times the frequency set for the first frequency ($\text{Freq-1} \times 3$), or to the maximum **Frequency (kHz)** parameter value available, and then press the Accept key to confirm. In this example, the **Frequency (kHz)** value is set to 24.9 (see Figure 9-22 on page 167).



Figure 9-22 Configuring the Frequency and Gain parameters for mixing frequency 2

- d)* Select **Gain (dB)**, set the value to expand the signal, ensuring that it spans approximately 6 grid divisions in the impedance plane view, and then press the Accept key to confirm. In this example, the **Gain (dB)** value is set to **58.0**.

NOTE

Evident advises against configuring the vertical gain parameter for frequency 1 or frequency 2 when following the mixing frequency procedures.

- e) Select **Rotation** ($^{\circ}$), set the value to orient the signal vertically, and then press the Accept key to confirm. In this example, the **Rotation** ($^{\circ}$) value is set to **10.0** (see Figure 9-23 on page 168).

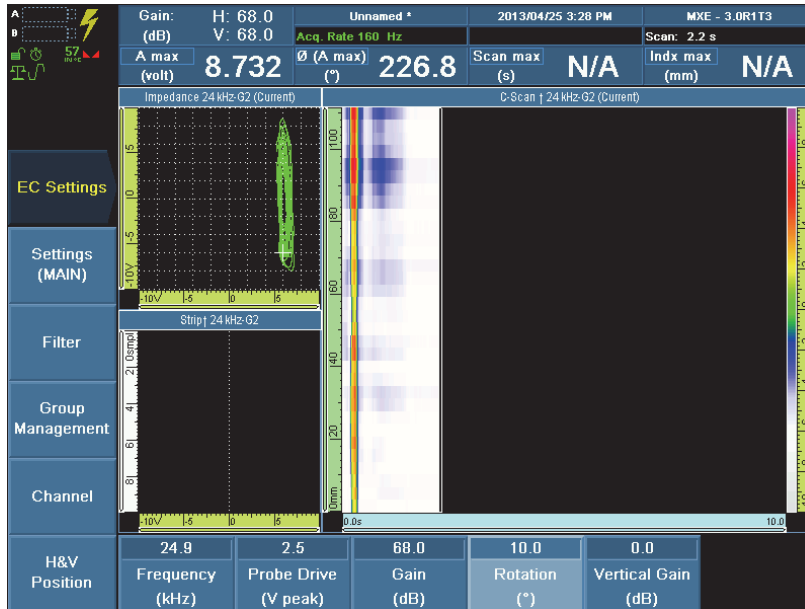


Figure 9-23 Configuring the Rotation parameter for mixing frequency 2

The second frequency for this mixing procedure is now configured. The next step is to activate the probe's encoder. For more information, see section 9.2.3 on page 168.

9.2.3 Activating the Probe Encoder

The third step in the procedure for mixing the lift-off signal to improve corrosion detection in ECA mode entails activating the probe's encoder.

To activate the probe encoder

1. Select **Scan > Inspection > Time = Encoder 1**, and then press the Accept key to confirm (see Figure 9-24 on page 169).

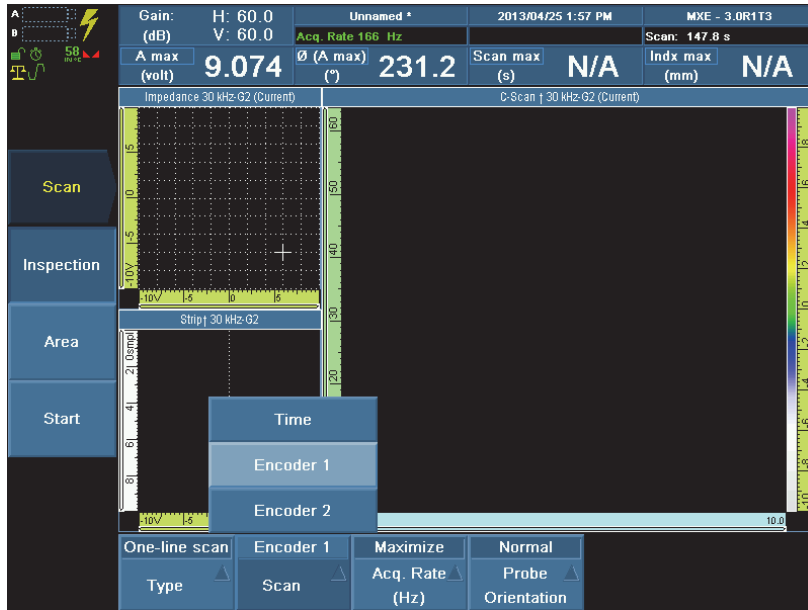


Figure 9-24 Activating the probe's encoder

- Set the encoder to Continuous mode. Select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm (see Figure 9-25 on page 170).

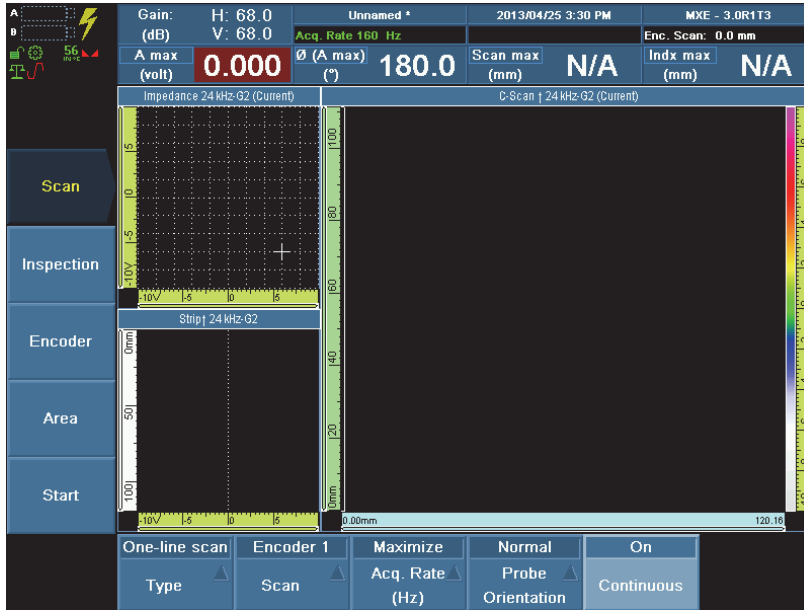


Figure 9-25 Setting the probe encoder to Continuous mode

- Set the **Scan End** parameter to display the data in the C-scan views with a 1:1 ratio between the scan axis and the index axis. Select **Scan > Area > Scan End**,

enter a value of **120.0**, and then press the Accept key to confirm (see Figure 9-26 on page 171).

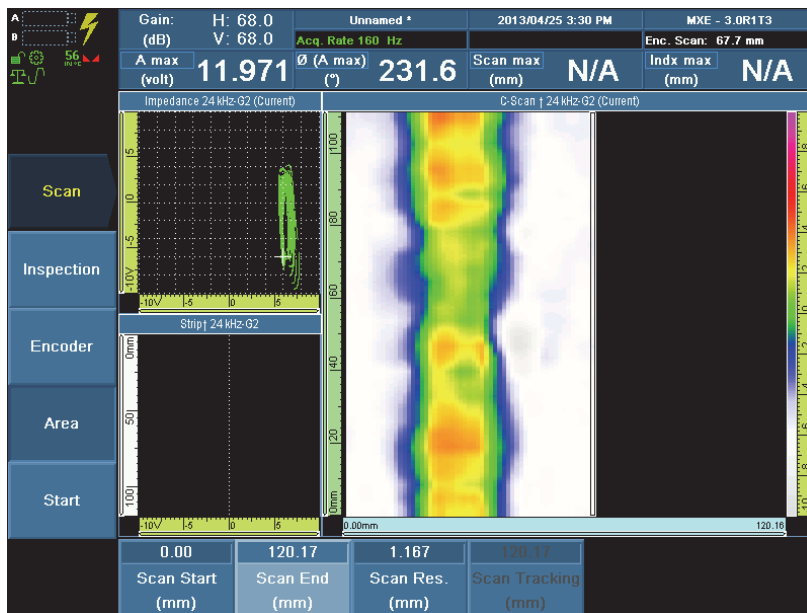



Figure 9-26 Setting the Scan End parameter for a 1:1 ratio in the C-scan view

For more information about setting the **Scan End** parameter in order to obtain a 1:1 ratio when displaying the data in the C-scan view, see section 12.4 on page 233.

4. Press the Set Balance key  to balance the signal.
5. Scan the tape. In the impedance plane view, the tape's signal should be oriented vertically. If not, repeat steps 2.a to 2.e to orient the signal appropriately.

The second frequency for this mixing procedure is now configured. The next step is to mix the two frequencies to improve corrosion detection. For more information, see section 9.1.3 on page 151.

9.2.4 Mixing the Two Frequencies to Improve Corrosion Detection

The third step in the procedure for mixing the lift-off signal to improve corrosion detection in ECA mode is to mix the two configured frequencies using the Mixing wizard.

To mix the two frequencies to improve corrosion detection

1. Select **Wizard > Mixing**.

The **Start** step activates the Mixing wizard (see Figure 9-27 on page 172).



Figure 9-27 The Start step parameters

TIP

In the Mixing wizard, select **Back** to return to the previous step, or **Next** to go to the next step.

2. Select **Start**.

The **Mix Definition** step allows you to configure the two channels that are to be combined (see Figure 9-28 on page 173). For more information about the Mixing wizard, see 15.7.1 on page 344.

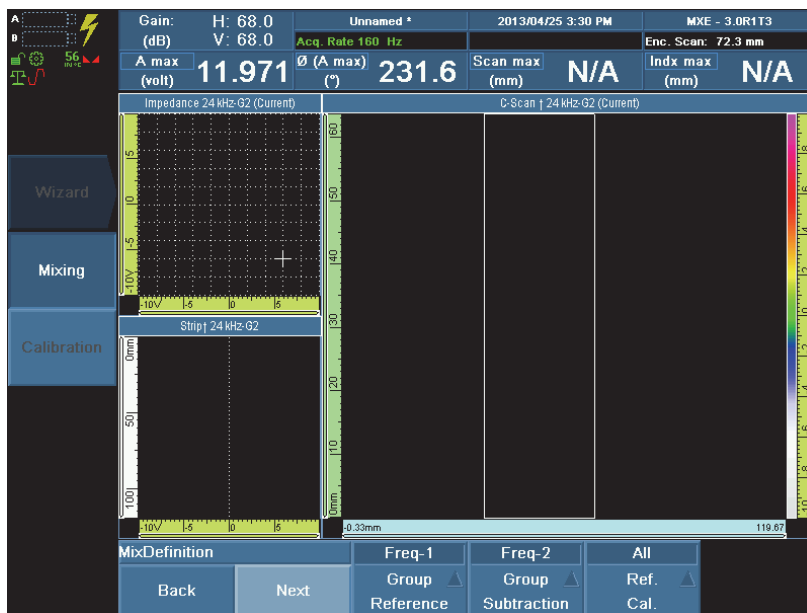


Figure 9-28 The MixDefinition step

Proceed as follows:

- Select **Group Reference = Freq 1**, and then press the Accept key to confirm. **Freq 1** contains the best corrosion signal (the keep signal).
- Select **Group Subtraction = Freq 2**, and then press the Accept key to confirm. **Freq 2** contains the best lift-off signal.
- Select **Ref. Cal = All**, and then press the Accept key to confirm.

When the **Ref. Cal** parameter is set to **All**, the mix coefficient is calculated independently for each channel. For more information about the **Mix Definition** step, see section 15.7.1.2 on page 345.

3. Select **Next**.

The **Mix Acquisition** step allows you to configure the acquisition. For more information about the **Mix Acquisition** step, see section 15.7.1.3 on page 345.

4. Select **Start**, and then scan the tape (see Figure 9-29 on page 174).

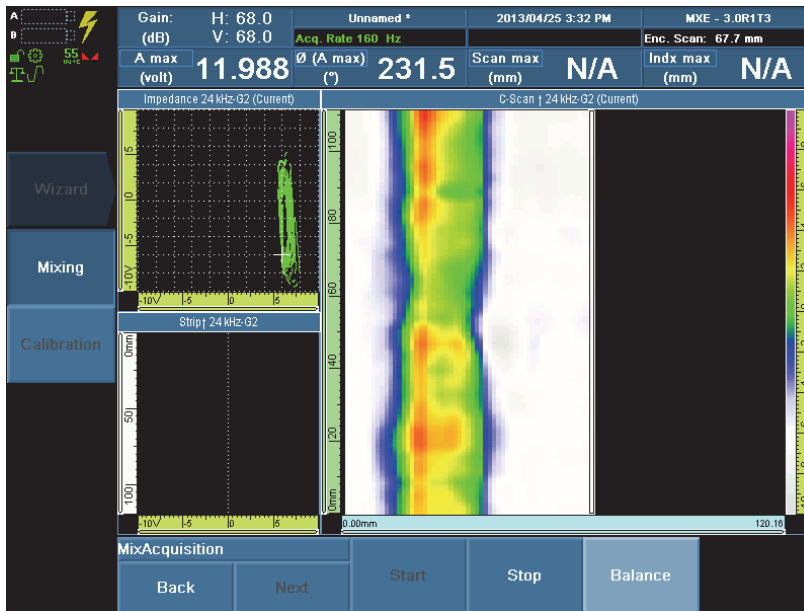


Figure 9-29 Scanning the good fastener in the Mix Acquisition step

5. Select **Stop**.
The **Next** button becomes available.
6. Select **Next**.
The **Mix and Finish** step allows the configuration of the scan start and scan length cursors that are used to define the data zone containing the defect for mixing, and

it also finalizes the mixing procedure (see Figure 9-30 on page 175). For more information about the **Mix and Finish** step, see section 15.7.1.4 on page 346.

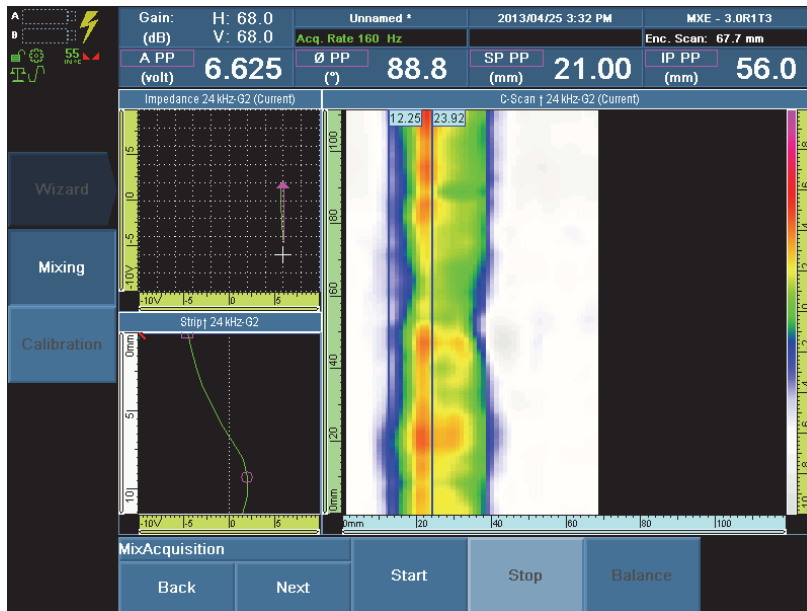


Figure 9-30 The Mix and Finish step

7. Configure the **Scan Start** parameter value to locate along the scan axis the beginning position of the data zone that contains the tape for mixing, and then press the Accept key to confirm. The scan start value should position the scan

start cursor before the tape, at a distance that is free of the lift-off signal generated by the tape (see Figure 9-31 on page 176).

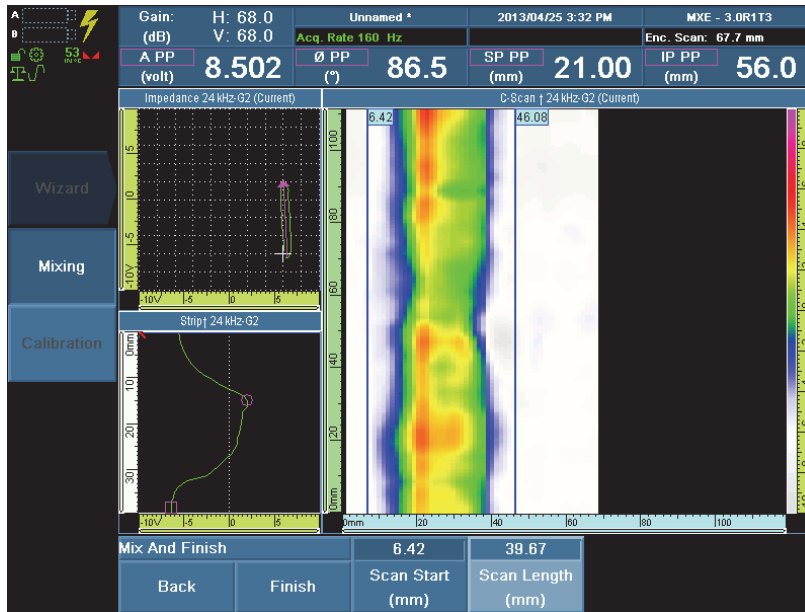


Figure 9-31 Positioning the measurement cursors in the Mix and Finish step

8. Configure the **Scan Length** parameter value to define the length of the data zone that contains the tape for mixing, in relation to the **Start Scan** parameter value, and then press the Accept key to confirm. The scan length value should position the scan end cursor after the tape, at a distance that is free of the lift-off signal generated by the tape.
9. Select **Finish**.



10. Press the Set Balance key **CLR 0** to balance the signal.

11. Scan the corrosion defects on the calibration sample.

The signals of the corrosion defects in the views should be weak (see Figure 9-32 on page 177).

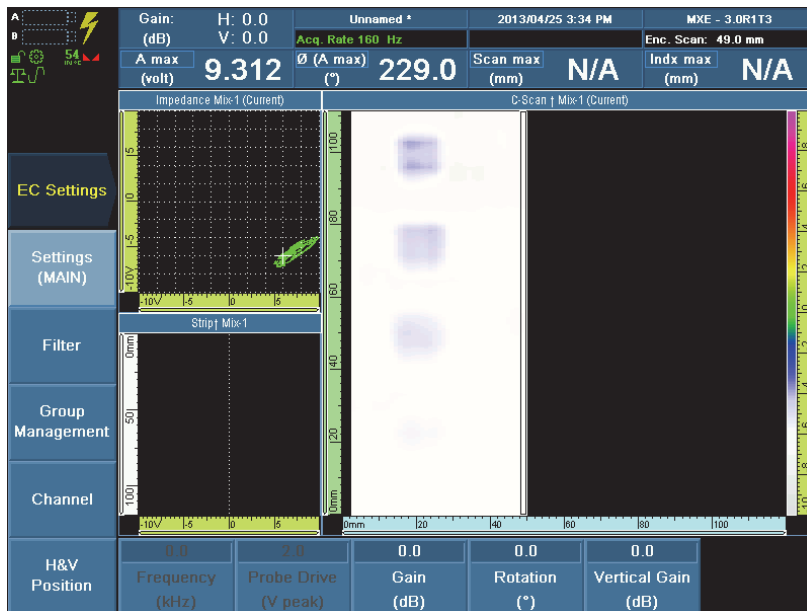


Figure 9-32 The signal resulting from mixing the frequency 1 and frequency 2 is weak

The two frequencies to improve corrosion detection are now mixed. The next step is to fine-tune certain parameters in order to enhance the signal of the defect. For more information, see section 9.2.5 on page 177.

9.2.5 Fine-Tuning Parameters to Enhance the Signal of the Defect

The fifth and final step in the procedure for mixing the lift-off signal to improve corrosion detection in ECA mode entails fine-tuning the gain, rotation, and vertical gain parameters to enhance the signals of the corrosion defects in the calibration sample.

Set the parameters according to the following criteria:

- Positioning the corrosion defect signals vertically
- Adjusting the C-scan signals so that each corrosion depth is displayed in a different color

To fine-tune parameters to enhance the signal of the defect on the calibration sample

1. Select **EC Settings > Settings (MAIN) > Gain (dB)**, set the value to expand the signal, ensuring that it spans approximately 6 grid divisions in the impedance plane view, and then press the Accept key to confirm. Typically, the **Gain (dB)** parameter value can be increased by 10 dB to 20 dB (see Figure 9-33 on page 178).

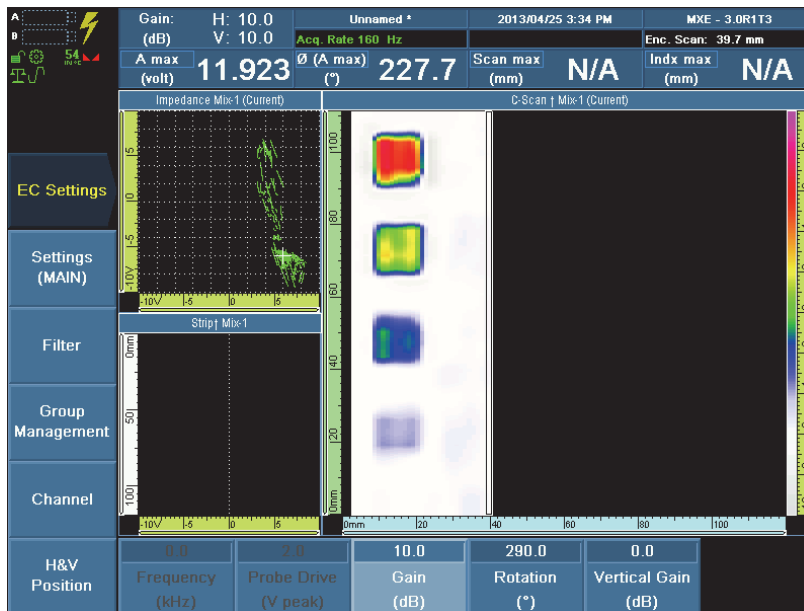


Figure 9-33 Fine-tuning the defect's signal to expand and rotate

2. Select **EC Settings > Settings (MAIN) > Rotation (°)**, set the value to vertically orient the corrosion defect signals, and then press the Accept key to confirm.
3. Select **EC Settings > Settings (MAIN) > Vertical Gain (dB)**, set the value to vertically increase the corrosion signals, and then press the Accept key to confirm. The tape's residual lift-off signal should be oriented horizontally.

The procedure for mixing the lift-off signal to improve corrosion detection in ECA mode is complete.

9.3 Mixing the Fastener Signal to Improve Crack Detection in ECT Mode

Including the Mixing wizard in the calibration procedure makes it very easy to mix the fastener signal to improve crack detection in ECT mode.

The following example provides the complete procedure, using the following pieces of equipment:

- Probe model Nortec SPO-3806 sliding probe
- Cable CROS-TF-6
- Sample RSDT-10125

This sample consists of two 2024-T3 aluminium 0.91 mm (0.036 in) sheets.

The general procedure to mix the fastener signal is divided into four main subsections, or steps, each of which a complete procedure. These procedures are to be performed in the following sequence.

To mix the fastener signal to improve crack detection in ECT mode

1. Add a frequency that detects the type of crack to inspect.
For more information, see section 9.3.1 on page 180.
2. Add a frequency that detects the fasteners on the parts to inspect.
Usually, that frequency is 3 times the configured frequency for crack detection.
For more information, see section 9.3.2 on page 183.
3. Mix the two frequencies to improve crack detection.
For more information, see section 9.3.3 on page 185.
4. Fine-tune parameters to enhance the signal of the defective fastener.
For more information, see section 9.3.4 on page 189.

9.3.1 Configuring a Frequency that Detects the Type of Crack Targeted for Inspection

The first step in the procedure for mixing the fastener signal to improve crack detection in ECT mode entails configuring a frequency that detects the type of crack targeted for inspection.

To configure a frequency that detects the type of crack targeted for inspection

1. Connect the probe model Nortec SPO-3806 to the OmniScan MX instrument. For more information, see section 1.1 on page 19.



2. Press the Accept key.
The probe is detected and its configuration loaded.
3. Select the probe. Select **Probe & Part > Settings > Select Probe = Universal 1-Channel**, and then press the Accept key to confirm (see Figure 9-34 on page 180).



Figure 9-34 Selecting the probe for mixing in ECT mode


4. Configure the first frequency. Select **EC Settings > Settings (MAIN)**, and then adjust the **Frequency (kHz)**, **Rotation (°)**, and **Gain (dB)** parameters.

Set the parameters according to the following criteria:

- Obtaining optimal fastener signal amplitude without saturation
- Positioning the fastener signal horizontally, and the crack signal vertically

Proceed as follows:



- Press the Set Balance key  to balance the signal.
- Scan the good fastener.
- Select **Frequency (kHz)**. In this example, the **Frequency (kHz)** value is set to 10.0 (see Figure 9-35 on page 181).

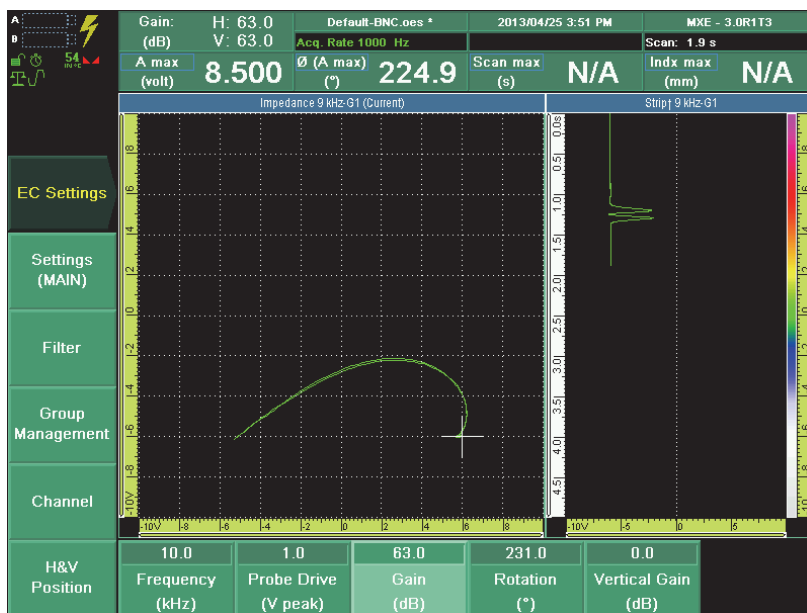


Figure 9-35 Configuring the Frequency, Gain, and Rotation parameters for mixing frequency 1

- Select **Gain (dB)**, set the value to expand the signal, ensuring that it spans approximately 6 grid divisions in the impedance plane view, and then press

the Accept key to confirm. In this example, the **Gain (dB)** value is set to 63.0 (see Figure 9-35 on page 181).

NOTE

Evident advises against configuring the vertical gain parameter for frequency 1 or frequency 2 when following the mixing frequency procedures.

- e) Select **Rotation (°)**, set the value to orient the signal horizontally, and then press the Accept key to confirm. In this example, the **Rotation (°)** value is set to 231.0.
5. Scan the good fastener, and then the defective fastener. In the impedance plane view, the good fastener's signal should be oriented horizontally, and the defective fastener signal should be oriented vertically (see Figure 9-36 on page 182). If not, repeat steps 5.a to 5.e to orient both signals appropriately.

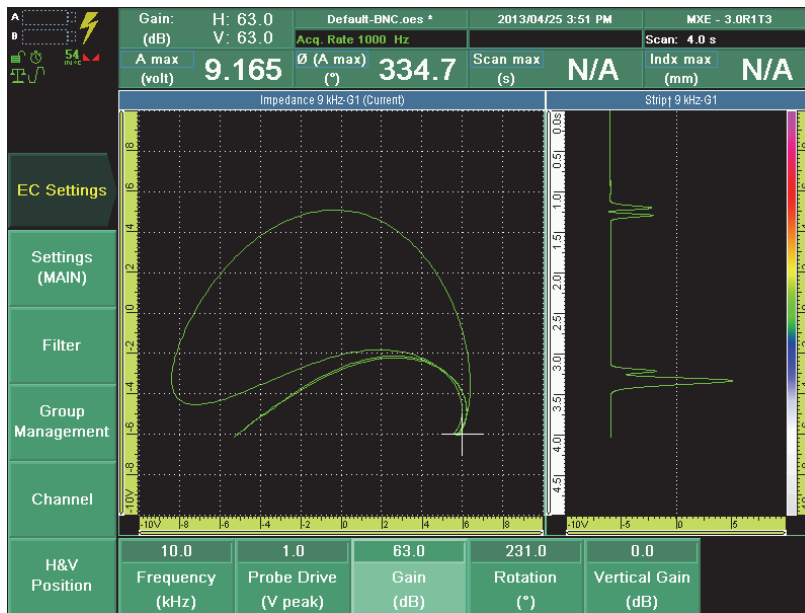


Figure 9-36 The defective fastener's signal using mixing frequency 1

The first frequency for this mixing procedure is now configured. The next step is to configure the second frequency. For more information, see section 9.3.2 on page 183.

9.3.2 Adding a Frequency that Detects the Fasteners on the Parts to Inspect

The second step in the procedure for mixing the fastener signal to improve crack detection in ECT mode entails adding a frequency that detects the fasteners on the parts to inspect.

To add a second frequency that detects the fasteners on the parts to inspect

1. Select **EC Settings > Group Management > Add Group = Freq-2**, and then press the Accept key to confirm (see Figure 9-37 on page 183).

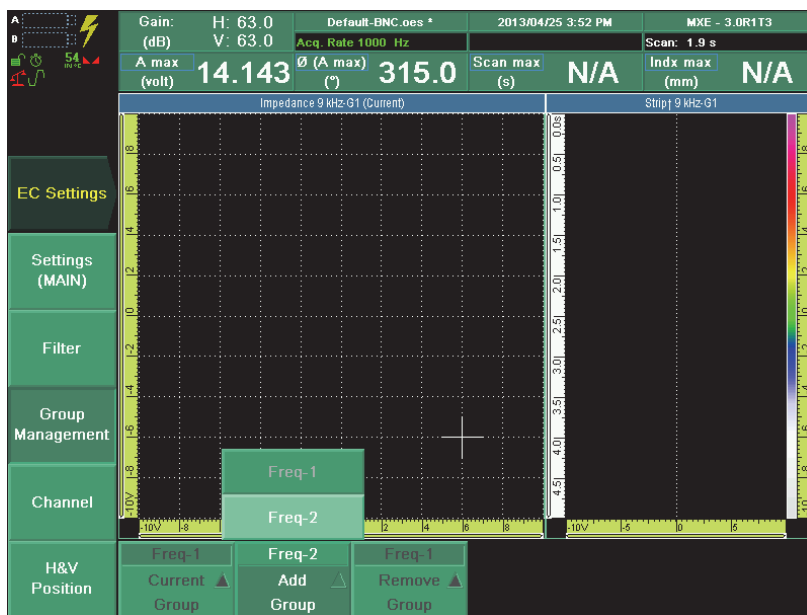


Figure 9-37 Setting the current group to frequency 2

The names of the views should now all end with **G2 (Current)**.


2. Configure the second frequency. Select **EC Settings > Settings (MAIN)**, and then adjust the **Frequency (kHz)**, **Rotation (°)**, and **Gain (dB)** parameters.

Set the parameters according to the following criteria:

- Obtaining optimal fastener signal amplitude without saturation
- Positioning the fastener signal vertically

Proceed as follows:



- a) Press the Set Balance key  to balance the signal.
- b) Scan the good fastener.
- c) Select **Frequency (kHz)**, set the value to three times the frequency set for the first frequency ($\text{Freq-1} \times 3$), and then press the Accept key to confirm. In this example, the **Frequency (kHz)** value is set to 30.0 (see Figure 9-38 on page 184).

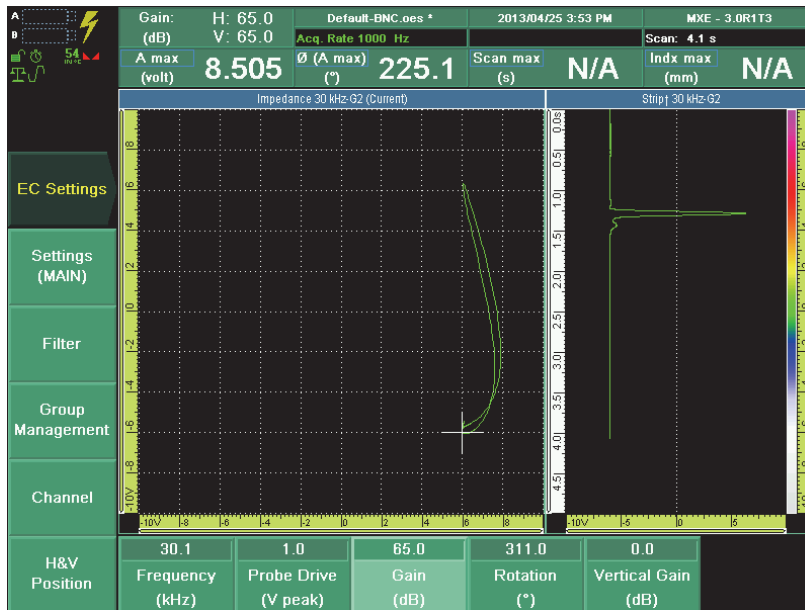


Figure 9-38 Configuring the Frequency parameter for mixing frequency 2


- d) Select **Gain (dB)**, set the value to expand the signal, ensuring that it spans approximately 6 grid divisions in the impedance plane view, and then press the Accept key to confirm. In this example, the **Gain (dB)** value is set to 65.0.

NOTE

Evident advises against configuring the vertical gain parameter for frequency 1 or frequency 2 when following the mixing frequency procedures.

- e) Select **Rotation (°)**, set the value to orient the signal vertically, and then press the Accept key to confirm. In this example, the **Rotation (°)** value is set to 311.0.



3. Press the Set Balance key  to balance the signal.
4. Scan the good fastener. In the impedance plane view, the good fastener's signal should be oriented vertically. If not, repeat steps 2.a to 2.e to orient the signal appropriately.

The second frequency for this mixing procedure is now configured. The next step is to mix the two frequencies to improve crack detection. For more information, see section 9.3.3 on page 185.

9.3.3 Mixing the Two Frequencies to Improve Crack Detection

The third step in the procedure for mixing the fastener signal to improve crack detection in ECT mode is to mix the two configured frequencies using the Mixing wizard.

To mix the two frequencies to improve crack detection

1. Select **Wizard > Mixing**.

The **Start** step activates the Mixing wizard (see Figure 9-39 on page 185).



Figure 9-39 The Start step parameters

TIP

In the Mixing wizard, select **Back** to return to the previous step, or **Next** to go to the next step.

2. Select **Start**.

The **Mix Definition** step allows you to configure the two channels that are to be combined (see Figure 9-40 on page 186). For more information about the Mixing wizard, see section 15.7.1 on page 344.

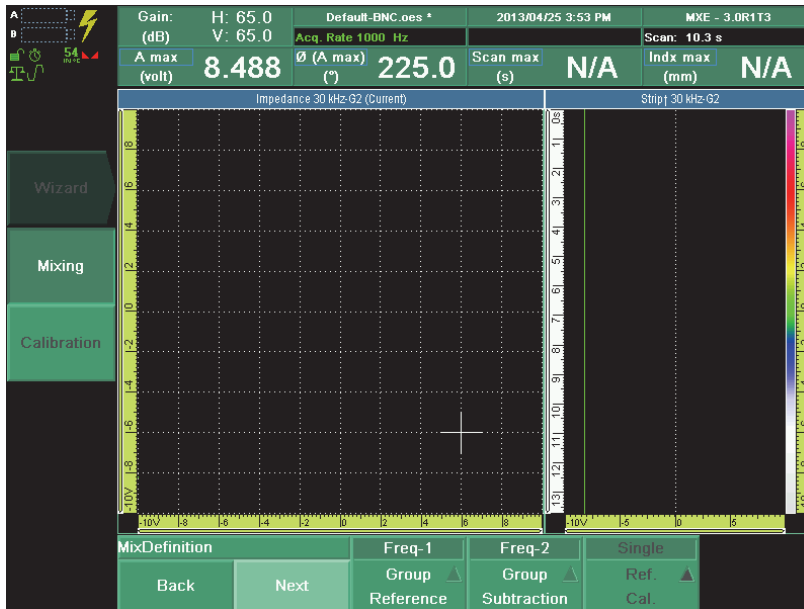


Figure 9-40 Setting the frequencies for group reference and group subtraction

Proceed as follows:

- a) Select **Group Reference = Freq 1**, and then press the Accept key to confirm. **Freq 1** contains the best detection of the sub-surface crack signal (the *keep* signal).

- b) Select **Group Subtraction = Freq 2**, and then press the Accept key to confirm. **Freq 2** contains the best detection of the good fastener as opposed to the crack signal.
3. Select **Next**.
The **Mix Acquisition** step allows to configure the acquisition. For more information about the **Mix Acquisition** step, see section 15.7.1.3 on page 345.
4. Select **Start**, and then scan the good fastener (see Figure 9-41 on page 187).

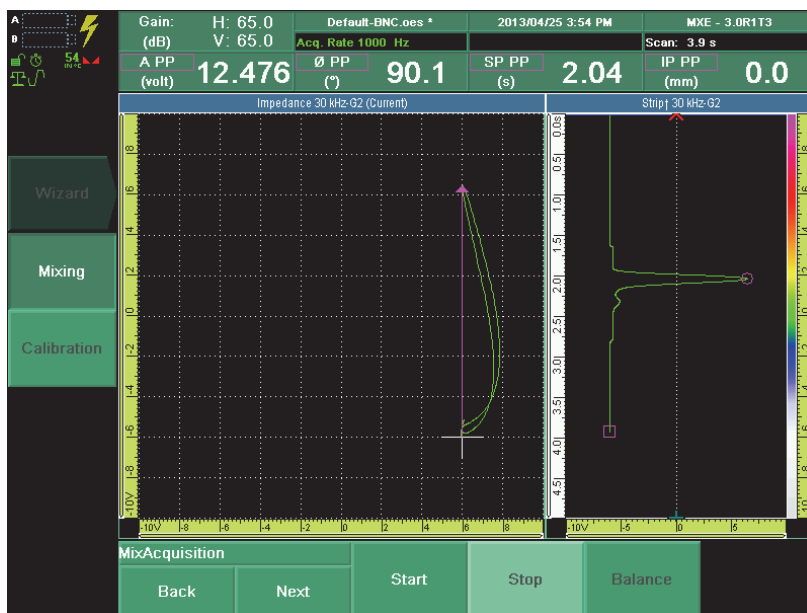


Figure 9-41 Scanning the good fastener in the Mix Acquisition step

5. Select **Stop**.
The **Next** button becomes available.
6. Select **Next**.
The **Mix and Finish** step allows for the configuration of the scan start, scan length, and index start cursors used to select the data zone containing the defect for mixing, and it also finalizes the mixing procedure. For more information about the **Mix and Finish** step, see section 15.7.1.4 on page 346.
7. Configure the **Scan Start** parameter value to locate along the scan axis the beginning position of the data zone that contains the defect for mixing, and then

press the Accept key to confirm. The scan start value should position the scan start cursor before the defect, at a distance equal to the length of the defect (see Figure 9-42 on page 188).



Figure 9-42 Positioning the measurement cursors in the Mix and Finish step

8. Configure the **Scan Length** parameter value to define the length of the data zone containing the defect for mixing, in relation to the **Start Scan** parameter value, and then press the Accept key to confirm. The scan length value should position the scan end cursor after the defect, at a distance equal to the length of the defect.
9. Configure the **Index Start** parameter value to locate the position of the index start cursor on the defect for mixing, along the index axis, and then press the Accept key to confirm. The index start value should position the index start cursor where the defect produces the strongest signal on the index axis.
10. Select **Finish**.



11. Press the Set Balance key  to balance the signal.

12. Scan the good fastener, and then the defective fastener on the calibration sample. The signal of both fasteners in the views should be weak (see Figure 9-43 on page 189).

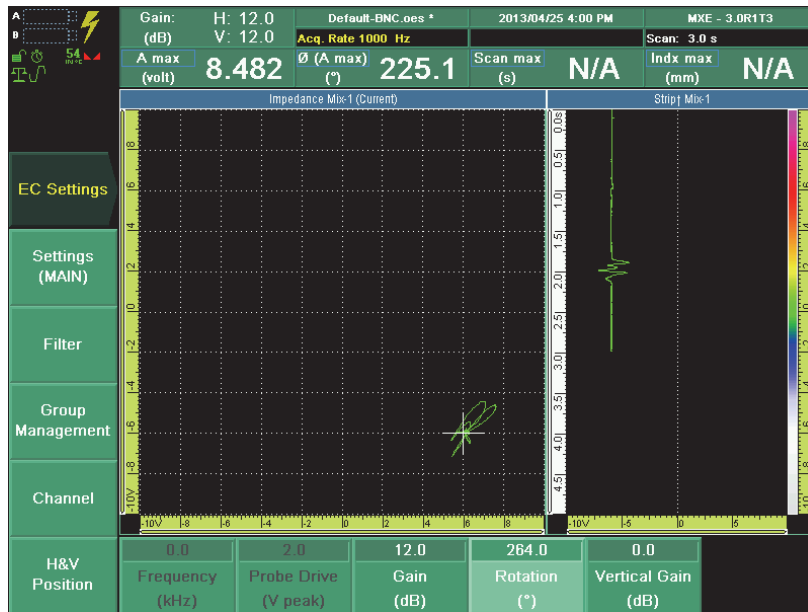


Figure 9-43 The signal resulting from mixing the frequency 1 and frequency 2 is weak

The two frequencies to improve crack detection are now mixed. The next step is to fine-tune certain parameters in order to enhance the signal of the defect. For more information, see section 9.1.4 on page 156.

9.3.4 Fine-Tuning Parameters to Enhance the Signal of the Defect

This section details the fourth and final step in the procedure for mixing the fastener signal to improve crack detection in ECA mode. This step includes procedures for fine-tuning the gain, rotation, and vertical gain parameters in order to enhance the signal of the defect on the calibration sample.

Set the parameters according to the following criteria:

- Position the defective fastener signal vertically
- Position the good fastener residual signal horizontally

To fine-tune parameters to enhance the signal of the defect on the calibration sample

1. Select **EC Settings > Settings (MAIN) > Gain (dB)**, set the value to expand the signal, ensuring that it spans approximately 6 grid divisions in the impedance plane view, and then press the Accept key to confirm. Typically, the **Gain (dB)** parameter value can be increased by 10 to 20 dB (see Figure 9-44 on page 190).

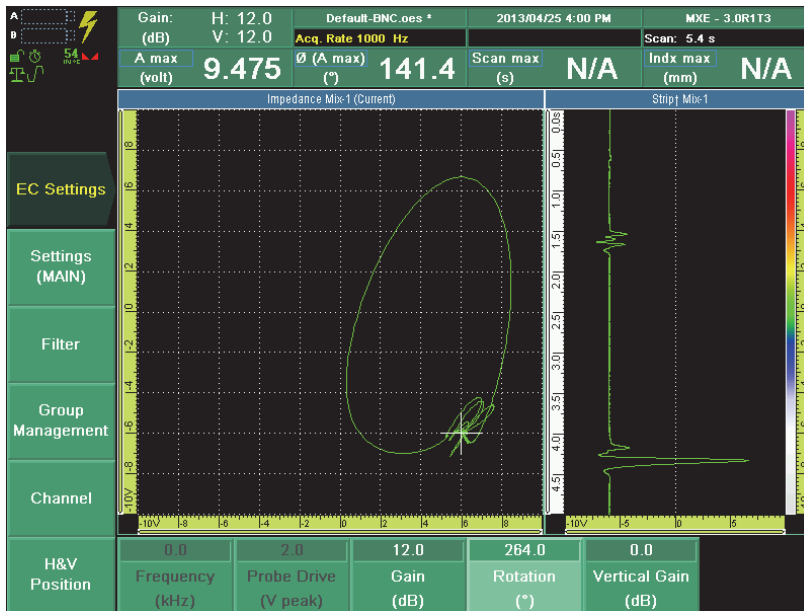


Figure 9-44 Fine-tuning the defect's signal to expand and rotate

2. Select **EC Settings > Settings (MAIN) > Rotation (°)**, set the value to vertically orient the defective fastener signal, and then press the Accept key to confirm. The good fastener's residual signal should be oriented horizontally.

The procedure for mixing the fastener signal to improve crack detection in ECT mode is complete.

10. Using the Calibration Wizard

The Calibration wizard walks you through step-by-step procedures to perform various calibrations. The Calibration wizard can be used to standardize the sensitivity of the coils of an ECA probe or to calibrate a probe encoder in ECT or ECA mode.

The following typical procedures are provided to normalize signals:

- “Normalizing Probe Signals in ECA Mode to Inspect Aircraft Wheels for Cracks” on page 191
- “Calibrating a Probe Encoder” on page 201

TIP

The normalization process can be interrupted at any time by pressing the

Cancel key  .

10.1 Normalizing Probe Signals in ECA Mode to Inspect Aircraft Wheels for Cracks

The normalization procedure that can be performed using the Calibration wizard is an advanced and optional operation which makes it very easy to standardize the sensitivity of the coils of an ECA probe.

The purpose of normalization is to ensure that all the elements of an ECA probe generate a signal that is expected and uniform. For example, a probe’s sensitivity is commonly normalized to 5 V or 10 V for a long transverse defect, to correct

unavoidable variations in sensitivity between elements. Normalization is specially useful during constant profile inspection procedures using an ECA rigid probe, such as scanning aircraft wheels. For this type of inspection, amplitude and rotation are normalized to a specified value.

The normalization procedure consist of scanning a critical defect that should generate the same EC signals for each coil, and then normalizing the probe defect signal. In most cases, such a critical defect is a long transversal notch (see Figure 10-1 on page 192).

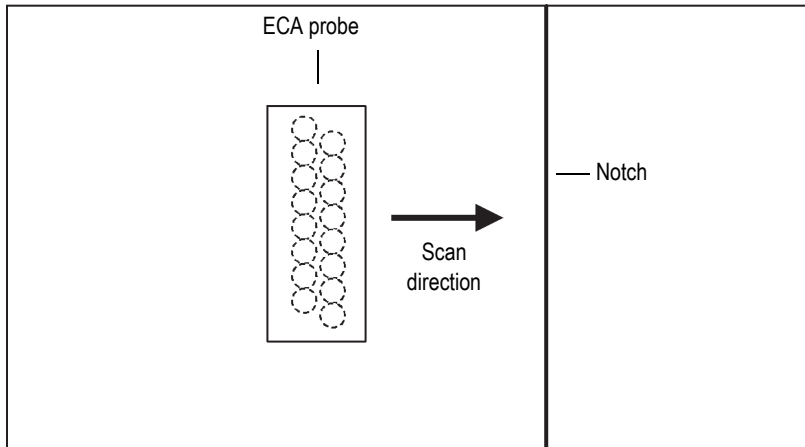


Figure 10-1 Set-up for calibration of ECA probe

In this example, an aircraft wheel with a notch running long the wheel axis is the test sample.

Every coil of the ECA probe is adjusted for rotation and gain in order to obtain the same phase and amplitude, as selected on a reference defect.

To normalize the signals for an inspection

1. Connect the probe to the OmniScan MX instrument. For more information, see section 1.1 on page 19.
2. Configure a basic ECA inspection setup. For more information, see section 3.3 on page 55.

3. Select **Display > Setup > Acquisition = CSI C-Scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
4. Scan the defect on the calibration standard.



5. Stop the acquisition to adjust the scan parameters. Press the Freeze key. Activating the Freeze key puts the OmniScan MXE software in analysis mode. For more information, see section 3.3.7 on page 66.
6. Position the selection cursors on the strongest signal (see Figure 10-3 on page 194). For more information, see section 12.2 on page 227.

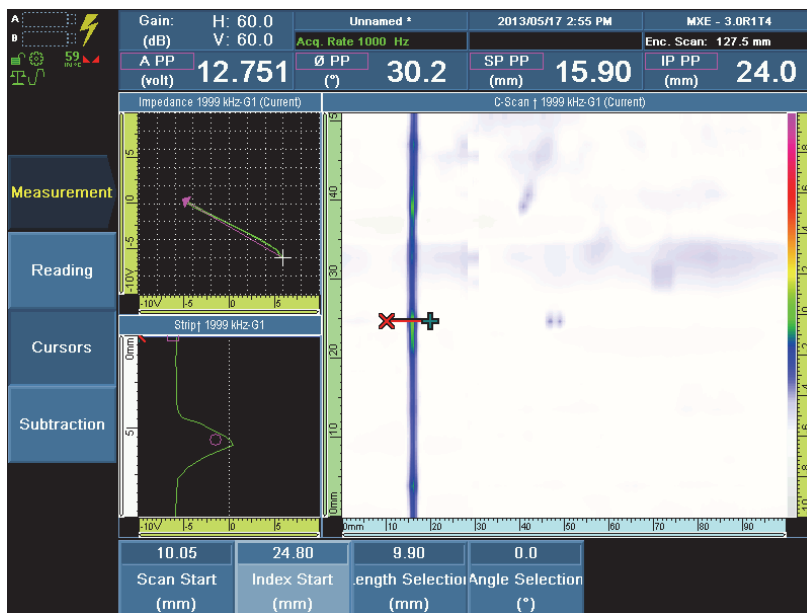



Figure 10-2 Positioning the selection cursors on the strongest signal

7. In the reading fields, read the **A PP** (amplitude peak-to-peak) parameter and the **Ø PP** (peak-to-peak angle) parameter values. For more information, see section 2.2 on page 28 and section 15.2.1 on page 314.

In this example, the **A PP** parameter value is 12.751 V and the **Ø PP** parameter value is 30.2°.

For this example, the objective of the normalization procedure is to standardize the sensitivity of all coils to an amplitude value of 10 V and to an angle value of 30°. Those values are obtained by rounding the 12.751 V and 30.2° readings.

8. Return to acquisition mode. Press the Freeze key .
 9. Start the Calibration wizard. Select **Wizard > Calibration**.
- OR

Press the Normalization key .

The **Select Calibration** step allows you to configure the type of calibration to perform, and then to start the wizard (see Figure 10-3 on page 194).

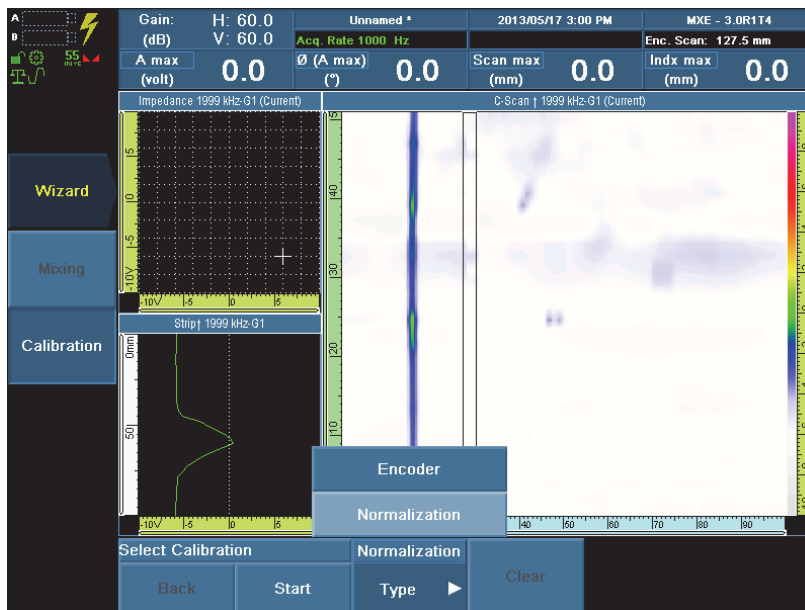


Figure 10-3 The Set Calibration step parameters

For more information about the Calibration wizard, see section 15.7.2 on page 346.

10. Select **Type = Normalization**, and then press the Accept key to confirm.

11. Press **Start**.

The **Definition Step** allows to configure the **Angle** (rotation) and **Amplitude** (gain) parameters (see Figure 10-4 on page 195).

Definition Step		180.0	5.0
Back	Next	Angle (°)	Amplitude (volts)

Figure 10-4 The Definition Step parameters

TIP

In the Calibration wizard, select **Back** to return to the previous step, or **Next** to go to the next step.

12. To set the **Definition Step** parameters, proceed as follows:

- a) Select **Angle (°)**, enter the desired angle value, which represents the desired signal angle, to which the defect signal is to be set after normalization, and

then press the Accept key to confirm. The default value is 0° . For the present example, the value is set to 30° (see Figure 10-5 on page 196).

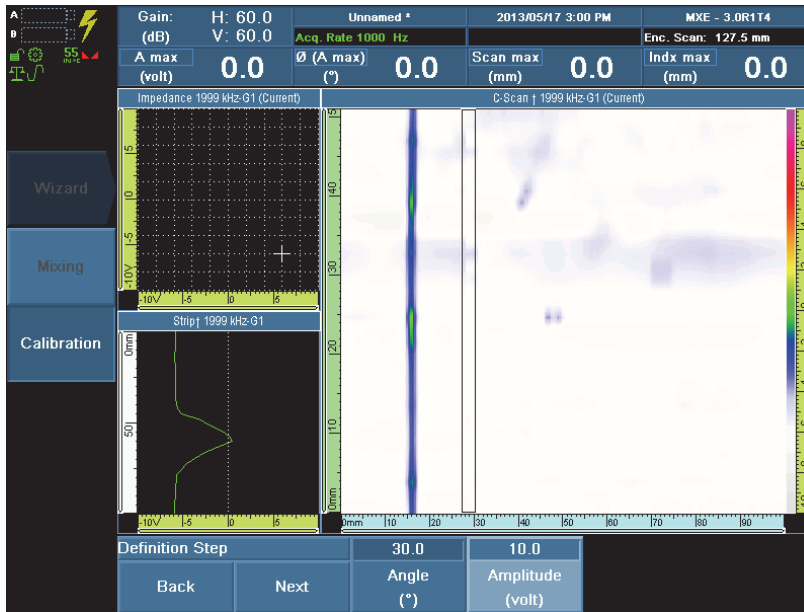


Figure 10-5 Setting the Angle and Amplitude parameter values for normalization

- b) Select **Amplitude (Volts)**, enter the desired voltage value, which determines the desired signal amplitude, at which the critical defect to be detected is to be set after normalization, and then press the Accept key to confirm. The default value is 5 volts. For the present example, the value is set to 10 V.
13. Select **Next**.

The **Acquisition Step** allows you to acquire signal data of the critical defect in the sample (see Figure 10-6 on page 196).



Figure 10-6 The Acquisition Step commands

14. To acquire the signal data within the **Acquisition Step**, proceed as follows:
- To balance the signal, select **Balance** (see Figure 10-7 on page 197).
- OR



Press the Set Balance key

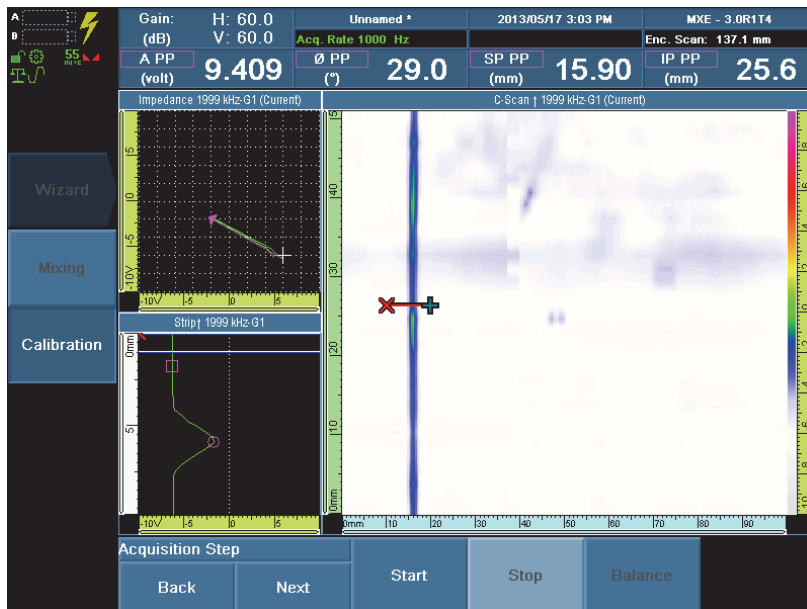


Figure 10-7 Acquiring the data of the critical defect signal

- Select **Start**.
 - Slide the ECA probe over the critical defect to be normalized.
 - Select **Stop**.
15. Select **Next**.

The **Selection Step**, allows you to position the selection cursors in the C-scan view to select the critical defect signal to be normalized (see Figure 10-8 on page 198).

Selection Step		0.00	10.00
Back	Next	Scan Start (s)	Scan Length (s)

Figure 10-8 The Selection Step parameters to position the selection cursors, defining the critical defect signal to be normalized

16. To set the **Selection Step** parameters, proceed as follows:
 - a) Select **Scan Start**, adjust the starting position of the cursor before the normalization defect, leaving some space before the signal, and then press the Accept key to confirm (see Figure 10-9 on page 198).

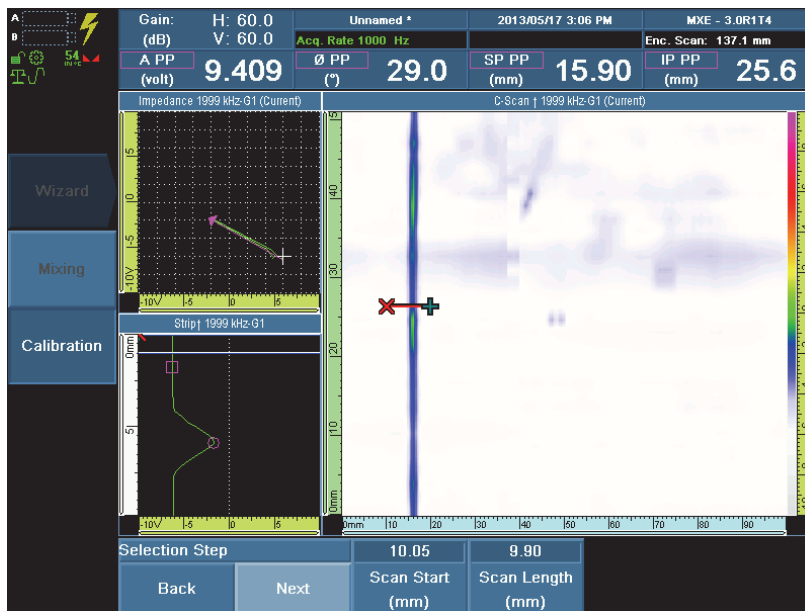


Figure 10-9 Positioning the selection cursor correctly with regard to the defect signal to be normalized

- b) Select **Scan Length**, place the end point cursor after the normalization defect, leaving some space between it and the signal, and then press the Accept key to confirm.

The selection cursors must contain the entire defect signal. The start point cursor(✘) must be located before the beginning of signal, and the end point cursor(+) must be located after the end of the signal.

NOTE

You can also move the selection cursors in the C-scan view using a mouse. For more information about the selection cursor, see section 2.8 on page 40.

17. Select **Next**.
18. Select **Normalize Angle** to perform an angle normalization (the selected signal is rotated until it reaches the **Angle** parameter value that was previously set in the **Acquisition Step**) [see Figure 10-10 on page 199].

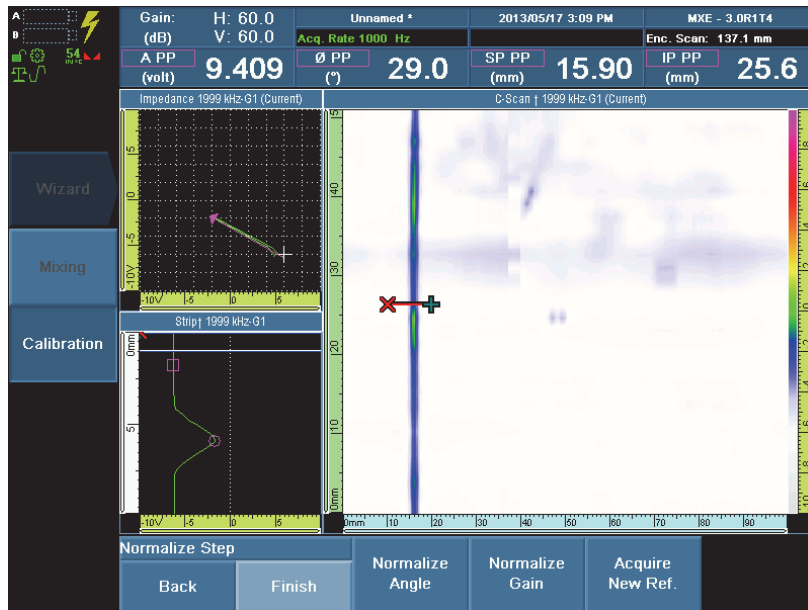




Figure 10-10 Normalizing the angle and the gain

19. Select **Normalize Gain** in order to perform an amplitude normalization (the selected signal is amplified until it reaches the **Amplitude** parameter value that was previously set in the **Acquisition Step**).
20. *Optional:* Select **Acquire New Ref.**
When a lift-off signal must be acquired with the defect signal, but cannot be acquired at the same time and included in the same set of data, the Acquire New Reference function allows you to return to the **Acquisition Step** without leaving the Calibration wizard, in order to acquire the data of the lift-off signal for normalization. When returning to the **Acquisition Step**, repeat steps 14 to 19.
21. Select **Finish**.
22. If needed, adjust the color palette. For more information, see section 6.6.1 on page 123.
The **Select Calibration** step of the Calibration wizard is displayed. You can perform another calibration.

NOTE

To exit the Calibration wizard, press the Cancel key



Once the signal normalization is done, when some of the groups (but not all) among the available groups are calibrated, the calibration status indicator () turns orange. The indicator turns green () when all the groups are calibrated.

NOTE

To reinitialize the Calibration wizard parameters, press the Cancel key



Once the normalization procedure has been completed, the vertical gain parameter can be updated to fine-tune the signal display in the views. To access the parameters, select **EC Settings > Settings (MAIN)**. For more information, see sections 3.3.3 on page 58 and 3.3.4 on page 61.

The procedure to normalize the sensitivity of the coils of an ECA probe is complete.

NOTE

In some situations the gain and the amplitude signal need to be acquired separately; for example, when the lift-off and the critical defect signals cannot be acquired at the same time. In such a case, the gain and amplitude signals are to be normalized separately. The Normalization option of the Calibration wizard allows this using the Acquire New Reference function, as described in the normalization procedure at step 20.

For certain types of inspections, such as detection of corrosion or cracks below the surface using a semi-rigid ECA probe, the Normalization option of the Calibration wizard can be used to standardize the sensitivity of all the coils on the probe to the lift-off, in order to improve the quality of the C-scan view.

To generate a controlled lift-off signal, a 0.5 in. wide by 0.003 in. thick piece of tape is applied to the calibration standard, on a portion that is free of defects. As indicated above, the normalization procedure is performed using the Calibration wizard. During the **Definition Step**, the **Angle** parameter value is set to 0°. The **Amplitude** parameter is left at its default value. During the **Normalize Step**, only the Normalize Angle function is activated. For more information, see section 13.2.4.2 on page 273.

10.2 Calibrating a Probe Encoder

Using the Calibration wizard makes it very easy to calibrate the encoder of a probe in ECT or ECA mode. A probe encoder needs to be calibrated when the encoder wheel is worn or when the encoder step is unknown.

In ECT mode, most data acquisition procedures are performed in time scan mode; very few require scanning with an active encoder on the probe. Using the one-line scan mode requires one active encoder. The calibration wizard can be used to calibrate the encoder, if needed.

In ECA mode, using the one-line scan mode requires one active encoder, which may need to be calibrated. Using the raster scan mode requires two active encoders. The Calibration mode allows for calibration of the two encoders.

The encoder calibration procedure consists of moving the probe-encoder assembly over a predetermined distance.

To calibrate a probe encoder

1. Connect the probe to the OmniScan MX instrument. For more information, see section 1.1 on page 19.



2. Press the Accept key.
The probe is detected and its configuration loaded.
3. Set the scan parameters.
For more information about setting scan parameters in ECT mode, see section 3.1 on page 45.
For more information about setting scan parameters in ECA mode, see section 3.3 on page 55.
4. Set the scan parameters for an encoder-based acquisition. For more information, see section 3.3.5.2 on page 64.
5. Start the Calibration wizard. Select **Wizard > Calibration**.
OR

Press the Normalization key



The **Select Calibration** step allows you to configure the type of calibration to perform, and then to start the wizard (see Figure 10-3 on page 194).

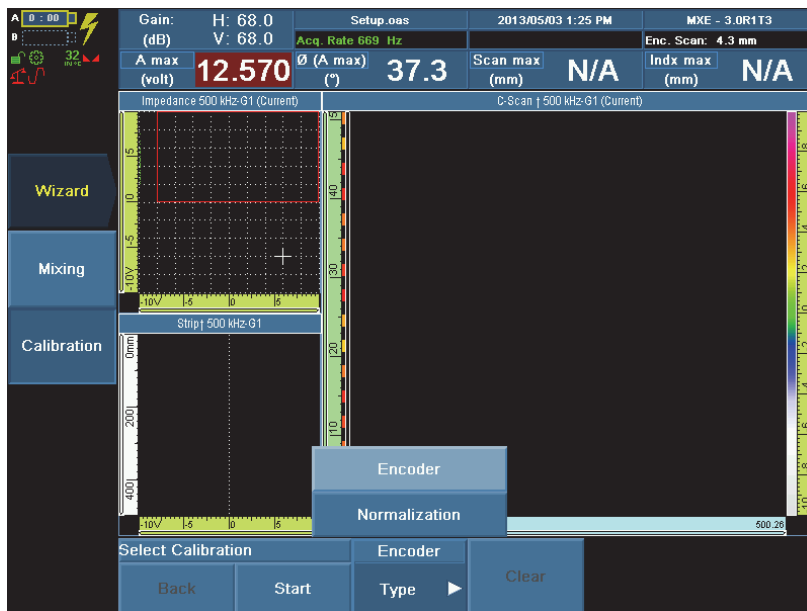


Figure 10-11 The Set Calibration step parameters

For more information about the Calibration wizard, see section 15.7.2 on page 346.

6. Select **Type = Encoder**, and then press the Accept key to confirm.

7. *Optional:* When a probe is equipped with two active encoders, select the encoder to calibrate. Probes for raster scans have two encoders. Choose **Encoder = 1** or **2** (see Figure 10-12 on page 204).

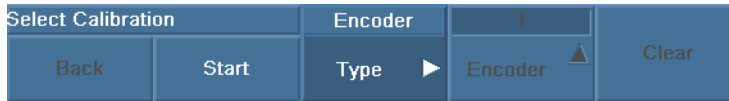


Figure 10-12 The Select Calibration step Encoder parameter

8. Press **Start**.

The **Set Origin** step allows you to configure the origin of the predetermined distance that the probe will travel to calibrate the encoder (see Figure 10-3 on page 194).



Figure 10-13 The Set Origin step parameters

TIP

In the Calibration wizard, select **Back** to return to the previous step, or **Next** to go to the next step.

9. Position the probe at the start point of the measured distance that it will travel to calibrate the encoder.

If necessary, configure the **Origin** parameter. The default value is **0.00** mm. Usually, the **Origin** parameter can be left at its default value.

10. Select **Next**.

The **Set Distance** step allows you to configure the measured distance the probe is to travel to calibrate the encoder (see Figure 10-14 on page 205).

Set Distance		10.00
Back	Calibrate	Distance (mm)

Figure 10-14 The Set Calibration step parameters

11. Select **Distance**, enter the measured distance the probe is to travel to calibrate the encoder, and then press the Accept key to confirm. The default value is **10.00** mm.
12. Move the probe with the encoder from the set start point. Travel the entire measured distance and stop at the end point.
13. Select **Calibrate**.

The **Accept** step allows you to accept the probe encoder calibration as accurate or to redo the encoder calibration steps (see Figure 10-15 on page 205).

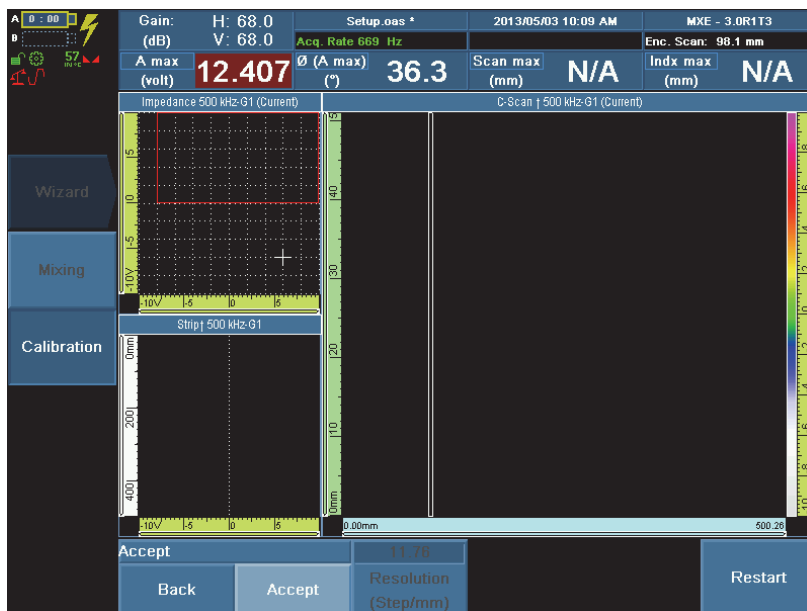


Figure 10-15 The Accept step parameters

The **Resolution** parameter displays the exact value resulting from the probe encoder calibration procedure.

14. Do one of the following:

a) When the **Resolution** parameter value is accurate, select **Accept**.

The **Select Calibration** step of the Calibration wizard is displayed. When a second encoder is to be calibrated, repeat steps 11 to 14.

b) When the **Resolution** parameter value is not accurate, select **Restart**.

The **Set Origin** step of the Calibration wizard is displayed. To calibrate the encoder again, repeat steps 9 to 14.

NOTE



To reinitialize the Calibration wizard parameters, press the Erase/Clear key

NOTE



To exit the Calibration wizard, press the Cancel key

The procedure to calibrate a probe encoder is complete.

11. Managing Files

This chapter groups techniques and procedures that relate to file management on the OmniScan MX. They are:

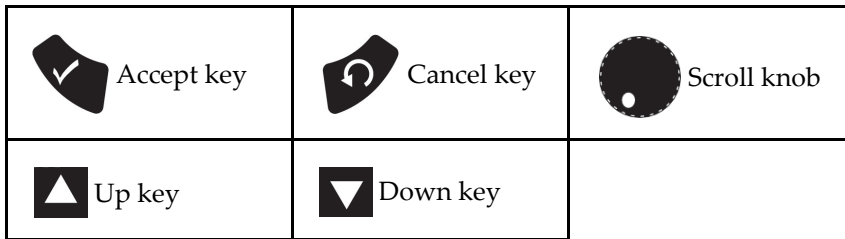
- “Using the File Manager” on page 207
- “Opening Files” on page 213
- “Configuring a Report” on page 218
- “Printing a Report from a Remote Computer” on page 220
- “Changing the Company Logo” on page 223
- “Locking and Unlocking a Setup” on page 223
- “Saving a Setup” on page 224
- “Saving a Data File” on page 225

11.1 Using the File Manager

This section explains how to use the File Manager utility. The techniques described below function on the basis that you are using the OmniScan instrument without any extra input peripheral (mouse or keyboard).

For more information about the purpose of each option, refer to section 15.8 on page 355.

Here is a quick reminder of the main keys used in these procedures:



To open the File Manager

1. Select **Preferences > Tools > File Manager**.

The File Manager window appears (see Figure 11-1 on page 208).

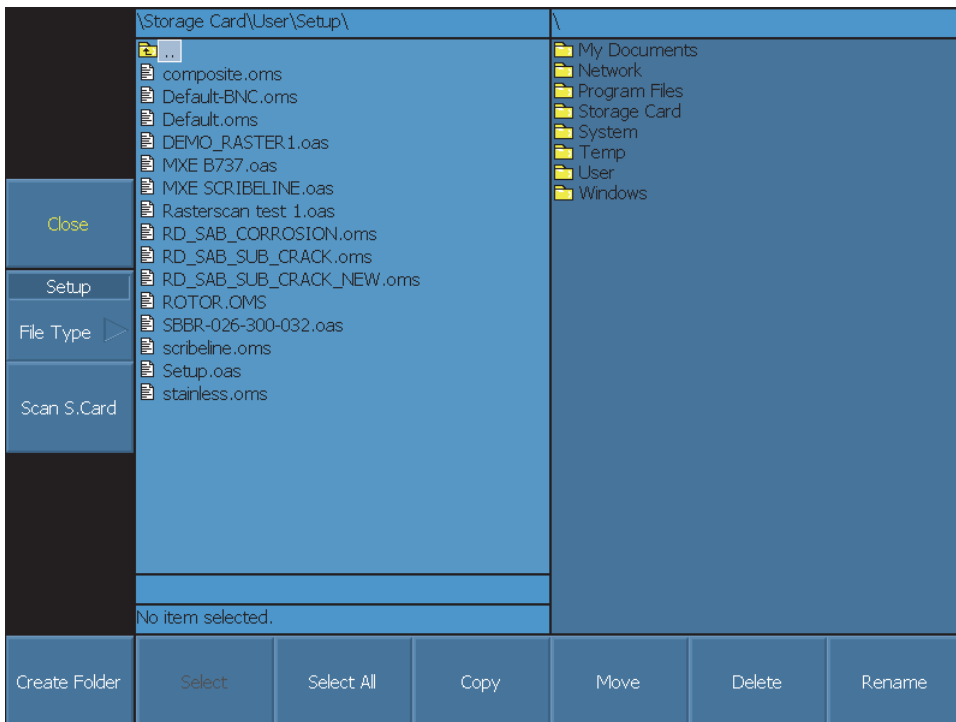


Figure 11-1 The File Manager window

11.1.1 Interface

The interface of the File Manager is designed to be easy to use, while providing you with as many management options as possible, even if no keyboard or mouse is connected to the OmniScan instrument. There are four areas in the File Manager (see Figure 11-2 on page 209).

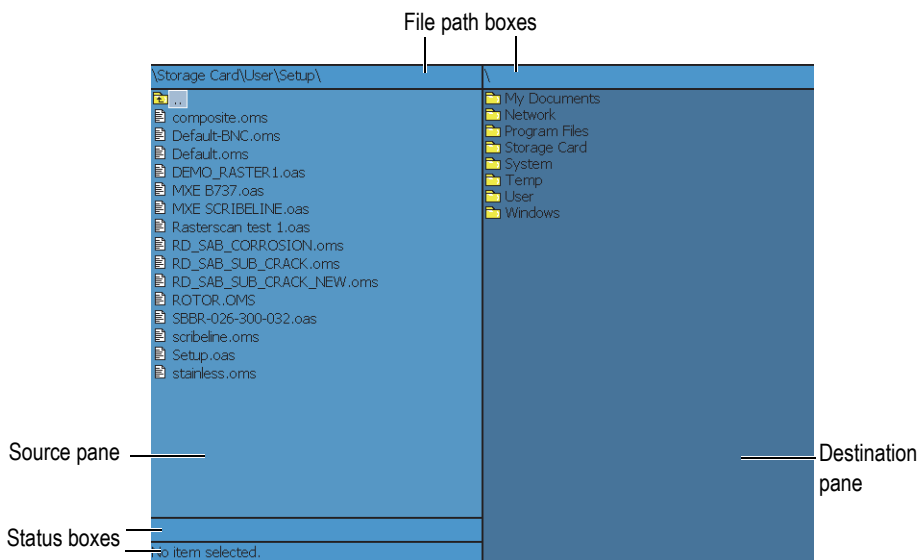


Figure 11-2 The File Manager areas

File path boxes

Each box displays the file path that leads to the current folder in its respective pane.

Source pane

Whenever a file management command is used, it affects the currently selected item (file or folder icon) in this pane. This pane also indicates the source folder when copying or moving a file or folder.

Destination pane

This pane only is used with the **Copy** and **Move** options. It displays the destination folder for the file that is being copied or moved.

An item cannot be deleted or renamed in this pane, nor can an item be moved or copied to the source pane.

Status boxes

when applicable, the upper status box displays file size information and the lower status box displays the name of the currently selected item (see Figure 11-3 on page 210).



Figure 11-3 The status boxes

11.1.2 Folder and File Operations

The procedures that follow explain how to use the File Manager to perform certain operations related to folders and files. These procedures are explained under the assumption that you are using the OmniScan instrument without any added USB peripherals. They are:

- “To change folders” on page 210
- “To switch between the panes” on page 211
- “To create a folder” on page 211
- “To select an item” on page 212
- “To copy an item” on page 212
- “To change folders” on page 210
- “To delete an item” on page 213
- “To rename an item” on page 213

To change folders

- ◆ In the File Manager, use the Scroll knob or the Up and Down keys to choose the

desired folder, and then press the Accept key





NOTE

Select the top item in a pane (see Figure 11-4 on page 211) to go to the parent folder.




Figure 11-4 The parent folder icon

To switch between the panes

1. In the File Manager, press the Cancel key  once.
The source pane turns pale blue.
2. Use the Scroll knob or the Up and Down keys to switch panes (the currently selected pane is the one in pale blue), and then press the Accept key .

NOTE

To exit the File Manager, you can press the Cancel key  twice.

To create a folder

- ◆ In the File Manager, navigate to the folder in which you wish to create a new folder, and then select the **Create Folder** button.

To select an item

1. In the File Manager, navigate through folders until you reach the desired file.
2. Select the item(s) according to one of the following methods:



- a) Press the Accept key.
- b) Choose **Select**.
- c) Select **Select All** if you want to select all the items in a folder.

NOTE

The selection options are only necessary when planning to copy or move items.

To copy an item

1. In the File Manager, in the source pane, select the item you want to copy.
2. Make sure that you have enough space in the destination storage device for the copy of the item.
3. In the destination pane, select the folder where you wish to copy the item.
4. Select **Copy**.

NOTE

Using a mouse to drag files across the two panes does not work, as the drag-and-drop feature is not currently supported.

To move an item

1. In the File Manager, in the source pane, select the item you want to move.
2. Make sure that you have enough space in the destination storage device to move the item.
3. In the destination pane, select the folder where you wish to move the item.
4. Select **Move**.

To delete an item

1. In the File Manager, in the source pane, select the item you want to delete.
2. Select **Delete**.

A message box appears, asking you to confirm the deletion.

3. Select **Yes** or press the Accept key



To rename an item

1. In the File Manager, in the source pane, select the item you want to rename.
2. Select **Rename**.

A message box appears, asking you to confirm the change of name.

3. Enter the new name.

4. Select **OK** or press the Accept key



11.2 Opening Files

This section describes how to open different files on the OmniScan MX.

- “Setup Files” on page 214
- “Data Files” on page 215
- “Setup Files” on page 214
- “Image Files” on page 217

11.2.1 Setup Files

To open a setup file

1. Press the Open File key .

The **File Manager** window appears (see Figure 11-5 on page 214).

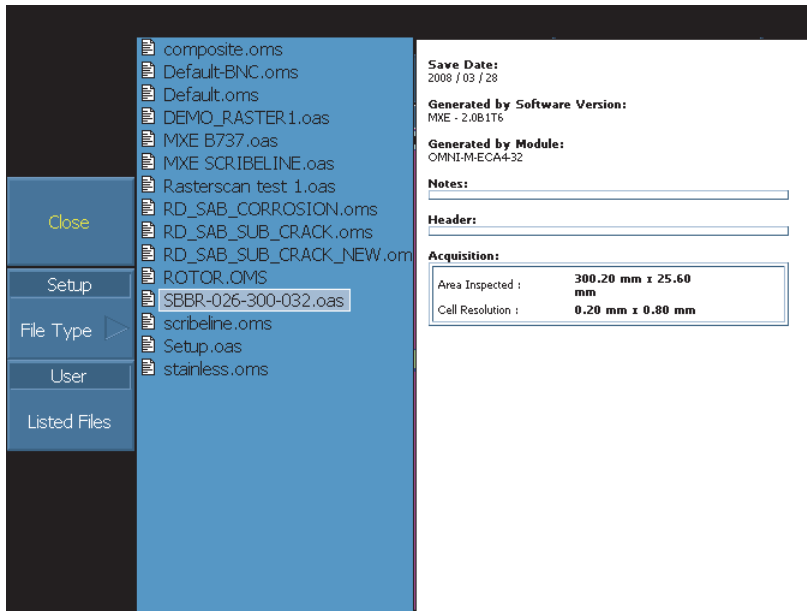


Figure 11-5 The File Manager window

The **Setup** file type is used by default.

2. In the source pane, select the desired setup file.
A preview of the file appears in the destination pane.
3. Select the **Open** button to open the file.

11.2.2 Data Files

To open a data file

1. Press the Open File key .
The **File Manager** window appears (see Figure 11-6 on page 215).

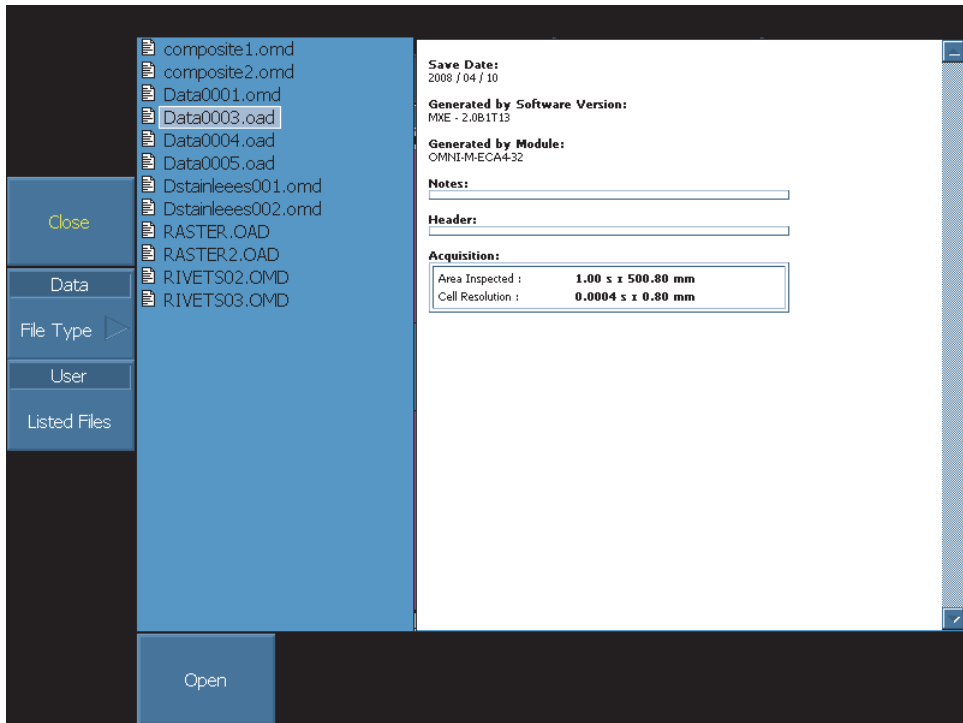


Figure 11-6 The File Manager window

2. In the **File Type** option list, select **Data**.
3. In the source pane, choose the desired data file.
A preview of the file appears in the destination pane.
4. Select the **Open** button to open the file.

11.2.3 Report Files

To open a report file

1. Press the Open File key .

The **File Manager** window appears (see Figure 11-7 on page 216).

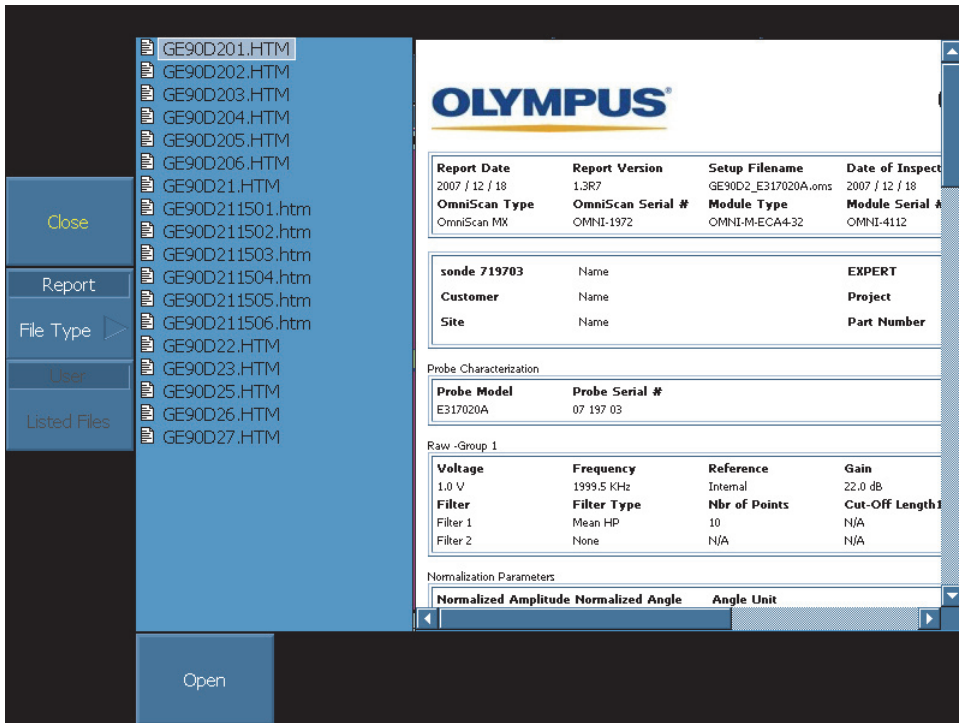



Figure 11-7 The File Manager window

2. In the **File Type** option list, select **Report**.
3. In the source pane, select the desired report file.
A preview of the file appears in the destination pane.
4. Select the **Open** button to open the report file.

5. Press the Cancel key  to go back to the File Manager.
6. Select the **Close** button to return to the display screen.

11.2.4 Image Files

To open a screen capture file

1. Press the Open File key . The **File Manager** window appears (see Figure 11-8 on page 217).

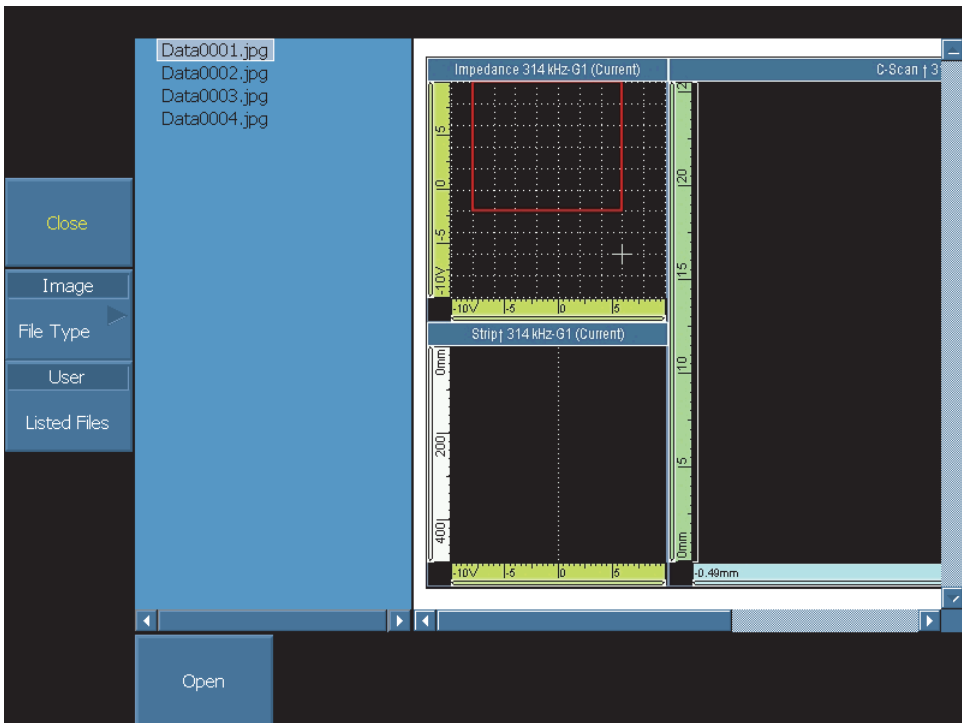



Figure 11-8 The File Manager window

2. In the **File Type** option list, select **Image**.

3. In the source pane, choose the desired screen capture file.
A preview of the file appears in the destination pane.
4. Select the **Open** button to open the file.
5. Press the Cancel key  to go back to the File Manager.
6. Select the **Close** button to return to the display screen.

11.3 Configuring a Report

This section explains how to configure a report.



To configure a report

1. Select **File > Report** and use the parameter buttons to configure the report. For more details, see section 15.9.1.1 on page 359.
2. If the **User Field** option is required in the report, proceed as follows, otherwise skip to step 3.
 - a) Select **File > User Fields > Select**.
 - b) Choose the number of the user fields you wish to include in the report.
 - c) Ensure that the **File > User Fields > Enable** toggle button is activated in order to make it appear in the report.
 - d) Make sure that the **File > User Fields > Label** parameter displays the information you want. If it does not, enter the new information in the edit field (see Figure 11-9 on page 218).
 - e) Make sure that the **File > User Fields > Content** edit button displays the information you want attached to the label. If it does not, enter the new information in the edit field (see Figure 11-9 on page 218).

Contractor	NDT Generics	Technician	John Smith
		Project	The Big Project

Figure 11-9 The Label and Content user fields in a report

- f) In the **File > User Fields > Select** parameter, choose the number of the next user field you wish to include in the report.

- g) Repeat steps 2.c to 2.f until all the required user fields have been activated.
3. Add a note to the report if necessary. To add a note, proceed as follows:
- Select **File > Report > Edit Notes** to create the note.
The **Notes** dialog box appears.
 - Enter the text of the note.
 - Select **Close**.
 - Select **Yes** or press the Accept key  to accept the changes and save the note.
4. Add a header to the report if necessary. To add a header, proceed as follows:
- Select **File > Report > Edit Header** to create the header.
The **Header** dialog box appears.
 - Enter the text of the header
 - Select **Close**.
 - Select **Yes** or press the Accept key  to accept the changes and save the header.
5. Select **File > Report** and then proceed as follows:
- Select **File > Report > File Name**, and then enter a name for the report. For more information about the available variables, see section 15.9.1.1 on page 359.
 - Select **Preferences > Setup > Category = Report**.
 - Select **Preferences > Setup > Paper Size**, and then select the desired paper size for the report.
 - Select **File > Report > Build** to display a preview of the report. You must then choose one of the three options that follow:
 - Select **Print** to print the report directly, providing you have a compatible printer connected to one of the USB ports.
 - Select **Save and Close** to save the report on the destination device and return to the **File > Report** submenu.
 - Select **Close** to return to the **File > Report** submenu without saving the report.

11.4 Printing a Report from a Remote Computer

It is possible to transfer a report from the OmniScan MX to a remote computer, and then print it from that computer.

To print a report from a remote computer

1. Create a report on the OmniScan MX, save it on the storage card, and note the name of the report.
2. Remove the storage card from the OmniScan MX and insert it into a memory card reader connected to your computer.
3. Go to the \User\Report\ folder on the storage card.
4. Copy both the report file and the folder with the same name to the remote computer.
5. Open the report by double-clicking the .htm file.
6. Once in the web browser (that is, Microsoft Internet Explorer), click the **File** menu and click the **Page Setup** command.
7. In the **Margins** group box, enter **10** in the **Left** text box and enter **10** in the **Right** text box. This is assuming that your current unit of measurement is millimeters.
8. Click the **OK** button.
9. Print the report.

11.5 Creating a Custom Report Template

This section explains how to create a custom report template from the standard OmniScan report template.

A custom template can be created directly on the OmniScan MX, provided that you have a network link between the instrument and a computer for importing files, such as logos. However, the following procedure uses a computer to create the template. The procedure consists of copying the files of the standard report to the custom report folder, and customizing the copied files. The procedure makes use of the removable storage card of the OmniScan MX in order to transfer the custom template file created on a computer to the OmniScan MX instrument.

To create a custom report template

1. Remove the storage card from the OmniScan MX instrument, and using a memory card reader, connect it to your computer.
2. Using Windows Explorer on your computer:
 - a) Open the storage card drive.

IMPORTANT

When performing this procedure, the folder names must be typed exactly as they are spelled in the procedure. When choosing any other spelling or name, the OmniScan does not recognize the folders and does not generate the custom report template.

- b) If they do not already exist in the storage card, create the following folders
\\User\Template\Report\ (see Figure 11-10 on page 221).

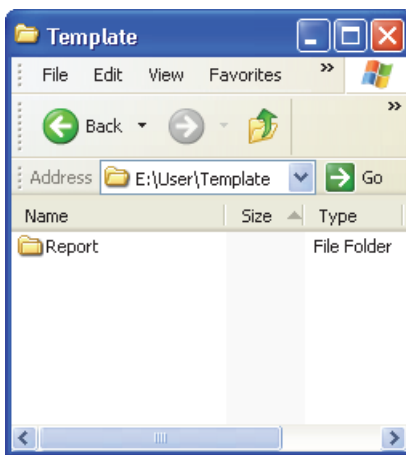


Figure 11-10 The Report folder path

3. Copy the \\App\MXE 3.0\Template\Report\Complete\ folder to the \\User\Template\Report\ folder that you have created.

4. Rename the \User\Template\Report\Complete\ folder that you have just copied using a name of your choice (renamed to My_Template in the example shown in Figure 11-11 on page 222).

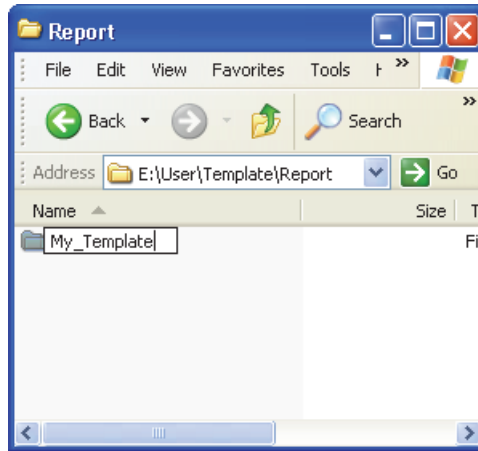


Figure 11-11 The path for the custom report files



CAUTION

Do not modify or replace any files in the original \App\MXE 3.0\Template\Report\Complete\ folder. These are the original files used to create the default report. When you replace or modify the original files, you lose the ability to create a custom template.

5. Copy your custom files (for example, your logo image file) to the folder you renamed in step 4.
6. Disconnect the storage card from your computer.
7. Reinstall the memory card in the OmniScan.
8. Restart the OmniScan to bring changes into effect.
9. To select the newly created report template, select **File > Report > Category = Format**.

The newly created report template appears in the **File > Report > Template** parameter under the name you used in step 4.

11.6 Changing the Company Logo

It is possible to customize a report by replacing the Evident logo with the logo from your own company.

To change the company logo on a single report

1. Create a logo that does not exceed 130 × 60 pixels. A larger image disrupts the rest of the layout.
2. Save it as **logo.jpg** (name must be identical).
3. Create a report on the OmniScan MX, save it on the storage card, and note the name of the report (<Report Name>).
4. Remove the storage card from the OmniScan MX and insert it in a memory card reader connected to your computer.
5. Go to the \User\Template\Report\<Report Name>\ subfolder on the storage card.
6. Replace the existing logo.jpg image file with the one you created.

To change the company logo when booting from a storage card

1. Create a logo that does not exceed 130 × 60 pixels. A larger image disrupts the rest of the layout.
2. Save it as **logo.jpg** (the name must be identical).
3. Shut down the OmniScan MX and remove the storage card.
4. Insert the memory card in a card reader connected to a computer.
5. Go to the \User\Template\ folder on the storage card.
6. Erase or rename the existing logo.jpg file.
7. Copy the logo.jpg image file you created to the \User\Template\ folder on the storage card.
8. Remove the memory card from the reader and insert it into the OmniScan MX slot.

11.7 Locking and Unlocking a Setup



This section describes how to lock and unlock a setup file.

If a setup file is locked, only the **User** menu remains active. For more information about the configuration of the **User** menu, see section 6.5 on page 121.

To lock a setup

1. Select **Preferences > Instrument > Category = System**, and then press the Accept key to confirm.
2. Select **Preferences > Instrument > Admin Password**.
3. Enter a numeric password that will be used to unlock the setup.
4. Enter the password again to confirm it.
5. Select **OK**.
6. Select **File > Save > Save Setup As** and proceed as follows:
 - a) Activate the **Setup Lock** option.
 - b) In the **Filename** edit button, enter a name for the setup.
 - c) Select the **Save** button.

To unlock a setup

1. Press the Start/Stop key  and Store/Print key  simultaneously.
2. Enter the password you chose in **Admin Password**.
3. Select the **OK** button.

11.8 Saving a Setup

To guard against accidental loss of data, make sure you regularly save your setup to a file.

To save a setup

1. Select **File > Save > Save Setup As**.
2. Enter a file name in the editable field of the **Filename** button.
3. Select the desired **Setup Lock** option (see section 11.7 on page 223).
4. Select **Save**.
5. Exit the File Manager.

11.9 Saving a Data File

It is recommended to regularly save your data to guard against accidental loss of data.

To save a data file


1. Select **File > Open > Storage**, choose the desired option, and then press the Accept key to confirm.
2. Select **File > Save > File Name**, enter a file name root, and then press the Accept key to confirm.

TIP

Use the # character as a variable to automatically generate an incremental number in file names. For example, type **DATA##** as the file name root to have files saved automatically with the following names: DATA00, DATA01, DATA02, etc. each time the Store/Print key is pressed, until the maximum incremental number for the file name is reached (DATA99). Other variables can be included as part of the file name root. For more information, see section 15.8.2 on page 356.

-
3. Select **File > Save > Save Data**.
OR



Press the Store/Print key .

For more information about the options listed in this procedure, see section 15.8 on page 355.

12. Analyzing the Acquired Data

This chapter groups procedures that relate to inspections using the OmniScan MXE software. They are:

- “Changing the Angle Convention” on page 227
- “Setting Subtraction Cursors (ECA Mode Only)” on page 227
- “Using the Zoom Function” on page 230
- “Configuring a 1:1 Ratio for C-Scan Views in Continuous Mode” on page 233

12.1 Changing the Angle Convention

This section describes how to change the angle convention.

To change the angle convention

1. Select **Preferences > Instrument > Category = Unit**, and then press the Accept key to confirm.
2. In the **Angle Units** option, select the preferred angle convention (see section 15.9.3 on page 365).

12.2 Setting Subtraction Cursors (ECA Mode Only)

The main purpose of the subtraction function is to reduce the noise level, or to improve the signal-to-noise-ratio. Subtraction is a post analysis acquisition filtering system, which only operates in analysis mode. This function allows you to select a data point, line, or column, representing the noise level. The selected data is subtracted from the overall data of the C-scan view.

The procedures in this section explain the setting of various subtraction cursors. They include:

- “Setting a Vertical Subtraction Cursor” on page 228
- “Setting a Horizontal Subtraction Cursor” on page 229
- “Setting a Point Subtraction Cursor” on page 230

12.2.1 Setting a Vertical Subtraction Cursor

To set a vertical subtraction cursor

1. Select **Measurement > Subtraction > Type = Column**, and then press the Accept key to confirm.
2. Select **Measurement > Subtraction > Scan Position**, enter the location of the cursor on the scan axis, and then press the Accept key to confirm.
3. Select **Measurement > Subtraction > Activate = On**, and then press the Accept key enable the cursor. Selecting **Activate = Off** will disable the cursor (see Figure 12-1 on page 228).

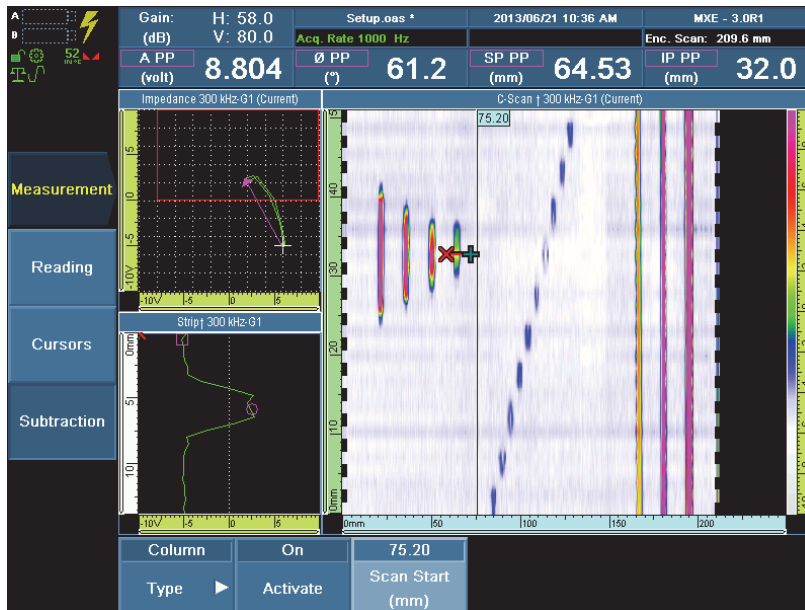


Figure 12-1 Vertical subtraction cursor

12.2.2 Setting a Horizontal Subtraction Cursor

To set a horizontal subtraction cursor

1. Select **Measurement > Subtraction > Type = Line**, and then press the Accept key to confirm.
2. Select **Measurement > Subtraction > Index Start**, enter the location of the cursor on the index axis, and then press the Accept key to confirm.
3. Select **Measurement > Subtraction > Activate = On**, and then press the Accept key to enable the cursor. Selecting **Activate = Off** will disable the cursor (see Figure 12-2 on page 229).

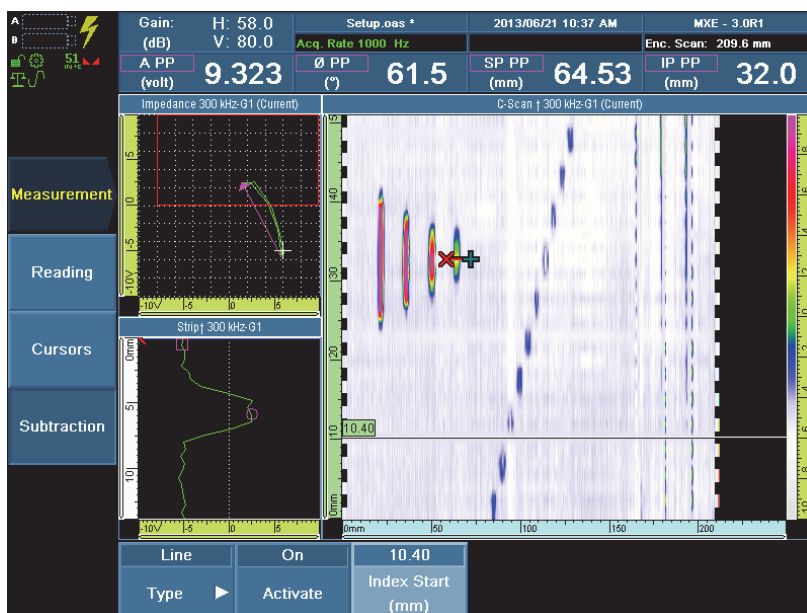


Figure 12-2 Horizontal subtraction cursor

12.2.3 Setting a Point Subtraction Cursor

To set a point subtraction cursor

1. Select **Measurement > Subtraction > Type = Sample**, and then press the Accept key to confirm.
2. Select **Measurement > Subtraction > Scan Start**, enter the location of the cursor on the scan axis, and then press the Accept key to confirm.
3. In the **Index Start** option, enter the location of the cursor on the index axis, and then press the Accept key to confirm.
4. Select **Activate = On**, and then press the Accept key to enable the cursor. Selecting **Activate = Off** will disable the cursor. (see Figure 12-3 on page 230)

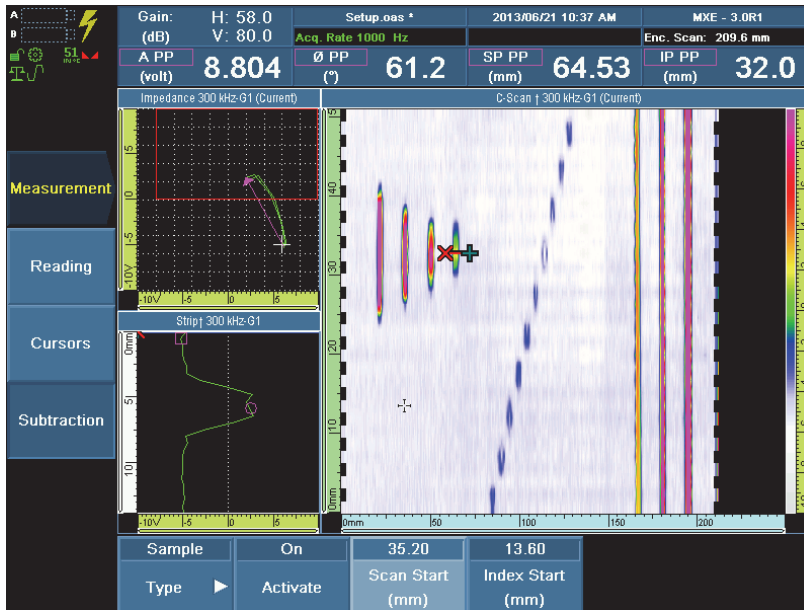


Figure 12-3 Point subtraction cursor

12.3 Using the Zoom Function

This section describes how to use the zoom function. This function is only available in analysis mode, or in acquisition mode if the acquisition is encoder-synchronized.

12.3.1 Zooming Using the Mouse

You can zoom in on or out of the views in the OmniScan MXE software interface using a mouse that has been connected to one of the USB ports on the OmniScan MX instrument. When zoomed in on data, you can also scroll to the left or to the right using the middle mouse button.

To zoom in using a mouse

1. Place the mouse cursor at one of the corners of the area you wish to zoom in on.
2. Press the left mouse button and drag the mouse towards the opposite corner of the desired area.
A green, hollow rectangle is formed.
3. Release the mouse button.

To scroll a C-scan when zoomed in using a mouse

- ◆ Roll the middle mouse button forward to scroll in the direction of the first acquired value in the C-scan view.
OR
- ◆ Roll the middle mouse button backward to scroll in the direction of the last acquired value in the C-scan view.

To zoom out using a mouse

- ◆ Double-click on the zoom bars that are beside the rulers of the data display.

TIP

You can modify the zoom by using a mouse to resize or scroll the zoom box.

12.3.2 Zooming Using Menu Commands or Function Keys

You can zoom in on or out of the views in the OmniScan MXE software interface using menu commands or function keys.



To zoom in using menu commands

1. Select **Display > Zoom > Type**.
2. Select the desired zoom option, and then press the Accept key to confirm. For more information on these options, see section 15.4.4 on page 333.
3. Set the appropriate parameters for the selected option.



To zoom out using menu commands

1. Select **Display > Zoom > Type**.
2. Select **Off**, and then press the Accept key to confirm.

To zoom in using a function key

- ◆ To zoom in on the strip chart view, press and hold the Set Balance key .
- ◆ To zoom in on the impedance plane view, press the Best Fit key .

To zoom out using a function key

- ◆ To zoom out of the C-scan view, press and hold the Set Balance key .
- ◆ To zoom out of the impedance plane view, press and hold the Best Fit key .

12.4 Configuring a 1:1 Ratio for C-Scan Views in Continuous Mode

In continuous scan mode (**Scan > Inspection > Continuous = On**, see section 15.6.1 on page 338), the acquisition signal in the C-scan views can be displayed with a 1:1 ratio along the scan and index axes (see Figure 12-1 on page 228 and Figure 12-5 on page 234).



Figure 12-4 The C-scan view displayed with a 1:1 ratio in CSI view mode



Figure 12-5 The C-scan view with a 1:1 ratio in C-scan view mode

Obtaining a 1:1 ratio for the acquisition signal in the C-scan views is done by multiplying the probe coverage by a specific factor to determine the value of the **Scan End** parameter (**Scan > Area > Scan End**), depending on the display layout in use (see Table 10 on page 234).

Table 10 Multiplication factor applied to probe coverage per display layout type

Display layout type	Multiplication factor
CSI	Probe coverage x 1.1 (see Figure 12-4 on page 233)
C-scan	Probe coverage x 1.6 (see Figure 12-5 on page 234)
Two C-scans	Probe coverage x 3.56

For common ECA probe models, the recommended **Scan End** parameter values for the display layout types are available in Table 11 on page 235.

Table 11 Scan End parameter values for common ECA probe models

Probe model	Probe coverage (mm)	Recommended Scan End parameter value for a 1:1 ratio in C-scan views		
		CSI	C-scan	2 C-scans
SAA-112-005-032	112.0	120	180	400
SAA-056-005-016	56.0	60	90	200
SAA-128-002-032	128.0	140	200	460
SAA-064-002-016	64.0	70	100	230
SAB-067-003-032	67.2	70	110	240
SAB-056-005-032	56.0	60	90	200
SAB-064-030-032	64.0	70	100	230
SDBR-021-002-016	20.8	20	30	70
SDCR-021-002-016	20.8	20	30	70
SBB-051-150-032	51.2	60	80	180
SBAR-064-500-016	64.0	70	100	230
SBBR-022-300-032	21.8	20	30	80
SBBR-026-300-032	25.9	30	40	90
FBB-051-500-032 (bridge)	51.2	60	80	180
FBB-051-500-032 (reflection 2)	48.0	50	80	170

13. Applicative Inspection Procedures

Inspection procedures for some common eddy current technology applications are provided for the ECT and ECA modes. These typical inspection procedures can be adapted for your specific inspection needs.

Typical inspection procedures in ECT and ECA modes:

- “Applicative Inspection Procedure in ECT Mode – Creating a Setup for Inspecting Fasteners with a Surface Probe” on page 238
- “Applicative Inspection Procedures in ECA Mode” on page 244
 - “Creating a Setup for Detecting Surface Breaking Cracks Around Fasteners” on page 244
 - “Detecting and Measuring Corrosion on an Airplane Fuselage” on page 250
 - “Inspecting Lap Splices for Subsurface Cracks on an Airplane Fuselage” on page 261
 - “Inspecting Lap Splices for Doubler Cracks on an Airplane Fuselage” on page 268
 - “Replacing Traditional NDT Inspection Methods by Eddy Current Array Inspection” on page 276

IMPORTANT

The following procedures are provided only as examples, in order to demonstrate how to use the OmniScan MX instrument equipped with the ECA module and the OmniScan MXE software. Using different probes or calibration standards, or inspecting parts of a different material, grade, condition, or thickness will require different parameters than the ones provided herein. Please refer to the approved OEM procedures or contact your Evident representative for actual inspections.

13.1 Applicative Inspection Procedure in ECT Mode – Creating a Setup for Inspecting Fasteners with a Surface Probe

This section presents the procedure for inspecting fasteners with a surface probe in ECT mode.

Required equipment:

- Evident metal-shaft pencil probe MP905-50B or any surface probe
- Calibration sample: Nortec TB-S1, or any EDM notch standard consisting of an aluminum part with three cracks of different depths
- Verification sample: Nortec SPO-3932 or any equivalent fastener standard, including a good fastener and two fasteners with surface breaking cracks

The samples must correspond to the part to be inspected: same material, same grade, same condition, same thickness, and same paint thickness.


If the paint thickness is unknown, Evident recommends measuring it with a probe designed for nonconducting coating, such as the Nortec 500C (U8030105), 500S (U8030055) or 500D (U8030056), and a conductivity probe (U8690029 or U8690030), and the calibration standard set (U8880084), or their equivalents.

To create a setup for inspecting fasteners with a surface probe


1. Switch to the ECT mode:

◆ Select **ECA > ECT**.

OR

Press and hold the Menu key  for two seconds.

2. Connect the probe into the BNC or triax fisher/powerlink connector of the OmniScan MX instrument (adaptor F19-L16 can be used for standard triax or powerlink connectors). For more information about connecting a probe, see section 1.1 on page 19.
3. Select **Probe & Part > Settings > Select Probe = Absolute (BNC) or Universal 1-Channel** if you are using a triax fisher or a powerlink cable with or without an adaptor, and then press the Accept key to confirm.
The probe is detected, and its configuration is loaded.
4. Configure the frequency, probe drive, and gain:
 - a) Select **EC Settings > Settings (MAIN) > Frequency**, enter the parameter value, and then press the Accept key to confirm. For aluminum, for this

- example, a value of **300 kHz** is entered. Depending on the probe choice, other frequencies will be used.
- b) Select **EC Settings > Settings (MAIN) > Probe Drive = 2 V**, and then press the Accept key to confirm.
 - c) Select **EC Settings > Settings (MAIN) > Gain = 50 dB**, and then press the Accept key to confirm.
5. Position the probe on a defect-free area on the TB-S1 calibration sample. To ensure valid calibration, make sure that you hold the probe perpendicular to the sample surface and maintain contact.
6. Press the Set Balance key  to balance the signal.
7. Select **EC Settings > Settings (MAIN) > Rotation (°)**, repetitively and gently lift-off and put down the probe, while at the same time rotating the scroll knob to set the phase angle as follows: set the value by choosing a delta of 0.1, 1 or 10 increments to orient the signal horizontally, from right to left, paying particular

attention to the beginning of the curve (see Figure 13-1 on page 240). And then, press the Accept key to confirm.

Repetitively and gently lift off and put down the probe, while at the same time rotating the scroll knob to set the phase angle (**Rotation (°)** parameter).

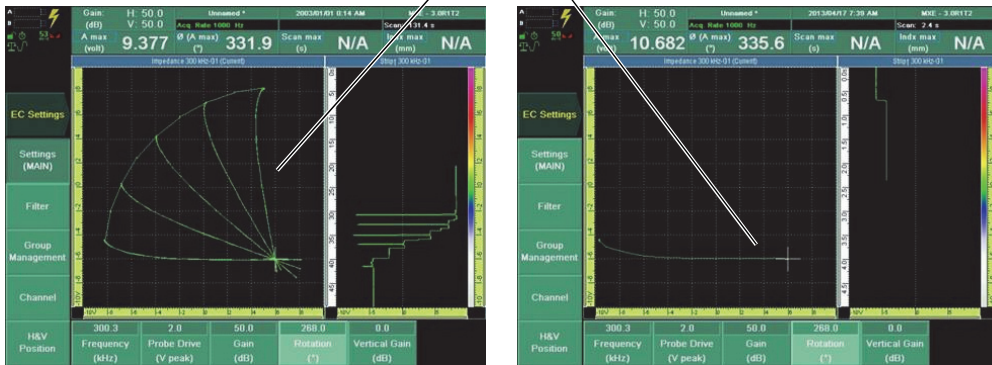
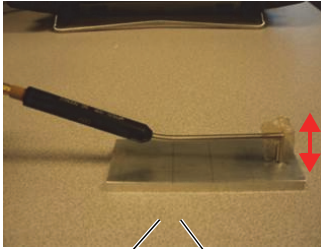


Figure 13-1 Adjusting the rotation of the lift-off signal

8. Scan the deepest crack on the standard and set the gain values as follows:
 - Select **EC Settings > Settings (MAIN) > Gain (dB)**, set the horizontal gain value, and then press the Accept key to confirm.
 - Select **EC Settings > Settings (MAIN) > Vertical Gain (dB)**, set the vertical gain value, and then press the Accept key to confirm.

NOTE

Both the gain and the vertical gain parameter values should be adjusted to expand the signal horizontally and vertically to make it span at least half of the impedance plane view, or 5 grid divisions, and with an 80 % amplitude (see Figure 13-2 on page 241).



Figure 13-2 Adjusting the gain of the deepest crack signal


Typical settings for this application example are provided in Table 12 on page 241.

Table 12 Example of settings using the MP905-50B probe for a typical surface breaking crack inspection

Parameter	Value
Frequency	300 kHz
Probe Drive	2 V

Table 12 Example of settings using the MP905-50B probe for a typical surface breaking crack inspection (*continued*)

Parameter	Value
Gain	55 dB
Rotation	268°
Vertical Gain	15 dB

9. Set the filter:
 - a) Select **EC Settings > Filter > Filter 1 > Type = Low-Pass IIR**, and then press the Accept key to confirm.
 - b) Select **EC Settings > Filter > Filter 1 > Freq. = 30 Hz**, and then press the Accept key to confirm.
10. Press the Set Balance key  to balance the signal.
11. Scan the three cracks to verify the crack signals (see Figure 13-3 on page 242).

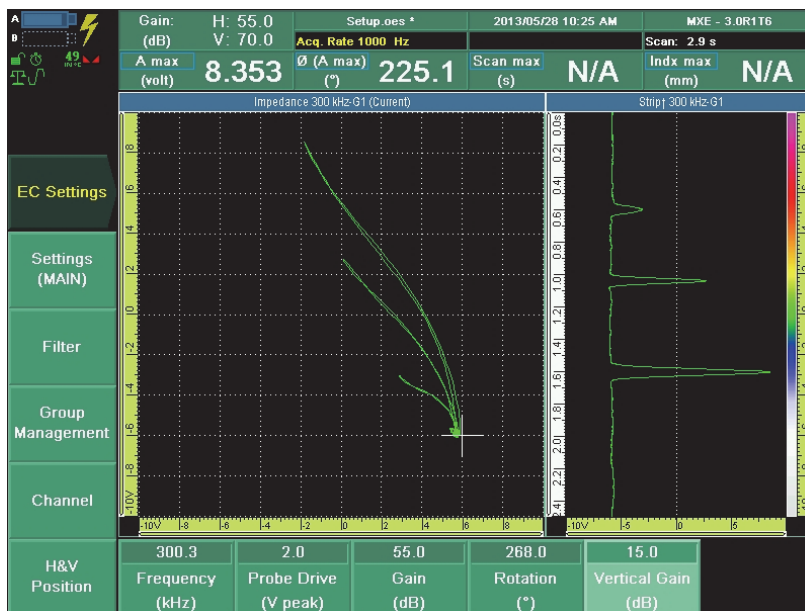



Figure 13-3 Example of crack signals with a surface probe

-
12. *Optional*: When you are satisfied with the results, press the Store/Print key  to save the acquisition data and the screen capture.

TIP

You can also save the setup. For more information, see section 11.8 on page 224.

This completes the calibration.

13. Validate the setup:
- a) Scan the defective fastener (with a crack), using a circular movement around it. Make sure to identify the variation of the crack signal to the fastener signal

(edge effect). Press the Erase/Clear key  as necessary to clear the views and make sure that the crack is correctly detected.

TIP

To keep the views refreshed with the latest acquisition data, configure the **Display > Data > Persistence = Live**, and then press the Accept key to confirm. For more information, see section 15.4.3 on page 332.

- b) *Optional*: When you are satisfied with the results, press the Store/Print key



to save the acquisition data and the screen capture (see example on Figure 13-4 on page 244).

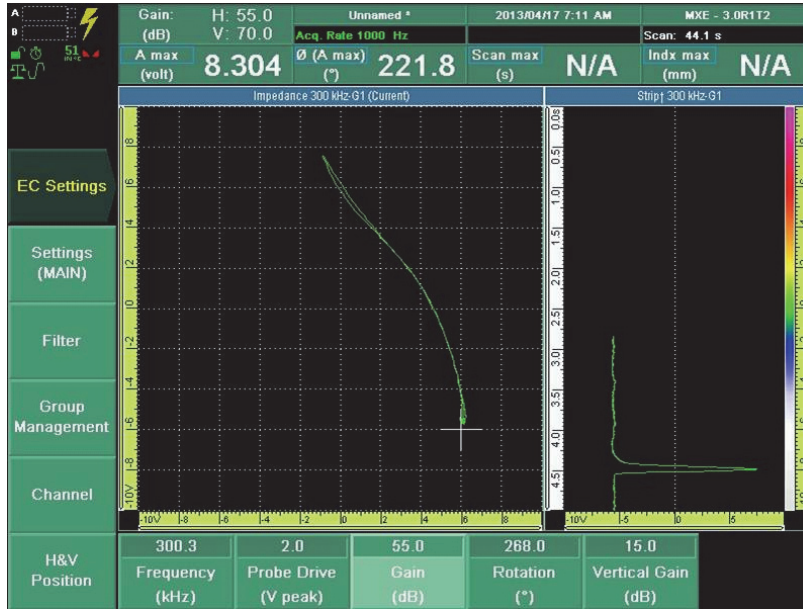


Figure 13-4 Example of crack detected around a fastener with a surface probe

13.2 Applicative Inspection Procedures in ECA Mode

This section presents typical inspection procedures in ECA mode.


13.2.1 Creating a Setup for Detecting Surface Breaking Cracks Around Fasteners

This section presents the procedure for detecting surface breaking cracks around fasteners.

Required equipment:

- Probe:
Evident probe kit SBBR026-ENC
- Samples:
Calibration sample: Nortec TB-S1, consisting in an aluminum part with three cracks of different depths
Verification sample: Nortec SPO-3932 or RSTD-10123, including a good fastener and two fasteners with surface breaking cracks
The samples must correspond to the part to be inspected: same material, same grade, same condition, and same paint thickness. If the paint thickness is unknown, Evident recommends measuring it with a probe designed for nonconducting coating, such as the Nortec 500C (U8030105), 500S (U8030055), or 500D (U8030056), with a conductivity probe (U8690029 or U8690030) or equivalent, and a calibration standard set (U8880084).

To create a setup for detecting surface breaking cracks around fasteners

1. If necessary, load the color palette spectrum.pal, which is the default palette.
2. Connect the probe and the encoder to the OmniScan MX instrument. For more information, see section 1.1 on page 19.
3. Press the Accept key .
The probe is detected, and its configuration is loaded.
4. Select **Display > Setup > Acquisition = SI Strip Chart and Impedance Plane**, and then press the Accept key to confirm.
5. Configure the frequency, the probe drive, and the gain parameter values for this example:
 - a) Configure the frequency parameter value: select **EC Settings > Settings (MAIN) > Frequency (kHz) = 300**, and then press the Accept key to confirm.
 - b) Configure the probe drive parameter value: select **Probe Drive (V peak) = 2.0**, and then press the Accept key to confirm.
 - c) Configure the first value for the gain parameter: select **Gain (dB) = 50**, and then press the Accept key to confirm.
6. Position the probe on a defect-free area of the TB-S1 sample. To ensure valid calibration, make sure that the sensitive area is in contact with the sample and that there is a minimum clearance from the sample edges.

7. Press the Set Balance key  to balance the signal.

Select **EC Settings > Settings (MAIN) > Rotation (°)**, repetitively and gently lift-off and put down the probe, as you do with a conventional ECT probe, while at the same time rotating the scroll knob to set the phase angle as follows: set the value by choosing a delta of 0.1, 1 or 10 increments to orient the signal horizontally, paying particular attention to the beginning of the curve (see Figure 13-5 on page 246). And then, press the Accept key to confirm.



Figure 13-5 Setting the Rotation parameter to orient the signal horizontally

- For this example, the **Rotation (°)** parameter value is set to **313**.
8. Scan the deepest crack and set the horizontal and vertical gain values as follows:
- Set the horizontal gain to expand the signal, ensure that it spans at least the half, or 5 grid divisions, of the impedance plane view, to provide 80 %

amplitude, and then press the Accept key to confirm. In this example, the **Gain (dB)** parameter value is set to **59 dB** (see Figure 13-6 on page 247).



Figure 13-6 Setting the Gain parameter to expand the signal vertically

- Set the vertical gain (typically, it is increased to a value of 8 dB to 15 dB) to expand the signal to ensure that it spans almost the entire height of the impedance plane view, and then press the Accept key to confirm. In this example, the Vertical **Gain (dB)** value is set to **15 dB**.
9. Activate the CSI display mode:
 - a) Select **Display > Setup > Acquisition = CSI C-scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
 - b) Scan the sample to make sure that a signal is displayed.
 10. Select **Scan > Inspection > Scan = Encoder 1**, and then press the Accept key to confirm.
 11. To ensure good results, activate the Continuous mode: select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm.
 12. Set the **Scan End** parameter to display the data in the C-scan views with a 1:1 ratio between the scan axis and the index axis. Select **Scan > Area > Scan End = 30**,

and then press the Accept key to confirm. For more information about setting the **Scan End** parameter in order to obtain a 1:1 ratio when displaying the data in the C-scans, see section 12.4 on page 233.

13. Select **Scan > Area > Scan Resolution**, make sure that the scan resolution is set to a value of **0.2**. And then, if the parameter value has been modified, press the Accept key to confirm.

14. Press the Set Balance key  to balance the signal.

15. Scan the Nortec TB-S1 calibration sample and make sure that the cracks are displayed (see Figure 13-7 on page 248).

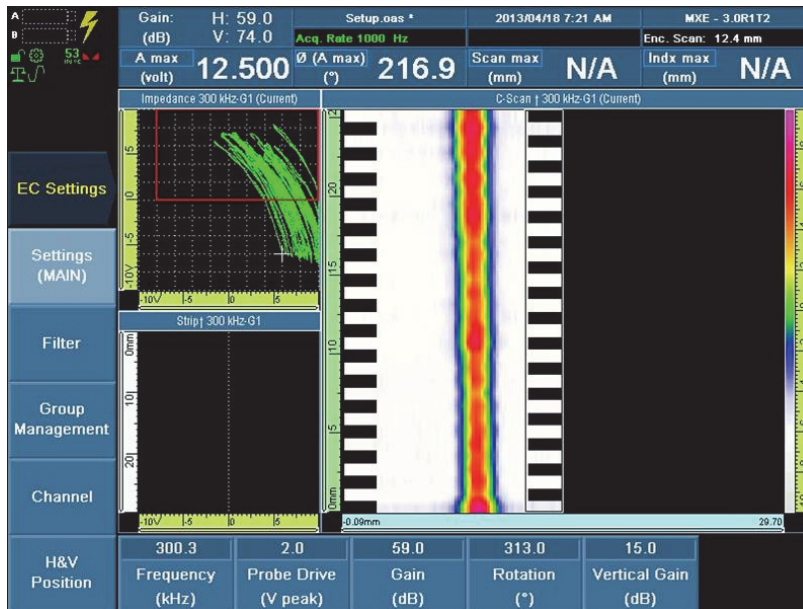



Figure 13-7 Example of cracks displayed after a rotation, gain, and vertical gain adjustment

16. Verify the sensitivity:
 - a) Position the probe on the verification sample (SPO-3932, RSTD-10123, or equivalent) between the fasteners.

- b) Press the Set Balance key  to balance the signal on the standard.

- c) Scan the good fastener, and then the two defective fasteners.
- d) Verify that the good fastener is displayed as a round form and the defective fasteners are displayed as a round form with a point (see Figure 13-8 on page 249).

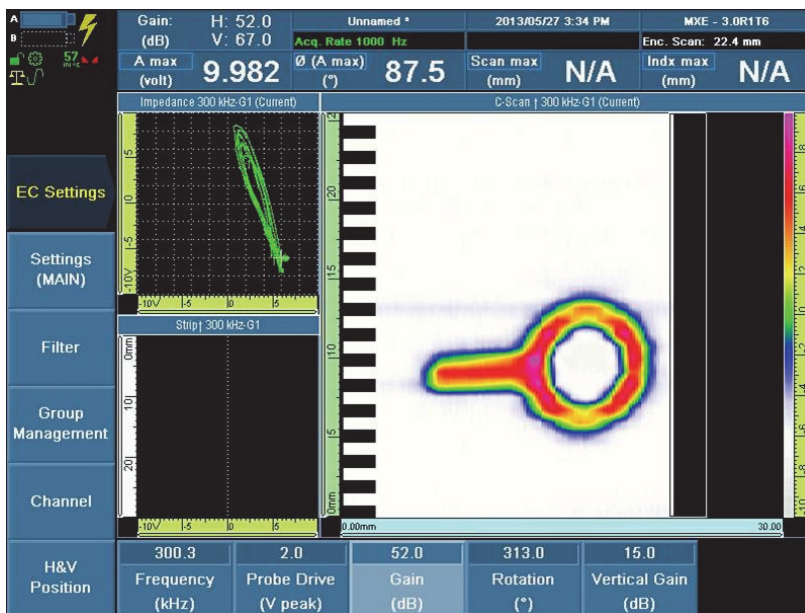


Figure 13-8 Example of a surface breaking crack around a defective fastener

- e) If necessary, adjust the sensitivity to enhance the signal display: select **EC Settings > Settings (MAIN)**, adjust the **Gain** or **Vertical Gain** values, and then press the Accept key to confirm.

TIP

If you do not need the impedance plane view, you can optimize the scan and display performance by using the C-scan mode only:

1. Select **Display > Setup > Acquisition = C-Scan**, and then press the Accept key to confirm.
2. Select **Scan > Area > Scan End = 40**, and then press the Accept key to confirm.

With this setting, the scan is displayed in full screen (see Figure 13-9 on page 250).

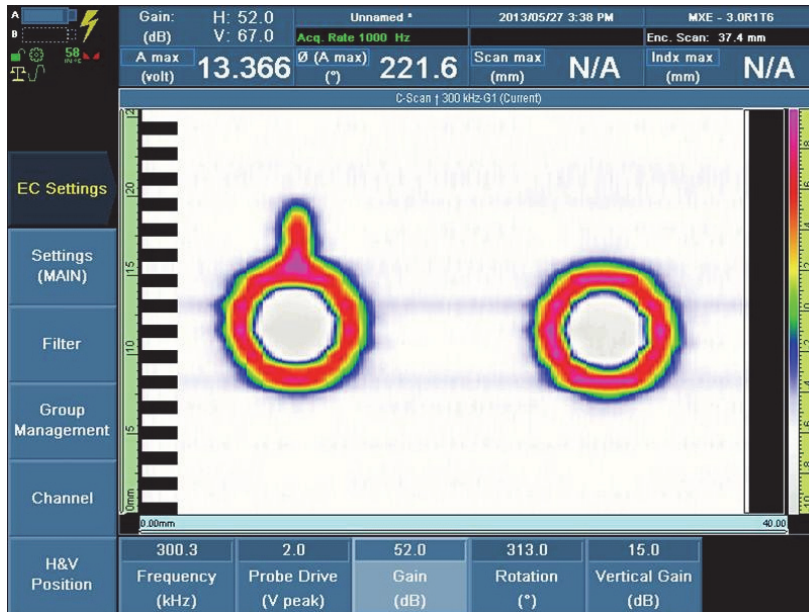


Figure 13-9 Example of surface breaking crack around fasteners as displayed in full screen: defective fastener (*left*) and good fastener (*right*)

NOTE

To create a setup for detecting surface breaking cracks around fasteners using a single-element surface probe, see section 13.1 on page 238.

13.2.2 Detecting and Measuring Corrosion on an Airplane Fuselage

This section describes the procedure for detecting and measuring corrosion on an airplane fuselage.

Required equipment:

- Probe:

Evident corrosion probe model SAA112-ENC

This probe is used for thicknesses of 1 mm (0.040 in.), as found in commercial airplanes.

OR

Evident corrosion probe model SAA128-ENC

This probe is used for thicknesses of 2 mm to 2.5 mm (0.080 in. to 0.090 in.), as found in military airplanes.

For this procedure, the probe encoders are not activated.

- Sample:

Calibration standard: RSTD-10124

and

Validation standard: RSTD-10123

Assembly that represents the part to be inspected: same material, same grade, same condition, and same thickness

The assembly contains four corrosion spots, which measure approximately 10 mm (or 0.5 in.) and extend 10 %, 20 %, 30 %, and 40 % of the part's thickness (see Figure 13-10 on page 252).




Figure 13-10 The calibration assembly for ECA corrosion inspection

The first step of the procedure consists in calibrating the sensitivity in such a way as to associate a color to the detected defect. The inspection is done on the opposite side of the corrosion, which is not visible on the exterior of the airplane.

13.2.2.1 Calibrating the Sensitivity for Corrosion Inspection

To calibrate the sensitivity for corrosion inspection

1. If necessary, load the color palette spectrum.pal, which is the default palette.
2. Depending on the sample thickness, connect the probe model SAA112-ENC or SAA128-ENC to the OmniScan MX instrument. For more information, see section 1.1 on page 19.
3. Press the Accept key .
The probe is detected, and its configuration is loaded.
4. Select **Display > Setup > Acquisition = SI Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
5. Configure the frequency, the probe drive, and the gain parameter values for this example:
 - a) Configure the frequency parameter value: select **EC Settings > Settings (MAIN)**, enter the value corresponding to the sample in the **Frequency** parameter, and then press the Accept key to confirm.

To determine the frequency, use the following formula:

$$f = \frac{2.5 \times \rho}{T^2} \quad (1)$$

Where:

f = frequency (kHz)


ρ = resistivity ($\mu\Omega$ -cm)

T = thickness of aluminium above the hidden corrosion (mm)

For example, for a 2024 T3 aluminum sample having a resistivity of 5.33 $\mu\Omega$ -cm and a thickness of 1 mm, the frequency is:

$$f = \frac{2.5 \times 5,33}{1^2} = 13 \text{ kHz}$$

For this example, the **Frequency** parameter value is set to **13** kHz.


- b) Configure the probe drive parameter value: select **Probe Drive (Vpeak) = 2.5**, and then press the Accept key to confirm.
 - c) Configure a first value for the gain parameter: select **Gain (dB) = 58**, and then press the Accept key to confirm.
6. Balance the probe as follows:
- a) Using the finger grip, position and press the probe onto a corrosion-free area of the sample.
 - b) Press the Set Balance key  to balance the signal.
 - c) Generate and set probe lift-off: repetitively lift off and gently put down the probe, as you do with a conventional ECT probe, and set the beginning of lift-off to 0.0° as follows:

Select **Rotation** ($^{\circ}$), set the value to orient the signal horizontally, and then press the Accept key to confirm. For this example, the **Rotation** ($^{\circ}$) parameter value is set to **315 $^{\circ}$** (see Figure 13-11 on page 254).



Figure 13-11 Adjusting the Rotation parameter to orient the signal horizontally

To validate the balance, vary the pressure on the probe: the signal should remain horizontal.

- d) Press the Accept key  to complete the probe balance.
- e) Select **Display > Setup > Acquisition = CSI C-Scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
- f) Scan the corrosion spots and modify the **Gain (dB)** parameter value so that the four corrosion spots have a good amplitude and different colors. The colors contribute to the measurement of the defects. For this example, the

Gain (dB) parameter value is set to **69** and the **Vertical Gain (dB)** parameter value is set to **5** (see Figure 13-12 on page 255).

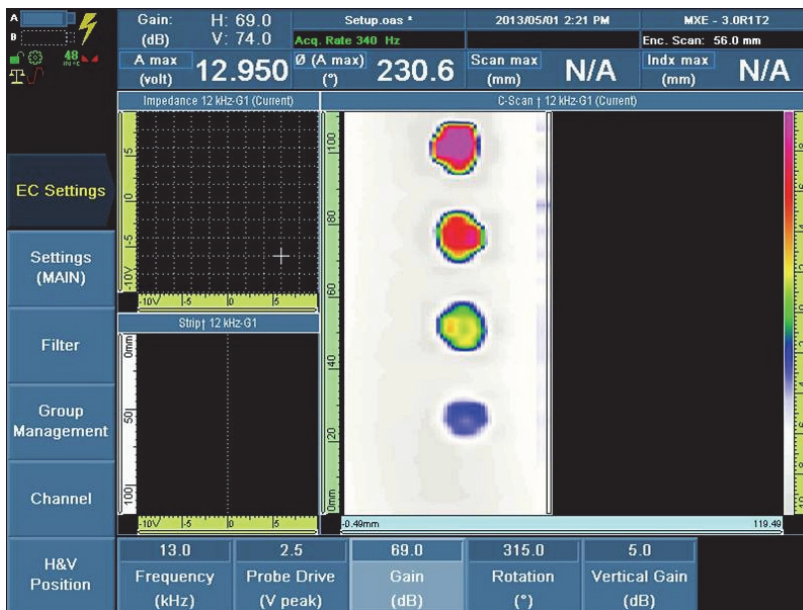


Figure 13-12 Adjusting the Gain parameter to display the four corrosion spots with different colors

g) Press the Accept key .

The typical settings for this application are provided in Table 13 on page 256.

Table 13 Typical settings for calibrating for corrosion inspection sensitivity

Parameter	Value
Frequency	13 kHz
Probe Drive	2.5 V
Gain	69 dB
Rotation	315°
Vertical Gain	5 dB

7. Scan the RSTD-10123 standard to validate corrosion as per standard drawing (see Figure 13-13 on page 257 and Figure 13-14 on page 258).

IMPORTANT

When using other alloys than 2024 aluminium or conditions other than T3, or thicknesses other than 1 mm, the probe sensitivity must be recalibrated.

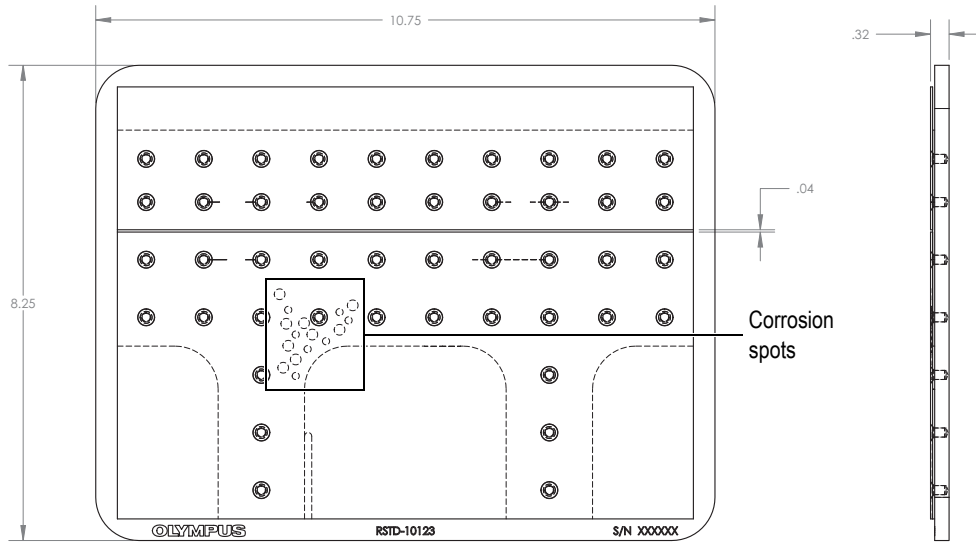


Figure 13-13 Drawing of the RSTD-10123 validation standard



Figure 13-14 Example of corrosion inspection using the spectrum.pal palette

TIP

You can also use the LOG-AMP.pal color palette. This palette is designed for producing well-defined ranges for corrosion display (see Figure 13-15 on page 259).

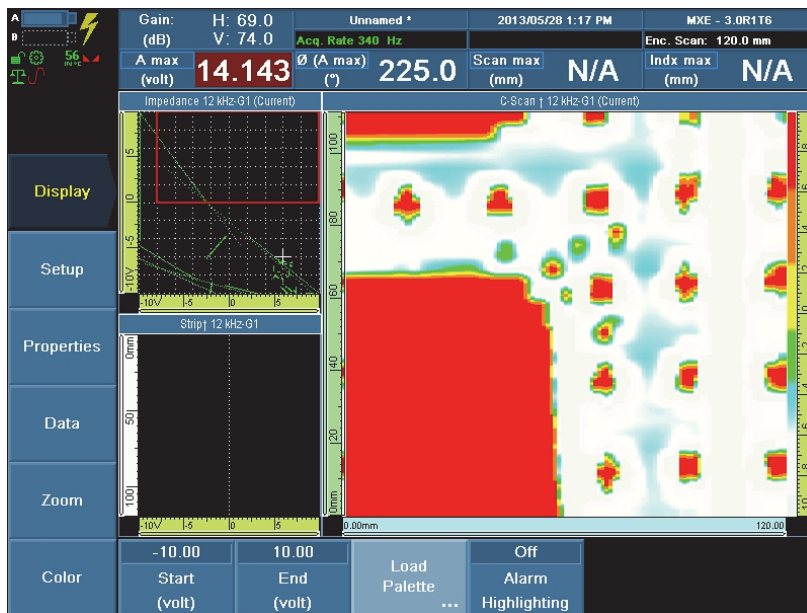



Figure 13-15 Example of corrosion inspection using the LOG-AMP.pal palette

8. Configure the C-scan view as follows:
 - a) Select **Preferences > Display .> Category = View**, and then press the Accept key to confirm.
 - b) Select the **CScan Interpolation** submenu, activate C-scan interpolation by selecting **On**, and then press the Accept key to confirm.

This function does a graphic interpolation between channels.

- c) Press the Set Balance key .
- d) Scan the sample.

The defects should be much clearer on the C-scan view (see Figure 13-14 on page 258).

13.2.2.2 Performing a Corrosion Inspection

To perform a corrosion inspection



1. Calibrate the sensitivity using the appropriate sample. See section 13.2.2.1 on page 252 for details.
2. Position the probe onto the part.
3. Press the Set Balance key  to balance the signal.
4. Scan the part at approximately 2.5 cm/s (1 in./s).
5. *Optional:* When you are satisfied with the results, press the Store/Print key  to save the acquisition data and the screen capture.

Figure 13-16 on page 261 shows a typical example of this application.



Figure 13-16 Typical example of corrosion inspection on a RSTD-10123 validation standard

13.2.3 Inspecting Lap Splices for Subsurface Cracks on an Airplane Fuselage

This section describes the procedure for inspecting lap splices for subsurface cracks on an airplane fuselage. Most of these cracks are located on the second layer, originating from a fastener.


Required equipment:

- Probe:
 - Evident probe SAB-064-030-032, which has a typical EC penetration of 1 mm, as needed in the case of civil airplanes
 - OR
 - Evident probe SAB067-ENC, which allows an EC penetration of 2 mm, as needed in the case of military airplanes


- Calibration sample RSTD-10125, consisting in an aluminum part with two layers and fasteners, and validation standard RSTD-10123

The sample must correspond to the part to be inspected: same material, same grade, same condition, and same paint thickness. If the paint thickness is unknown, Evident recommends measuring it with a probe designed for nonconducting coating, such as the Nortec 500C cable (U8030105), 500S (U8030055), or 500D (U8030056), and a conductivity probe (U8690029 or U8690030) or equivalent, and the calibration standard set (U8880084) or equivalent.

To create a setup for inspecting lap splices for subsurface cracks on an airplane fuselage

1. Load the SPECTRUM 3.pal color palette. For more information, see section 6.6 on page 123.
2. Connect the probe and the encoder to the OmniScan MX instrument. For more information, see section 1.1 on page 19.
3. Press the Accept key .
The probe is detected, and its configuration is loaded.
4. Select **Display > Setup > Acquisition = SI Strip Chart and Impedance Plane**, and then press the Accept key to confirm.
5. Set the horizontal and vertical positions:
 - a) Select **EC Settings > H&V Position > Horizontal Pos. (%) = 80**, and then press the Accept key to confirm.
 - b) Select **EC Settings > H&V Position > Vertical Pos. (%) = 20**, and then press the Accept key to confirm.
6. Configure the frequency, the probe drive, and the gain parameter values for this example:
 - a) Configure the frequency parameter value corresponding to the sample [see equation (1) on page 253]: select **EC Settings > Settings (MAIN) > Frequency (kHz) = 13**, and then press the Accept key to confirm.
 - b) Configure the probe drive parameter value: select **Probe Drive (V peak) = 2.5**, and then press the Accept key to confirm.
 - c) Configure the first value for the gain parameter: select **Gain (dB) = 58**, and then press the Accept key to confirm.
7. Balance the probe:
 - a) Using the finger grips, position the probe on the defect-free area of the RSTD-10125 sample where there is no defect. To ensure valid calibration, make sure

that the sensitive area is in contact with the sample and that there is a minimum clearance from the sample edges.

- b) Press the Set Balance key  to balance the signal.
8. Scan the good fastener, and do the following settings:
- a) Set the **Gain (dB)** to expand the signal to ensure that it spans at least the half, or 5 grid divisions, of the impedance plane view, and then press the Accept key to confirm. For your settings, look at the strongest signal, which comes from the element exactly above the fastener. For this application, for example, enter **70 dB**.
- b) Set the phase of the good fastener: select **EC Settings > Settings (MAIN) > Rotation (°)**, set the value to orient the signal of the good fastener horizontally and to the left from its origin, and then downward as it extends, and then

press the Accept key to confirm (see Figure 13-17 on page 264). If needed,

press the Set Balance key  to balance the signal.

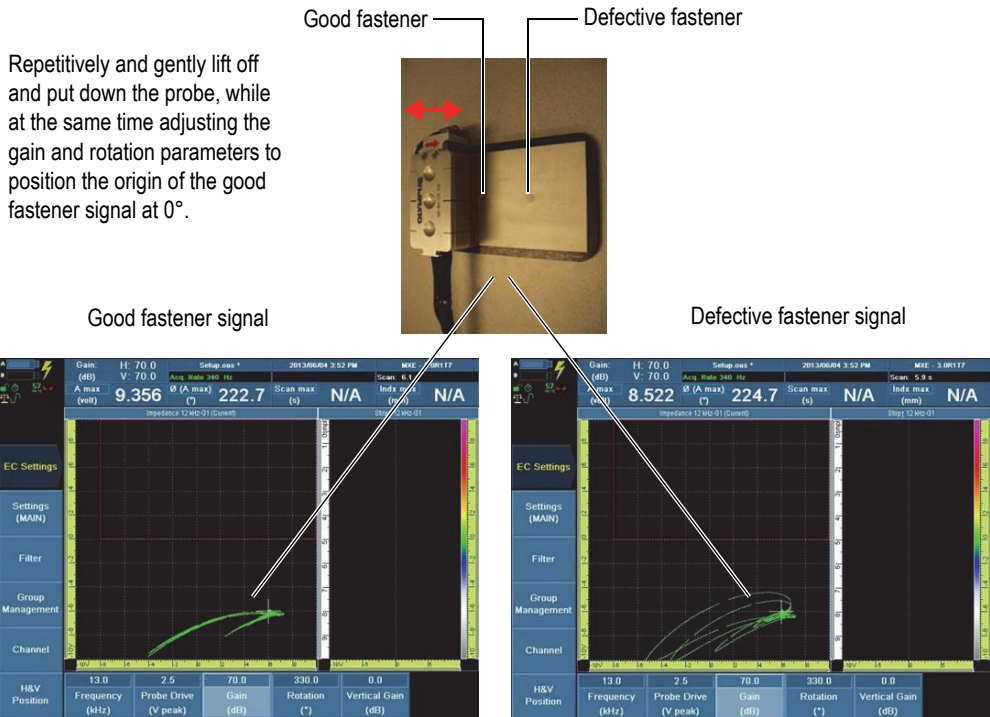


Figure 13-17 Adjusting the gain to expand the signal of the good fastener

- Scan the defective fastener (with a crack).

Two signals are displayed on the impedance plane view: the fastener and the crack (see Figure 13-18 on page 265).

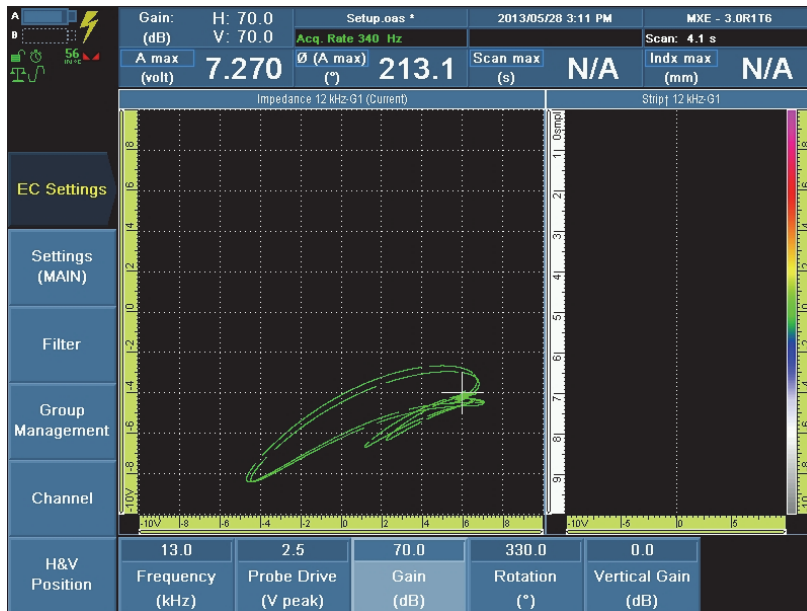


Figure 13-18 Impedance plane view with fastener and crack signals

10. Set the horizontal and vertical gain values as follows:
 - a)* Set the horizontal gain to expand the signal to ensure that it spans at least the half, or 5 grid divisions, of the impedance plane view, to provide 80 % amplitude. In this example, the **Gain (dB)** parameter value is set to **70 dB** (see Figure 13-19 on page 266).
 - b)* Set the vertical gain: select **EC Settings > Settings (MAIN)**, adjust the **Vertical Gain (dB)** to expand the crack signal to get into the alarm zone, and then

press the Accept key to confirm. In this application, the **Vertical Gain** parameter value is set to **20 dB**.

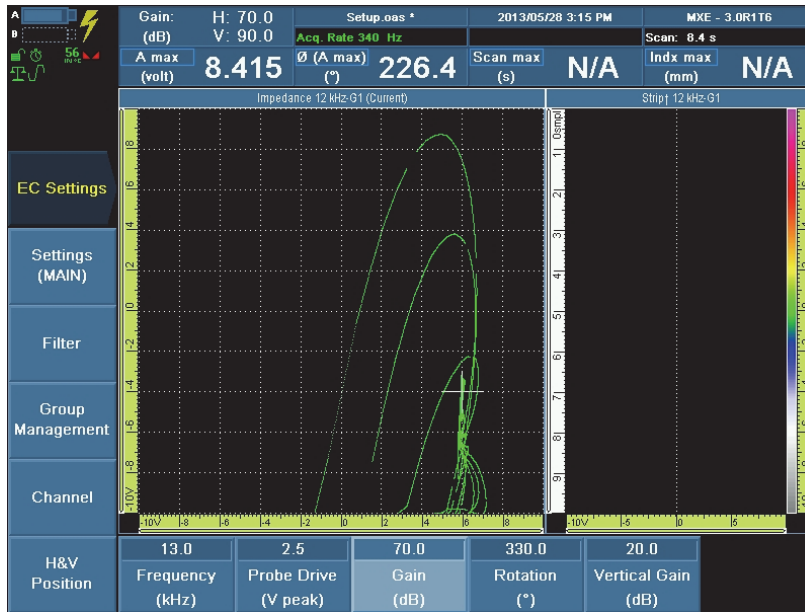


Figure 13-19 Crack signal over 80 % amplitude

11. Activate the CSI mode: select **Display > Setup > Acquisition = CSI C-Scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
12. Activate the encoder: select **Scan > Inspection > Scan = Encoder 1**, and then press the Accept key to confirm.
13. Activate the Continuous mode: select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm.
14. Set the scan parameters:
 - a) Select **Scan > Area > Scan End (mm) = 70** (2.76 in.), and then press the Accept key to confirm.
 - b) Select **Scan > Area > Scan Res. (mm) = 0.5** (0.0197 in.), and then press the Accept key to confirm.

15. Scan the fasteners on the RSTD-10125 calibration sample:

- a) Press the Set Balance key  to balance the signal.
- b) Scan the defective fastener.

Two signals are displayed on the C-scan view (see Figure 13-20 on page 267).

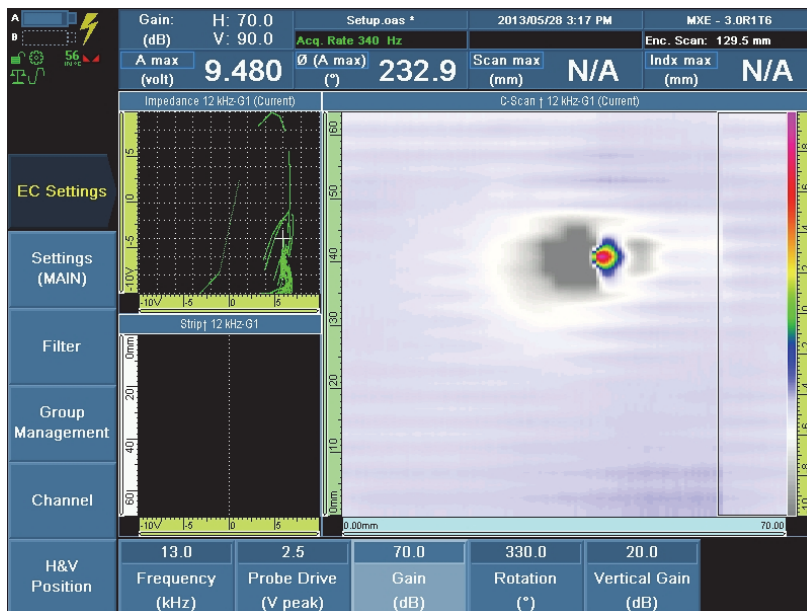


Figure 13-20 C-scan signal corresponding to the defective fastener on the RSTD-10125 sample

16. Scan the RSTD-10123 verification sample and adjust the gain to get a good contrast.

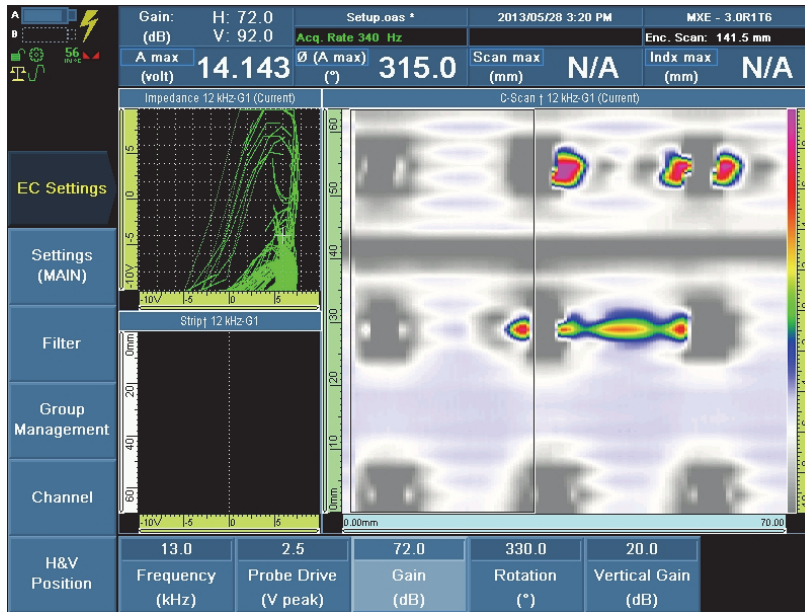


Figure 13-21 Example of multiple crack signals and a zipper crack signal

13.2.4 Inspecting Lap Splices for Doubler Cracks on an Airplane Fuselage

This section describes the procedure for inspecting lap splices for doubler cracks on airplane fuselage.


Required equipment:


- Probe:
Evident probe SAB-064-030-032, which has a typical EC penetration of 1 mm, as needed in the case of civil airplanes
- Calibration sample NDT-1069, consisting in a part with a single layer and a doubler, along which cracks can form and of validation sample RSTD-10123
The sample must correspond to the part to be inspected: same material, same grade, same condition, and same paint thickness. If the paint thickness is unknown, Evident recommends measuring it with a probe designed for

nonconducting coating, such as the Nortec 500C cable (U8030105), 500S (U8030055), or 500D (U8030056), and a conductivity probe (U8690029 or U8690030) or equivalent, and a calibration standard set (U8880084) or equivalent.

13.2.4.1 Creating a Setup for Inspecting Lap Splices for Doubler Cracks

To create a setup for inspecting lap splices for subsurface cracks

1. Load the SPECTRUM_3.pal color palette. For more information, see section 6.6 on page 123.
2. Connect the probe and the encoder to the OmniScan MX instrument. For more information, see section 1.1 on page 19.
3. Press the Accept key .

The probe is detected, and its configuration is loaded.
4. Select **Display > Setup > Acquisition = SI Strip Chart and Impedance Plane**, and then press the Accept key to confirm.
5. Set the horizontal and vertical positions:
 - a) Select **EC Settings > H&V Position > Horizontal Pos. (%) = 80**, and then press the Accept key to confirm.
 - b) Select **EC Settings > H&V Position > Vertical Pos. (%) = 20**, and then press the Accept key to confirm.
6. Configure the frequency, the probe drive, and the gain parameter values for this example:
 - a) Configure the frequency parameter value according to the sample thickness (1 mm) and crack depth (0.5 mm). The ideal frequency for this application is **25 kHz**. Select **EC Settings > Settings (MAIN) > Frequency (kHz) = 25**, and then press the Accept key to confirm.
 - b) Configure the probe drive parameter value: select **Probe Drive (V peak) = 3**, and then press the Accept key to confirm.
 - c) Configure the first value for the gain parameter: select **Gain (dB) = 72**, and then press the Accept key to confirm.
7. Balance the probe:
 - a) Position the probe on the single layer area of the NDT-1069 calibration sample. To ensure valid calibration, make sure that the sensitive area is in contact with the sample and that the encoder is outside of the sample.
 - b) Press the Set Balance key  to balance the signal.

8. Select **EC Settings > Settings (MAIN) > Rotation (°)**, repetitively and gently lift off and put down the probe, while at the same time rotating the scroll knob to adjust the phase angle to get a 0.0° horizontal left signal, and then press the Accept key to confirm (see Figure 13-22 on page 270).

Repetitively and gently lift off and put down the probe, while at the same time rotating the scroll knob to set the phase angle (**Rotation (°)** parameter).

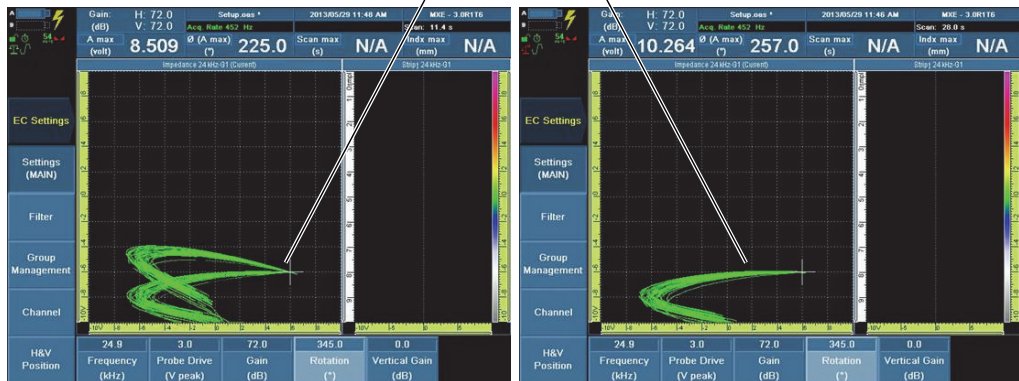
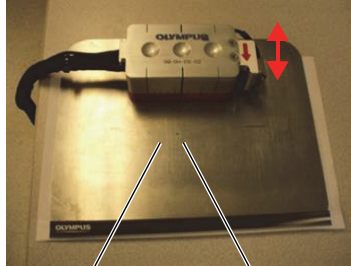


Figure 13-22 Adjusting the lift-off signal to orient it horizontally

9. Scan the sample on the flat side, along the doubler.
10. Set the horizontal and vertical gain to get 80 % amplitude along both axes in the impedance plane: select **EC Settings > Settings (MAIN)**, properly adjust the **Gain (dB)** parameter value to **78** and the **Vertical Gain (dB)** parameter value to **15**, and then press the Accept key to confirm.
11. Balance the probe by repeating step 7.

12. Scan the NDT-1069 calibration sample on the single-layer flat side, along the doubler.

The crack is displayed in color in SI mode (see Figure 13-23 on page 271).

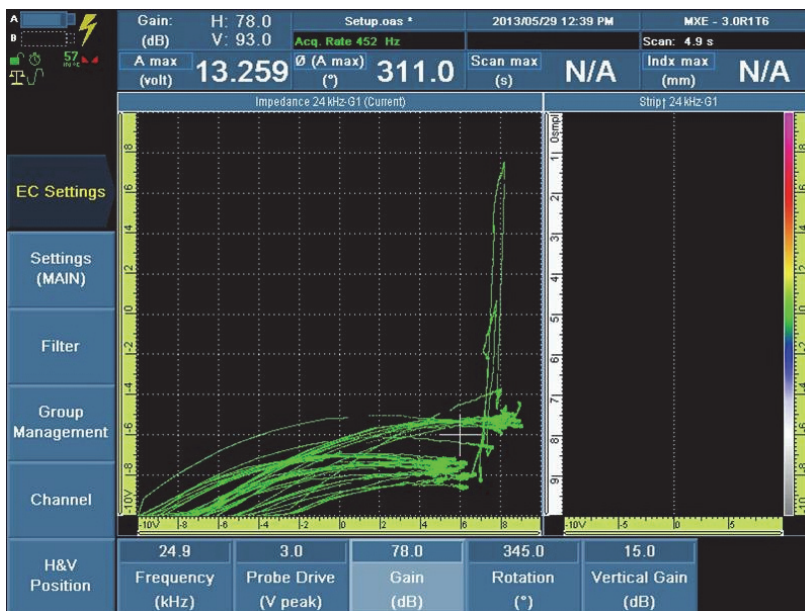


Figure 13-23 Example of a crack signal along the doubler

13. Select **Display > Setup > Acquisition = CSI (C-Scan, Strip Chart, and Impedance Plane)**, and then press the Accept key to confirm.
14. Activate the encoder: select **Scan > Inspection > Scan = Encoder 1**, and then press the Accept key to confirm.
15. Activate the Continuous mode: select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm.
16. Set the scan parameters:
 - a) Select **Scan > Area > Scan End (mm) = 70** (2.765 in.), and then press the Accept key to confirm.
 - b) Select **Scan > Area > Scan Res. (mm) = 0.5** (0.0197 in.), and then press the Accept key to confirm.
17. Scan the sample:


- a) Press the Set Balance key  to balance the signal.
- b) Scan the sample on the single-layer flat side, along the doubler.
- Crack and doubler signals are displayed in the C-scan view (see Figure 13-24 on page 272).



Figure 13-24 Crack and doubler signals displayed on the C-scan

Optionally, you can normalize the lift-off to improve performance and stabilize the signal.

13.2.4.2 Normalizing the Lift-off to Improve Performance and Stabilize the Signal

To normalize the lift-off to improve performance and stabilize the signal

1. Select **EC Settings > Settings (MAIN) > Rotation (°) > 0.0**, and then press the Accept key to confirm.
2. Lay a piece of tape 0.5 in. wide and 0.002 in. thick (Teflon, for example) on the single layer part of the sample. Make sure that there is some clear surface before and after the tape.
3. Select **Wizard > Calibration > Type = Normalization**, and then press **Start**.
4. In the **Definition Step**, select **Angle**, enter **0**, and then press the Accept key to confirm.
5. Select **Next**.
6. Position the probe on the single layer portion of the sample, and then select **Balance**.
7. Select **Start**.
8. Scan the sample by passing over the tape.
9. Select **Stop**.
10. Select **Next**.
11. Select **Scan Start** and then **Scan Length**, adjust the values to make the cursors select the entire lift-off signal that will be normalized, and then press the Accept key to confirm. The selection cursors must contain the entire lift-off signal on the C-scan.

The tape on the sample generates a controlled lift-off signal. In this example, the lift-off phase is 2.2° (see Figure 13-25 on page 274).

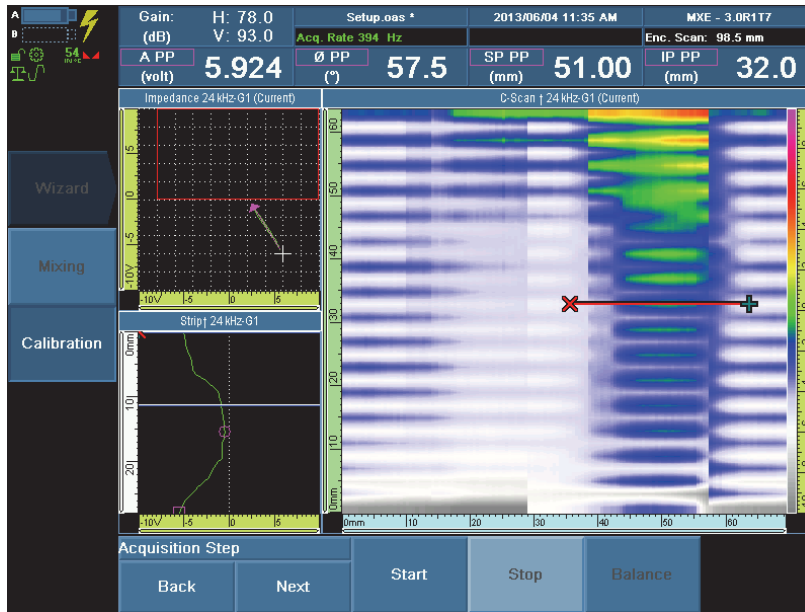


Figure 13-25 Lift-off signal generated with a tape

12. Select **Next**.
13. Select **Normalize Angle**.
14. Select **OK** to accept and close the message that notifies you that the vertical gain must be set to 0.

The lift-off angle is normalized to 360° for each element. This makes the sensitivity uniform and ensures signal stability.
15. Select **Finish**.
16. Scan the sample on the flat side, along the doubler.
17. Reset the vertical gain: select **EC Settings > Settings (MAIN)**, adjust the **Vertical Gain (dB)** to highlight the crack signal as it was before normalization, and then press the Accept key to confirm. In this application, the **Vertical Gain** value has been reset to 15 dB after normalization.

18. Scan the sample on the flat side, along the doubler.

The signal is now more stable as it is less affected by lift-off (see Figure 13-26 on page 275).

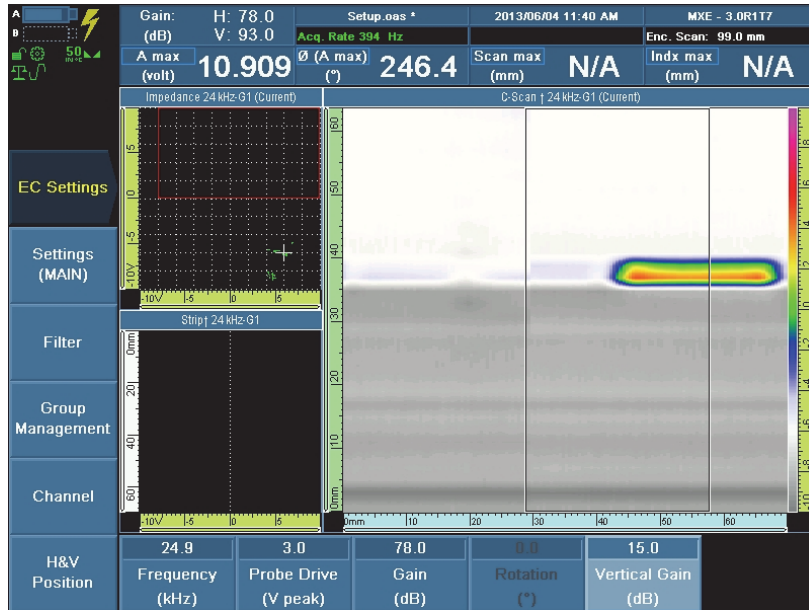


Figure 13-26 Example of a subsurface crack signal along the doubler, after normalization

NOTE

For more details on the normalization procedure, see section 10.1 on page 191.

13.2.5 Replacing Traditional NDT Inspection Methods by Eddy Current Array Inspection

Several traditional nondestructive testing inspection methods used for stress corrosion cracking, such as penetrant testing and magnetic particles testing, can be replaced by eddy current array technology using the OmniScan MX instrument equipped with the ECA module.

Required equipment:

- Probe:
Evident flex array probe kit FBB051-KIT-PIPE (which includes the probe FBB-051-500-032)

The probe assembly has 32 channels in impedance-bridge mode. Replaceable curved wear pieces can accommodate different pipe diameters, available in a standard kit ranging from 3.3 cm (1.3 in.) up to 71 cm (48 in.), in 15 different diameters. The probe operates with an encoder that allows tracking of the position as the C-scan view gets updated.

- Sample:
Piece of stainless steel or carbon steel piping, having some stress corrosion cracking, mostly axially oriented. Evident recommends the MESX319 (carbon steel) standard, which includes notches of different depths, allowing the calibration of various stress corrosion crack depths.

Eddy current array, being an electronic scan, does not require any particular surface preparation like penetrant testing or magnetic particle testing do. Magnetic coupling only requires that the coils are very close to the sample, but they do not have to be in direct contact.

Only a very rough cleaning is required to make sure that there is no debris or anything that could prevent the probe from scanning smoothly. There is no paint stripping or paint reapplication required, and as such, no waste disposal problems. This makes the eddy current array a very ecologically friendly method to quickly detect, identify, and evaluate the depths of the defects found in pipes and pipelines in the oil and gas industry.

13.2.5.1 Configuring The OmniScan MXE Software for Stress Corrosion Cracking Detection on Stainless Steel or Carbon Steel Piping

The following procedure describes the basic configuration of the OmniScan MXE software in order to use eddy current array to easily detect flaws on stainless steel or carbon steel piping.

Once the configuration procedure is complete, the configuration can be optimized either for evaluating defect depth based on the calibration standard, or for detecting defects based on accept/reject criteria using target defects on the calibration standard.

To configure stress corrosion cracking detection on stainless steel or carbon steel piping

1. Select **Display > Setup > Acquisition = CSI C-Scan, Strip Chart, and Impedance Plane**, and then press the Accept key to confirm.
2. If necessary, load the SPECTRUM.pal color palette, which is the default palette. For more information, see section 6.6.1 on page 123.
3. Set the horizontal and vertical positions of the offset null in the impedance plane view (see Figure 13-27 on page 277):
 - a) Select **EC Settings > H&V Position > Horizontal Pos. (%) = 50**, and then press the Accept key to confirm.
 - b) Select **EC Settings > H&V Position > Vertical Pos. (%) = 20**, and then press the Accept key to confirm.




Figure 13-27 Setting the horizontal and vertical positions of the offset null in the impedance plane view

4. Set the frequency. Select **EC Settings > Settings (MAIN) > Frequency = 150**, and then press the Accept key to confirm (see Figure 13-28 on page 278).



Figure 13-28 Setting the frequency for stress corrosion cracking detection on carbon steel piping

5. Balance the probe:
 - a) Position the probe on an area of the calibration standard that is free of defects.
 - b) Press the Set Balance key  to balance the signal.
6. Repetitively lift-off and put down the probe, and set the lift-off angle to the left and horizontally as follows: Select **EC Settings > Settings (MAIN) > Rotation (°)**, adjust the value by one-degree increments to orient the signal horizontally, from

right to left, and then press the Accept key to confirm. Pay particular attention to consider the beginning of the curve (see Figure 13-29 on page 279).

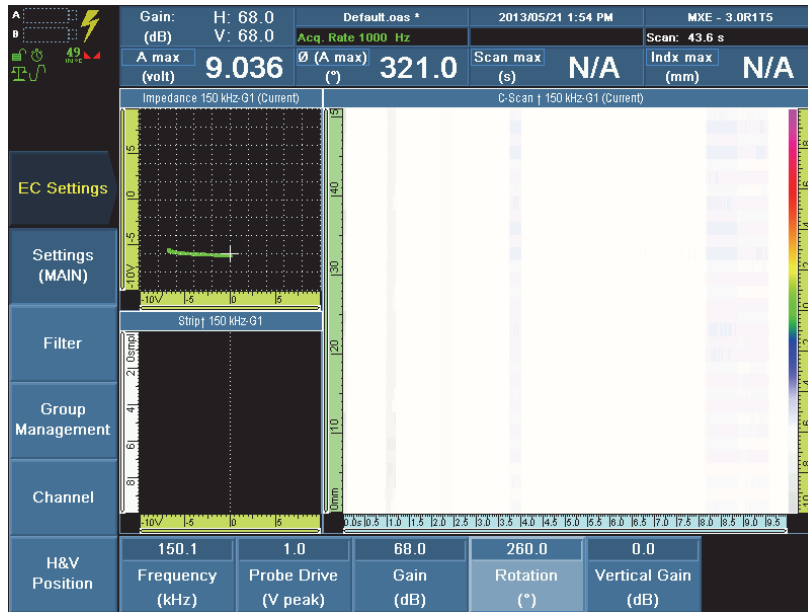


Figure 13-29 Setting the rotation for stress corrosion cracking detection on stainless steel piping

7. Scan the defects on the MESX319 (carbon steel) calibration standard.
8. Set the **Gain (dB)** to expand the signal, ensuring that it spans at least the half, or 6 grid divisions, of the impedance plane view, and then press the Accept key to

confirm. For this application, for example, enter **68 dB** (see Figure 13-30 on page 280).



Figure 13-30 Adjusting the gain to expand the signal of the defects

9. Set the vertical gain: select **EC Settings > Settings (MAIN) > Vertical Gain (dB)**, adjust the value as needed to help maximize the vertical deflection of the signal, and then press the Accept key to confirm (see Figure 13-31 on page 281).

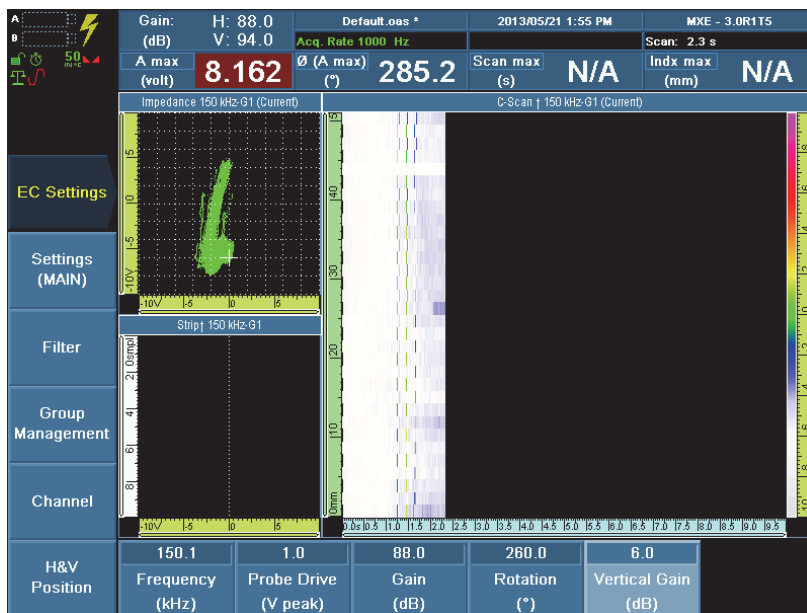


Figure 13-31 Adjusting the vertical gain to maximize the vertical deflection of the signal

10. Activate the encoder:

- a) Select **Scan > Inspection > Scan = Encoder 1**, and then press the Accept key to confirm (see Figure 13-32 on page 282).



Figure 13-32 Activating the probe encoder

- b) Select **Scan > Inspection > Continuous = On**, and then press the Accept key to confirm (see Figure 13-34 on page 283).

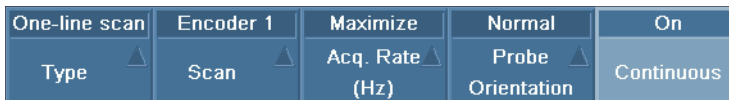


Figure 13-33 Activating the Continuous mode


- c) Set the C-scan view to a 1:1 ratio. Select **Scan > Area > Scan End = 60**, and then press the Accept key to confirm.

For more information, see section 12.4 on page 233. For common ECA probe models, the recommended **Scan End** parameter values for the display layout types are available in Table 11 on page 235.

- d) Change the polarity: select **Scan > Encoder > Polarity = Inverse**, and then press the Accept key to confirm.
- e) Select **Scan > Area > Scan Res. = 0.3**, and then press the Accept key to confirm (see Figure 13-34 on page 283).

0.00	59.70	0.300	59.70
Scan Start (mm)	Scan End (mm)	Scan Res. (mm)	Scan Tracking (mm)

Figure 13-34 Setting the Scan resolution

11. Balance the probe:
 - a) Position the probe on a defect-free area of the sample.
 - b) Press the Set Balance key  to balance the signal.
12. Scan the calibration standard.

The C-scan view shows the cracks in Continuous mode (see Figure 13-35 on page 284).

NOTE

To enhance the contrast, the gain or vertical gain can be readjusted.

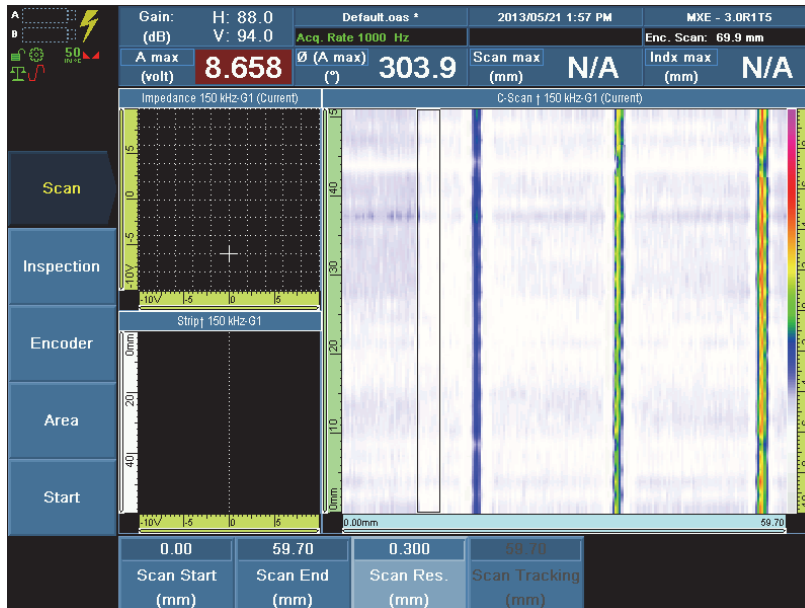


Figure 13-35 Example of impedance plane and C-scan view showing the cracks on a MESX319 standard

13. Save the setup as a file that can then be reused in inspection procedures. For more information, see section 11.8 on page 224.

The procedure for configuring the OmniScan MXE software for stress corrosion cracking detection on stainless steel or carbon steel piping is complete.

At this point, the configuration can be optimized either for evaluating defect depth based on the calibration standard, or for simply detecting defects based on accept/reject criteria using target defects on the calibration standard. For more information, refer to the following sections:

- “Estimating the Depths of Stress Corrosion Cracking on Stainless Steel or Carbon Steel Piping” on page 285
- “Detecting Stress Corrosion Cracking on Stainless Steel or Carbon Steel Piping Based on Accept/Reject Criteria” on page 288

13.2.5.2 Estimating the Depths of Stress Corrosion Cracking on Stainless Steel or Carbon Steel Piping

The following procedure describes the use of eddy current array to easily provide a good estimation of the depth of the flaws on stainless steel or carbon steel piping.

NOTE

The procedure from section 13.2.5.1 on page 276 must have been completed before the procedure that follows can be performed.

To estimate the depth of stress corrosion cracking on stainless steel piping

1. If necessary, load the SPECTRUM.pal color palette, which is the default palette. Select **Displays > Color > Load Palette**, and then press the Accept key to confirm. For more information, see section 6.6.1 on page 123.

NOTE

The **LOG-AMP.pal** palette and all the palettes with the **RAINBOW_** or **SPECTRUM_** prefix are suitable for estimating the depth of cracks.

2. *Optional*: Configure the high-pass IIR filter.
 - a) Select **EC Settings > Filter > Filter = Filter 1**, and then press the Accept key to confirm.
 - b) Select **EC Settings > Filter > Type = High-Pass IIR**, and then press the Accept key to confirm.

- c) Select **EC Settings > Filter > Max. Length = 500**, and then press the Accept key to confirm.

The maximum available value is automatically entered. For more information about the High-Pass IIR filter, see section 7.3 on page 131.

NOTE

Using a high-pass filter helps reduce background noise from the part to inspect. However, the high-pass filter must be used with caution, as it filters out longitudinal defects.

3. Scan the defects on the MESX319 (carbon steel) calibration standard.
4. To improve contrast, adjust the gain or vertical gain as needed. Select **EC Settings > Settings (MAIN)**, and then press the Accept key to confirm.

Adjust the contrast to obtain a different color on the C-scan for each calibration defect see Figure 13-36 on page 286).

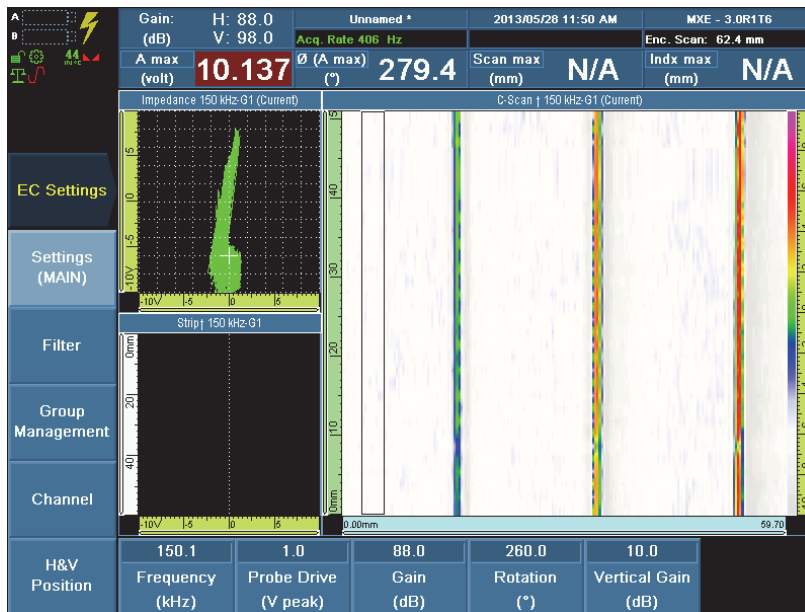


Figure 13-36 Contrast adjusted to display each calibration defect in a different color

NOTE

The required gain value changes depending on the color palette that is selected.

- Scan the defects on the calibration standard.

In the C-scan view, note that the longitudinal defects have almost disappeared (see Figure 13-35 on page 284).

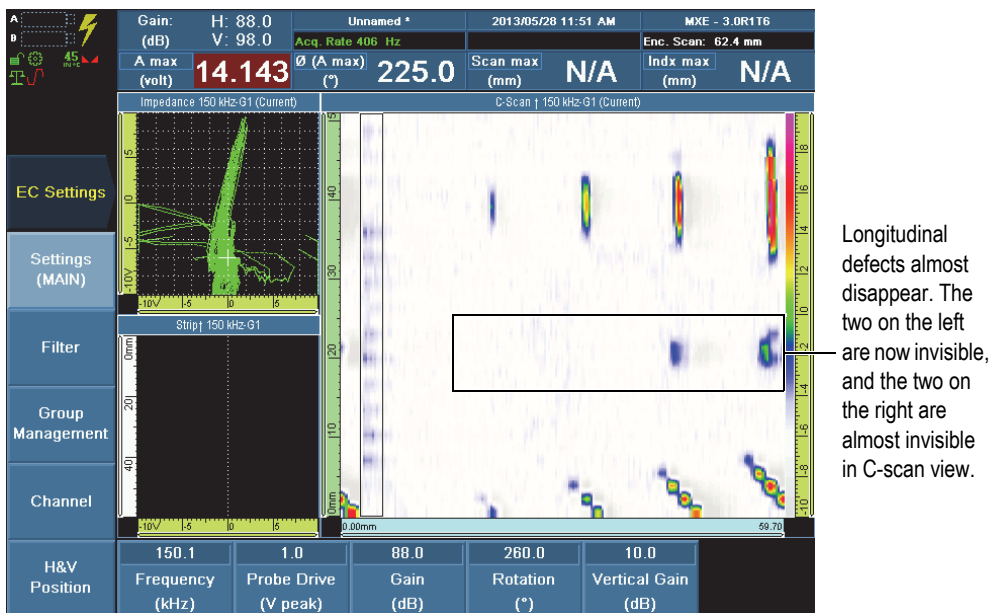


Figure 13-37 C-scan view with longitudinal defects almost invisible after activating the High-Pass IIR filter

- To archive any scan, press the Store/Print key .

The acquisition data and the screen capture are saved in a file that can be opened and analyzed later. The .jpg image can be cropped and used in a report.

- Save the setup as a file that can then be reused in inspection procedures. For more information, see section 11.8 on page 224.

The procedure for estimating the depth of stress corrosion cracking on stainless steel or carbon steel piping is complete.

The impedance plane view shows a merge of all 32 channels, as opposed to conventional eddy current equipment that has only one channel. Each of these channels get represented along the scan- or time-axis of the C-scan view, depending on the mode being used.

The colors represented on the C-scan correspond to the vertical deviation of the signal. White is equivalent to “no defect,” so the white background is good. The scale of colors from white to purple represents the signal from the null point to the top of the amplitude scale. So, the defects that have the most vertical amplitude are going to appear in purple on the C-scan. You can change the color correspondence by changing the color palette. Using different palettes allows you to have different levels of sensitivity or different representations to make sure you are satisfied with the results obtained.

The C-scan in Figure 13-35 on page 284 represents the defects of a calibration standard. Using the known depths of defects in the calibration standard, you can then estimate the depths of the defects and their corresponding color in the C-Scan view. For example, the blue notches are about 0.5 mm (0.020 in.) in depth. The yellowish-green ones are about 1.0 mm (0.040 in.) deep. The magenta ones are about 2.0 mm (0.080 in.) deep according to the standard.

Eddy current being mostly a surface inspection, it does not have the capability to penetrate the full wall. It provides sizing of the surface-breaking notches or surface-breaking defects only. It can still provide an indication whether it is just a scratch or a genuine crack.

13.2.5.3 Detecting Stress Corrosion Cracking on Stainless Steel or Carbon Steel Piping Based on Accept/Reject Criteria

The following procedure describes the use of eddy current array to easily detect and provide a good estimation of the depths of the flaws on stainless steel or carbon steel piping.

The ECA equipment can be used with the spectrum.pal palette to represent the depths of stress corrosion cracking as colors. A go-no-go testing method can also be used, rendering it a simple accept/reject equipment.

Based on criteria agreed upon by the customer and the service provider, the gain setting can be used to tune the sensitivity of the test so that it accepts or rejects certain defects.

To detect stress corrosion cracking on stainless steel or carbon steel piping based on accept/reject criteria

1. If necessary, load the **1_RED-DYE.pal** color palette, which is the default palette (patent rights protection by, but not limited to, the following: US D668,564; 13/967,690; CN201130084342.30). Select **Displays > Color > Load Palette** (see Figure 13-38 on page 289).

For more information, see section 6.6.1 on page 123.

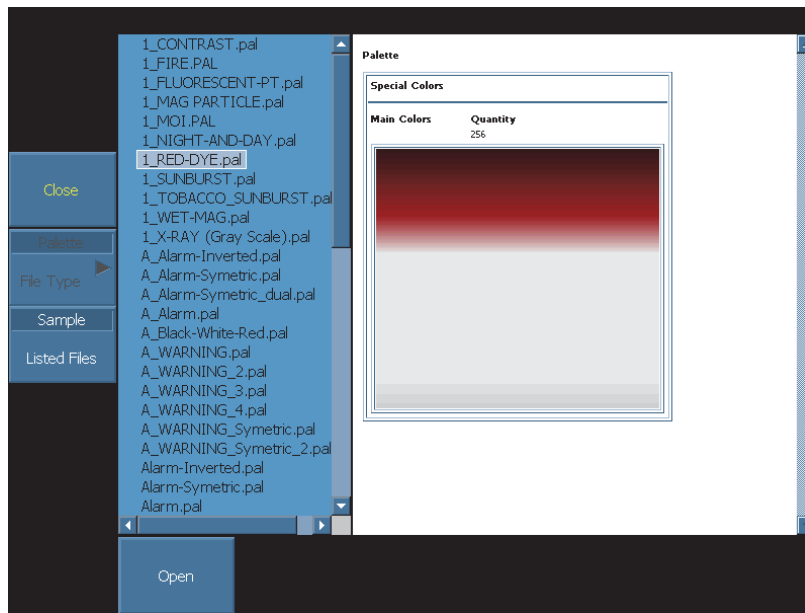


Figure 13-38 Selecting the **1_RED-DYE.pal** color palette

2. *Optional*: Configure the High-Pass IIR filter.
 - a) Select **EC Settings > Filter > Filter = Filter 1**, and then press the Accept key to confirm (see Figure 13-39 on page 290).



Figure 13-39 Configuring the High-Pass IIR filter

- b) Select **EC Settings > Filter > Type = High-Pass IIR**, and then press the Accept key to confirm.
- c) Select **EC Settings > Filter > Max. Length = 500**, and then press the Accept key to confirm.

The maximum available value is automatically entered. For more information about the High-Pass IIR filter, see section 7.3 on page 131.

NOTE

Using a high-pass filter helps reduce background noise from the part to inspect. However, the high-pass filter must be used with caution, as it filters out longitudinal defects.

3. Scan the defects on the MESX319 (carbon steel) calibration standard.
4. Adjust the gain. Select **EC Settings > Settings (MAIN) > Gain**, set the parameter value, and then press the Accept key to confirm. For more information, see section 3.3.4 on page 61.

Expand the signal to display the defect to be detected with optimal contrast. In the C-scan view, defects that are smaller than the defect to be detected are not displayed with the color scheme that identify defects.

5. Scan the defects on the calibration standard.

The defect that is smaller than the defect to be detected has almost disappeared (see Figure 13-40 on page 291).

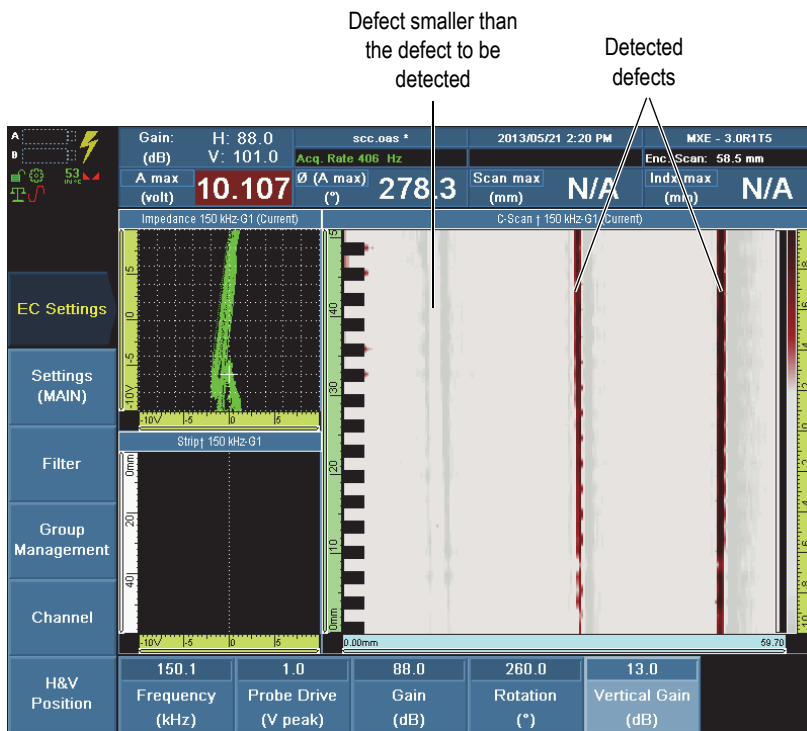


Figure 13-40 C-scan view showing a defect smaller than the defects to be detected as almost invisible

6. If needed, change the color palette to represent the signals in other ways. For example, load the **1_WET-MAG.pal** or the **1_FLUORESCENT-PT.pal** color

palette to simulate the wet magnetic particles test represented with a blue background and fluorescent-style display.

- To archive any scan, press the Store/Print key .

The acquisition data and the screen capture are saved in a file that can be opened and analyzed later. The .jpg image can be cropped and used in a report.

- Save the setup as a file that can then be reused in inspection procedures. For more information, see section 11.8 on page 224.

The procedure to detect stress corrosion cracking on stainless steel or carbon steel piping based on accept/reject criteria is complete. An alarm can be added as an option.

To add an alarm for the accept/reject criteria stress corrosion cracking configuration

- Set an alarm. Select **Alarm > Alarm Setup** (see Figure 13-41 on page 292). For more information, see chapter 8 on page 137.

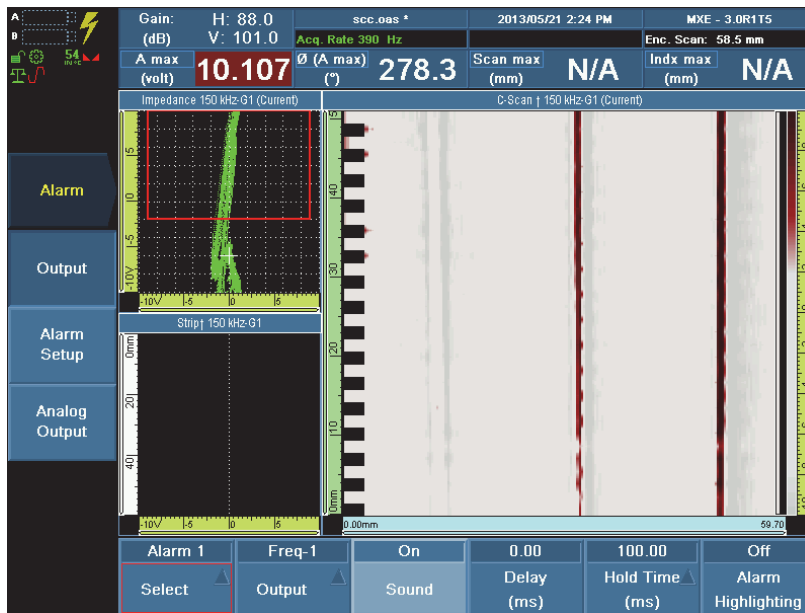


Figure 13-41 Setting an alarm for the accept/reject criteria

- Select **Alarm > Output > Alarm Highlight = On**, and then press the Accept key to confirm.

When the alarm is activated, the detected defects are displayed in red in the C-scan view (see Figure 13-42 on page 293).



Figure 13-42 Alarm activated for the accept/reject criteria

14. Connecting the OmniScan MX Directly to a Computer Under Windows XP

This section describes how to set up a direct network connection between the OmniScan MX and a computer running the Microsoft Windows XP operating system. It is organized as follows:

- “Connecting the Hardware Under Windows XP” on page 295
- “Configuring the Remote Computer Under Windows XP” on page 296
- “Creating a User Account on the Remote Computer Under Windows XP” on page 299
- “Creating a Shared Folder on the Remote Computer Under Windows XP” on page 301
- “Configuring the OmniScan MX Under Windows XP” on page 306
- “Saving OmniScan MX Data on the Remote Computer Under Windows XP” on page 307
- “Connecting the OmniScan MX to a Network” on page 307

14.1 Connecting the Hardware Under Windows XP

To connect the hardware (Windows XP)

1. Connect a crosslink Ethernet (RJ-45) cable to the network port of the remote computer.
2. Connect the other end of the cable to the OmniScan MX Ethernet port.

14.2 Configuring the Remote Computer Under Windows XP

To configure the remote computer under Windows XP

1. On the remote computer, open the Control Panel window.
2. Open the **Network Connections** control panel by clicking its icon (see Figure 14-1 on page 296).



Figure 14-1 The Network Connections icon

3. Double-click the connection you wish to configure.
The **Local Area Connection Status** dialog box appears (see Figure 14-2 on page 296).

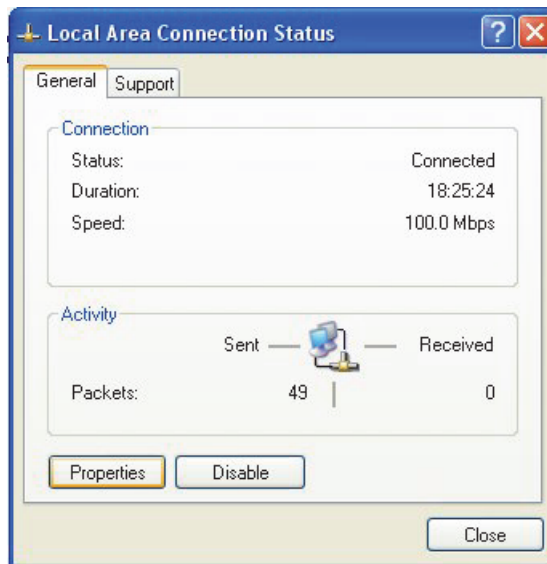


Figure 14-2 The Local Area Connection Status dialog box (Windows XP)

4. On the **General** tab, click the **Properties** button.

The **Local Area Connection Properties** dialog box for the selected connection appears (see Figure 14-3 on page 297).

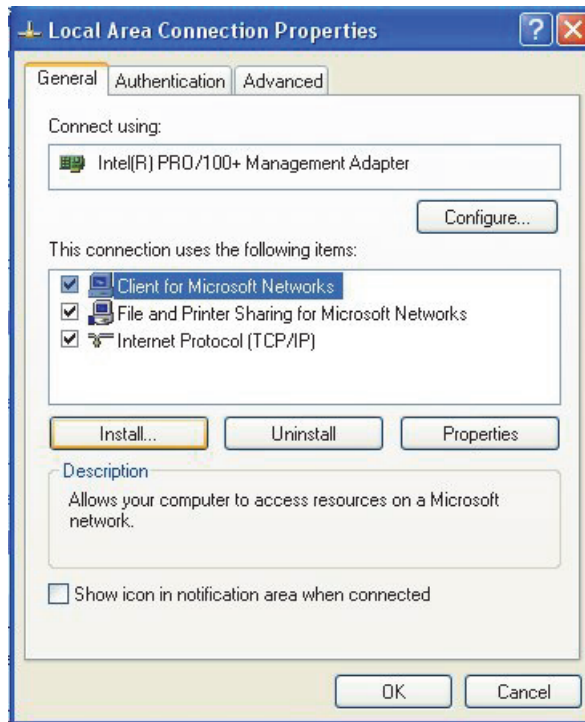


Figure 14-3 The Local Area Connection Properties dialog box (Windows XP)

5. Make sure that the three following items are available in the connection window (see Figure 14-3 on page 297):
 - Client for Microsoft Networks
 - File and Printer Sharing for Microsoft Networks
 - Internet Protocol (TCP/IP)
6. Select the **Internet Protocol (TCP/IP)** item.

7. Click the **Properties** button.

The **Internet Protocol (TCP/IP) Properties** dialog box appears (see Figure 14-4 on page 298).

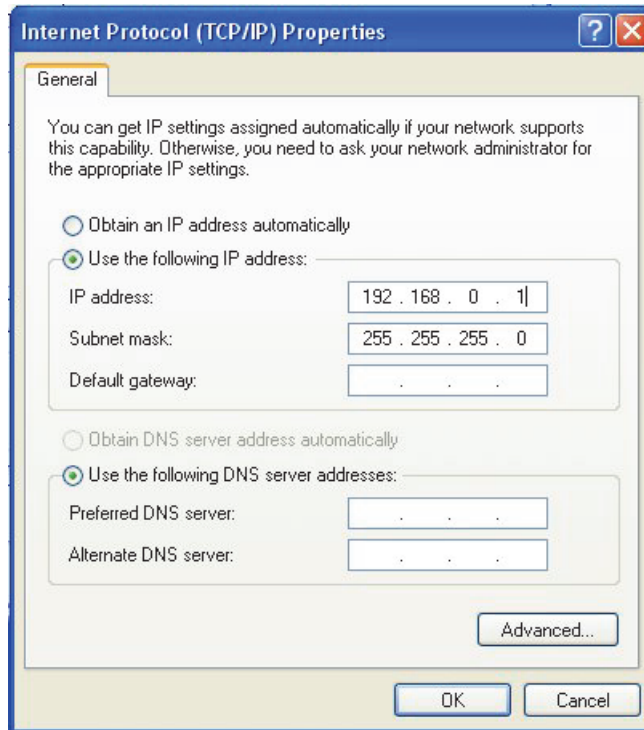


Figure 14-4 The Internet Protocol (TCP/IP) Properties dialog box (Windows XP)

8. Select the **Use the following IP address** option.
9. In the **IP address** text box, type an IP address (see Figure 14-4 on page 298).
10. In the **Subnet mask** text box, type a subnet mask (see Figure 14-4 on page 298).
11. Click the **OK** button to confirm the changes and close the dialog box.

14.3 Creating a User Account on the Remote Computer Under Windows XP

To create a user account on the remote computer (Windows XP)

1. On the Windows XP desktop, using the right mouse button, click the **My Computer** icon and select the **Manage** command.
The **Computer Management** window appears (see Figure 14-5 on page 299).

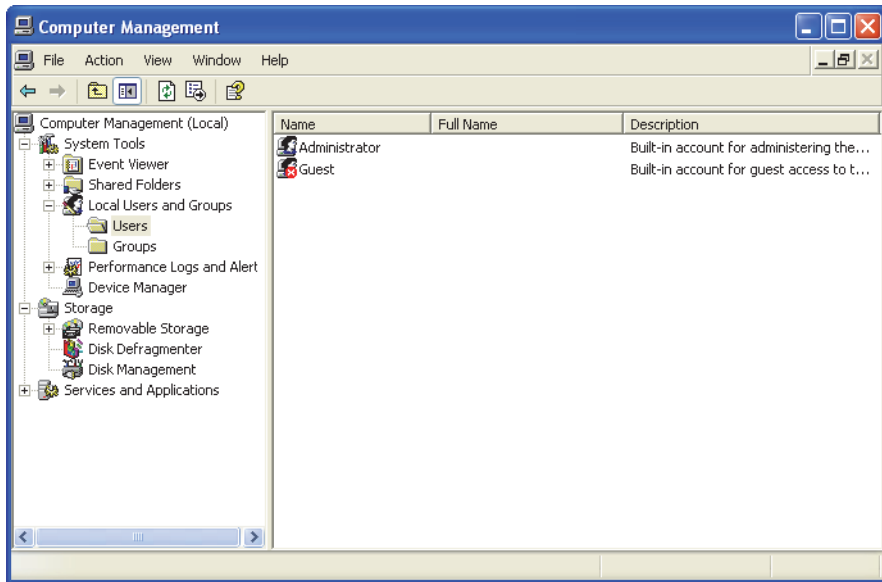


Figure 14-5 The Computer Management window

2. In the left window pane, double-click **Local Users and Groups**.
3. In the left window pane, select the **Users** folder.

- Click the **Action** menu, and then select the **New User** command.
The **New User** dialog box appears (see Figure 14-6 on page 300).

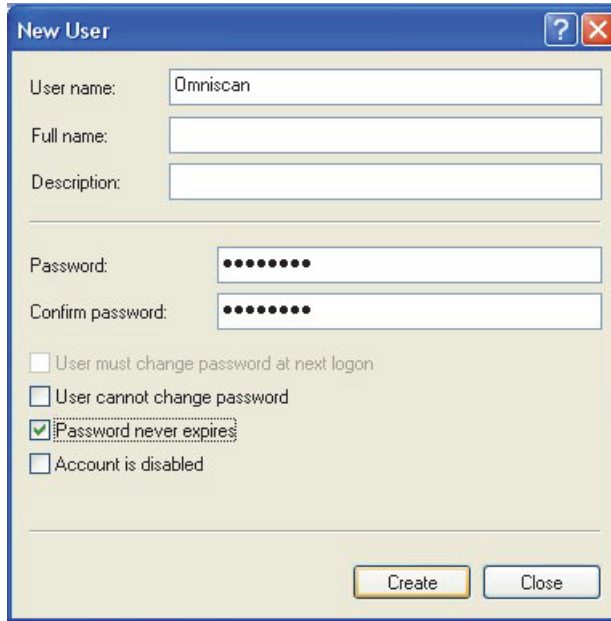


Figure 14-6 The New User dialog box (Windows XP)

- In the **User name** text box, type **Omniscan**.
- In the **Password** and **Confirm password** text boxes, type **Omniscan**.
- Clear the following check boxes (see Figure 14-6 on page 300):
 - User must change password at next logon**
 - User cannot change password**
 - Account is disabled**
- Select the **Password never expires** check box.
- Click the **Create** button.
The **New User** dialog box closes.
- Close the Computer Management window.

14.4 Creating a Shared Folder on the Remote Computer Under Windows XP

To create a shared folder on the remote computer Under Windows XP

1. Create the **Omniscan** folder on the hard disk drive of the remote computer.
2. Right-click the **Omniscan** folder, and then select the **Sharing and Security** command.

The **Omniscan Properties** dialog box appears.

3. In the **Omniscan Properties** dialog box, click the **Sharing** tab (see Figure 14-7 on page 301).

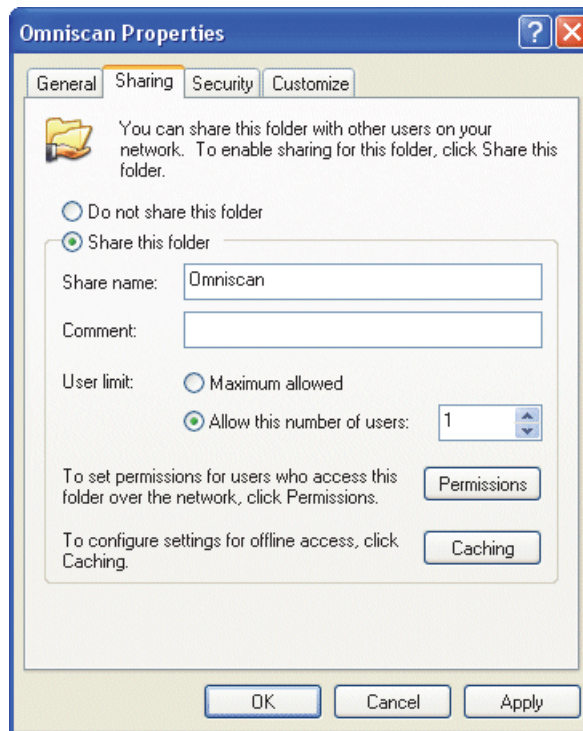


Figure 14-7 The Omniscan Properties dialog box (Windows XP)

4. Select the **Share this folder** option.

5. At this point, if the **Permissions** button does not appear in the **Share this folder** group box, proceed as follows:
 - a) On the Windows XP desktop, double-click the **My Computer** icon.
 - b) On the **Tools** menu, click **Folder Options** (see Figure 14-8 on page 302).

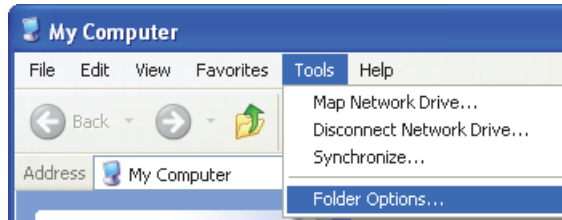


Figure 14-8 The Tools menu

The **Folder Options** dialog box appears (see Figure 14-9 on page 303).

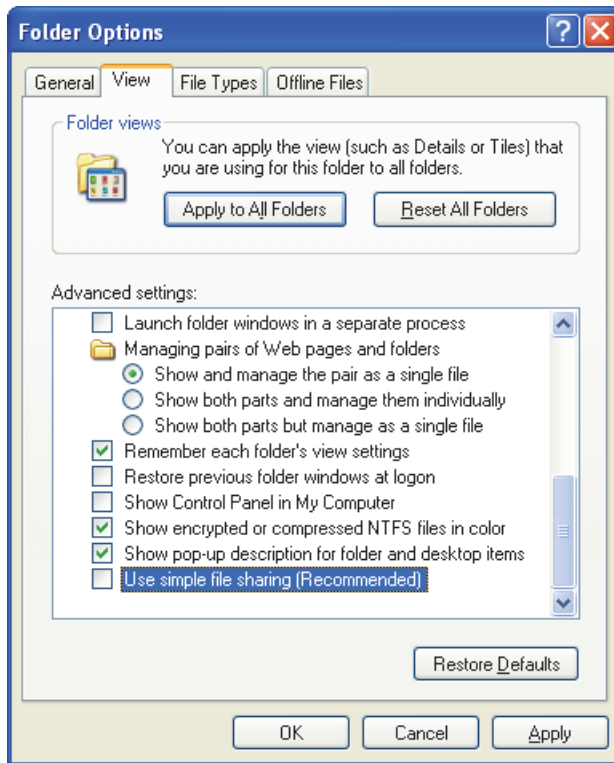


Figure 14-9 The Folder Options dialog box (Windows XP)

- c) Click the **View** tab.
- d) Clear the **Use simple file sharing** check box (see Figure 14-9 on page 303).
- e) Click the **OK** button.

6. In the **Omniscan Properties** dialog box, click the **Permissions** button. The **Permissions for Omniscan** dialog box appears (see Figure 14-10 on page 304).

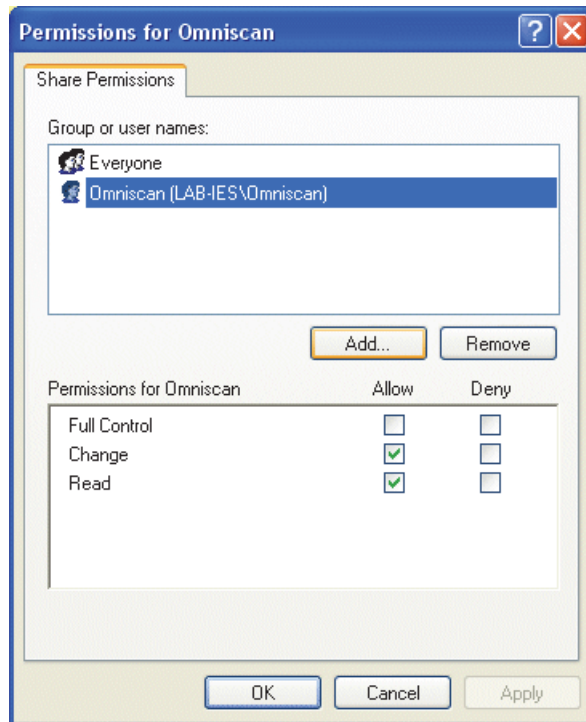


Figure 14-10 The Permissions for Omniscan dialog box (Windows XP)

7. Click the **Add** button.

The **Select Users or Groups** dialog box appears (see Figure 14-11 on page 305).

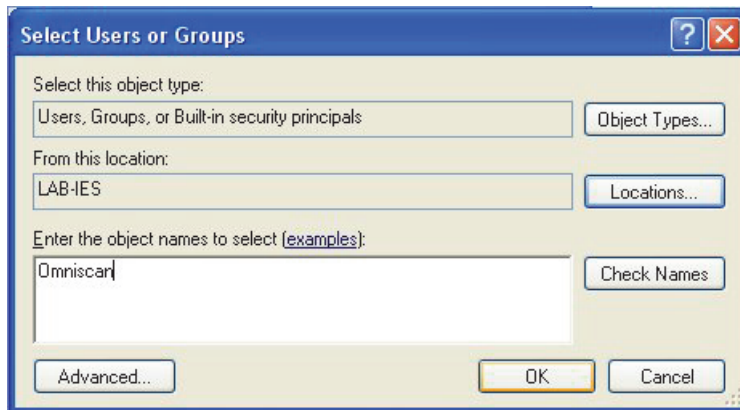


Figure 14-11 The **Select Users or Groups** dialog box (Windows XP)

8. Click the **Locations** button.
9. In the dialog box that appears, select the name of the remote computer, and then click the **OK** button.
10. In the **Select Users or Groups** dialog box, in the **Enter the object names to select** text box, type **Omniscan** (see Figure 14-11 on page 305), and then click **OK**.

11. In the **Permissions for Omniscan** dialog box, in the **Allow** column, select the **Change** and **Read** check boxes (see Figure 14-12 on page 306), and then click **OK**.

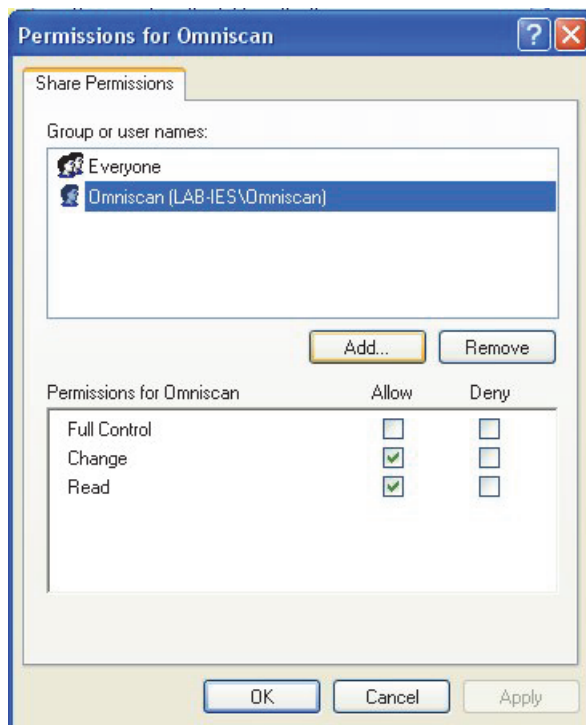


Figure 14-12 The Permissions for Omniscan dialog box (Windows XP)

14.5 Configuring the OmniScan MX Under Windows XP

To configure the OmniScan MX (Windows XP)

1. On the OmniScan MX instrument, select **Preferences > Instrument > Category = Network Settings**, and then press the Accept key to confirm.
2. Select **Preferences > Instrument > DHCP = Off**, and then press the Accept key to confirm.
3. Select **Preferences > Instrument > IP Address**, enter an IP address for the OmniScan MX, and then press the Accept key to confirm.

It must be in the same range (the same first three blocks), but not identical to the IP address of the remote computer (for example, 192.168.0.1 and 192.168.0.2).

4. Select **Preferences > Instrument > Subnet Mask**, enter the subnet mask address of the OmniScan MX, and then press the Accept key to confirm.

It must be the same address as the subnet on the remote computer.

5. Select **Preferences > Instrument > Apply**.
6. In the **Remote PC** parameter button, enter the name of the remote computer on the network, and then press the Accept key to confirm.
7. Select **Preferences > Instrument > Connect**, and then press the Accept key to confirm.

14.6 Saving OmniScan MX Data on the Remote Computer Under Windows XP

To save OmniScan MX data on the remote computer (Windows XP)

- ◆ Select **File > Save > Storage = Network**, and then press the Accept key to confirm.

14.7 Connecting the OmniScan MX to a Network

This section describes how to set up a connection between the OmniScan MX and a computer network.

To connect the OmniScan MX to a computer network

1. Connect a straight Ethernet (RJ-45) cable to a network port (usually a wall plug).
2. Connect the other end of the cable to the OmniScan MX Ethernet port.
3. Select **Preferences > Instrument > Category = Network Settings**, and then press the Accept key to confirm.
4. Select **Preferences > Instrument > DHCP = On**, and then press the Accept key to confirm.
5. Select **Preferences > Instrument > Apply**.
6. In the **Remote PC** parameter, enter the name of the remote computer on the network, and then press the Accept key to confirm.
7. Select **Preferences > Instrument > Connect**, and then press the Accept key to confirm.

To save OmniScan MX data on the remote computer

- ◆ Select **File > Save > Storage = Network**, and then press the Accept key to confirm.

15. Menu Description

This chapter provides reference information for each menu, submenu, and parameter button available in the user interface of the OmniScan software (see Figure 15-1 on page 309).

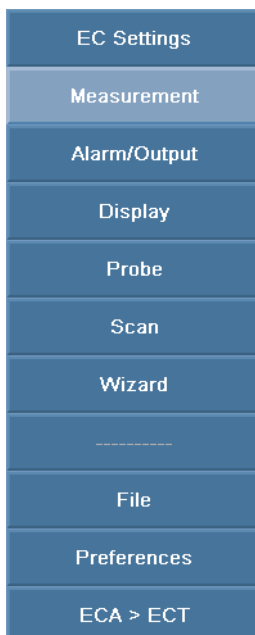


Figure 15-1 The Main menu

The structure of the sections follows the hierarchical structure of the menu, submenu, and parameter buttons found in the user interface of the software. The menus are:

- “EC Settings Menu” on page 310
- “Measurement Menu” on page 313
- “Alarm Menu” on page 322
- “Display Menu” on page 329
- “Probe & Part Menu” on page 336
- “Scan Menu” on page 338
- “Wizard Menu” on page 344
- “File Menu” on page 355
- “Preferences Menu” on page 359
- “ECT <_> ECA Menu” on page 369

The content of this chapter corresponds to the information available directly from the online help system of the OmniScan MX.

TIP

For information about how to access the online help system of the OmniScan MX, see section 2.6 on page 38.

15.1 EC Settings Menu

The **EC Settings** menu contains the inspection parameters that are specific to the eddy current inspection technique.

15.1.1 Settings (MAIN) Submenu

The **Settings (MAIN)** submenu manages the frequency and the amplitude of the EC signal injected in each coil of a group.

Frequency

Used to set the frequency of the signals injected in the coils of the selected group.

Probe Drive

Used to set the amplitude degree of the probe drive.

Gain

Used to set the gain applied to the raw or mixed coils of the selected group (ECT mode only).

Rotation

Used to set the phase applied to the raw or mixed coils of the selected group (ECT mode only).

Vertical Gain

Used to set the V-Gain amplitude level in decibels (ECT mode only).

15.1.2 Filter Submenu

The **Filter** submenu contains the filters applied to a group of EC signals. Filters are applied only in the scan direction on each coil that belongs to a group. For more information on filter behavior, see section 3.3.8 on page 72.

Select

Allows you to choose the first or the second filter.

Type

Used to select the filter type to apply to the selected group of EC signals.

None: When selected, this option removes the selected filter. If this option is applied to **Filter 2**, then **Filter 1** is automatically set to **None** as well.

Low-Pass IIR: Smooths the EC signal displayed and increases the signal-to-noise ratio. Keeps long defects and filters high-frequency noise. Simulates an Analog LP filter. The **Max. Freq.** parameter appears when this filter is selected.

High-Pass IIR: Smooths the EC signal displayed and increases the signal-to-noise ratio. Keeps short defects and filters slow signal drift. Simulates an Analog HP filter. The **Min. Freq.** parameter appears when this filter is selected.

Avg Low-Pass: Low-pass on average data value (one-line scan time and one-axis synchronization). The average LP filter is made with the selected number of points (data number) used to set the width of the windows. The filter takes half of the points before the data and the other half after the data and it averages those values. Keeps long defects and filters high-frequency noise. The **No. of Points** parameter appears when this filter is selected.

Avg High-Pass: High-pass on average data value (one-line scan time and one-axis synchronization). This filter shows the difference between the value of the data and the value of the Average LP. Keeps short defects and filters slow signal drift. The **No. of Points** parameter appears when this filter is selected.

Med Low-Pass: Low-pass on median data value (one-line scan time and one-axis synchronization). The median LP filter is made with the selected number of points (data number) used to set the width of the windows. It takes half of the points before the data and the other half after the data and it makes a median out of those values. Keeps long defects and filters high-frequency noise. The **No. of Points** parameter appears when this filter is selected.

Med High-Pass: High-pass on median data value (one-line scan time and one-axis synchronization). This filter shows the difference between the value of the data and the value of the Median LP. Keeps short defects and filters slow signal drift. The **No. of Points** parameter appears when this filter is selected.

Min. Freq

Allows you to set the minimum frequency of high-pass (hertz) filter.

Max. Freq

Allows you to set the maximum frequency of the low-pass (hertz) filter.

No. of Points

Allows you to set the number of points according to the average low-pass or high-pass or the median low-pass or high-pass filter.

15.1.3 Group Management Submenu

Generally, the **Group Management** submenu allows you to select the coil groups that are preprogrammed in a probe, and add or remove a frequency parameter to a selected coil group.

Current Group

Used to select a group of raw or mixed coils. This button is only active if more than one group is preprogrammed in the probe.

Add Group

Used to create a new group of raw or mixed coils.

Remove Group

Used to delete the current group.

15.1.4 Channel Submenu

The **Channel** submenu contains the characteristics of each channel of a group of raw channels.

Select

Used to select one of the channels of the selected group.

Enable

Used to activate the selected channel.

Invert

Used to set the rotation applied to the selected raw channel. It allows you to apply a rotation of $\pm 180^\circ$ to the selected channel.

15.1.5 H&V Position

The **H&V Position** submenu contains the horizontal and vertical parameters to position the origin of the balanced signal on the impedance view as a percentage of the horizontal axis of the view. The graduation, and thus the parameter value, is in percentage (%) of the impedance plane's length or height. The **Horizontal Pos (%)** and the **Vertical Pos (%)** parameters can also be configured in the **Display > Properties** menu.

Horizontal Pos (%)

Defines the horizontal position of the origin of the balanced signal on the impedance view as a percentage of the horizontal axis of the view. The default value is 80 %.

Vertical Pos (%)

Defines the vertical position of the origin of the balanced signal on the impedance view as a percentage of the vertical axis of the view. The default value is 20 %.

15.2 Measurement Menu

The **Measurement** menu provides various measurement options.

15.2.1 Reading Submenu

The **Reading** submenu contains four reading fields (see Figure 15-2 on page 314), each of which can be configured to display a separate reading option for the acquisition mode and the analysis mode. The results are always taken from data within the scan and index reference cursors.

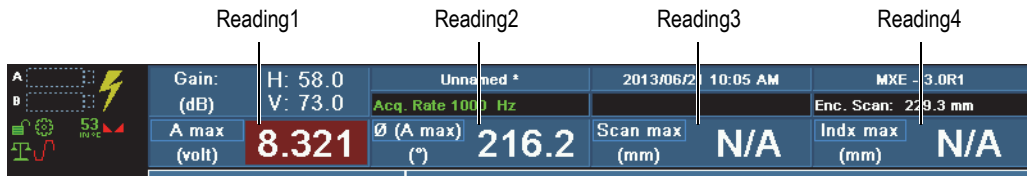


Figure 15-2 Selecting a reading field

Mode

Used to set the readings for the acquisition and the analysis mode, for each of the four reading fields at the top of the display screen. Select **Acquisition** or **Analysis**, depending on the mode for which the reading fields are to be configured (see Figure 15-3 on page 314).

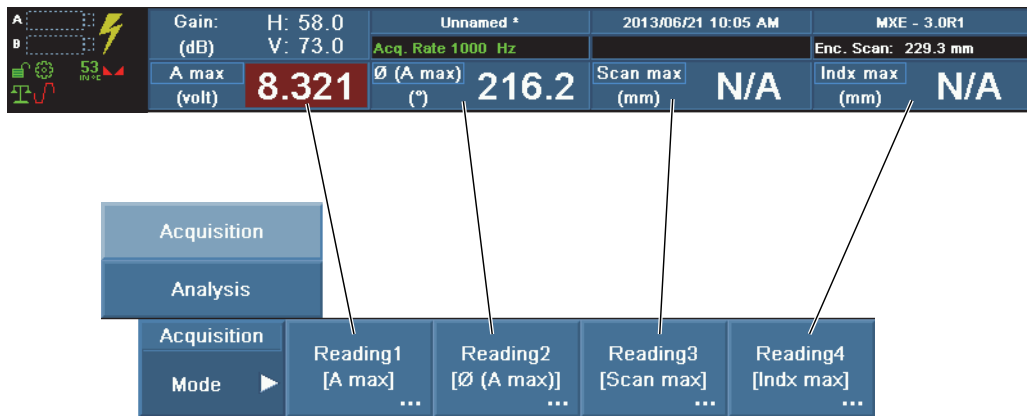


Figure 15-3 Selecting a reading field

Reading1, 2, 3, and 4

These four buttons open a Reading field group selection dialog box to allow you to specify which reading you want displayed in their respective reading fields at the top of the display screen for the acquisition mode and the analysis mode (see Figure 15-4 on page 315).

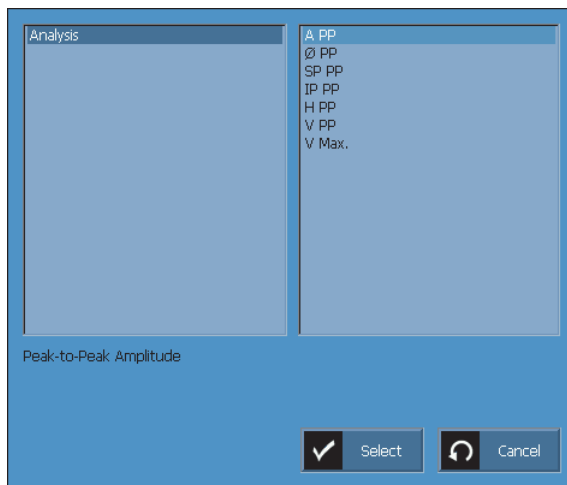


Figure 15-4 Reading field group selection dialog box in acquisition mode

The following reading field options are available in acquisition mode (see Figure 15-4 on page 315):

A Max – Maximum Amplitude Vector

Shows the maximum amplitude vector (see Figure 15-5 on page 316).

∅ (A Max) – Angle of Maximum Amplitude Vector

Shows the angle of maximum amplitude vector (see Figure 15-5 on page 316).

Scan Max – Scan Position of Maximum Amplitude Vector

Shows the scan position of maximum amplitude vector.

Indx Max – Index Position of Maximum Amplitude Vector

Shows the index position of maximum amplitude vector.

Ratio – Data Received/Data Required

Shows the ratio of data received/data required.

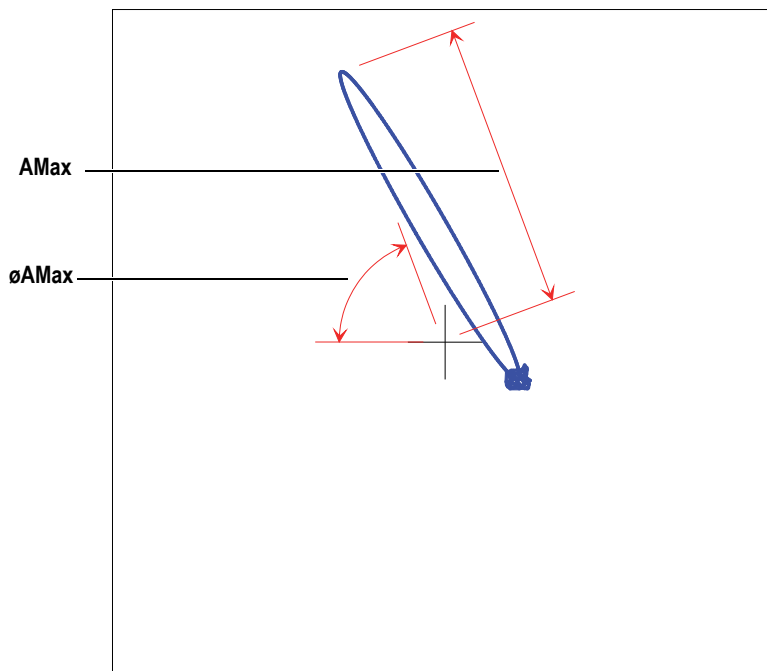


Figure 15-5 The reading displays the **AMax** and **øAMax** values in acquisition mode

The following reading field options are available in analysis mode (see Figure 15-6 on page 317):

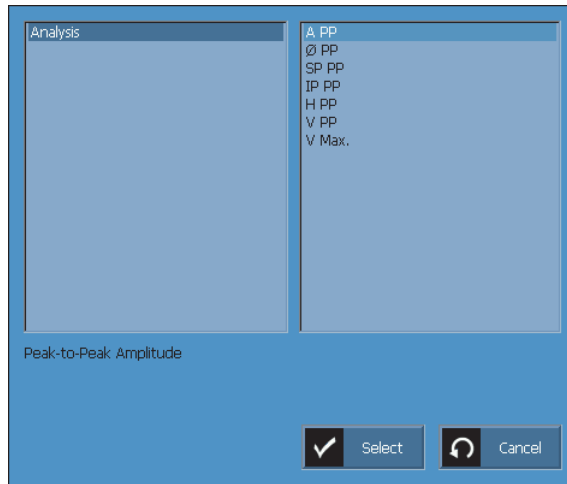


Figure 15-6 Reading field group selection dialog box in analysis mode

A PP – Peak-to-Peak Amplitude

Used to calculate and display the largest amplitude vector illustrating the peak-to-peak position.

Ø PP – Peak-to-Peak Angle

Used to calculate the angle on the peak-to-peak vector based on the horizontal axis (see Figure 15-7 on page 318).

SP PP – Peak-to-Peak Amplitude Scan Position

Used to calculate the scan position of the peak-to-peak amplitude.

IP PP – Peak-to-Peak Index Amplitude

Used to calculate the index position of the peak-to-peak amplitude on the index axis.

H PP – Peak-to-Peak Horizontal Amplitude

Used to calculate the peak-to-peak amplitude on the basis of the horizontal axis (see Figure 15-7 on page 318).

V PP – Peak-to-Peak Vertical Amplitude

Used to calculate the peak-to-peak amplitude on the basis of the vertical axis (see Figure 15-7 on page 318).

V Max – Maximum Vertical Amplitude

Used to calculate the maximum vertical variation from the 0,0 point (see Figure 15-7 on page 318).

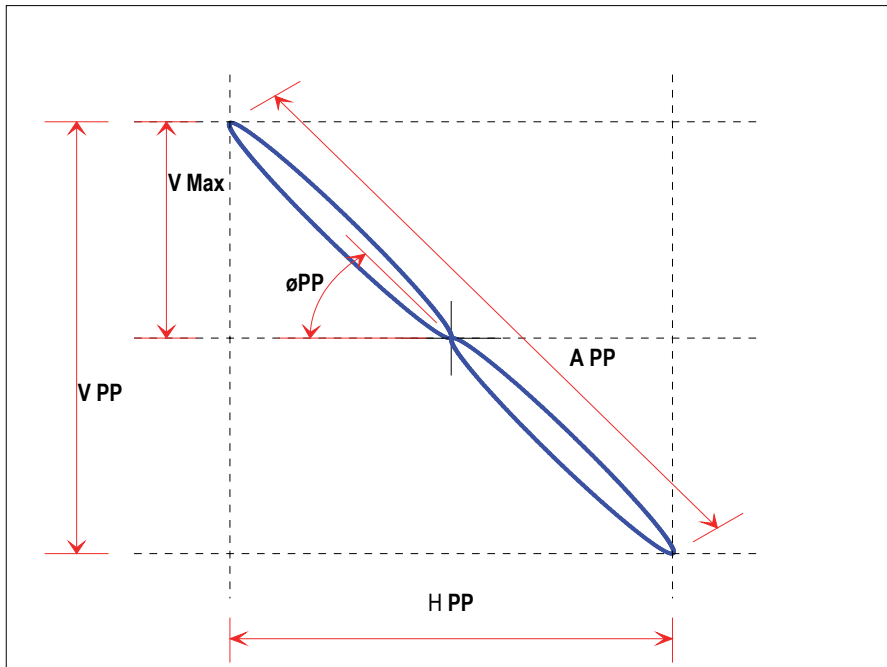


Figure 15-7 The reading in analysis mode

Select

Used to select the types of readings that are going to be represented graphically on the impedance plane and on the strip charts.

Show

When activated, this option enables graphical representations of the reading types chosen in the **Select** option on the impedance plane.

15.2.2 Cursors Submenu

The **Cursors** submenu allows you to select a specific data zone from among the acquired data. The cursors are effective on C-scans and strip charts.

Scan Start (mm/in.)

Used to set the beginning position of the zone that will be selected on the scan axis. The default value is set as the first quarter of the view along the scan axis.

Index Start (mm/in.)

Used to set the beginning position of the zone that will be selected on the index axis. The default value is set as the center of the view along the index axis.

Length Selection (mm/in.)

Used to set the length of the zone that will be selected. The default value is set as half the length of the view along the scan axis.

Angle Selection (°)

Used to set the angle of the zone that will be selected. The default value is 0°, which orients the selection cursor along the scan axis.

15.2.3 Subtraction Submenu (Analysis Mode only)

The **Subtraction** submenu manages the definition of the chosen data type (point, line, or column) for the subtraction operation. The subtraction operation allows you to eliminate variations in lift-off between the elements of a probe (see Figure 15-8 on page 320).

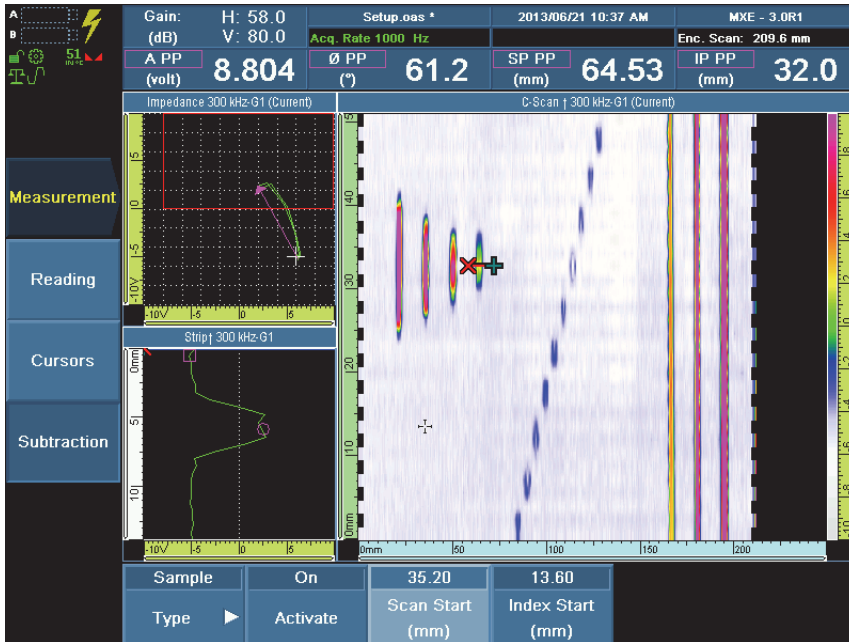


Figure 15-8 Subtraction example

Type

Used to set what data type you want to subtract: choose a data **Sample**, **Line** or **Column**.

Activate

Used to set the subtraction to **On** or **Off**.

Scan Start

Starts the acquisition of the scan used to set the subtraction.

With **Type = Column**: selects the column you want to subtract from all the acquisition.

With **Type = Line**: not used.

With **Type = Sample**: selects the scan position of the sample you want to subtract from the entire acquisition.

Index Start

Selects the line you want to be subtracted from the entire acquisition of the index used to set the subtraction.

With **Type = Column**: not used.

With **Type = Line**: selects the line you want to subtract from all the acquisition.

With **Type = Sample**: selects the index position of the sample you want to subtract from all the acquisition.

15.2.4 Reference Signal Submenu (ECT Mode Only)

The **Reference Signal** submenu provides signal reference parameters.

Reference Signal 1

Used to mark the signal as reference 1. Activated when there is an impedance plane view shown. It copies data in the impedance plane and, once the portion of data is accepted and frozen, the system highlights the data in green.

Reference Signal 2

Used to mark the signal as reference 2. Activated when there is an impedance plane view shown. It copies data in the impedance plane and, once the portion of data is accepted and frozen, the system highlights the data in red.

NOTE

Reference signals are not included in a saved setup file. For more information about setup files, see section 11.8 on page 224.

15.3 Alarm Menu

The **Alarm** menu allows you to define the alarms and their respective outputs. Alarms are triggered when the signal meets the user-defined alarm conditions.

15.3.1 Output Submenu

The **Output** submenu allows you to associate the selected hardware output with an alarm number and a buzzer capability according to a delay and a hold time.

Select

Allows you to choose **Alarm 1**, **Alarm 2**, or **Alarm 3**.

Output

Allows you to enable the alarm.

Sound

Allows you to activate the buzzer.

Delay (ms)

Used to set the delay before activating the TTL output, calculated in milliseconds.

Hold Time (ms)

Allows you to set the holding time of the TTL output, calculated in milliseconds.

Alarm Highlighting

In C-scan views, displays the signal with the color of the alarms configured in the **Alarm > Alarm Setup** menu (Alarm 1: red, Alarm 2: yellow, and Alarm 3: green), with a grayscale color palette as the background. Sets the alarm highlighting to **On** or **Off**. This parameter can also be configured from the **Display > Color = Alarm Highlighting** menu. Set the alarm highlighting to **On** or **Off**.

15.3.2 Alarm Setup Submenu

The **Alarm Setup** submenu allows you to define the alarm on the impedance plane that will trigger an alarm if a signal passes through that zone.

Select

Allows you to select the number of the alarms to be defined.

Alarm 1: yellow

Alarm 2: red

Alarm 3: green

Type

Allows you to choose between different shapes of alarm zones.

None

There is no shaped zone.

Pie

This is a sector-shaped zone (see Figure 15-9 on page 323).

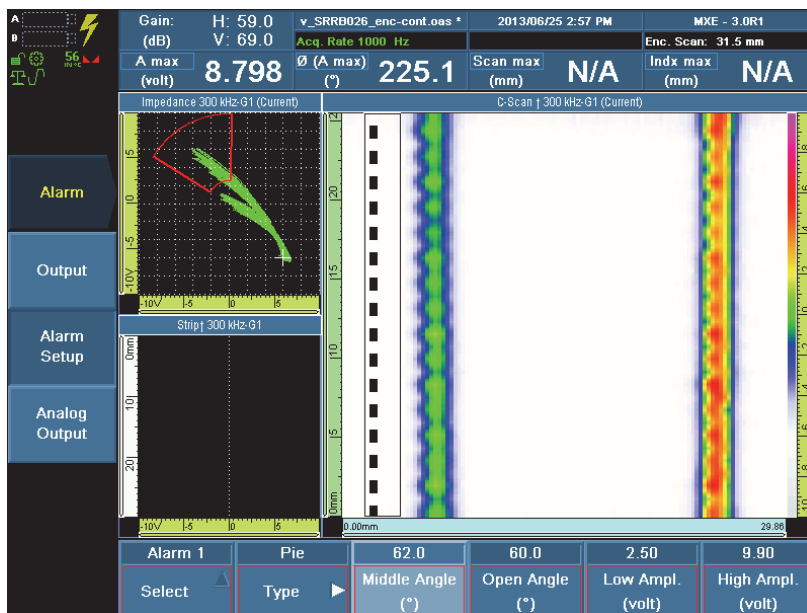


Figure 15-9 Pie alarm type

Middle Angle (°): Used to set the middle angle of the zone with respect to the chosen angle units.

Open Angle (°): Used to set the angle range of the zone from the start angle with respect to the chosen angle units.

Low Ampl. (volt): Used to set the low amplitude boundary of the zone, calculated in volts.

High Ampl. (volt): Used to set the high amplitude boundary of the zone, calculated in volts.

Rectangle

This is a rectangular zone (see Figure 15-10 on page 324).

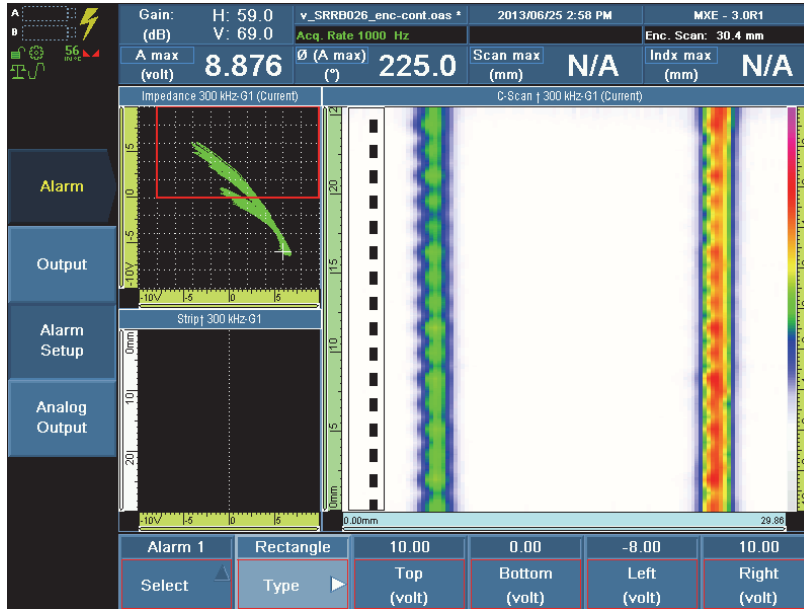


Figure 15-10 Rectangle alarm type

Top (volt): Used to set the middle amplitude of the zone in relation to the horizontal impedance plane axis.

Bottom (volt): Used to set the middle amplitude of the zone in relation to the vertical impedance plane axis.

Left (volt): Used to set the amplitude range of the zone with respect to the middle amplitude on the horizontal impedance plane axis.

Right (volt): Used to set the amplitude range of the zone with respect to the middle amplitude on the vertical impedance plane axis.

Ring

This is a ring-shaped zone (see Figure 15-11 on page 325).

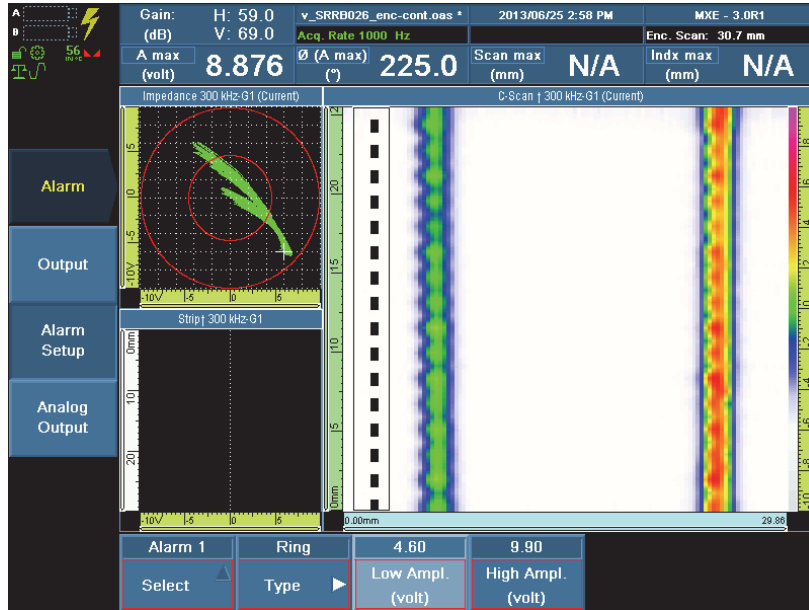


Figure 15-11 Ring alarm type

Low Ampl. (volt): Used to set the low amplitude boundary of the zone.

High Ampl. (volt): Used to set the amplitude range of the zone from the low amplitude value.

Pie Inverse

This is a zone defined by the entire impedance plane range, except for a pie-shaped zone (see Figure 15-12 on page 326).

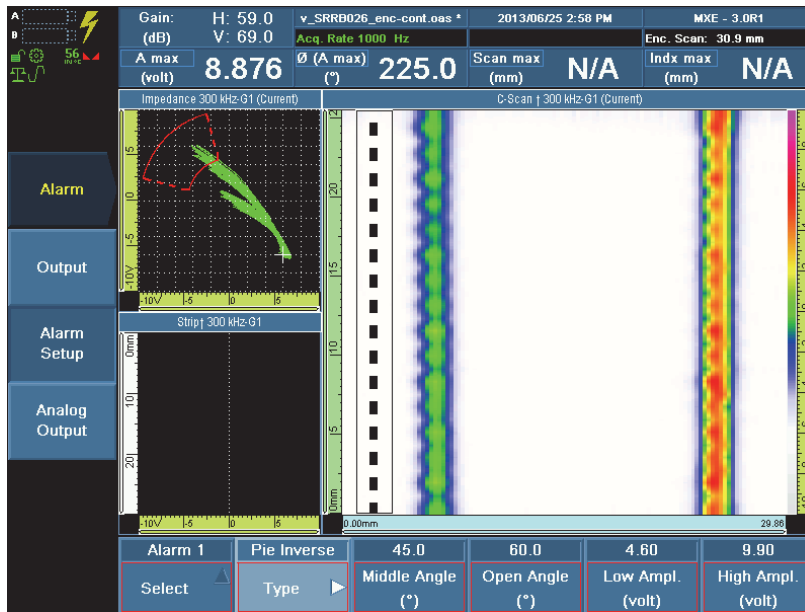


Figure 15-12 Pie Inverse alarm type

Middle Angle (°): Used to set the middle angle of the zone with respect to the chosen angle units.

Open Angle (°): Used to set the angle range of the zone from the start angle with respect to the chosen angle units.

Low Ampl. (volt): Used to set the low amplitude boundary of the zone.

High Ampl. (volt): Used to set the amplitude range of the zone from the low amplitude value.

Rectangle Inverse

This is a zone defined by the entire impedance plane range, except for a rectangular-shaped zone (see Figure 15-13 on page 327).

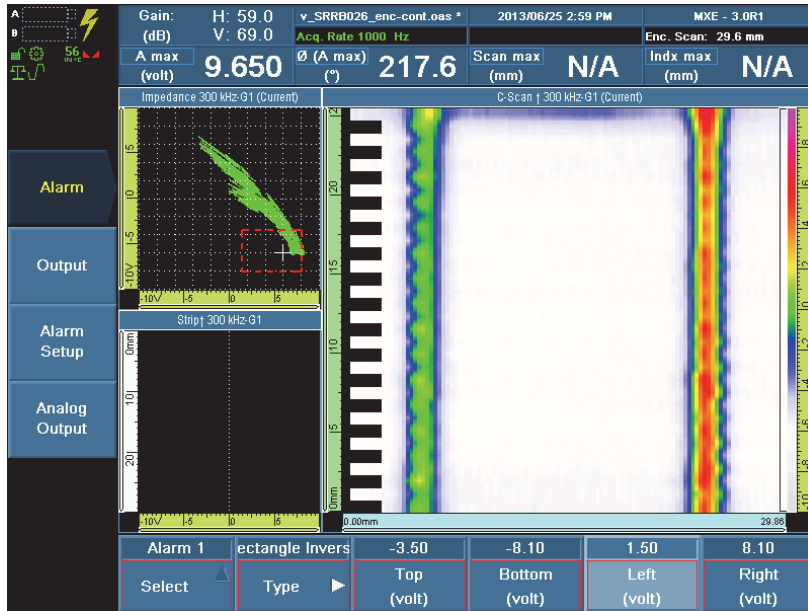


Figure 15-13 Rectangle Inverse alarm type

Top (volt): Used to set the middle amplitude of the zone in relation to the horizontal impedance plane axis.

Bottom (volt): Used to set the middle amplitude of the zone in relation to the vertical impedance plane axis.

Left (volt): Used to set the amplitude range of the zone with respect to the amplitude start on the horizontal impedance plane axis.

Right (volt): Used to set the amplitude range of the zone with respect to the middle amplitude on the vertical impedance plane axis.

Ring Inverse

This is a zone defined by the entire impedance plane range, except for a ring-shaped zone (see Figure 15-14 on page 328).

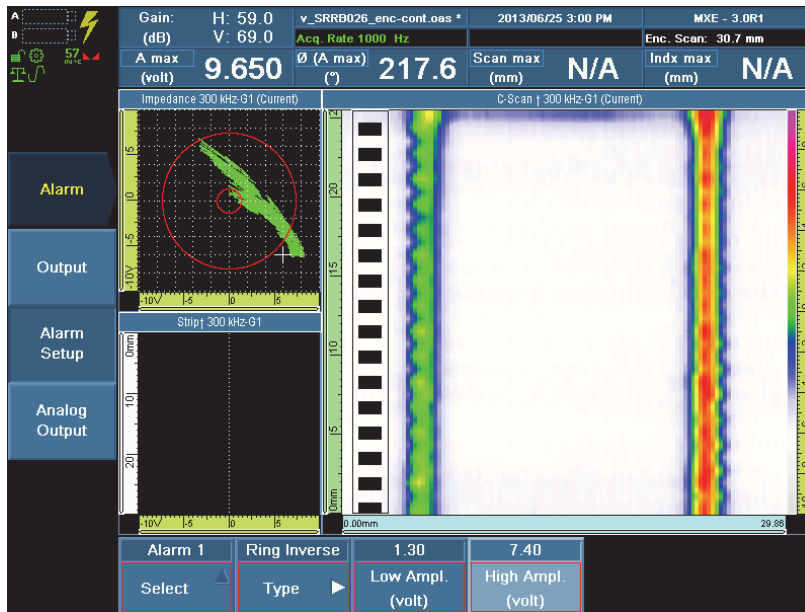


Figure 15-14 Ring Inverse alarm type

Low Ampl. (volt): Used to set the low amplitude boundary of the zone.

High Ampl. (volt): Used to set the amplitude range of the zone from the lowest amplitude value.

15.3.3 Analog Output Submenu

Analog Output

Allows you to choose to which Group and which Channel you wish to apply an analog output.

Used to activate or deactivate the analog output of the selected channel of the selected group.

Current Group

Allows you to choose a group for which you want to set an analog output.

Channel

Allows you to choose which channel of the selected group you will apply an analog output to.

15.4 Display Menu

The **Display** menu contains the options related to the display screen.

15.4.1 Setup Submenu

The **Setup** submenu manages the signal that will be displayed in acquisition mode and in analysis mode.

Acquisition:

ECA Only:

C C-Scan (horizontal or vertical). This acquisition type requires an ECA probe or synchronization of both axes.

2 x C Two C-Scans. It requires an ECA probe or synchronization of both axes.

SI Strip Chart and Impedance Plane

CSI C-Scan, Strip Chart, and Impedance Plane. It requires an ECA probe or synchronization of both axes. This display is unavailable during acquisitions.

ECT in Time:

SI Strip chart and Impedance Plane

Strip charts (Y, X, or both components) shown in time (s) or in distance (mm) (encoder mode) and an impedance plane. Display enabled in acquisition and analysis mode.

2 x SI Two Strip Charts and Two Impedance Planes

Two strip charts (Y, X, or both components) shown in time (s) or in distance (mm) (encoder mode) and two impedance planes. Display enabled in acquisition and analysis mode.

4 x I + S Four Impedance Planes and One Strip Chart

Four impedance planes and a strip chart (Y, X, or both components) shown in time (s) or in distance (mm) (encoder mode). Display enabled in acquisition and analysis mode.

ECT in Raster Scan:

C C-Scan (horizontal or vertical). It requires an ECT probe or synchronization of both axes.

CSI C-Scan, Strip Chart, and Impedance Plane. It requires an ECT probe or synchronization of both axes. This display is unavailable during acquisitions.

2 x C Two C-scans. It requires an ECT probe or a synchronization of both axes. This is the most efficient view for helical scanning of fastener holes.

Analysis

ECA Only:

C C-Scan (horizontal or vertical). It requires an ECA probe or synchronization of both axes.

2 x C Two C-Scans. It requires an ECA probe or synchronization of both axes.

CSI C-Scan, Strip Chart, and Impedance Plane. It requires an ECA probe or synchronization of both axes. This display is unavailable during acquisition.

2 x CI Two C-scans and Two Impedance Planes. It requires an ECA probe or synchronization of both axes. This display is unavailable during acquisition.

ECT in Time:

SI Strip charts and an impedance plane

2 x SI Two strip charts and two impedance planes

4 x I + S Four impedance planes and a strip chart

ECT in Raster Scan:

C C-Scan (horizontal or vertical). It requires an ECT probe or synchronization of both axes.

CSI C-Scan, Strip Chart, and Impedance Plane. It requires an ECT probe or synchronization of both axes. This display is unavailable during acquisition.

2 x C Two C-Scans. It requires An ECT probe or synchronization of both axes.

2 x CI Two C-scans And Two Impedance Planes. It requires an ECT probe or synchronization of both axes. This display is unavailable during acquisition.

Keep Layout

When **On** in **Acquisition** mode, the last selected layout is preserved when switched to **Analysis** mode. When **Off** in **Acquisition** mode, the last selected layout is automatically modified into a layout specifically used for analysis purposes when switched to **Analysis** mode.

View 1, **View 2**, and **View 3** are used in ECA and ECT modes, when more than two groups or channels are displayed. The user selects the view (see Figure 15-15 on page 331).

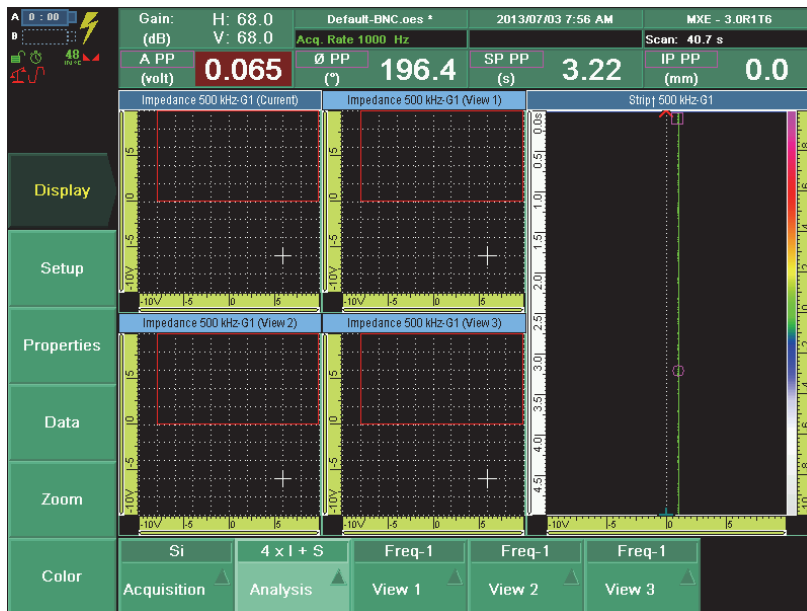


Figure 15-15 The view choices in ECT

15.4.2 Properties Submenu

The **Properties** submenu contains the different parameters and applicable options of all available displays.

C-Scan Component

Allows you to set the horizontal and vertical component of the x-axis or y-axis for the C-Scan view.

X → : Displays the horizontal component on the x-axis.

Y ↑ : Displays the vertical component on the y-axis.

Strip Component

Allows you to set the horizontal and vertical component of the x-axis and/or y-axis for the strip chart view.

X → : Displays the horizontal component on the x-axis.

Y ↑ : Displays the vertical component on the y-axis.

X → + Y ↑ : Displays the horizontal component on the x-axis and the vertical component on the y-axis.

Grid

Allows you to specify whether or not grids are in use in Impedance and/or in Strip Chart views.

Impedance: Grids are displayed in Impedance views.

Strip Chart: Grids are displayed in Strip Chart views.

Impedance & Strip Chart: Grids are displayed in Impedance and Strip Chart views.

No Grid: No grids are displayed in either views.

Horizontal Pos (%)

Defines the horizontal position of the origin of the balanced signal, the offset null, in the impedance plane view as a percentage of the horizontal axis of the view. The default value for the **Horizontal Pos (%)** parameter is **80**.

Vertical Pos (%)

Defines the vertical position of the origin of the balanced signal, the offset null, in the impedance plane view as a percentage of the vertical axis of the view. The default value for the **Vertical Pos (%)** parameter is **20**.

15.4.3 Data Submenu

The **Data** submenu allows you to configure how the acquisition data is displayed in the views.

Scan Tracking (s) [ECA mode only]

For the one-line scan inspection type (**Scan > Inspection > Type = One-line scan**) the **Scan Tracking** parameter is used to set the portion of the acquisition data along the scan axis that is to be displayed in the data views.

By default the value is equal to the **Scan End** parameter value. When setting a value that is lower than the one set for the **Scan End** parameter, the portion of the signal that is displayed in the views is smaller than the entire data set, thus providing an enlarged view of the acquisition data on the scan axis. The **Scan Tracking** parameter is also available in the **Scan > Area** submenu.

Index Tracking (s)

For the raster scan inspection type (**Scan > Inspection > Type = Raster scan**) the **Index Tracking** parameter is used to set the portion of the acquisition data along the scan axis that is to be displayed in the data views.

Persistence (ECT mode only)

Used to change the duration of the displayed data in the Impedance plane:

Live

Displays the last 3 seconds of data.

Full Range

Displays the same data that is determined by the duration defined for the strip chart views, using the **Scan Start** and **Scan End** parameters that are set in the **Scan > Area** submenu.

Imped. Persistency (ECA mode only)

Used to set the refresh time of the information displayed in the impedance view, from **Infinite** to a specific number, calculated in seconds.

15.4.4 Zoom Submenu

The **Zoom** submenu contains various zooming options. The parameters displayed on the screen depend on the chosen **Type** option.

View

Allows you to select the display type for which to set the zoom parameters. The options available through the **View** option list change depending on the display type that is currently selected in **Display > Setup > Acquisition** and **Analysis** menus.

Auto

Allows to choose general layout options applied to all the displayed views.

C-Scan

Allows to display the zoom parameters for C-scan views.

Imped.

Allows to display the zoom parameters for impedance plane views.

Strip ↑

Allows to display the zoom parameters for strip chart views.

Center (in **Auto** view only)

Centers the view.

Best Fit (in **Auto** view only)

Performs an optimal zoom in impedance plane and strip chart views.

Full Scale (in **Auto** view only)

Used to go back to the full range of the impedance plane after selecting the **Best Fit** option.

NOTE

You can zoom in on or out of C-scan or impedance plane views in the OmniScan MXE software interface using function keys. For more information, see section 12.3.2 on page 231.

Type (in C-Scan, Imped. or Strip ↑ view only)

Allows you to choose the type of zoom. The corresponding zoom parameters are then displayed. The **Type** menu is available in analysis mode only.

Off

Disables the zoom function.

Absolute

Displays the absolute starting and ending points of the possible zoom axes, for the view selected in the **View** submenu:

(**View = C-Scan**)

Start Scan: Used to set the starting position of the window on the horizontal axis. Set in seconds if in time mode and in millimeters or inches if in distance mode (encoder).

End Scan: Used to set the ending position of the window on the horizontal axis. Set in seconds if in time mode and in millimeters or inches if in distance mode (encoder).

Start Index: Used to set the starting position of the window on the vertical axis. Set in seconds if in time mode and in millimeters or inches if in distance mode (encoder).

End Index: Used to set the ending position of the window on the vertical axis. Set in seconds if in time mode and in millimeters or inches if in distance mode (encoder).

(View = Imped.)

Start Y \rightarrow : Used to set the starting position of the zoom on the amplitude axis of the horizontal component, calculated in volts.

End Y \rightarrow : Used to set the ending position of the zoom on the amplitude axis of the horizontal component, calculated in volts.

(View = Imped. or Strip \uparrow)

Start Y \uparrow : Used to set the starting position of the zoom on the amplitude axis of the vertical component, calculated in volts.

End Y \uparrow : Used to set the ending position of the zoom on the amplitude axis of the vertical component, calculated in volts.

(View = Strip \uparrow)

Start Data: Used to set the starting position of the window on the vertical axis. Set in seconds if in time mode and in millimeters or inches if in distance mode (encoder).

End Data: Used to set the ending position of the window on the vertical axis. Set in seconds if in time mode and in millimeters or inches if in distance mode (encoder).

NOTE

You can zoom in on or out of the views in the OmniScan MXE software interface using a mouse that has been connected to one of the USB ports on the OmniScan MX instrument. For more information, see section 12.3.1 on page 231.

15.4.5 Color Submenu

Used to set the color that will be displayed in the C-scan view (yellow, blue, green, white, or red).

Start

Used to specify the starting point in volts.

End

Used to specify the ending point in volts.

Load

Load a different color palette.

Alarm Highlighting

In C-scan views, displays the signal with the color of the alarms that are configured in the **Alarm > Alarm Setup** menu (Alarm 1: red, Alarm 2: yellow, and Alarm 3: green), with a grayscale color palette defining the remaining parts of the C-scan which are outside of the alarm settings. Set the alarm highlighting to **On** or **Off**. This parameter can also be configured from the **Alarm > Output = Alarm Highlighting** menu.

15.5 Probe & Part Menu

The **Probe & Part** menu contains the parameters that relate to the probes used in the inspections.

15.5.1 Settings Submenu

The **Settings** submenu manages the physical characteristics of the probes used in the inspection.

Select Probe (ECT mode only)

Used to select the appropriate single element probe characteristics (see Figure 15-16 on page 337). Before a probe has been automatically detected or properly selected, the **Unknown** parameter is displayed. Once a probe has been selected, the **Unknown** parameter disappears from the **Select Probe** submenu.

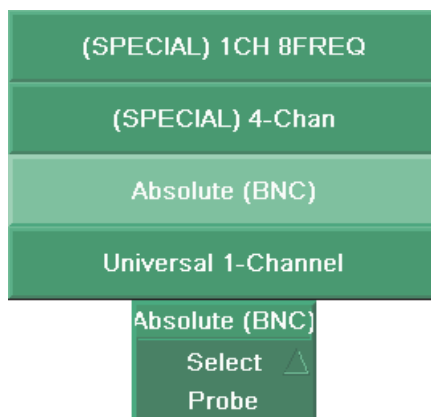


Figure 15-16 Available choices for the Select Probe parameter

Default Config. (ECA mode only)

Allows you to use the default configuration. Also, a message box warns you that this operation will cause the current configuration to be lost.

Balance

Allows the system to balance the probe offset and to return the signals to zeros.

View Probe Info

Accesses the probe characteristics file, and displays the characteristics in a dialog box.

MUX (ECA mode only)

Allows you to operate the OmniScan MX instrument with a multiplexer. Choose **On** or **Off**.

15.6 Scan Menu

The **Scan** menu manages the options that influence how data is acquired over an area, whether on a time basis or based on an x and y encoded signal.

15.6.1 Inspection Submenu

The **Inspection** submenu contains the parameters to configure the different types of scans.

Type

Used to select the desired type of inspection.

One-Line Scan

One-line scan with one encoder or time on the scan axis.

Raster Scan

Multiple-line scan with two encoders, both on the scan axis and the index axis. The **Index** parameter is set as the opposite of the **Scan** parameter, when applicable.

Scan

Allows you to specify the source of the data positioning for the scan axis.

Time: Firing is done at precise time intervals

Encoder 1: Firing is done at precise distance intervals based on the position of one or the first encoder.

Encoder 2: Firing is done at precise distance intervals based on the position of the second encoder, when the probe has one.

Index

Allows you to select the source of the information used to set a position on the index axis. Available only for the raster scan inspection type.

Time: Data is acquired at precise time intervals dictated by the internal or external clock frequencies.

Encoder 1: **Encoder 1** provides the source. This option is only active if either **One Axis** or **Both Axes** was selected as a **Source** option.

Encoder 2: **Encoder 2** provides the source. This option is only active if either **One Axis** or **Both Axes** was selected as a **Source** option.

Off: No information source is used.

Acq. Rate

Used to set the acquisition frequency. Choose **Maximize** or an automatically determined acquisition rate value. By default, the Maximize acquisition rate is selected.

Probe Orientation

Allows you to select **Normal** or **Inverse** for the on-screen scan direction.

Continuous (ECA mode only)

When the one-line scan inspection type is selected, activates continuous acquisition mode, using a probe equipped with an encoder. This enables continuous acquisition of data, and overrides the scan end limit value that is set in the **Scan End** parameter (**Scan > Area** submenu). Choose **On** or **Off**.

TIP

When activating the continuous acquisition mode, set the scan encoder type to **Quad Up** (**Scan > Encoder > Type** submenu, see section 15.6.2 on page 339). When deactivating the continuous acquisition mode, the scan encoder type must be manually changed to **Quad**, or to the appropriate parameter for the probe being used.

When the continuous acquisition mode is activated, the **Scan End** and the **Scan Tracking** parameters in the **Area** submenu become linked together. When the **Scan Tracking** parameter value is smaller than the **Scan End** parameter value, only the portion of the data corresponding to the scan tracking distance is displayed in the view, thus providing an enlarged view of the acquisition data along the scan axis. The continuous acquisition mode is optimized for displaying data on-screen with a C-scan-only view option selected.

15.6.2 Encoder Submenu

The **Encoder** submenu contains the configuration of the encoders.

The **Encoder** submenu is displayed when the one-line scan inspection type is selected (**Scan > Inspection > Type = One-Line Scan**), and **Encoder 1** or **Encoder 2** is selected in the **Scan** submenu (**Scan > Inspection > Scan = Encoder 1** or **Encoder 2**), or when the raster scan inspection type is selected (**Scan > Inspection > Type = Raster Scan**).

The encoder channels are used to record position data and synchronize data sampling according to probe position.

Encoder

Used to select the encoder you want to configure.

Polarity

Reverses the count of the encoder if the probe is only able to scan in the wrong direction. Changes the scan direction of the encoder. Choose **Normal** or **Inverse**.

Type

Used to select the type for the currently selected encoder. There are two encoder hardware inputs that you can configure independently. Each encoder input has two channels, A and B, enabling a dual-channel encoder for quadrature reading of the resolution.

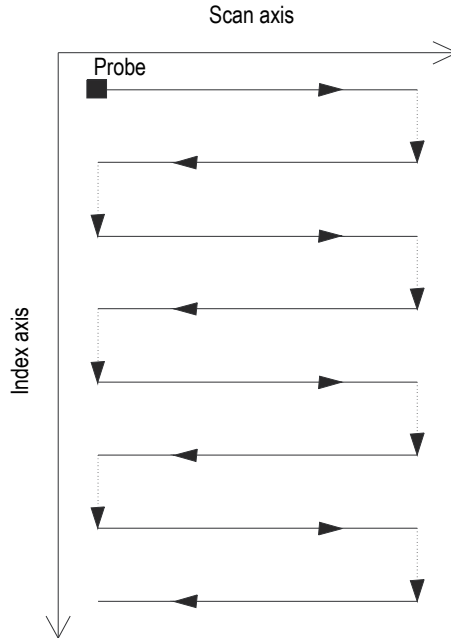


Figure 15-17 Bidirectional surface scan (raster scan)

Clock/Dir: Select this option when you use a stepper controller and its documentation specifies that the position output signal is a clock/direction type (5 V pulse for the position/speed and 5 V signal for the direction).

Quad: Select this option when the attached encoder (5V TTL output) is a dual-channel output encoder. The channels are generally named A and B. When the encoder is rotating clockwise (from left to right in Figure 15-18 on page 341), channel B follows channel A with a 90-degree delay. When the encoder is rotating counterclockwise, channel A follows channel B with a 90-degree delay. In this way, you can determine if the rotation is clockwise or counterclockwise. The decoder counts one step each time it detects a rising or a falling edge on channel A or channel B. This means that if the real encoder resolution is 1000 steps/revolution, the final resolution with the quadrature reading is 4000 steps/revolution.

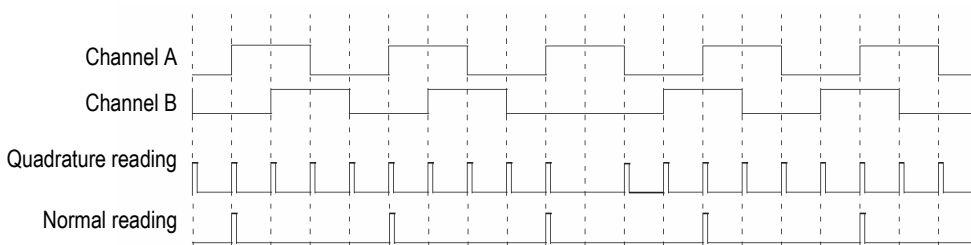


Figure 15-18 Quadrature and normal reading of the resolution

Up: The decoder only reads channel A and increments the counter even if the encoder is turning counterclockwise. The final resolution is the real encoder resolution.

Down: The decoder only reads channel A and decrements the counter even if the encoder is turning clockwise. The final resolution is the real encoder resolution.

Clock/Dir Up: The decoder only reads channel A and increments the counter. When the signal of channel B (direction) is high, the acquisition stops to prevent overwriting the data while you move the probe back and the counter is decremented.

Clock/Dir Down: The decoder only reads channel A and decrements the counter. When the signal of channel B (Dir) is high, the acquisition stops to prevent overwriting the data while you move the probe back and the counter is incremented.

Quad Up: The decoder reads channel A and channel B in quadrature mode (4 times the encoder resolution) and increments the counter when the encoder rotates clockwise. When the encoder rotates counterclockwise, the acquisition stops to prevent overwriting the data and the counter decrements.

Quad Down: The decoder reads channel A and channel B in quadrature mode (4 times the encoder resolution) and decrements the counter when the encoder rotates counterclockwise. When the encoder rotates clockwise, the acquisition stops to prevent overwriting the data and the counter increments.

Clicker: Used when you use an encoder on **Encoder 1** and an Evident indexer device (clicker) on **Encoder 2**. The encoder measures the position on the scan axis and you press the push-button of the clicker to increment the position on the index axis after manually moving the probe one step on the index axis. This procedure is frequently used to perform a manual raster scan.

Resolution

Used to set the number of counts per unit of the selected encoder.

Origin

Used to set the value (in inches or millimeters) to which the selected encoder is preset when the **Preset** command button is used.

Preset

Presets the selected encoder to origin.

15.6.3 Area Submenu

The **Area** submenu allows you to define the zone where the data will be acquired.

Scan Start

Used to set the starting location of the acquisition zone on the scan axis.

Scan End

Used to set the end of the acquisition zone on the scan axis.

Scan Res.

Used to set the resolution of the acquisition zone on the scan axis.

Scan Tracking (ECA mode only)

When in one-line scan inspection mode (which is activated by selecting **Scan > Inspection > Type = One-line Scan**), used to set the portion of the acquisition data along the scan axis that is to be displayed in the data views.

By default the value is equal to the **Scan End** parameter value. When setting a value for the **Scan Tracking** parameter that is smaller than the one set for the **Scan End** parameter, the portion of the signal that is displayed in the views is smaller than the entire acquisition data set, thus providing an enlarged view of the acquisition data along the scan axis. This parameter is also available in the **Display > Data** submenu.

Index Start

Used to set the starting location of the acquisition zone on the index axis. Unavailable in one-line scan inspection mode (**Scan > Inspection > Type = One-line scan**).

Index End

Used to set the end of the acquisition zone on the index axis. Unavailable in one-line scan inspection mode (**Scan > Inspection > Type = One-line scan**).

Index Res. (ECT mode only)

Used to set the resolution of the acquisition zone on the index axis, calculated in millimeters. Unavailable in one-line scan inspection mode (**Scan > Inspection > Type = One-line scan**).

By default, the index resolution is set equal to the probe coil spacing.

15.6.4 Start Submenu

The **Start** submenu offers options regarding the triggering and pausing of an inspection.

Start Mode

Allows you to specify the action to be applied when the acquisition is started

(using the Start/Stop key ).

Reset All: Resets data and encoder parameters (encoder presets and display pane settings).

Reset Encoder: Only resets both encoders to their **Origin** values.

Reset Data: Only resets the display pane or data.

Start

Restarts the inspection (C-scan, B-scan, etc.).

Pause

When activated, this option pauses the firings and activates the analysis mode. Choose **On** or **Off**.

15.7 Wizard Menu

The **Wizard** menu consists of submenus that offer step-by-step instructions to configure specific aspects of your setup. Each step of a wizard contains a title, navigation buttons, and associated parameter buttons. Using the wizards is the best way to easily and quickly create your setup.

15.7.1 Mixing Submenu

The **Mixing** submenu provides a step-by-step wizard to walk you through the procedure to combine two channels in order to attenuate the part of the signal coming from certain features of inspected parts, or to remove a probe signal such as lift-off or pillowing, to enhance the signal of defects.

NOTE

The **Mixing** submenu is only available when more than one group has been configured in the **EC Settings > Group Management > Add Group** menu. For more information about adding groups and the Mixing wizard, see section 9 on page 139.

15.7.1.1 Start Step

The **Start** step allows you to start the **Mixing** wizard by selecting **Start**.

TIP

In the Mixing wizard, choose **Back** to return to the previous step, or **Next** to go to the next step.

15.7.1.2 Mix Definition Step

The **Mix Definition** step allows you to configure the two channels that are to be combined to eliminate a given signal, such as a fastener or a lift-off signal, or pillowing.

The two following buttons allow you to move between steps in the Mixing wizard:

Group Reference

Allows to choose the reference group of channels from among the available groups. Groups are defined using the **EC Settings > Settings (MAIN) > Group Management** menu.

Group Subtraction

Allows you to choose the group of channels to be subtracted. You may choose any group, except the group selected as reference.

The **Group Subtraction** is subtracted from the **Group Reference** to generate a mixed channel with minimal residual signal:

$$\text{Mix} = \text{Group Reference} - \text{Coefficient processing} \times \text{Group Subtraction}$$

Ref. Cal.

Used to select how mix coefficients are calculated. The choices are:

Single: Calculates the mix coefficient from a single channel, and then applies the coefficient to all channels.

All: Calculates the mix coefficient independently for each channel.

15.7.1.3 Mix Acquisition Step

The **Mix Acquisition** step allows you to perform the acquisition.

Start

Used to begin the acquisition for the selected group.

Stop

Used to end the acquisition for the selected group.

Balance

Used to balance the signal for the selected group.

15.7.1.4 Mix and Finish Step

The **Mix and Finish** step allows you to configure the scan axis and index axis cursors that select the data zone that contains the defect for mixing, and to complete the mix.

Scan Start

Used to set the beginning position of the data zone that contains the defect for mixing along the scan axis. The scan start value should position the scan start cursor before the defect, at a distance equal to the length of the defect.

Scan Length

Used to set the length of the data zone that contains the defect for mixing, from the **Start Scan** parameter value. The scan length value should position the scan end cursor after the defect, at a distance equal to the length of the defect.

Index Start

Used to set the position of the index start cursor on the defect for mixing, along the index axis. The index start value should position the index start cursor where the defect produces the strongest signal, relative to the index axis.

Finish

Allows you to complete the **Mix and Finish** step and to terminate the **Mixing** wizard.

15.7.2 Calibration Submenu

The **Calibration** submenu provides a wizard that walks you through the steps that are necessary for performing various calibrations.

In ECA mode, the sensitivity of the coils of a probe is standardized. In both ECT and ECA modes, probe encoders can be calibrated. For more information, see section 10 on page 191.

15.7.2.1 Select Calibration Step

The first step of the calibration wizard is to select what aspect you want to calibrate. The following parameters appear in the **Select Calibration** step (see Figure 15-19 on page 347).

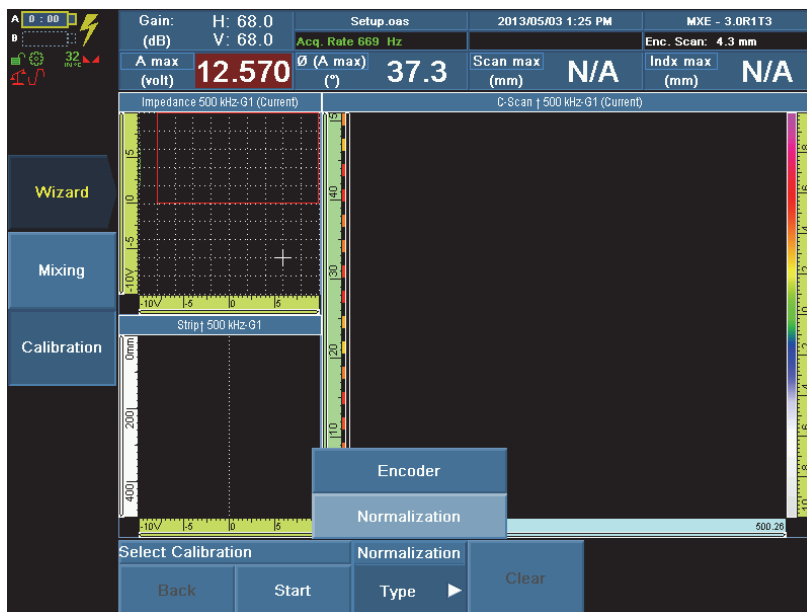



Figure 15-19 The Select Calibration step

NOTE



Press the Normalization key  to directly access the **Wizard > Calibration > Select Calibration** step (see Table 7 on page 106 for details).

Start

Choose **Start** to move to the first step of the selected wizard. The type of calibration must have previously been selected using the **Type** submenu. The wizard guides you through the rest of the procedure.

TIP

In the Calibration wizard, choose **Back** to return to the previous step, or **Next** to go to the next step.

Type

Used to select the type of calibration. Choose **Normalization** or **Encoder**. The option selected by default is **Normalization**.

Encoder

Used when the resolution (step/mm) of the encoder is unknown.

NOTE

The **Encoder** parameter only appears when **Scan > Inspection > Scan > Encoder = 1** or **2**.

Normalization

Used to standardize the sensitivity of all the coils of an ECA probe.

The main purpose of normalization is to standardize the sensitivity of the coils of an ECA probe. The user needs to scan a sample with a defect that should generate the same EC signal for each coil. In most cases, such a defect is a long transversal notch (see Figure 15-20 on page 349). The gain and rotation for each coil of the ECA probe is adjusted in order to attain the same phase and amplitude as selected by the user on a reference defect.

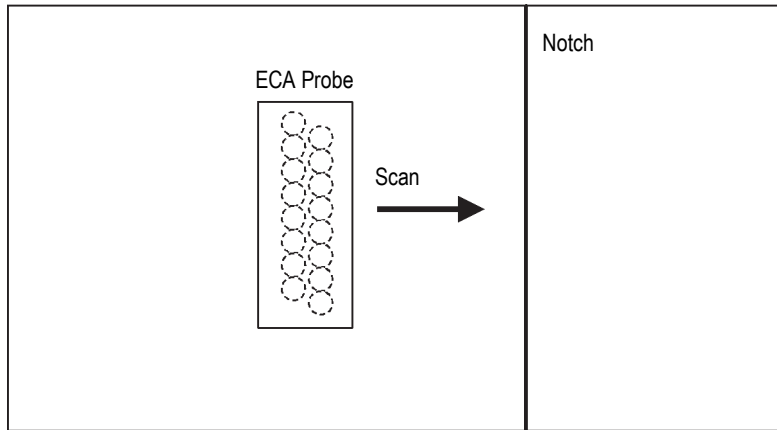


Figure 15-20 Setup for calibration of an ECA probe

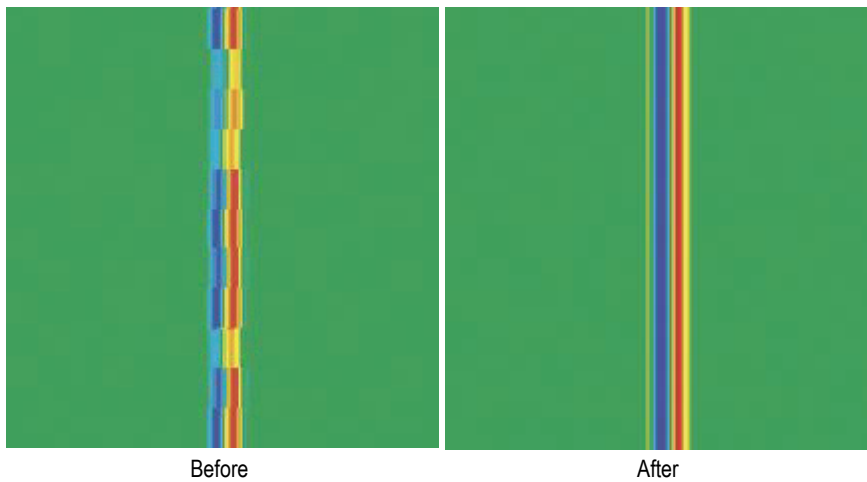


Figure 15-21 Scan before and after normalization

Encoder

Used to select which encoder to calibrate. Choose 1 or 2.

NOTE

The **Encoder** submenu is available only when the connected probe is equipped with two active encoders, such as a probe used to perform raster scans.

Clear

Used to remove the settings that were configured using the normalization process and return to a pre-normalized configuration.

15.7.2.2 Definition Step (Normalization)

The **Definition** step allows you to define the angle and the amplitude (see Figure 15-22 on page 350).

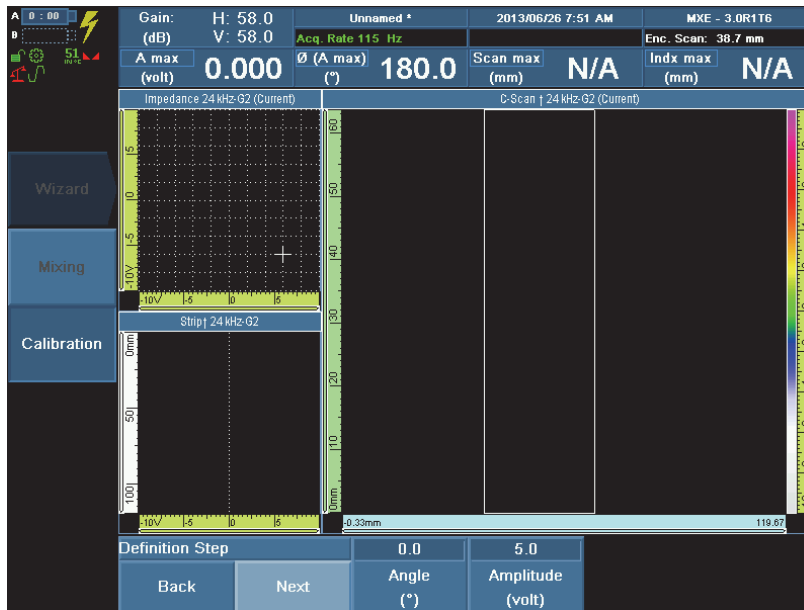


Figure 15-22 The Definition Step

Angle

Used to set the angle to which each channel of the selected group will be normalized.

Amplitude

Used to set the amplitude to which each channel of the selected group will be normalized.

15.7.2.3 Acquisition Step (Normalization)

The **Acquisition Step** allows you to configure the acquisition (see Figure 15-23 on page 351).

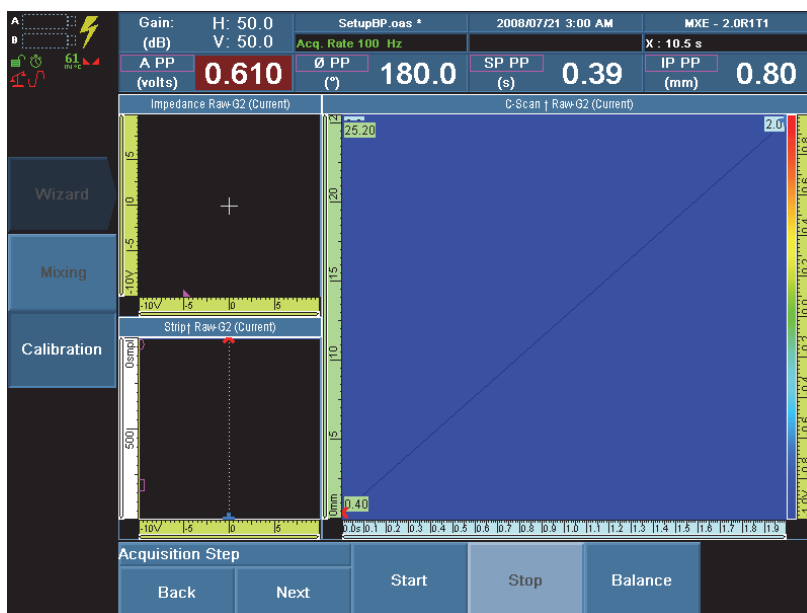


Figure 15-23 The Acquisition Step

Start

Select **Start** to begin the acquisition for the selected group.

Stop

Select **Stop** to end the acquisition for the selected group.

Balance

Select **Balance** to balance the probe for the selected group.

15.7.2.4 Selection Step (Normalization)

The **Selection Step** allows you to configure the scan parameters (see Figure 15-24 on page 352).

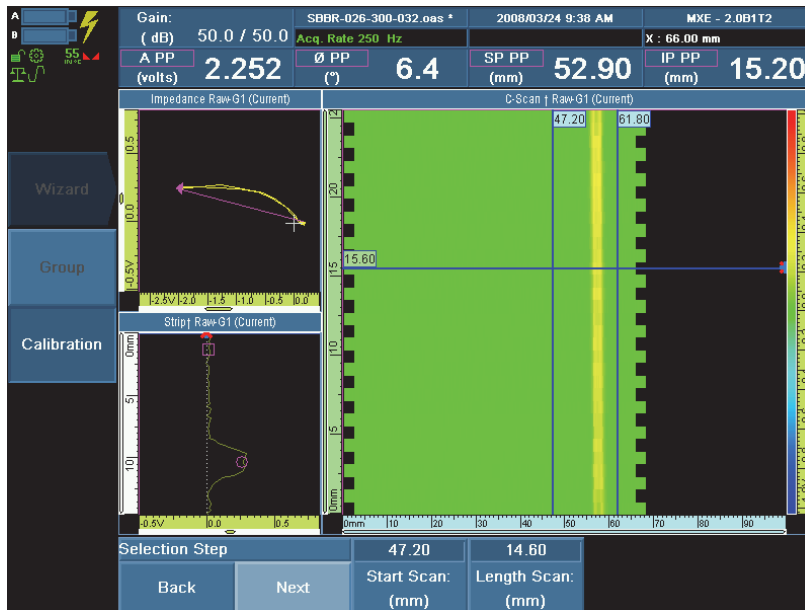


Figure 15-24 The Selection Step

Scan Start

Used to set the starting position of the selected data zone which contains the calibration defect.

Scan Length

Used to set the length of the selected data zone which contains the calibration defect.

15.7.2.5 Normalize Step (Normalization)

The **Normalize Step** allows you to configure the scan parameters (see Figure 15-25 on page 353).

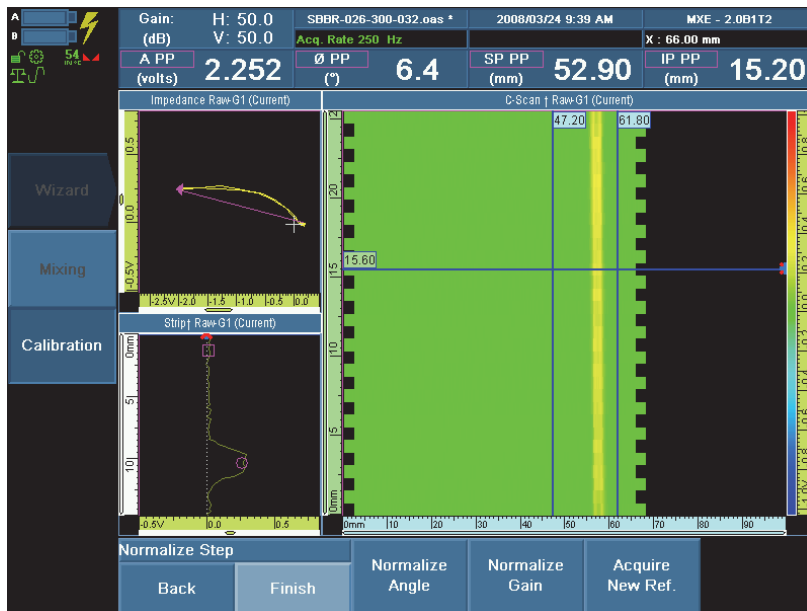


Figure 15-25 The Normalize Step

Normalize Angle

Used to set the angle to which each channel of the selected group will be normalized.

Normalize Gain

Used to set the gain to which each channel of the selected group will be normalized.

Acquire New Ref.

During normalization, when the defect signal cannot be acquired at the same time as the lift-off signal and included in the same set of data, the **Acquire New Ref.** button allows you to return to the **Acquisition Step** without leaving the Calibration wizard, and repeat the steps that are necessary to acquire data of the critical defect for normalization.

Finish

Used to return to the **Select Calibration** step without leaving the Calibration wizard, in order to perform another calibration.

15.7.2.6 Set Origin Step (Encoder)

The **Set Origin** step allows you to set the origin position for the encoder.

Origin

Used to set the value, in inches, to which the selected encoder is preset when the **Preset** command button is used.

Used to set the start point of the scan on the part to inspect.

15.7.2.7 Set Distance Step (Encoder)

The **Set Distance** step allows you to set the measured distance that the encoder is to travel for the calibration. Choose **Calibrate** to perform the calibration.

Distance

Used to set the distance of the axis, calculated in inches.

Specifies the length of the scan.

Calibrate

Performs the calibration and moves to the **Accept** step.

15.7.2.8 Accept Step (Encoder)

The **Accept** step allows you to accept the calibration. Choose **Accept** to terminate the calibration.

Accept

Accepts the encoder calibration and restarts the encoder from the **Select Calibration** step.

Resolution

A read-only parameter, which shows the calibrated resolution of the encoder measurement.

Restart

Restarts the encoder calibration from the **Set Origin** step.

15.8 File Menu

The **File** menu contains the parameters that relate to data files, reports, setups, formatting, and other similar parameters.

15.8.1 Open Submenu

The **Open** submenu contains parameters to load data into the OmniScan.

Storage

Lists the destinations where data may be stored.

Storage Card: Stores reports, setups and acquisition data on the storage device (Compact Flash card).

Internal Memory: Stores setups and probe data in the OmniScan permanent internal memory. Note that the available space is very limited, so use it with discretion.

Network: Stores reports, setups and acquisition data on a network. The OmniScan MXE must be connected to a network in order for this parameter to respond.

To connect the OmniScan MX to a network, refer to the following sections:

- “Connecting the OmniScan MX Directly to a Computer Under Windows XP” on page 295
- “Connecting the OmniScan MX to a Network” on page 307

USB Storage: Stores data on a connected USB storage device, represented in the file system as \Hard Disk. This item appears only when you connect a USB storage device to one of the USB ports of the OmniScan.

USB Storage 2: Stores data on a second connected USB storage device, represented in the file system as \Hard Disk2. This item appears only when you connect a second USB storage device to another USB port of the OmniScan.

Open

Opens a file browser, which lists available files according to the following parameters:

File Type

Setup: Lists setup files located in the \User\Setup folder.

Data: Lists data files located in the \User\Data folder.

Report: Lists report files located in the \User\Report folder.

Image: Lists .jpg format screen capture files located in the \User\Screen folder.

Listed Files

Toggles between a list of **User** created files and a list of **Sample** files that are part of the software distribution.

IMPORTANT

These folders cannot be changed. A file type may only be opened in a folder that shares the same name type.

TIP

Press the function key to directly access the **File > Save > Save Data** parameter (see Table 7 on page 106 for details).

15.8.2 Save Submenu

The **Save** submenu contains parameters that configure how the OmniScan saves data.

Storage

Read-only parameter in this submenu. Editable on the **Open** submenu.

Save Setup As

Saves the current setup under a different name or in a different location.

Save: Saves the setup.

File name: Used to enter a name for the file.

Setup Lock: When activated, this parameter locks the setup.

IMPORTANT


Once a setup is locked, the operator can only use the commands programmed on the **User** menu.

Save Data

Simultaneously saves the current data and the on-screen views and menus as separate files in different folders onto the selected storage destination. Both files have the same name, which is set in the **File Name** parameter, but with different file types.

Data is saved as a data type file into the \User\Data folder in the .oed format (ECT mode) or .oad format (ECA mode). The screen, including the views and the menus, is saved as an image type file into the \User\Screen folder in the .jpg format.

TIP

Press the Store/Print  function key to directly activate the **File > Save > Save Data** command (see Table 7 on page 106 for details).

File Name

Used to specify a file name for data files and screen capture image files. You can use variables to build the file names. The following variables can be used:

#: automatically incremented number (Data### becomes Data001, Data002, and so on)

%D: date (yyyy-mm-dd format)

%T: time (hh.mm.ss format)

Example: Data###_%D_%T becomes Data001_2008-02-29_11.33.00.

15.8.3 Report Submenu

The **Report** submenu contains parameters to configure and generate reports.

The reports are generated in HTML format and can be printed directly from the OmniScan MX or viewed and printed through a web browser on a computer. Refer to section 15.9.1.1 on page 359 and section 15.8.4 on page 358 for more report related parameters.

File Name

Used to specify a file name for the report. Enter the appropriate file name using the function keys or a keyboard. You can use variables to build the file name. The following variables can be used:

#: automatically incremented number (Report### becomes Report001, Report002, and so on)

%D: date (yyyy-mm-dd format)

%T: time (hh.mm.ss format)

Example: Report###_%D_%T becomes Report001_2008-02-29_11.33.00

Edit Notes

Opens the text editor to edit a note attached to a report, a data file, or a setup file.

Edit Header

Opens the text editor to edit the header of a report, a setup, or a data file.

Build

Builds a preview of the report and offers the following parameter buttons:

Print: Prints the report.

Save And Close: Saves the report and closes the window.

Close: Closes the window without saving the report.

15.8.4 User Field Submenu

The **User Field** submenu contains several user-specified fields, including custom information, that can be added to a report. To include these user fields in a report, select **File > User Field > Enable = On**.

Select

Used to select which user field (1 through 10) to edit.

Enable

Activates the currently selected user field.

Label

Used to enter a new name for the selected user field.

Content

Changes the contents of the selected user field.

15.9 Preferences Menu

The **Preferences** menu includes submenus and succeeding parameters that configure various aspects of the system and offer access to the system utilities.

15.9.1 Setup Submenu

Category

Used to select the category for the other parameters of the submenu. The choices are:

- “Report Category” on page 359
- “DIN Category” on page 361
- “User Menu Category” on page 361
- “Data Category” on page 362

15.9.1.1 Report Category

Select **Preferences > Setup > Category = Report** to see the following parameters, which allow you to customize reports.

Template

Used to select a report template. The report types are written in parentheses next to the report name. The following is a description of the two report types.

Complete

This is a template delivered with the OmniScan MXE software. The report files are located on the storage device in the
\\App\MXE\Template\Report\Complete folder.



CAUTION

Do not modify or replace any files in the Complete folder located in \App\MXE\Template\Report. These are the original files used to create the default report. If you replace or modify them, you will no longer have the original files to create a custom template.

Custom report

This is a template that you make using custom files. These files are placed in a folder that you create on the OmniScan MXE storage device. For more information about creating a report template, see section 11.5 on page 220.

Component

Used to select the sections to be included in the report. Check the desired items.

User Field

Toggles the inclusion of the user field section to the report. For more information on user fields, refer to section 15.8.4 on page 358.

Probe

Toggles the inclusion of the probe characteristics field in the report.

Setup

Toggles the inclusion of the setup field in the report. This field includes eddy current settings, mechanical settings, and TCG and gate information in the report.

Note

Toggles the inclusion of the note field in the report. It includes editable notes that can be printed with the report.

All

Includes all available sections in the report.

None

Excludes all available sections from the report.

Include

Used to select which type of image you want included in the report.

Current Layout

Includes a screen capture of the current layout in the report.

Off

No images are included.

Paper Size

Used to specify the paper format on which you want to print the report (**Letter**, **Legal**, **A4**, or **B4**).

Orientation

Used to select the orientation of the report page. Choose **Portrait** or **Landscape**.

15.9.1.2 DIN Category

Select **Preferences > Setup > Category = DIN** to access the following parameters, which allow you to configure the digital inputs.

Select DIN

Used to select a digital input (**DIN1** through **DIN4**) to which you assign a function from the **Assign DIN** list.

Assign DIN

Used to specify and assign a function to the digital input selected from the **Select DIN** list. Select one of the following functions: **None**, **Preset Encoder 1**, **Analyze/Acquire**, **Balance**, **Clear&Reset**, or **Save Data**.

15.9.1.3 User Menu Category

Select **Preferences > Setup > Category = User Menu** to access the following parameters, which allow you to customize the user menu.

Select Key

Used to select a function key (F2 through F6) to which you assign a function from the **Assign Key** list.

Assign Key

Used to assign a function to the key selected from the **Select Key** list. Choose a function in the list.

Switch to User Menu

Used to switch the interface to the configured user menu.

15.9.1.4 Mouse Control Category

Select **Preferences > Setup > Category = Mouse Control** to access the following parameters, which allow you to customize the control of the interface in the OmniScan MXE software using a mouse or a control area.

Mouse

Used to activate or deactivate the mouse or control area usage.

Off

With this option, the mouse cannot be used to control the interface.

Mouse

With this option, the mouse is activated to control the interface.

Control Area

With this option, the control area is activated to control the interface.

15.9.1.5 Data Category

Select **Preferences > Setup > Category = Data** to configure the data management.

Scan Area

Used to optimize the usage of the data memory. This parameter is available only when an encoder is used for one-line scans and raster scans. The available options are:

Maximize Scan Area

With this option, the instrument does not acquire data over already scanned areas, freeing data memory and maximizing the scan area.

Maximize Data Quantity

This default option permits scanning over already scanned areas and accumulates the data of all passes, as long as data memory is available.

15.9.2 Display Submenu

Category

Used to select the category for the other parameters of the **Display** submenu. The choices are:

- “Luminance Category” on page 363
- “View Category” on page 363

- “Grid Category” on page 364

15.9.2.1 Luminance Category

The **Luminance** category allows you to configure the screen’s brightness level. Select **Preferences > Display > Category = Luminance** to access the following parameter:

Bright (%)

Used to set the brightness level of the screen from 1 % through 100 % in increments of 1 %. The instrument is set by default to 25 % to maximize battery consumption. The maximum value is 75 % when operating the OmniScan on batteries and 100 % when operating the OmniScan on the AC power supply.

15.9.2.2 View Category

The **View** category allows you to configure the cursors in the data views, the zoom function, so all views are zoomed at once, and the C-scan interpolation. Select **Preferences > Display > Category = View** to access the following parameters:

Cursor

User selectable parameter, used to independently show or hide the peak to peak measurement cursor, the maximum measurement cursor, and the selection cursor, as well as the text (time or position) on the selection cursor. Used with all displays.

PP Cursor

Shows or hides the peak to peak measurement cursor. The PP cursor’s color in the views is magenta. Used with all displays.

Max Cursor

Shows or hides the maximum measurement cursor. The Max cursor’s color in the views is blue. Used with all displays.

Selection Cursor

Shows or hides the selection cursor. Used with all displays.

Selection Text

Displays text (time or position) on the cursor. Used with all displays.

Link Zoom

When there are many views from many groups, when set to **On**, this button links all the views to the same zoom. When set to **Off**, the zoom applies only to the current view.

CScan Interpolation

When set to **On**, improves the resolution of the C-scan. When set to **Off**, the C-scan is displayed at its default resolution (see Figure 15-26 on page 364).

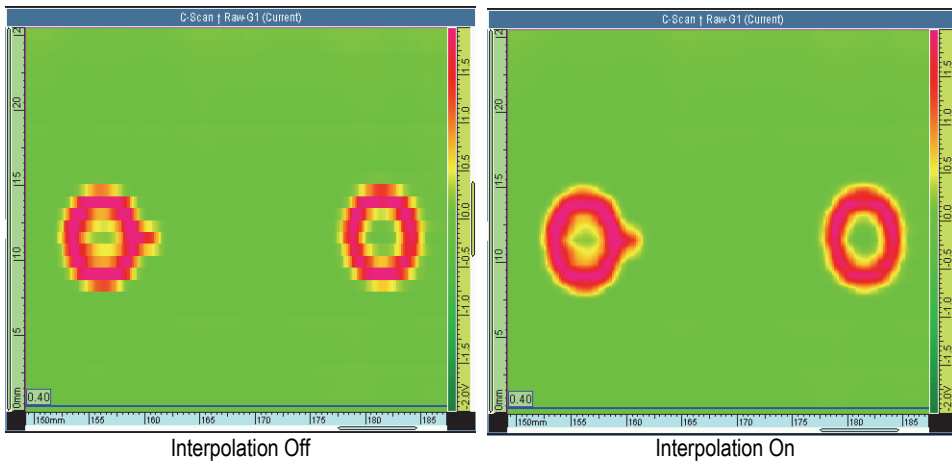


Figure 15-26 Impact of interpolation on signal display quality

Strip Direction (in ECT mode only)

In the strip charts display, used to choose the direction of the strip chart: either **Top-Bottom** or **Bottom-Top**.

15.9.2.3 Grid Category

The Grid category allows you to set the preferences for the grids that can be displayed in the impedance plane and strip chart views. Select **Preferences > Display > Category = Grid** to access the following parameters:

Grid Division (V)

Defines the scale of the grid in number-of-volts increments. Choose **0.1**, **0.5**, **1**, or **2**.

Grid

Allows you to specify the type of grid in use on the impedance display:

None: Does not display any grid.

Polar: Displays the polar grid.

Angular: Displays the angular grid.

Rectangular: Displays the rectangular grid.

Polar+Angular: Displays the polar and the angular grids.

Polar+Rectangular: Displays the polar and the rectangular grids.

Angular+Rectangular: Displays the angular and the rectangular grids.

NOTE

Other than **Rectangular**, the grid options are only displayed in impedance plane views. When **Strip Chart** is selected as one of the display options from the **Display > Properties > Grid** menu, only a rectangular grid is displayed in strip chart views. For more information, see section 15.4.2 on page 331.

15.9.3 Instrument Submenu

Category

Used to select the category for the other parameters of the submenu. The choices are:

- “Unit Category” on page 365
- “Screen Category” on page 366
- “System Category” on page 366
- “Network Settings Category” on page 367

15.9.3.1 Unit Category

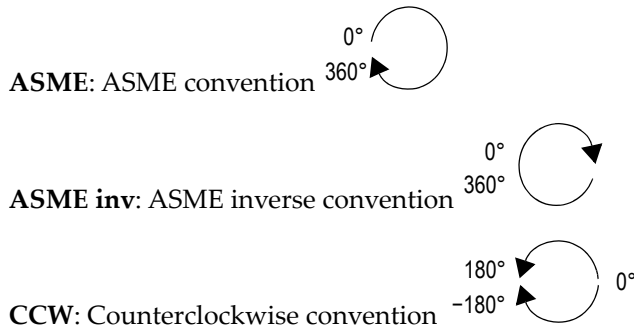
Select **Preferences > Instrument > Category = Unit** to access the following parameters.

Units

Used to choose either the metric (**Millimeters**) or imperial (**Inches**) measuring system.

Angle Units

Allows you to choose which angle convention you wish to apply.



15.9.3.2 Screen Category

Select **Preferences > Instrument > Category = Screen** to access the following parameters.

Scheme

Used to select the color and contrast scheme for the OmniScan MXE screen that is most appropriate for indoor or outdoor operation.

Indoor: color optimized for indoor use

Outdoor: color optimized for outdoor use

15.9.3.3 System Category

Select **Preferences > Instrument > Category = System** to see the following parameters.

Clock Set

Used to set the time. Choose once to select the hour, twice for the minutes, a third time for the seconds, and a fourth time to select **AM** or **PM**.

Date Set

Used to set the date. Choose once to select the year, twice for the month, and three times for the day.

Admin. Password

Changes the administrative password. This parameter is used when you unlock a setup, access the Microsoft Windows CE operating system, and update the OmniScan MXE software.

Option Key

Used to consult and edit the software option key stored in your module. The software option key activates the purchased software options.

Startup Mode

Lets you choose the desired OmniScan operating mode when you turn it on.

Automatic: The OmniScan MX starts using the application that was operating when the OmniScan was last turned off.

Manual: The OmniScan MXE starts and asks you to select which application you want to use.

15.9.3.4 Network Settings Category

The **Network Settings** submenu contains the parameters used to connect the OmniScan MX to a network. Contact your network administrator to obtain appropriate values for the following parameters.

DHCP

Set to **On** to enable the OmniScan startup process to request an IP address from the DHCP server. Set to **Off** to have the OmniScan startup process use the fixed IP address specified in the **IP address** parameter.

IP address

Used to manually set an IP address for the OmniScan MXE software. Select once, twice, three times, and four times to choose one of the four parts of the IP address.

Subnet Mask

Used to manually set the subnet mask coordinates for the OmniScan MXE software. Select once, twice, three times, and four times to choose one of the four parts of the subnet mask.

Apply

Applies the changes made to the parameters of the **Network** submenu.

Connect/Disconnect

Toggles the state of the connection between the OmniScan MXE software and the PC. This parameter is available when there is an active connection between the OmniScan MX instrument and a computer.

15.9.4 Tools Submenu

The **Tools** submenu contains parameters providing access to various tools.

File Manager

Opens the File Manager, which contains the following parameters:

Close

Closes the File Manager and returns to the data view screen.

File Type

Used to specify the type of file you are looking for. All other types are ignored.

Create Folder

Creates an empty folder in the selected folder.

Select

Used to select a file.

Select All

Used to select all the files in the selected folder.

Copy

Copies the selected files into the folder displayed in the right pane.

Move

Moves the selected files into the folder displayed in the right pane.

Delete

Deletes a selected file.

Rename

Used to rename a selected file.

System Info

Displays system information such as the hardware version number, the software version number, and the memory status.

To close the **System Info** window, press the Cancel key.

Win CE

Used to access the Microsoft Windows CE operating system environment. A password is required to complete the operation.

To switch back to the OmniScan MXE interface, you can use the ALT+TAB key combination (if you have a keyboard plugged in) or you can choose the OmniScan MXE button on the Windows task bar.

NOTE

A mouse is required in order to fully benefit from the Microsoft Windows CE operating system.

VNC Server (Remote Desktop)

Used to activate the virtual network computing (VNC) server on the OmniScan. Once enabled, use a VNC viewer on a remote computer connected to the OmniScan MX to view the display of the OmniScan on the computer screen and to control the OmniScan using the mouse and the keyboard of the computer. The default IP address of the OmniScan is 192.168.0.2. For communication configuration information, see chapter 6 on page 115.

15.10 ECT <_> ECA Menu

The **ECT <_> ECA** menu allows you to toggle between the conventional eddy current (ECT) and the eddy current array (ECA) applications. Selecting **ECT <_> ECA** terminates the current application and starts the other one.

You can also switch between the conventional eddy current (ECT) and the eddy current array (ECA) application simply by pressing and holding the Menu key for more than two seconds.

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