ETHER NDE

Eddy Current Solutions

Advanced Eddy Current Instrument for Additive Manufacturing

AMCheck

User Manual

ETher NDE Ltd.
Endeavour House,
Unit 18, Brick Knoll Park,
Ashley Road,
St Albans,
Hertfordshire,
AL1 5UG.

Tel: +44 (0) 1582 767912
www.ethernde.com
sales@ethernde.com

1. Introduction

1.1. About the AMCheck

The AMCheck instrument is a dual frequency eddy current inspection instrument with conductivity and C-Scan capability. It is designed for flaw detection and evaluation using the Eddy Current non-destructive testing (NDT) inspection method.

AMCheck can perform a great many eddy current inspection tasks including surface defect detection, high-speed rotary inspection of holes and low frequency inspection of non-ferrous material. The dual channel/frequency capability means that the instrument can perform, in addition to single frequency, applications that require dual frequency. Examples of dual frequency are the suppression of unwanted signals by mixing or dual test with one probe (typically simultaneous absolute and differential testing) or dual probe testing where one probe must be absolute but the other could be any of the types the instrument can used with.

The unique capability of the AMCheck over ETher NDE's other Eddy Current instruments is its ability to construct a C-Scan image from the Eddy Current data. The AMCheck's additional Encoder connector allows two independent encoders to be connected. With two Encoders representing X and Y coordinates a detailed image can very easily be constructed of an area under test. The advantages of a C-Scan include the ability of untrained operators to easily recognise a defect and the ease at which untested areas can be identified.

The AMCheck is designed to be mounted on a flat panel.

Due to its 10Hz to 12.8MHz-frequency range (10Hz to 20MHz in Single frequency mode) it is able to detect surface and subsurface defects in components made from non-ferrous metals and their alloys and on ferrous materials can detect surface breaking defects.

Always refer to the applicable inspection and operator certification procedures and national and international standards before undertaking a test particularly those referring to certification of operators.

The instrument may be used with nearly all eddy current probes including:

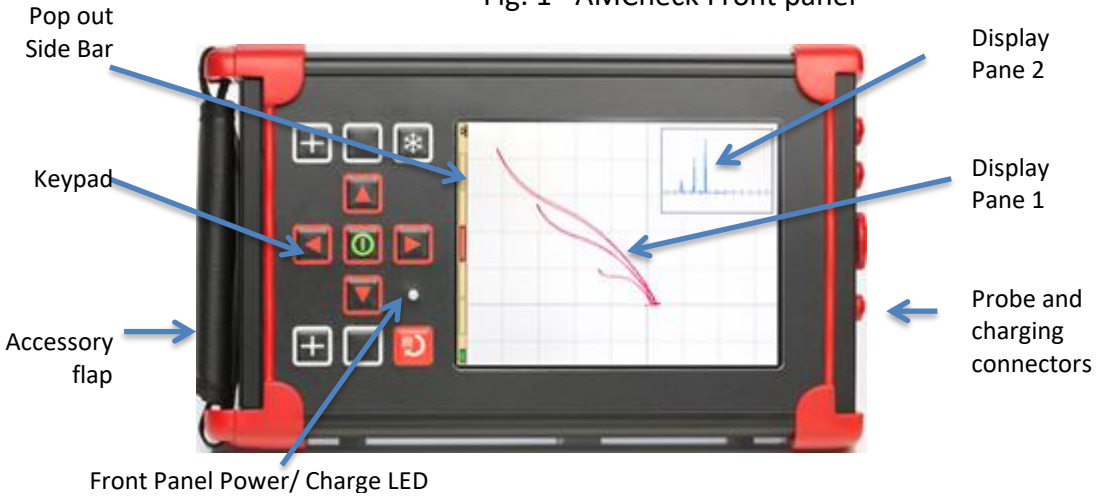
- Absolute single element probes
- Absolute bridge connected probes
- Absolute reflection connected probes (e.g. Spot Absolute Probes)
- Differential bridge connected probes (e.g. ID Probes)
- Differential reflection connected probes
- Sliding transmit receive reflection probes
- Rotary drives. Directly compatible with both ETher and GE/Hocking rotary drives and by means of an adapter with Rohmann drives MR1, SR1 and SR2.

The User Manual of the ETher NDE AMCheck portable eddy current instrument (referred to as the "instrument") is intended to explain the operation principles of the instrument.

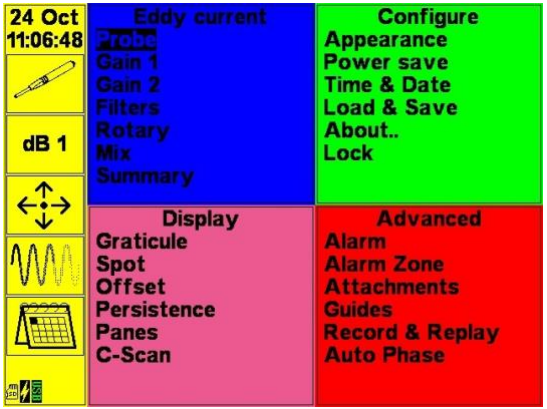
1.2. A first look at the instrument.

This section gives an overview of the various external features of the instrument.

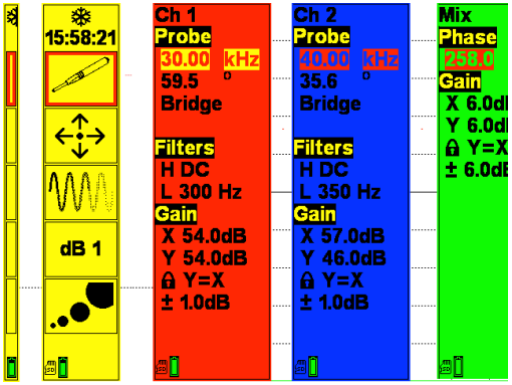
Fig. 1– AMCheck Front panel



Pressing the MENU/BACK key  toggles to the Main Menu.



Repeatedly pressing the LEFT & RIGHT cursor key changes the side bar on the left of the operating screen changes between Small, Normal and Quick-Menu CH1, and if dual frequency is selected then CH2 and Mix modes.



1.3. Keypad

1.3.1. Cursor keys

Long press (greater than 3 seconds) on the centre/enter key switches the instrument on.

The 4 red arrow keys are cursor keys and the centre key acts as both the on/off key and the enter key.

In the operating screen pressing the right cursor key changes the side bar from the default setting of the user programmable quick access icons to the quick setting menu for channel 1, 2 or mix. Press the left cursor key to exit the quick-menu display.

In the operating screen pressing the left cursor key changes the side bar from the default setting to a smaller version, this allows a full screen view of the Main Pane. Press the right cursor key to expand the menu once again.

In the menu screens the direction keys move the cursor/selection point Left, Right, Up, Down. The centre key is used first to select a menu item. Once a menu item is selected its various values can be highlighted using the UP and DOWN keys. Pressing OK will then allow the individual highlighted value to be modified. Pressing Enter again will accept the value and return to having the sub menu highlighted. Press the Back Key to accept all values and return to the Main Menu.

Long press (greater than 3 seconds) on the centre/entre key switches the instrument off if a setting has been changed the operator will be prompted to save the current setting or not.

1.3.2. Menu/Back Key

The menu/back key gives quick access to the main Menu as well as going back to the previous item.

Eddy current signal balance (1 top one bottom of unit). Long Press (greater than 3 seconds) activates Auto Phase (see 5.2.5.6).

2 Independent User programmable blank soft keys, one top one bottom. A 3 second push on either of these will show a list of the programmable options. Up Down to select and centre key to Enter. Once programmed use a short press to activate key function. Functions selectable from;

- None
- Clear Screen – clear whole screen
- Clear Pane 1 – clear only pane 1
- Clear Pane 2 – clear only pane 2
- Screen Shot – Save bitmap of the current screen display. Note that Screen Shots are saved to the SD card and appear in a folder along with the currently selected settings.
- Auto Phase – Activates the Auto Phase setting function see 5.2.5.6.

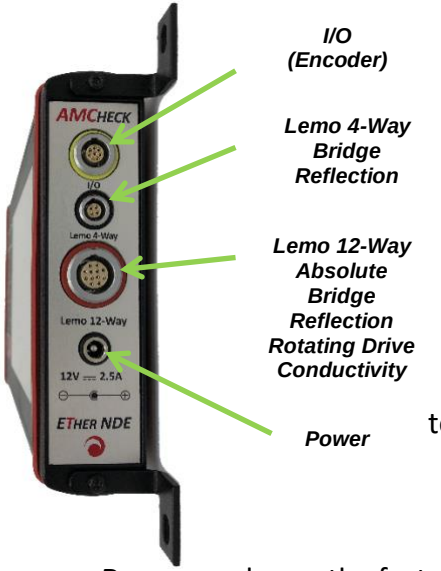
- Balance Load – in absolute mode automatically optimises the balance load using one of the internal loads. See 5.2.2.1
- Screen Flip – toggles the screen orientation from right handed to left handed.
- Loop – records a short section (equal to persistence time) of data and displays it repetitively. This allows easy setting of gain, phase, filters, display and other parameters.
- Trace – Stores the current displayed trace in Pane 1 to the Graticule layer of the image. 2nd press erases this trace from the graticule layer. Good for making comparative tests.

Each key may be programmed separately allowing two different functions to be programmed. Programmed key settings are saved in a setting file so each setting can have the most useful function programmed.

Press to Freeze Display/Long press to Thaw.

LED indicator Green indicates external power applied, amber indicates power applied and charging in progress. Green indicates charging complete and instrument on external power.

1.4. Connector Side of the instrument (probe, encoder & charger connector):



Probe Connectors – There are two different probe connectors;

a) Lemo 4-Way connector to connect Bridge and Reflection probes. This connector is selected in the Menu Eddy Current /Probe Function and is referred to as **Probe 2** when in Dual mode.

b) Probe Connector (12 way Lemo 2) connects Bridge, Reflection and Absolute probes and Rotary Drives. For Bridge probes using a 4 pin Lemo connector (e.g. disconnect weld probes) use part number ALL12-L04-015B. For Reflection probes (e.g. spot faced probes such as PUS13) use ALL12-L04-015R. By using adapter part number AAL12P-B02S then absolute probe with cables terminated with a BNC connector may be connected.

Power - only use the factory supplied charger/power supply.

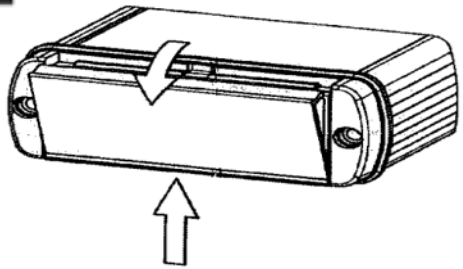
Encoder – Lemo 8-Way connector provides an input for 2 encoders and the 0v and 5v to power them. See the section IJD for more details in interfacing with this connector.

1.5. Flap Side of the instrument (accessory connectors under flap)

Open the flap by gripping the flap firmly, whilst pushing from the back and then rotate the flap open as shown below.

NOTE: Do not use tools to open, as this will damage the instrument.

VGA - for video output using a monitor, projector or head up display



Micro SDHC Card - can add up to 32GB of removable memory

USB - used to connect to a PC for data transfer and remote operation

To Open Flap

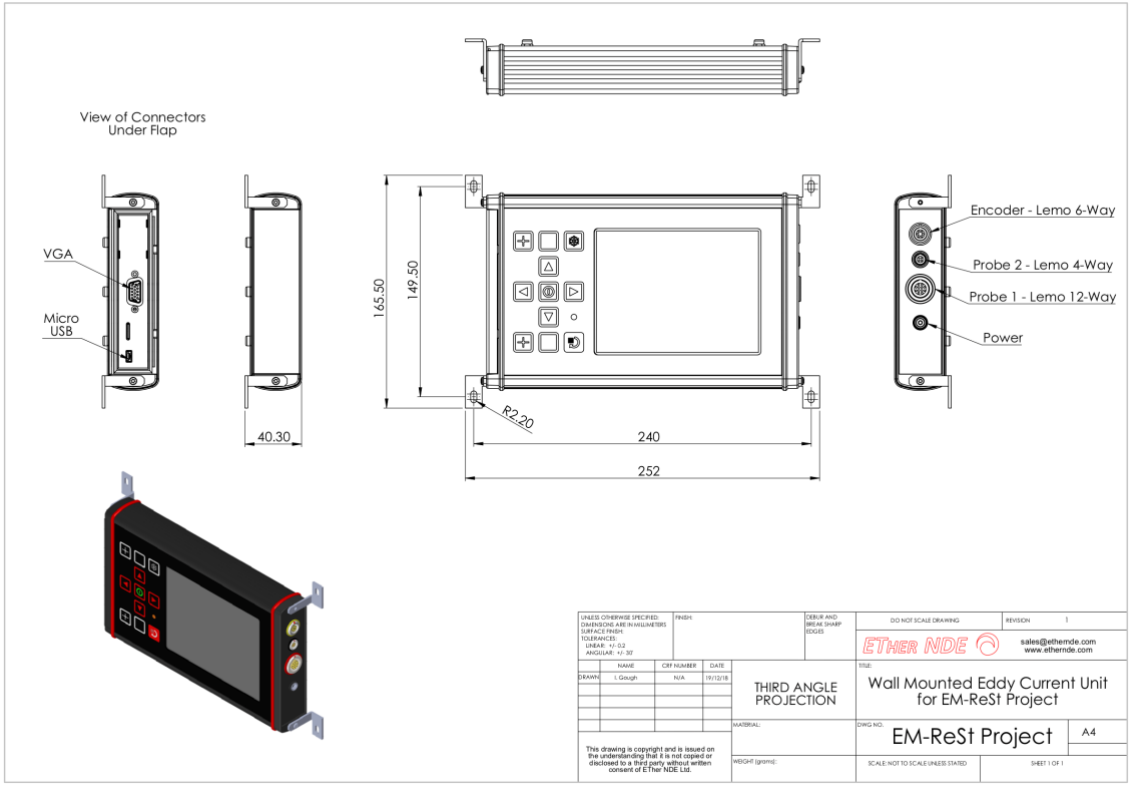
1 Press centrally on hinge axis

2 Simultaneously pry open cap

2. Installation

The AMCheck is designed to be installed on a flat panel such as an equipment console or panel.

Details are given on the next page.


View of Connectors
Under Flap
VGA
Micro
USB
40.30
165.50
149.50
R2.20
240
252
Encoder - Lemo 6-Way
Probe 2 - Lemo 4-Way
Probe 1 - Lemo 12-Way
Power
ETHER NDE
sales@ethernde.com
www.ethernde.com
THIRD ANGLE
PROJECTION
Wall Mounted Eddy Current Unit
for EM-ReSt Project
EM-ReSt Project
A4
This drawing is copyright and is issued on the understanding that it is not copied or disclosed to a third party without written consent of ETher NDE Ltd.

3. Standard Package and recommended accessories

3.1. Standard Package

Description	**Part. No.**	**Qty.**
KIT, AMCheck, Dual Frequency Eddy Current Portable Flaw Detector with Encoder Input. Including:	KIAMAS001	1
AMCheck Instrument including USB Stick with manual	IAM001	1
Accessory, AeroCheck+, Power Adapter + Input Plugs (UK, EU, US & Australia)	AWEL002	1
AMCheck Quick Reference Card	41048	1
Digital I/O Free Plug with Cable Sleeve	C234, C232	1
Software and Manual on USB Stick	60099	1

3.2. Recommended Packages

Scanners for use with the AMCheck

Description	Part. No.	Qty.
Accessory, Incremental Miniature Encoder with Spring Lever and Measuring Wheel, 2m, Lemo 8-Way (To fit dia. 16mm probes) (Kubler Rotary Encoder, Incremental, 1024 PPR 5V)	ASCAN002	1
KIT, SCANNER, Suction Cup Base, X-Y and R-Theta Magnetic Encoders	KSCAN001	1
KIT, SCANNER, Suction Cup Base, X-Y Magnetic Encoders	KSCAN002	1
KIT, AUTO SCANNER, XY Small frame 60 x 46cm	KSCAN003	1
KIT, AUTO SCANNER, XYZ Big frame 82 x 77cm	KSCAN004	1
Other scanners are available or the AMCheck may be interfaced to any dual axis 5v incremental encoder system.		

3.3. Optional Accessories and Probe Kits

Description	Part. No.	Qty.
Accessory, Lead, Lemo 8-Way - Lemo 8-Way, 2.5m (To Connect EThER Scanners to PhaseCheck, AMCheck)	ALL08-ENC-002	1
Accessory, Lead, Lemo 00 to Microdot, 1.5m	ALLCX-M02-015A	1
Accessory, Lead, Lemo 12-Way - BNC Plug, , 1.5m (Absolute)	ALL12-B02-015A	1
Accessory, Lead, Lemo 12-Way - Lemo 4-Way, , 1.5m (Bridge)	ALL12-L04-015B	1
Accessory, Lead, Lemo 12-Way - Lemo 4-Way, , 1.5m(Reflection)	ALL12-L04-015R	1
Accessory, Lead, Lemo 12-Way - Lemo 12-Way, 2.0m (Rotating Drive)	ALL12-L12-020-020M	1
Accessory, Lead, Lemo 12-Way to x2 Micro Plug, 1.5m (RX TX) (Reflection)	ALL12-M02-M02-015AR	1
Accessory, Hard Transit Case with Padded Dividers Internal Size 432 x 280 x 153mm (AeroCheck+ + Vantage	AWEL004	1
Accessory, Adapter Lemo 00 Coaxial to BNC Socket	AALCX-B02S	1
External 8*AA Dry Cell External Battery Pack	AWEL006	1
Accessory, Encoder to Lemo 8-way, 2m long. ENCODER - Incremental Encoder 1024 ppr 12000rpm 5 24 V dc (Manual Scanning)	ALL08-ENC-002	1
In car power adapter/charger	AWEL008	1

KIT, Surface Inspection. Including:	KASUR001	
Probe, Unshielded, 500kHz, Fe/NFe, Plastic Handle, Straight, 100mm Long	PU500PSFE/NFE	1
Probe, Shielded, 2MHz, Plastic Handle, Straight, 28mm Tip Length (Total Length 114mm, 4.5”) (Straight Shank)	PS002PS028-114N	1
Probe, Shielded, 2MHz, Plastic Handle, Straight, 28mm Tip Length (Total Length 114mm, 4.5”) (Straight Shank)	PS500PD064-114N	1
Probe, Shielded, 2MHz, Plastic Handle, Double Crank, 6.4 (0.25") Tip Length (Total Length 114mm, 4.5") (15deg Crank, 90deg tip Shank)	PS002PD064-114N	1
Probe, Knife, 65 deg, 2MHz, NFe, Unshielded	PK065002NFE	1
Cable Lemo 00 Coaxial to Microdot Plug Absolute cable 1.5m	ALLCX-M02-015A	1
Test Block, Ferrous (Steel EN1A), 0.2, 0.5, 1.0mm slots	ATBF	1
Accessory. Test Block, Ferrous (Steel EN1A), 0.2, 0.5, 1.0mm slots	ATBA	1
Accessory, Butterfly PTFE Tape (Pack of 30)	AW003	1
Accessory, Deluxe Probe Case	AC002	1

Kit, Sub-surface Inspection Low Frequency. Including:	KASUBS001	1
Probe, Surface, Straight, Dia 16mm, 300Hz - 100KHz, Plastic, Lemo 4-Way	PUS16	1
Probe, Surface, Right Angled, Dia 11mm, , 300Hz - 100KHz, Plastic, Lemo 4-Way	PUR11	1
Accessory, Lead, Lemo 12-Way - Lemo 4-Way, 1.5m (Reflection)	ALL12-L04-015R	1
Accessory, Test Block, Aluminium 7075-T6, , 1.6mm Thick, x4 Flat Bottom Holes 75%(1.2mm), 50%(0.8mm), 25%(0.4mm), 12.5%(0.2mm) Deep.	ATB001	1

KIT, Weld, Probes + Accessories. Including:	KAWEL001	
Probe, Weld, Dia 16.00mm (Medium) 100kHz, , Straight, Disconnect	PWM100S000	1
Probe, Unshielded, Broad Band, 100k , (35kHz-250kHz), BNC	PUB100K	1
Accessory. Test Block, Weld Probe, Ferrous , (Steel EN1A) + x4 0.5mm Shims, , 0.5, 1.0, 2.0mm slots	ATBW	1
Accessory, Lead, Lemo 12-Way - Lemo 4-Way, 1.5m (Bridge)	ALL12-L04-015B	1
Accessory, Lead, Lemo 00 to BNC, 1.5m	ALLCX-B02-015A	1
Accessory, Butterfly PTFE Tape (Pack of 30)	AW003	1
Accessory, Deluxe Probe Case PHDC1	AC002	1

4. Getting Started

4.1. Battery Charging

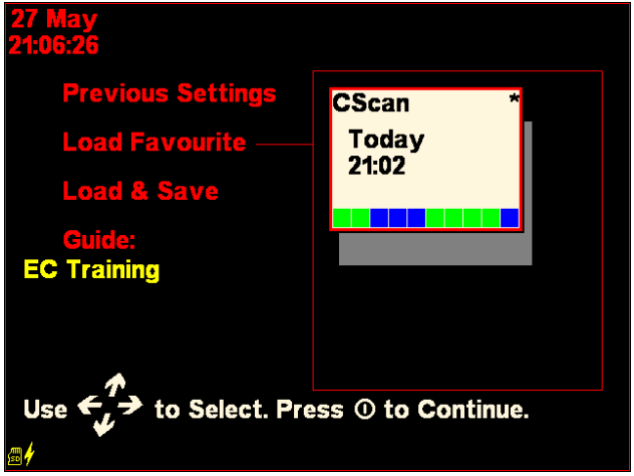
1. Connect the instrument's AC/DC supply to the DC power socket. When DC power is connected, the green or amber DC LED will stay on. NOTE: DO NOT CONNECT AN AC/DC POWER PACK other than one's supplied by EThER NDE otherwise the warranty will be void and irreparable damage will occur to the instrument. Options are AWEL002 (AC Charger), AWEL006 (Dry Cell Pack) and In-car charger (AWEL008).
2. As soon as the DC power is connected, the battery will start to be charged. With the instrument powered down the battery will charge fully within 2 hours.
3. During Charging the front panel LED is Amber, when charging is complete the LED colour changes to Green. If the instrument is powered up and used during charging the battery will charge more slowly than if the unit was not powered up.
4. Note the instrument may be used whilst charging is taking place.

4.2. Switching the instrument on

1. Press the POWER key until the display turns on (should be within 3 seconds).
2. The instrument will first display the product splash screen for 3 seconds

NOTE: After a large electrostatic discharge, the AMCheck may have to be restarted; this is a protection circuit ensuring the instrument is not damaged.

4.3. The opening screen



The first screen the user will see once the equipment is powered up is the splash screen. Following the splash screen one of two screens will be displayed. if a save slot has been set to be one of the 5 available Favourites, then a Welcome Screen is displayed. On the left there are three functions:

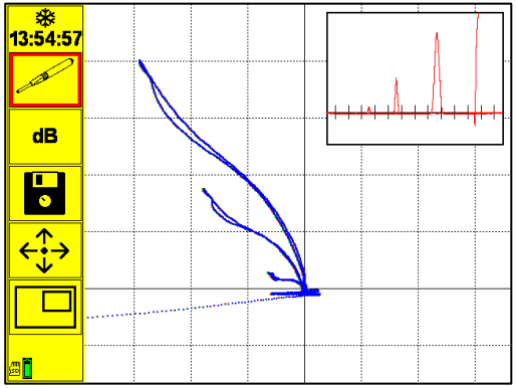
Previous Settings – instrument will return to the settings used last time the equipment powered down

Load Favourite – select from one of the favourites on the right of the screen

Load & Save – short cut directly to the Load & Save Menu

Guide – the instrument can display guides. This item will only appear if a favourite selected in the right pane has a guide associated with it e.g. along with the Default Favourite there is an associated Guide called EC Training which is a quick guide to operating the instrument.

If there are no favourites then the instrument goes straight to the real time operating screen.

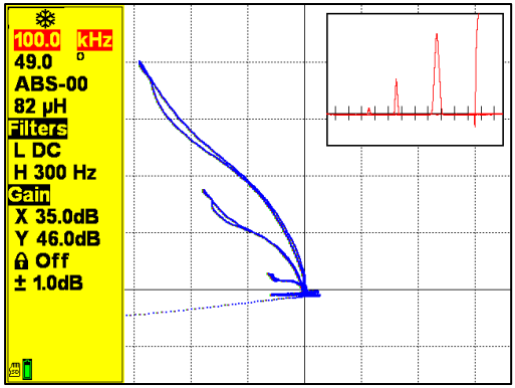


4.4. Real Time Operating Screen

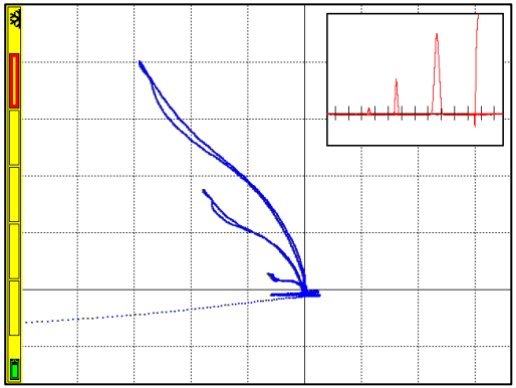
On the left on the side bar are 5 icons, 4 that are user programmable soft keys, plus the lower Icon is the last function used by the user from the Main Menu, or the alarm if the alarm is set active and not already present.

1) In the Operating screen pressing the right cursor key reveals the Quick Menu on the side bar. The Quick Menu provides a convenient, quick and simple way to make adjustments during a test. Use up down cursor keys to change the item selected and then press enter to adjust and up/down cursor keys now adjusts the parameter and enter.

2) One left press then returns to the Icon Side Bar.



3) A further Left cursor press shrinks the side bar as shown to the right. In this mode, all menu items are still usable. A further Right cursor press reveals the Icon Side Bar Again.



4) Pressing then Menu/Back Key reveals the main menu. Pressing the Menu/Back Key then returns to the Real Time display.

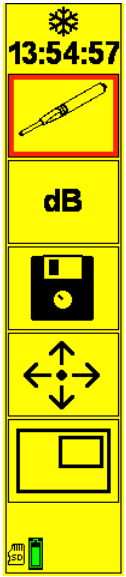
4.5. Switching the Instrument Off

Press the On/Off Enter key in the centre of the cursor keys for 3 seconds and release.

5. Operation

Once the Instrument has powered up then the Operating screen is displayed if no favourites are selected (otherwise see 3.3).

5.1. Operating screen

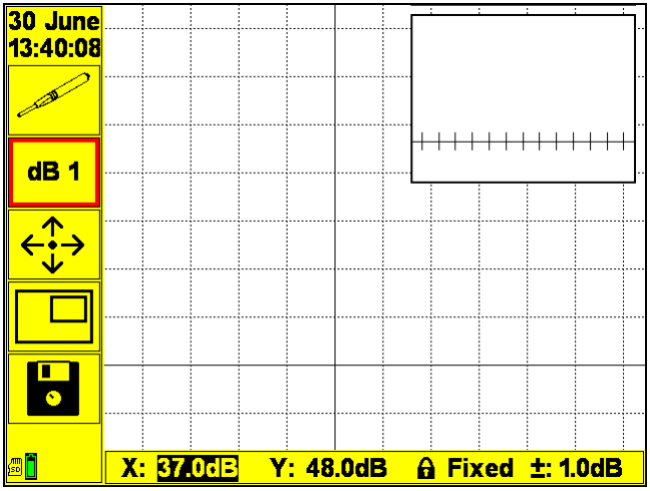


The Operating screen has to the left a Side Bar.
There is a Snowflake icon at the top of the Side Bar to indicate if the display is frozen (note a frozen display will not show live data). Usually the Date will be visible here. To unfreeze a short press on the freeze button and a long press clears the screen. The time is shown below.

The top four icons are user programmable. See 5.2.1 for how to programme these icons.

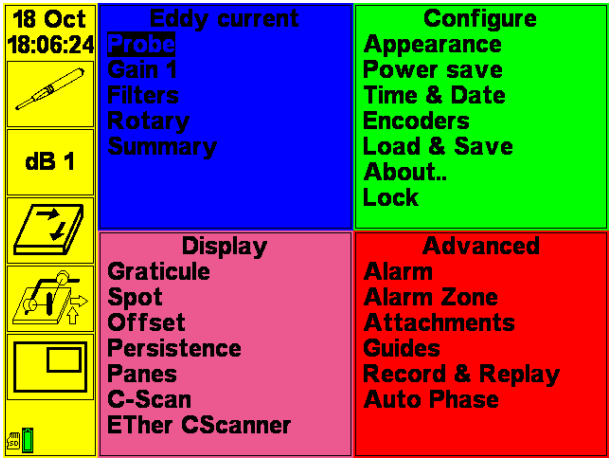
The Fifth Icon slot is automatically the last item used on the Menu if it is not already programmed as an Icon unless the alarm is in use.
SD card present Icon, Battery Level (or a lightning icon indicates that external power is present) and a Spinning Replay Icon shows that a replayed signal is being displayed.

Select an Icon and then press the Enter Key to display to display a summary menu at the bottom of the screen. Use the right left key to highlight an item and Cursor Up/Down to increase and decrease the item. Press the Menu/Back Key to exit the summary menu.

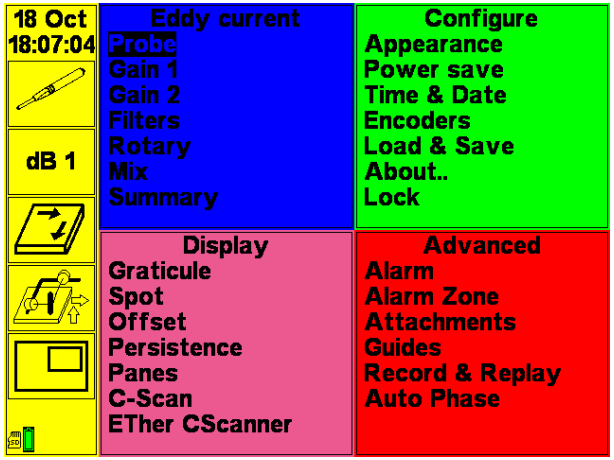

30 June
13:40:08
dB 1
X: 37.0dB
Y: 48.0dB
Fixed
±: 1.0dB

5.2. Main Menu

Press the Menu/Back Key to reveal the Main Menu. Depending on operation mode the screen may look different with Gain 2 and Mix only being available in Dual mode.



Dual Channel



Single Channel

The Menu is divided into several panes for ease of use. The Right/Left Cursor Keys select the pane and the up/down cursor key select individual items. Then press the Enter Key to select and the Menu/Back to leave the

item. Then press the Enter Key to adjust the parameter and the Enter to leave the parameter. Pressing the Menu/Back key again to return the user to the Operating screen.

5.2.1. Side Bar Programming Pane

Programming of the Side Bar icons is done in the Menu Screen. To remove one of the top 4 icons, select the unneeded icon and perform a long press (3 seconds) on the Back/Menu Key.

To add a Menu Item, there needs to be an empty icon slot, select the item on the Menu and then perform a long press (3 seconds) on the Back/Menu Key.

The 5th slot is always the last Menu Item that was viewed, assuming that this is not already one of the top 4 or the alarm is activated.

5.2.2. Eddy Current Pane

Parameters that can be adjusted are;

5.2.2.1. Probe

- Mode – When changing the mode, the irrelevant parameters within the table will be hidden and the relevant parameters displayed in the most suitable location.
    - Single Probe Single Freq – One probe in the Lemo-12 way running at one frequency.
    - Single Probe Dual Freq - One probe in the Lemo-12 way running at two frequencies.
    - Dual Probe – 2 Probes, each running at their own frequency, the same or different.
- Freq : adjustable from 20Hz-20MHz (12MHz in Dual mode)
- Phase: Adjustable from 0.0-359.9 degrees with 0.1 degree precision
- Type: Sets how the probe is connected. The Type under Probe 1 refers to the probe connected to the Lemo 12-Way, Probe 2 is the Lemo 4-Way.
    - Probe 1 Types:
        a. Absolute-12
        b. Bridge

    c. Reflection
    d. Rotary
  - Probe 2 Types (if Probe 1 is NOT in Rotary):
    a. Bridge
    b. Reflection
- Load: Used to match a single element absolute probe in the Lemo 12-way. Settable from Auto and from values in the range of 2.2uH-82uH in 15 increments.

To use the Auto Load selection feature; Select the Probe Menu Item Load and then change the value to Auto. Then set one of the Soft keys (long press) to Balance Load. With the probe required connected and preferably in contact with the test surface then Press the assigned key momentarily to perform Auto Balance Load selection.

5.2.2.2. Gain 1

Channel 1 gain parameters;

- Gain X: Horizontal gain in dB -18 to + 82 dB Range Settable to 0.1dB resolution.
- Gain Y: Vertical gain in dB -18 to + 82 dB Range Settable to 0.1dB resolution.
- Gain Lock: which may be set off (X and Y Gain are individually adjustable), Y=X; both gain values are equal and Fixed: where the dB ratio between the X/Y values is kept a constant difference (and hence the X/Y signal ratio remains constant).
- Increment: Sets the gain adjustment precision to either 0.1, 1 or 6dB
- Drive: Set the drive level at 0, 6 or 10dB

- Input Gain: sets the input Gain 0 or 12 dB

5.2.2.3. Gain 2

Only visible when in Dual mode. Channel 2 gain parameters;

- Gain X: Horizontal gain in dB -18 to + 82 dB Range Settable to 0.1dB resolution.
- Gain Y: Vertical gain in dB -18 to + 82 dB Range Settable to 0.1dB resolution.
- Gain Lock: which may be set of (X and Y Gain are individually adjustable), Y=X; both gain values are equal and Fixed: where the dB ratio between the X/Y values is kept a constant difference (and hence the X/Y signal ratio remains constant).
- Increment: Sets the adjustment precision to either 0.1, 1 or 6dB
- Drive: Set the drive level at 0, 6 or 10dB
- Input Gain: sets the input Gain 0 or 12 dB

5.2.2.4. Filters

There will be either 1 or 2 High and Low pass filters depending on whether in Dual or Single mode.

- High Pass: Settable from DC= Off, 6 slow balance drift compensation filters from 0.01 Hz to 0.5 Hz and then conventional filters from 1 -2000Hz. Used to reduce unwanted low frequency signals.
- Low Pass Filter: Settable from 5-2000Hz. Used to reduce unwanted high frequency noise. Default value for manual inspection is 300Hz.
- Filter Lock: Off = both filters may be adjusted separately and Ratio: where the filters stay a fixed ratio apart.
- Increment: Sets the precision of the adjustment adjustable from 0.10 to 100.

-

5.2.2.5. Rotary

Sets the required rotation speed for the drive.

- RPM: may be set from 600 – 3000 rpm in 100 rpm increments for ETher NDE Drive.
- Rotary: Set to match drive type. NB ETherNDE will operate Hocking/GE 33A100 with no adapter. Also options that require a special cable are Zetec (ALL12-L08-020M) and Rohmann (ALL12-F08-020METH). For the non-ETher drives the drive speed is expressed in %.

5.2.2.6. Mix

The mix channel is the output of the subtraction of Channel 2 from Channel 1. The parameters allow that signal to be adjusted as required.

- Phase: Mix Channel phase adjustable from 0.0-359.9 degrees with 0.1 degree precision
- Gain X: Horizontal gain in dB -18 to + 82 dB Range Settable to 0.1dB resolution.
- Gain Y: Vertical gain in dB -18 to + 82 dB Range Settable to 0.1dB resolution.
- Gain Lock: which may be set of (X and Y Gain are individually adjustable), Y=X; both gain values are equal and Fixed: where the dB ratio between the X/Y values is kept a constant difference (and hence the X/Y signal ratio remains constant).
- Increment: Sets the adjustment precision to either 0.1, 1 or 6dB

5.2.2.7. Summary

This item shows a single screen view of all the instruments current settings.

5.2.3. Configure Pane

5.2.3.1. Appearance

- Backlight: 10-100% lower backlight setting gives substantially longer battery life.
- Scheme: Bright = Good for outdoor use, Dark=Good for indoor use and Black & White
- Font: Bold or Italic Text
- Screen Flip: Right Handed, Left Handed or Auto (uses internal sensor to set orientation)
- Language: Selectable from English, French, Spanish, Italian, Portuguese, Russian, Japanese, Chinese, Turkish, Czech, and Norwegian.

5.2.3.2. Power Save

- Auto Power Off: Off, 5-60 mins.
- Auto Screen Dim: Off, 5-60 mins

5.2.3.3. Time and Date

- Time/Date- adjust as per other parameters
- Format- Allows selection of date format from DD/MM/YY, MM/DD/YY or DD Mm

5.2.3.4. Load & Save.

Select this function by highlighting the item and pressing enter.

The main screen shows the saved settings (each blue square represents a save attachment). Use the up down cursor keys to change which saved setting is highlighted (red box) and press Enter to see a brief summary of the settings and Enter a second time to Load.

The functions of the icons are as follows;

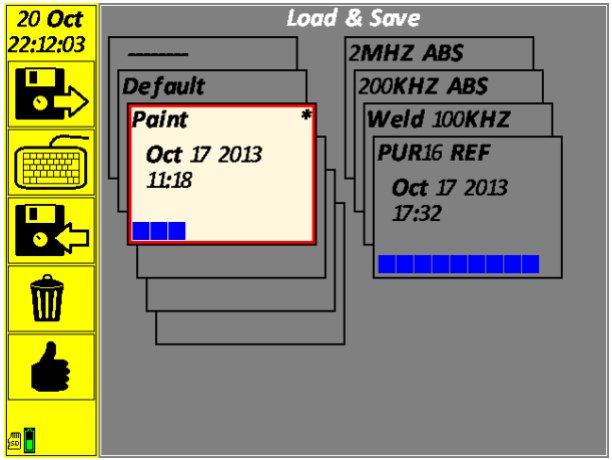
Recall from memory

Rename setting slot

Save current settings to memory slot

Delete current settings slot

Make current Settings slot a favourite. Up to five settings may be set as favourites.



To create a new setting select the empty setting (with no name) and press enter.

A setting that has been selected as a favourite has an asterisk (*) in the top right hand corner. Favourite settings will appear on the opening screen and provide a convenient way of quickly using the most commonly used settings.

If no favourites are set then the instrument when powered up will start up in the Operating screen and use the last settings used.

The blue squares on the Setting Item indicate that there are screen shots associated with this setting. Red squares indicate that there are data recordings.

5.2.3.5. About

Important information about the instrument, including: Firmware Version, Current Slot, Manufactured Date and Instrument ID

5.2.3.6. Lock

The AMCheck has the ability to restrict access to any menu item. Any menu item that has a picture of a Padlock after its name is locked.

This means that its value can be read but not adjusted.
Some menu items such as Load/Save can still be entered but if locked then files can only be loaded and not saved or deleted.

Locking and Unlocking Process

Entering Lock Mode - First, to change the locked status of a Menu Item the instrument must be in LOCK mode. To enter this mode first select the Menu Item LOCK within the CONFIGURE Menu Group. The user will now be prompted to enter the LOCK code. This code is entered by using the **U**p, **D**own, **L**eft, **R**ight keys. By default the code **is L, L, U, D, L**. Once entered correctly the Lock Menu will display the instructions to Lock and Unlock Menu items, which are repeated below.

Locking/Unlocking - Once in Lock Mode the Lock status of a Menu Item is toggled by highlighting the Menu Item and then holding down the Menu/Back key. Once the desired Menu Items have been set the machine must be rebooted to leave Lock Mode.

5.2.4. Display Pane

5.2.4.1. Graticule

Settings for the display graticule for pane 1 and pane 2

- Type: None, Grid, Polar, Timebase or Meter (context sensitive).
- Size: 5 – 50 % in 5%

5.2.4.2. Spot

Settings for how the spot is drawn to the screen in Pane 1 and Pane 2

- Size: To enhance the spot visibility choice of 1x1, 2x2 or 3x3 pixels
- Colour: Sets spot colour
- Co-ordinates: Displays numeric position of spot None, X,Y or Theta,R

5.2.4.3. Offset

Offset: Spot position offset for pane 1 and 2 in %. 0% is the middle of the screen. E.g. to move the centre towards the top right, X and Y will both be positive. To move the spot to the bottom left corner, both will be negative.

5.2.4.4. Persistence

Persistence and Time-base settings for Pane 1 and Pane 2

- Persistence – Time in Seconds that a point is visible in X-Y mode. Available values start at 0.1s and go up to 20s then OFF. When OFF, data is drawn but never erased from the screen.
- Sweep – Time taken for a single sweep across the screen in Timebase mode. Available values start at 0.1s and go up to 20s.
- TB Sweeps – Number of continuous Sweeps that are visible before being removed in Timebase mode.
- Steps – The number of Steps that are visible in Waterfall mode.

5.2.4.5. Panes

Each Pane can have different Sources and Different type

- Pane 1: XY, Time-base, Waterfall and Meter with peak hold and percentage.
    - Source = Ch1, Ch2 or Mix with two sources possible
- Pane 2: Off, XY, Time-base, Waterfall and Meter with peak hold and percentage
    - Source = None, Ch1, Ch2 or Mix with only one source possible. Note: If Pane 1 has two sources then Pane 2 cannot be on.
    - Size: Size 5-50%
      Note: 50% = Equal sized left and right displays
    - Location: Up/Down to move Pane 2 position. Selectable from Top right, Bottom Right, Bottom Left, Top Left.

5.2.4.6. C-Scan

The C-Scan menu allows all aspects of the C-Scan, including the Encoders, to be configured. This menu item is covered in detail in the C-Scan section of this manual.

5.2.4.7. ETHER C-Scanner

This menu permits control of an externally connected motorised scanner and is covered in more detail in the C-Scan section.

5.2.5. Advanced Pane

The advanced pane is where all the special functions of the instrument are located.

5.2.5.1. Alarm

Alarm: Audio and Visual Alarm

- Source:
  - 1&2 – Acts on both channels with alarm output logically OR ed
  - 1- channel 1
  - 2- channel 2
  - Mix- mix channel
- Action: Audio Alarm, Freeze, Audio Alarm and Freeze, LED only (no freeze or audio)

- Stretch: Time alarm stays on after activation from 500ms to 10s.

5.2.5.2. Alarm Zones

- Type: Off, Sector, Box

If Sector then;

- Inner
- Outer
- Start
- Stop

If Box then;

- Top
- Bottom
- Left
- Right

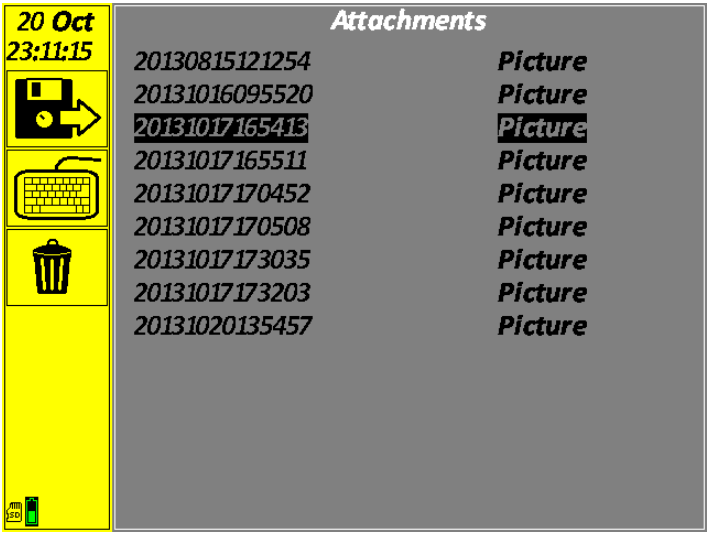
5.2.5.3. Attachments

Attachments are either screen shots (Picture) or recordings. By default a screenshots file name is a date and time stamp with the date in reverse numerical order, this ensures that files are displayed in chronological order.

Load selected screen shot or recording

Rename selected attachment

Delete selected screenshot or recording

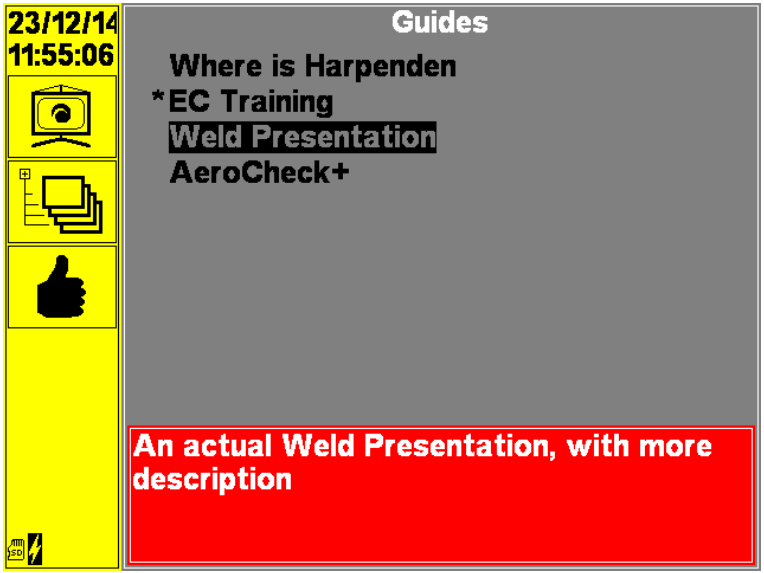


Note: Screen shots and Recordings are saved to the SD card in order to appear on the Attachments Menu they must be saved with the setting they are associated with.

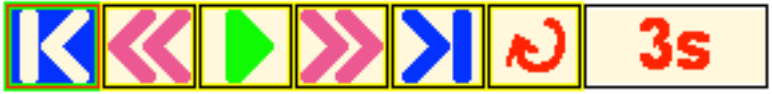
To return to the Operating screen after recalling a screen shot press any key.

5.2.5.4. Guide Tool

The Guide Tool allows presentations uploaded to the instrument using EThER Realtime Software to be viewed on the instrument whilst performing an inspection.
Once entering the Guide Tool a menu showing all the available guides is shown. The Asterisk (*) denotes that this is the previously selected favourite for the currently recalled settings. Up/Down cursor keys highlight different guides. Pressing OK will show a description in the red box at the bottom of the screen.
Select this Icon and press OK to display the guide as a slide show.
Select this Icon and press OK if you need to display individual files in the Guide.
Use this icon to make the currently highlighted Guide a favourite.



When a Guide is being displayed pressing OK will make the control bar appear.
Use the left/right cursor to highlight an icon and then press OK to activate.



 Select the play icon to begin guide play back.

 The symbol will then toggle to the pause play back.

Whilst a recording is playing there are several functions that can be used to view the recording.

 = Return to start

 = Advance one slide (same as right cursor key)

 = Go back one slide (same as left cursor key)

 = Go to end

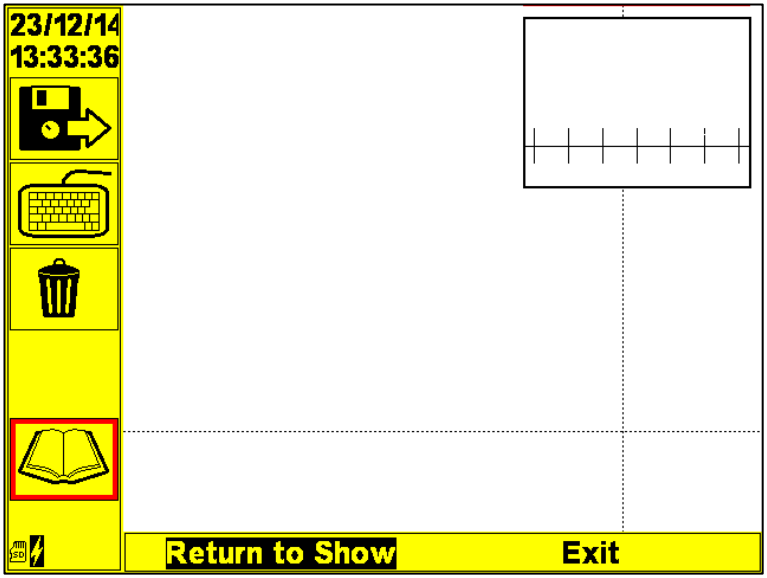
 = Exit Guide temporarily

To exit a Guide permanently press the Back/Menu Key.

= Select and then cursor up/Down alters duration between each slide in a guide being displayed.

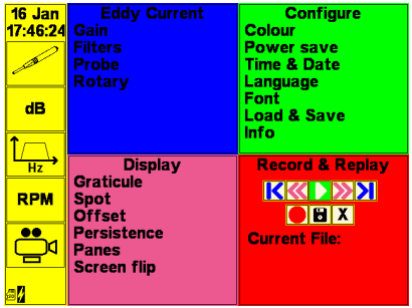
If a Guide is exited temporarily then the Guide Icon appears in the Menu Side Bar.

Selecting the Guide Icon (Book) then causes a lower tool bar to appear that gives the option of returning to the Show or Exiting the Show.



5.2.5.5. Record & Replay Function

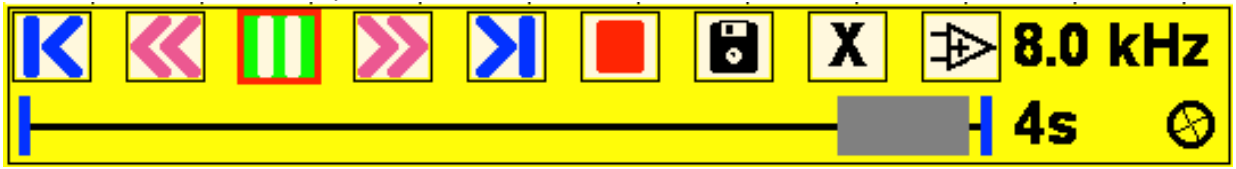
The Record & Replay Function allows data to be captured for up to 150s. This data may then be saved on the instrument, replayed either on the instrument or transferred to a PC and analysed using the utility ETherAnalyser. Captured data can be analysed in greater detail by zooming in on the collected data and also a recording can be used to optimise the equipment settings such as Filter, Gain and Phase in a consistent matter.



1. To use this sequence first place the Record & Replay Icon on the Side Bar (see 5.2.1)

2. Then return to the operating screen and select the Record & Replay  Icon (camera).

3. A special tool bar will be displayed at the bottom of the screen. Top right is the data sample rate used for the data recording. During the recording a grey cursor moves across the screen and the time display on the right is updated. The Grey cursor width indicates the time duration of the on screen persistence). The activity symbol (lower right) is animated to indicate activity.



4. Using the cursor keys and the Enter Key select the item required. A red box surrounds the symbol selected.


The Record Item Symbol toggles between the record state and the stop state. Select to record (note when selected the Icon Colours Reverse to denote the symbol is selected.


When the symbol is selected it changes to the Stop Symbol and the recording continues until is selected again. Should the recording length be exceeded the recording is always of the last 150 seconds.


Select the play icon to begin data replay.

 The symbol will then toggle to the pause symbol.

Whilst a recording is playing there are several functions that can be used to view the recording.

 = Return to start

 = Slow down replay

 = Speed up replay

 = Fast Forward to end

You can also leave the recording function using the Back Key and the recording will continue running. This then allows settings to be altered and the result viewed. This can be useful when calibrating a rotary probe setup or other dynamic tests. To return to the Record & Replay function then select the Record & Replay Icon.

To zoom in on a specific part of the recording move the blue cursor bars at each end of the recording. Press the down cursor key and the left or right to select a cursor. The selected cursor turns red when selected. Then press the Enter key and the cursor turns green. Use the left and right keys to move the cursor. The display on the right shows the cursor position in time. When in the correct position press the Enter key again and the colour of the highlighted cursor changes from green to red. Use the cursor keys to move the selection focus to the required cursor. Then press Enter and use the Left and Right cursor keys to select the other cursor.

 = Save recording. The User is prompted for a file name. Saved record may be replayed at any time by loading the item in the Attachments function see 5.2.5.3 Recordings are saved to the SD card in order to appear on the Attachments Menu they must be saved with the setting they are associated with.

 = Exit Record & Replay Function and return to the Operating screen.

 = Auto mix function. Record a signal to suppress and press the centre enter key for the instrument to automatically derive the optimal mixing coefficients.

5.2.5.6. Auto Phase

This provides an automatic means of setting the phase in any required orientation.

- Angle: the required angle measured from the usual 9 o'clock lift off position as zero degrees and then rotating clockwise.
- Radius: Sets the threshold crossing for the phase setting to be triggered at.
- Set one of the user programmable soft keys to activate this function.

6. Setting the AMCheck to perform an inspection

6.1. With a configuration file

If you have a configuration file for the probe, load the setting file as described in section 5.4. It is a recommended practice to validate that the settings loaded by the software are correct for the probe type. To do so press MENU, go on the Probe and Frequency tab, and verify the settings. Then following this ensure that the response from the calibration reference standard is as per the procedure the inspection is being performed to. Press MENU when finished.

6.2. With no configuration files

1. First press the MENU,
2. Set the gain to about 40 dB. Make sure the Gain Lock is set do Y=X.
3. Set the Probe; set the Type. Load and Frequency as required.
4. Set the filters for manual inspection as High Pass = DC and Low Pass = 300Hz
5. Set the display type you require to use with the Display configuration.
6. Adjust the gain and phase to obtain the response required by the inspection procedure.

7.1. Sample application setup

By default the instrument has a number of factory settings.

These may be reviewed in the Load & Save function

- 2MHz Absolute – using the Lemo 00 for Surface defect detection
- 200kHz Absolute – using the Lemo 00 for Surface defect detection
- 500kHz Absolute – using the Lemo 12 way for Surface defect detection
- PUR16 Reflection – Low Frequency 10kHz for sub-surface testing on non-ferrous material
- Rotary – 500kHz setting for Rotary Inspection of Holes
- Weld – 100kHz setting for weld inspection
- Paint – 100kHz using Lemo 00 for paint coating assessment as in Weld Inspection
- Weld Dual Probe - 100kHz settings for Weld and Paint Inspection
- ID Probe-Mix -21kHz and 18kHz ID Tube inspection mix

The above settings may be used as a starting point for a wide range of inspections using.

7.1.1. High Frequency Surface Inspection

These notes are offered as a guide to help carry out a test for surface inspection using High Frequency Eddy Currents. There are three high frequency surface inspection tests on the instrument;

- 2MHz Absolute – using the Lemo 00
- 200kHz Absolute – using the Lemo 00
- 500kHz Absolute – using the Lemo 12 way

7.1.1.1. Equipment Required:

Probes and cables;

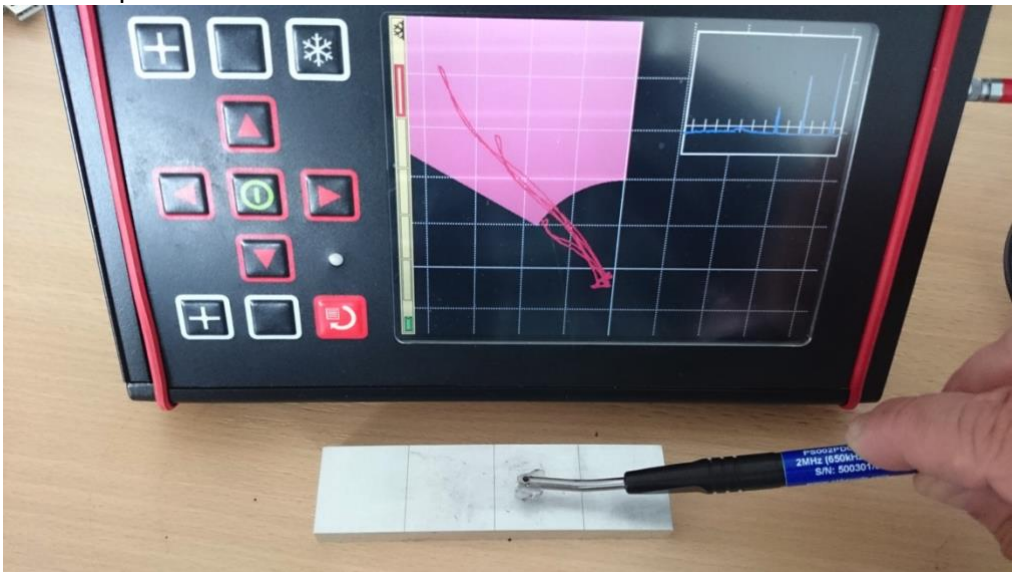
- 200kHz Absolute - PS200PD064-114N and Lead, Lemo 00 to Microdot - ALLCX-M02-015A
- 500kHz Absolute – PS500PC195-114N and Lead, Lemo 12-Way to Microdot – ALL12-M02-015A
- 2MHz Absolute – PS002PS066-152N and Lead, Lemo 00 to Microdot - ALLCX-M02-015A

Test Blocks;

- Aluminium 7075-T6 with 3 slots 0.2, 0.5, 1.0mm – ATBA
- Titanium with 3 slots 0.2, 0.5, 1.0mm – ATBT
- Stainless Steel with 3 slots 0.2, 0.5, 1.0mm – ATBS
- Ferrous Steel (EN1A) with 3 slots 0.2, 0.5, 1.0mm – ATBF
- Magnesium with 3 slots 0.2, 0.5, 1.0mm – ATBM
- Steel with 3 slots 0.5, 1.0, 2.0mm and 4 off 0.5 mm shims (Weld Inspection)- ATBW

7.1.1.2. Setup:

1. Connect probe to cable and connect to the instrument.

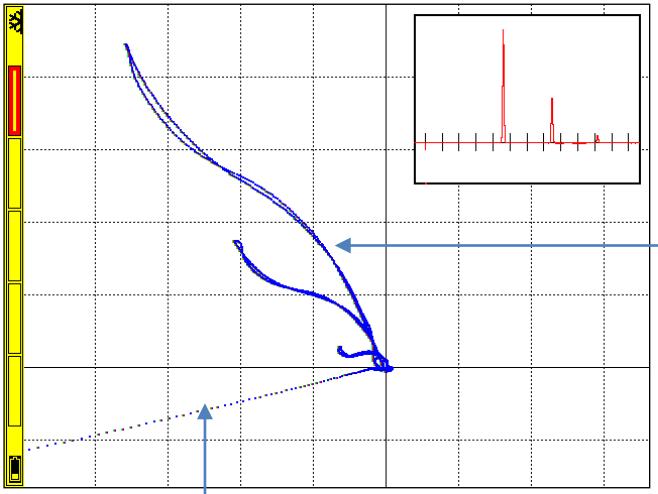


2. Switch instrument on.
3. Press Menu.
4. Use the cursors to scroll the menu until Load & Save is highlighted, press Enter key. Use the up down cursor to select Required Setup, select the load icon and press Enter

5. The main Operating screen will appear as soon as the setup has been recalled.
6. Place the probe on the Reference Standard (away from EDM notches) normal (90°) to the surface
7. First set the load using the Auto Load Option in the Probe Menu and assign one of the soft keys (see 2.3.2)
8. Then carry out Balance/Lift off function setting Auto Phase under advanced at 0 degrees and radius 50%. Then assign the other soft key to Auto Phase.
9. Scan the probe over the 0.5 mm EDM notch and note signal response.
10. If more or less sensitivity is required, use the Gain (dB key) or Quick-Menu to increase or decrease signal amplitude as required.
11. Adjust the phase to set the lift off horizontal by either using the Auto Phase Key (assigned above) or Probe Phase Item or the Quick-Menu Phase Item.
12. Carry out scan of the component.

Note:

1. If you use a different Frequency probe remember to adjust Frequency setting on the instrument to match the probe. The balance load will also need to be set to match the probe see 5.2.2.1
2. Where possible always use a Reference Standard, which is a similar material to that which is to be inspected.
3. Always try and keep the probe normal (90°) to the surface of inspection, especially if scanning in a radius.



Three Notch
Responses

Lift off

7.1.2. Low Frequency Sub-Surface Inspection

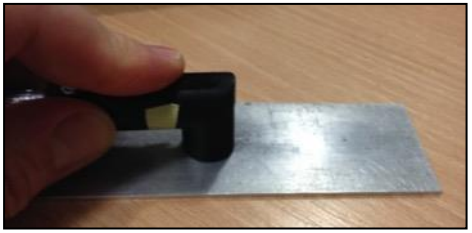
These notes are offered as a guide to help carry out a test for low frequency sub-surface inspection using Low Frequency Eddy Currents.

7.1.2.1. Equipment Required:

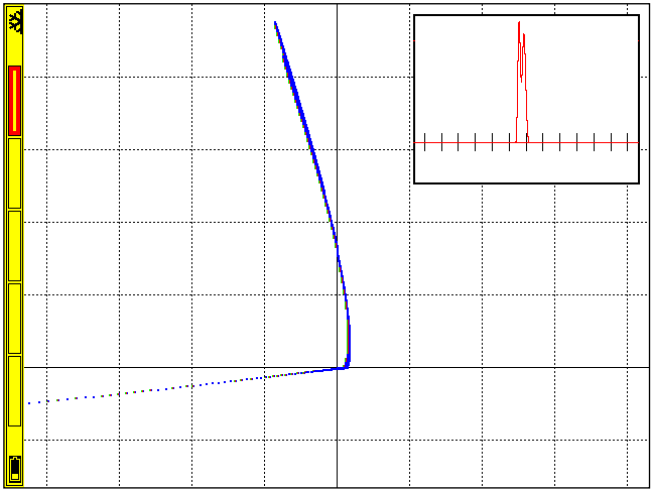
Probes = 300Hz – 100kHz Reflection Probe – PUR16
Cable = Lead, Lemo 12-Way to Lemo 4-Way Reflection Type – ALL12-L04-015R
Test Piece = Aluminium Thin Plate – ATB001

7.1.2.2. Setup:

1. Connect probe to cable and connect to the instrument.
2. Switch instrument on.
3. Use the cursors to scroll the menu until Load & Save is highlighted, press Enter key. Use the up down cursor to select PUR16 REF, select the load icon and press Enter
4. The main Operating screen will appear as soon as the setup has been recalled.
5. Place the probe on the Reference Standard with the flat-bottomed holes facing downwards.



6. Then carry out Balance/Lift off function setting Auto Phase under advanced at 0 degrees and radius 50%. Then assign the other soft key.
7. Scan the probe over the defects and note signal response.
8. If more or less sensitivity is required, use the Gain (dB key) or Quick-Menu to increase or decrease signal amplitude as required.
9. Adjust the phase to set the lift off horizontal by either using the Probe Phase Item or the Quick-Menu
10. Carry out scan of component.



Note:

1. Use your finger as a guide along the edge of the test piece. This will help maintain the same probe to edge distance.
2. Always try and keep the probe normal (90°) to the surface of inspection.

7.1.3. Rotary Setting

These notes are offered as a guide to help carry out a hole inspection using a rotary drive.

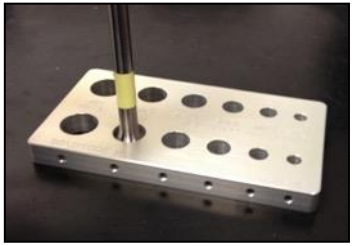
7.1.3.1. Equipment Required

Lead, Lemo 12-Way to Lemo 12-Way – ALL12-L12-020M
Rotating Drive – ARD002
Rotating Probe – PRR1111-065
Aluminium Hole Test Block - ATB005

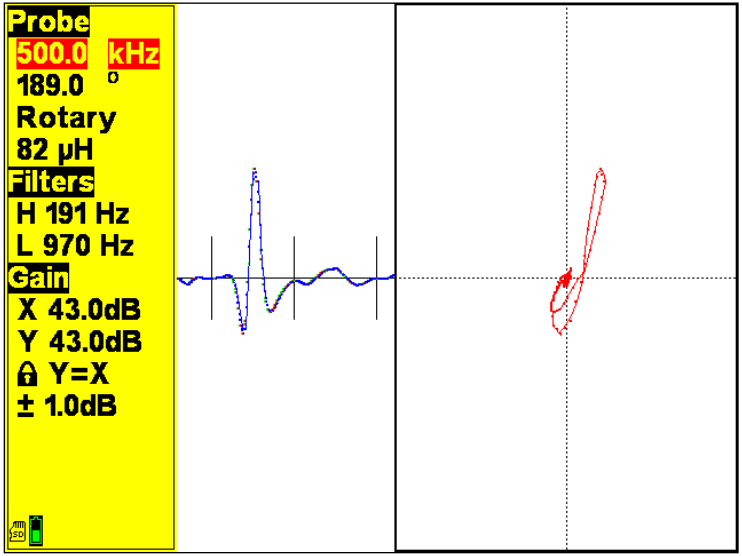
7.1.3.2. Setup

1. Connect probe to cable and connect to the instrument.
2. Switch instrument on.
3. Use the cursors to scroll the menu until Load & Save is highlighted, press Enter key. Use the up down cursor to select ROTARY, select the load icon and press Enter

4. The main Operating screen will appear as soon as the setup has been recalled.
5. Press Balance
6. Start the drive rotating by pressing the key on the drive.
7. Pass the probe through the hole with the defect.
8. If more or less sensitivity is required, use the Gain (dB key) or Quick-Menu to increase or decrease signal amplitude as required.



9. Adjust the phase to set the defect signal vertical by either using the Probe Phase Item or the Quick-Menu
10. Adjust the High and Low Pass filters to get the appropriate signal.
11. Carry out scan of component.


Probe
500.0 kHz
189.0 °
Rotary
82 µH
Filters
H 191 Hz
L 970 Hz
Gain
X 43.0dB
Y 43.0dB
Y=X
± 1.0dB

7.1.4. Weld Probe Single Setting

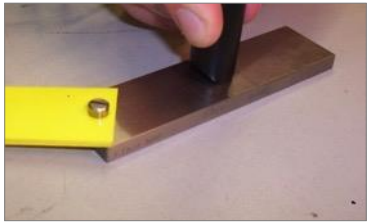
These notes are offered as a guide to help carry out a Weld Probe Inspection.

7.1.4.1. Equipment Required

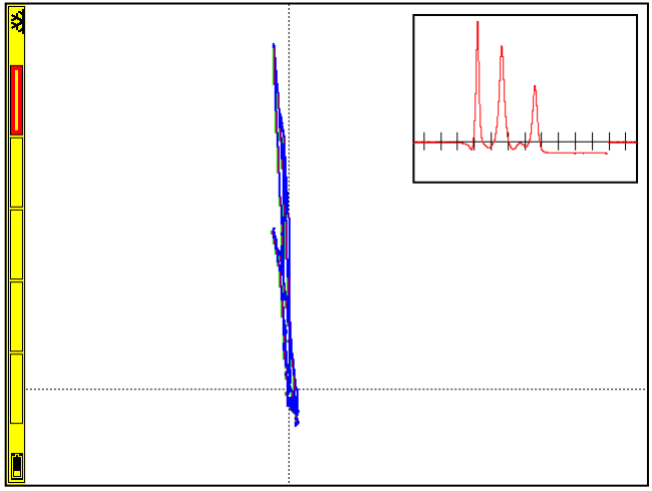
Lead, Lemo 12-Way to Lemo 4-Way Bridge Type – ALL12-L04-015B
100kHz Weld Probe Bridge – PWM100S000
Steel Test Block with 3 slots 0.5, 1.0, 2.0mm and 4 - 0.5 mm shims - ATBW

7.1.4.2. Setup

1. Connect probe to cable and connect to the instrument.
2. Switch instrument on.
3. Use the cursors to scroll the menu until Load & Save is highlighted, press Enter key. Use the up down cursor to select Weld 100kHz, select the load icon and press Enter
4. The main Operating screen will appear as soon as the setup has been recalled.
5. Place the probe on the test block and Press Balance
6. Move the probe over the defects.
7. If more or less sensitivity is required, use the Gain (dB key) or Quick-Menu to increase or decrease signal amplitude as required.



8. Adjust the phase to set the defect signal vertical by either using the Probe Phase Item or the Quick-Menu
9. Carry out scan of component.



7.1.5. Paint Probe (Weld Setting)

These notes are offered as a guide to help carry out a dual channel Weld Probe Inspection.

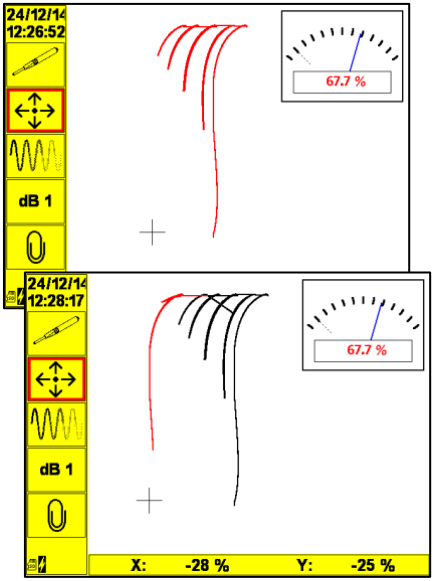
7.1.5.1. Equipment Required

Probe, Unshielded, Broad Band, 100k - PUB100K
Accessory, Lead. Lemo 00 to BNC, 1.5m - ALLCX-B02-015A
Steel Test Block with 3 slots 0.5, 1.0, 2.0mm and 4 - 0.5 mm shims - ATBW

7.1.5.2. Setup

1. Connect probe to cable and connect to the instrument.
2. Switch instrument on.

3. Use the cursors to scroll the menu until Load & Save is highlighted, press Enter key. Use the up down cursor to select PAINT WELD, select the load icon and press Enter
4. The main Operating screen will appear as soon as the setup has been recalled.
5. Place the probe on the test block and Press Balance
6. Select the offset Icon on the front panel.
7. Adjust gain and phase as required to set the lift off vertical by either using the Probe Phase Item or the Quick-Menu
8. Then moving the X Offset create the trace for the 4 shims
9. Set Trace function on and store trace (this gives a black version of the image) to enable easy comparison.



7.1.6. Weld Inspection with two probes

These notes are offered as a guide to help carry out a dual channel Weld Probe Inspection using 2 probes. This allows the operator to set the instrument for Weld Inspection

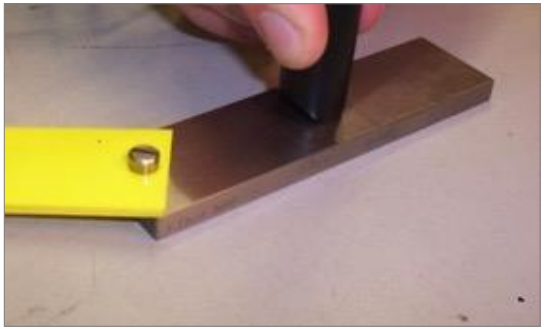
7.1.6.1. Equipment Required

Lead, Lemo 12-Way to Lemo 4-Way Bridge Type – ALL12-L04-015B
100kHz Weld Probe Bridge – PWM100S000
Probe, Unshielded, Broad Band, 100k - PUB100K
Accessory, Lead. Lemo 00 to BNC, 1.5m - ALLCX-B02-015A
Steel Test Block with 3 slots 0.5, 1.0, 2.0mm and 4 - 0.5 mm shims - ATBW

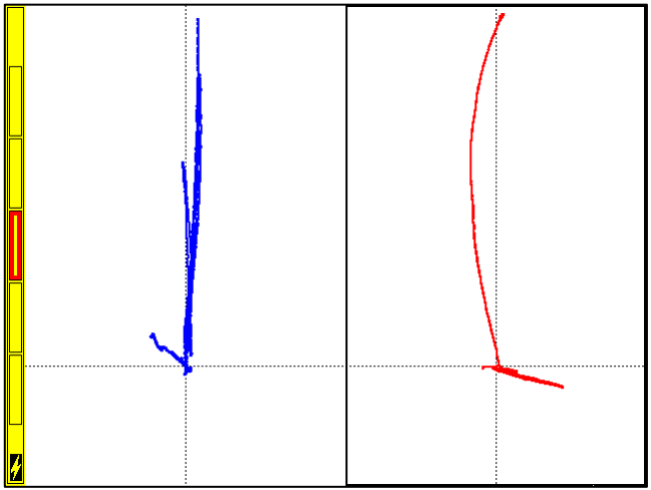
7.1.6.2. Setup

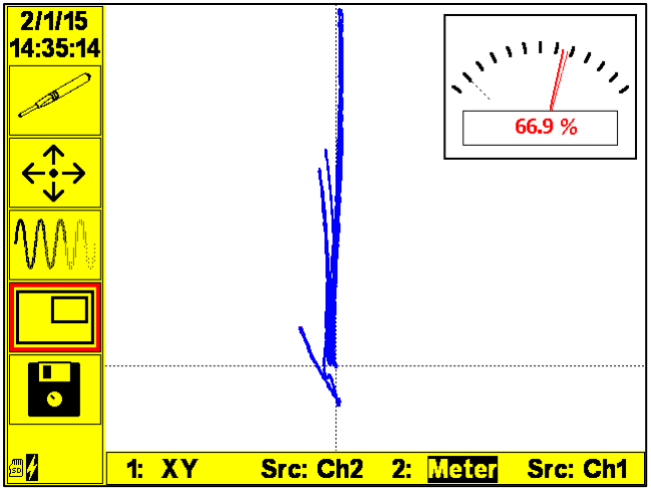
1. Connect probes to cable and then connect both to the instrument.
2. Switch instrument on.
3. Use the cursors to scroll the menu until Load & Save is highlighted, press Enter key. Use the up down cursor to select Weld Dual, select the load icon and press Enter
4. The main Operating screen will appear as soon as the setup has been recalled.

5. Place the probe on the test block and Press Balance
6. Move the probe over the defects.
7. If more or less sensitivity is required, use the Gain (dB key) or Quick-Menu to increase or decrease signal amplitude as required.
8. Adjust the phase to set the defect signal and lift off signal vertical by either using the Probe Phase Item or the Quick-Menu
9. Carry out scan of component. NOTE: Left pane shows differential channel 2 and right pane absolute channel 1.



10. Alternatively you may set the weld probe to be both Differential (normal flaw detection) and coating thickness assessment by changing the probe type to ABS&DIFF INTERNAL. NOTE: the load setting for the 100kHz WeldProbe to work in absolute is 12uH.
11. Further if more convenient Pane 2 can be set to Meter or Time and made to occupy a smaller part of the screen e.g. 30%




2/1/15
14:35:14
66.9 %
1: XY
Src: Ch2
2: Meter
Src: Ch1

7.1.7. Dual Frequency Mixing

7.1.7.1. Principle of mixing

The principle of dual frequency mixing is that that at different frequencies different signal indications (e.g. lift off and defect) have a different relative phase and amplitude response. By means of phase rotation and Gain change of the X Y signal components one of these indications can be manipulated to be nearly the same in phase and amplitude as the other and then by subtraction (mixing) the unwanted component is minimised giving an improved detection of the unwanted signal. Channel 1 is the primary channel and as such is not manipulated in the Auto Mix process whereas Channel 2 is the secondary channel. It is good practise for the secondary channel to be set so that it is relatively more sensitive to the unwanted signal then the wanted signal.
Although this example is for a low frequency mix this is equally applicable to other absolute probe mixes and the procedure and principles are widely applicable.
NOTE; mixing inevitably causes an increase in the electronic noise (grass).

7.1.7.1. Example of mixing

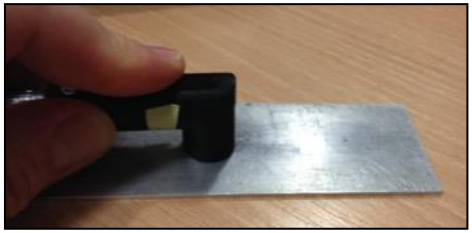
The conventional example of mixing is to use a non-ferrous tube and minimise the effect of a ferrous support ring however here we demonstrate mixing out lift off on a low frequency test. This test uses 5kHz on Channel 1 and 20kHz on Channel 2.

7.1.7.2. Equipment Required:

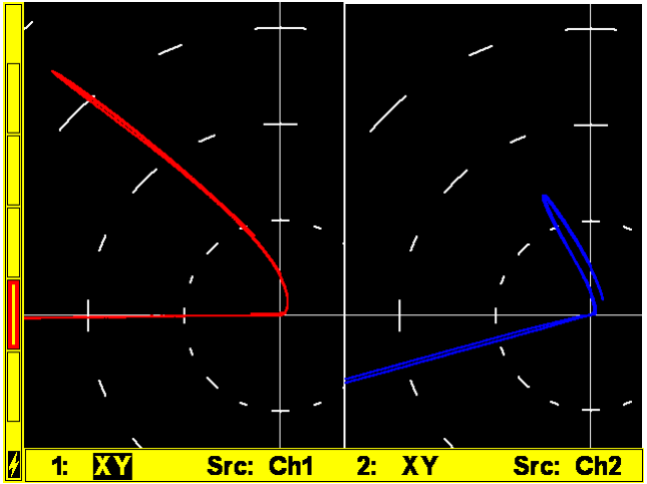
Probes = 300Hz – 100kHz Reflection Probe – PUR16
Cable = Lead, Lemo 12-Way to Lemo 4-Way Reflection Type – ALL12-L04-015R
Test Piece = Aluminium Thin Plate – ATB001

7.1.7.3. Setup:

1. Connect probe to cable and connect to the instrument.
2. Switch instrument on.
3. Use the cursors to scroll the menu until Load & Save is highlighted, press Enter key. Use the up down cursor to select DUAL SPOT MIX, select the load icon and press Enter
4. The main Operating screen will appear as soon as the setup has been recalled.
5. Place the probe on the Reference Standard with the flat-bottomed holes facing downwards.
6. Then carry out Balance/Lift off function setting Auto Phase under advanced at 0 degrees and radius 50%. Then assign the other soft key.
7. Scan the probe over the defects and note signal response.
8. If more or less sensitivity is required, use the Gain (dB key) or Quick-Menu to increase or decrease signal amplitude as required.

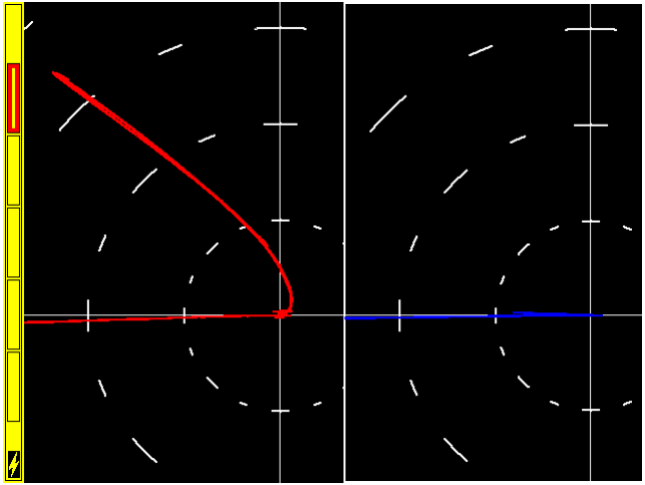


9. Set the panes to display channel 1 and channel 2 as shown.

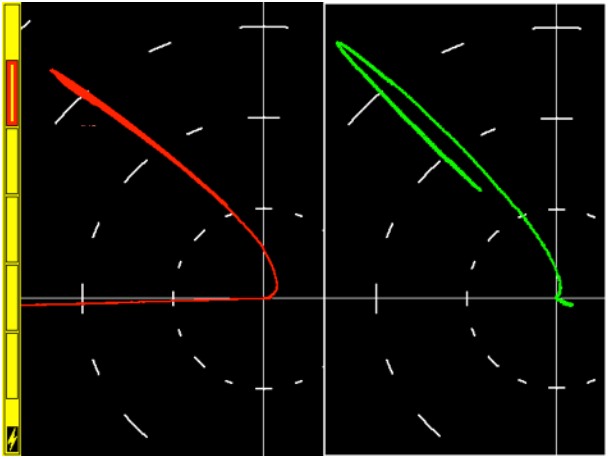


10. Repeat the setting for channel 2 so that the display looks similar to that above.
11. Now in the Record function record the lift off whilst gently rocking the probe. Press Stop to complete.
12. Then select the Auto Mix function 
13. Once the message “Auto Mix Complete” is displayed return to the operating screen by selecting Exit 

14. The display will now look like this



15. Now adjust the Pane setting to show the Mix channel in pane 2.
16. Adjust the Mix phase to set the signal as required by either using the Probe Phase Item or the Quick-Menu.



17. The mix is now complete

Note:

1. Use your finger as a guide along the edge of the test piece. This will help maintain the same probe to edge distance.
2. Always try and keep the probe normal (90°) to the surface of inspection.

7.1.8. Conductivity

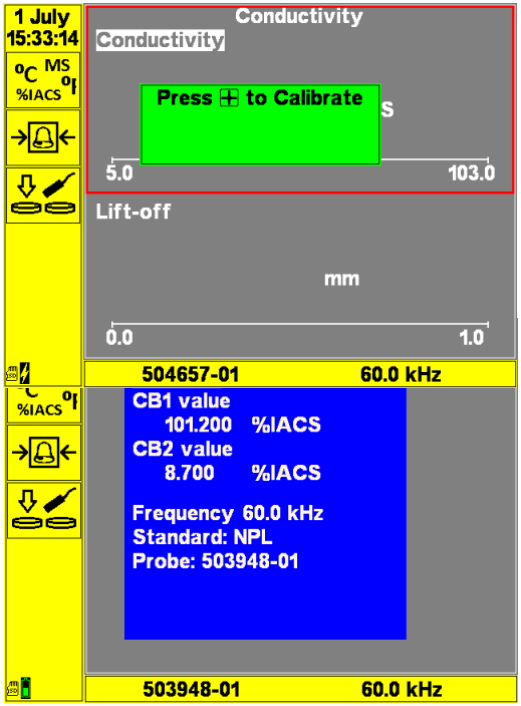
These notes are offered as a guide to help carry out a conductivity inspection using probe PCON001. The probe has an internal memory that stores the probe characteristics for calculating conductivity. Only one test frequency can be applied to a probe.

7.1.8.1. Equipment Required

Probe, Conductivity, 60kHz, Dia 13.00mm, Straight, Lemo 7-Way (AeroCheck Plus) – PCON001
Accessory, Lead, 12-Way Lemo to 7-Way Lemo, 0.7m, Conductivity – ALL12-L07-007-CON
Accessory, Dual Conductivity Reference Standard – ASIG010
REFERENCE HOLDER - Dual Conductivity Standard, (Thermal Bridge for Stability) - 40517

7.1.8.2. Setup:

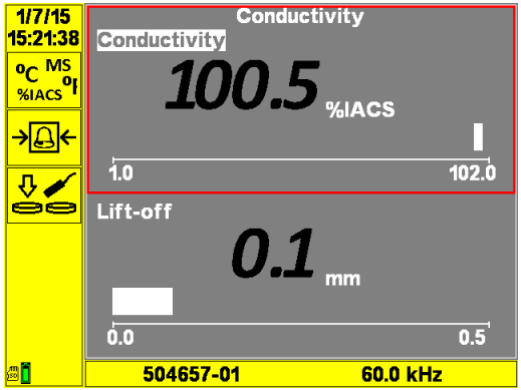
1. Switch instrument on.
2. Connect probe to cable and connect to the instrument.
3. Instrument will auto detect the probe and go into conductivity mode, as shown:



4. Press OK key to calibrate if the message box is shown, otherwise press left arrow and select the calibrate icon:  Scroll down and enter CB1 and CB2 %IACS values as shown on Dual Conductivity Reference Standard, press the back button, the unit will then go back to the main calibration screen.

5. Calibrate the probe by following the on screen prompts.

6. Once calibrated carry out measurement, example measurement shown:

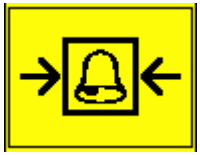


7. Disconnect the probe cable and the conductivity mode will exit and the instrument will return to its normal operation mode.

I. Additional Features

To Set display panes cursor right then up down to select pane to change then cursor right each key press changes display from Conductivity, Metal Sort, Minimum Thickness at measured conductivity and Lift Off/Non-conductive Coating thickness.

To set Units (both type and resolution) and Metal Sort select this icon with the cursor Key and press enter to open menu to set units display precision. Move up down left column to select Unit, Press Enter and then left right to select digit or item, up down to change and then enter to validate.



Sets the alarm range for both conductivity value and lift-off. First select the required display panes as the two displayed panes. Then select this icon with the cursor keys and press enter to select. The numeric value at the left end of the scale is highlighted press enter to edit the value. The Up Down Cursor Keys edit a digit and left right change the digit selected. Press enter to confirm selection. Press the right cursor key to move the selected numeric value and repeat the above procedure for each value to be edited.

Press the Back Key to exit this function.

II. Tips for Accurate Measurements

Always ensure that Probe, Dual Reference and Material to be tested are at the same temperature.
Re-calibrate the instrument every 15 minutes. There is a visual warning that the calibration needs to be repeated.
Frequent calibration is the key to accurate measurement.
Try not to hold the face of the probe, dual reference or material to be tested in your in your as this will change the temperature.

III. Specification

Accuracy

0.5%-10% IACS better than +/- 0.05% IACS

10%-25% IACS better than +/- 0.25% IACS
25%-60% IACS better than +/-0.5% IACS
60%-110% IACS better than +/- 1% IACS
Lift off corrected to 1.0 mm
No temperature compensation
All Errors at 90% Confidence Level

Resolution

3 decimal points max
Auto resolution mode AutoS= Legacy Instrument, Auto= SigmaCheck.

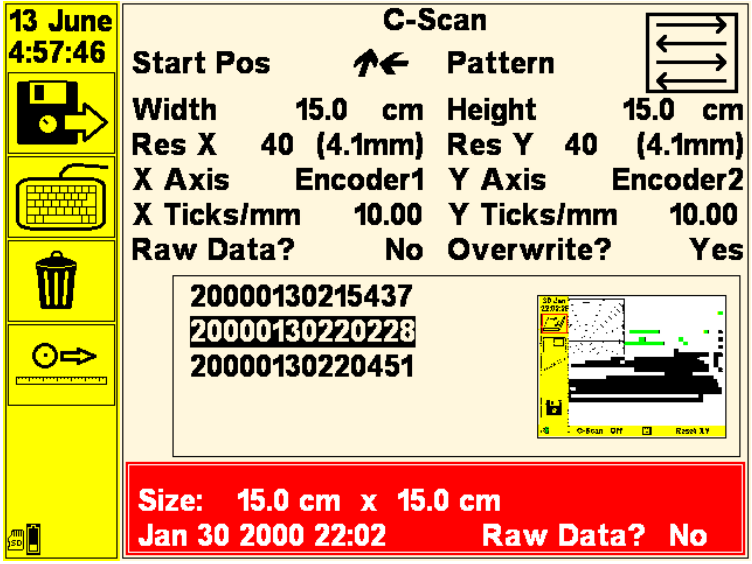
8. C-Scan

A C-Scan displays Eddy Current signals on a 2-Dimensional map of the area or item under test. The simplest example would be the flat (or close to) surface of an aircraft wing, where the C-Scan frame can be attached to the surface with suction cups. Another example is a scanning frame that magnetically attaches to the pipe, 1 encoded axis being longitudinal and the other, circumferential.

All of the Eddy Current data taken to create the C-Scan is stored in the internal memory of the instrument. If the combination of resolution, height, width and raw data results in there being insufficient memory then the text will change from BLACK to RED. Changing the aforementioned parameters will change the amount of memory required.

8.1. C-Scan Parameters

The C-Scan will convert the height of the Eddy Current signal to a colour. This colour will be plotted on the 2-Dimensional display at coordinates specified by the encoders. If two “real” encoders are not available then it is possible to simulate the movement with the press of one of the keys. The C-Scan menu allows the following parameters to be configured:



- Start Position.
- Pattern.
- Width
- Height
- Raw Data stored (Y or N)
- Overwrite (Y or N)
- For the X axis:
  - Resolution
  - Encoding source.
  - Ticks/mm
- For the Y axis:
  - Resolution
  - Encoding source.
  - Ticks/mm

8.1.1. Start Position:

Where on the 2 dimensional C-Scan window should the data be written before any movement, this is the starting position of the cross hair. When configuring the C-Scan it is often better to begin with it in the centre, once configured then it can be changed to where the real scan will begin.

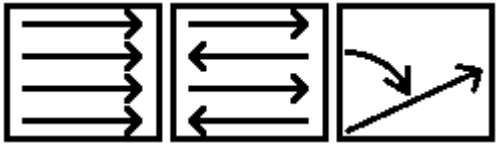
8.1.2. Pattern.

The Pattern controls 2 aspects of the C-Scan.

1. Whether the coordinates from the encoders represent Polar or Cartesian coordinates. (Radius-Theta or X-Y)
2. The behaviour if fewer than 2 encoders are present, of the axis NOT tied to an encoder.

The 3 icons (shown here) represent:

1. Cartesian, Left to Right scanning.
2. Cartesian, alternating Left to Right, Right to Left
3. Polar C-Scan.



If 2 encoders are being used (one for each axis), choose the Polar option if using a Polar scanner, else choose either of the other 2.

If using an XY scanner and an encoder is assigned to one axis then the behaviour of the other axis can be defined by the scan pattern. The pattern indicates what will happen to the non-encoded axis when it is increased by means of a button press (see below on how to assign a button to an axis), by reaching the end of the test piece, or by travelling backwards.
Left to right scanning would reset the encoded axis to the start and expect it to increase.
L to R, R to L scanning would leave the current encoded axis where it is and expect it to decrease.

8.1.3. Width

Inform the instrument the width of the item under test. This will affect the scaling of the image as it will be fitted to the instruments screen. A different value may be used here to change the way the C-Scan is scaled to the screen, but bear in mind that the values of encoder resolution etc may become invalid.

8.1.4. Height

Inform the instrument the height of the item under test. This will affect the scaling of the image as it will be fitted to the instruments screen. A different value may be used here to change the way the C-Scan is scaled to the screen, but bear in mind that the values of encoder resolution etc may become invalid.

8.1.5. Raw Data stored (Y or N)

For each data point that the AMCheck stores to generate the C-Scan we can choose to simply store the value that is used when generating the colour OR we can store the X-Y data and the colour. The benefit in only storing the

colour data is that the memory required is an 8th of that when storing the full data, or a 16th of that when storing 2 channels. If there is a shortage of memory (as indicated by the text going from BLACK to RED, changing this value may solve the issue).

8.1.6. Overwrite (Y or N)

When moving the probe over the test piece it is likely that at some point the same physical area will be scanned more than once. In this situation we have the option to either use the latest data (Overwrite) or to take the higher of the 2 values, which is to keep the value most likely to indicate a defect.

8.1.7. For the independent X and Y axis:

8.1.7.1. Resolution

A resolution of 1 will result in 1 Eddy Current value being stored for each tick of the encoder. With many encoders having as many as 10 ticks per mm but a probe diameter of (for example) 5mm, this is overkill and although a very detailed C-Scan would result, the instrument may well not have the required memory. In this instance, by setting the resolution to 50 would store 1 value per 5mm. Using a value of 10 would store 1 value per mm.
The value chosen here is a multiplier of the area covered by a single encoder tick. It reduces the memory requirement by the same amount.
If an encoder isn't being used for the axis, but instead a key press is configured, then it is recommended to set to the Resolution to 1 and set the Ticks/mm to the distance that the axis should move.

8.1.7.2. Encoding source.

Here we define what action results in the axis position changing. The options are:

- Encoder 1
- Encoder 2
- OK (Tick)
- Blank 1
- Blank 2
- DOWN
- UP
- Auto Out (on encoded axis reaching the end of the test piece, increase)
- Auto Back (when encoded axis changes direction, increase)

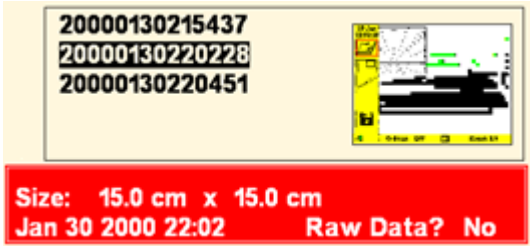
Encoder 1 & 2 relate to physical encoders connected to the AMCheck.
The options of OK (Tick), Blank 1, Blank 2, DOWN & UP refer to the keys on the AMCheck. Here, a simple press of the relevant key will increase the position on the axis.
Auto Out will automatically increase the axis position when the OTHER axis goes off the end of the C-Scan.
Auto Back will automatically increase the axis position when the OTHER axis changes direction.

8.1.7.3. Ticks/mm

When using an Encoder, this value is how many ticks are sent from the encoder when travelling 1mm. For coarse encoders it is possible to go as low as 0.01, or the equivalent of 1 tick for 100mm. See Encoder Training below for details on how to do this automatically.

8.1.8. List of Existing C-Scans

When a new C-Scan is saved from the Status Bar menu, a small thumbnail image is also generated.
All saved C-Scans within an existing save slot are displayed on the lower portion of the C-Scan menu page:



- There is a list of C-Scan names. Those shown are the auto-generated names. They can be renamed, see Rename below.
- The thumbnail of the highlighted C-Scan is displayed to the right.
- On the first OK press, A summary of the highlighted C-Scan is shown in the red box.
- Press OK for the 2nd time and the data will be reloaded and can be appended to.

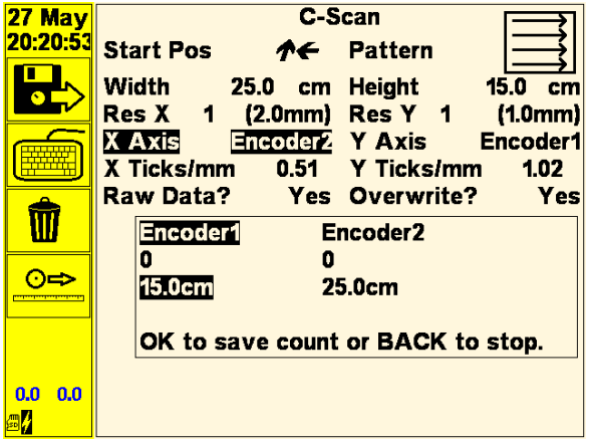
8.1.9. Quick Menu

The C-Scan menu has its own set of icons on the Quick Menu that can be used. These are:

- Open – Opens a highlighted C-Scan. The same as pressing OK twice on a highlighted C-Scan.
- Rename – Allows a highlighted C-Scan to be renamed.
- Delete – Deletes the highlighted C-Scan.
- Encoder Training – Opens the Encoder Training window , see below.

8.1.9.1. Encoder Training

Selecting the Encoder Training menu item will bring up the Encoder Training window on the lower part of the C-Scan window:

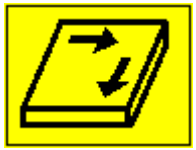


Below each encoder is a counter (both 0 in this example) and a distance. The distance is taken from which ever axis is set to use the respective Encoder.
The encoder that is to be trained should be moved through the distance shown, the encoder counter will increase or decrease accordingly. Once the distance has been moved, press OK and the highlighted Encoder will be updated. Use the LEFT & RIGHT keys to change which encoder is highlighted.

8.1.10. Status bar menu

Selecting the C-Scan Quick Menu item when in real time brings up the C-Scan status bar menu with the following options:

- C-Scan ON or OFF
- Save
- Reset XY



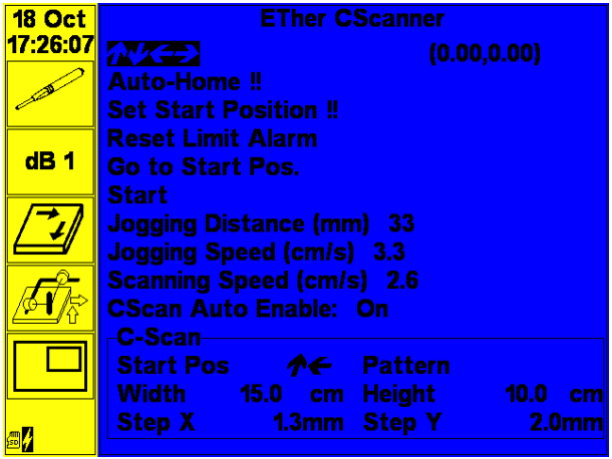
Placing new live data in to a C-Scan will only take place once C-Scans are turned ON using this menu. Selecting SAVE will save the C-Scan to the microSD card using a filename generated from the time and date. This can be renamed afterwards. Saved C-Scans can be recalled at a later date or be viewed on a PC using ETherRealTime.

Selecting Reset XY move the cross hair back to the Start Position as specified in the main C-Scan menu. This is often required just before a scan is initiated.

Another useful button that is frequently required when producing a C-Scan is the long press on the FREEZE key, this clears the screen.

8.2. ETHER CScanner Parameters

This sub-menu controls an externally connected motorised scanner



8.2.1. Cursor Keys

Select to use move/jog the XY mechanism. Back to Exit.

8.2.2. Auto Home

Select to send the scanner home position and reset the encoders.

8.2.3. Set Start Position

Set the start position by moving the mechanism using the cursor keys (see above)

8.2.4. Reset Limit Alarm

Should an end stop alarm be triggered this functions resets the alarm.

8.2.5. Go to Start Pos.

This function moves the mechanism to the start position.

8.2.6. Start

This starts a C-Scan and toggles to Stop

8.2.7. Jogging Distance

In mm the distance each short press of the cursor key moves the mechanism.

8.2.8. Jogging Speed

The speed in cm/s a press of the cursor key moves the mechanism during jog.

8.2.9. Scanning Speed (cm/s)

The speed in cm/s the mechanism moves during a scan.

8.2.10. CScan Auto Enable

Setting tis removed the need to enable the C-Scan

8.2.11. Quick Menu

It is recommended that this and the C-Scan item be set as soft keys and tis gives some commonly used items during a C-Scan.

9. Connectors

Connector 1 (Lemo 12-Way)

Model: Socket 12 Way Panel Mounted LEMO EEG2B312CNN (PCB PINS) –CLN

Mating Connector: Plug 12 way Free Lemo FGG2B312CLAD52Z

Pin	Name	Description	Note
1	FG0V	Generator 0v	
2	FGO/P	Generator output	
3	+VB	Battery Supply	
4	Motor –	Motor drive current return.	
5	Motor +	Motor drive current feed.	
6	0VD	Electrical ground (analogue).	
7	Diff+	Pick-up signal terminal. Positive.	
8	Diff–	Pick-up signal terminal. Negative.	
9	ENC	Encoder signal from rotating probe, one tick per turn.	
10	Gunsw/sck	Dual Use Gun Switch On/Off and also I2C bus clock	
11	Gun sda	GUN I2C bus data	

12	Gunalarm	Output of instrument flaw alarm	

Using the Voltage free alarm contact; there is a V-MOS FET connected between pin 6 (0VD) and 12 (Gunalarm). You will need to pull up pin 12 to a Power Supply (e.g. but not necessarily pin 3 (+VB)) with say a 10k resistor. You can also use an external supply but must make sure that its 0v is connected to Pin 6. **Note:** the maximum rating for the Transistor is 50v dc at 10mA.

Connector 2 (Lemo 4-Way)
Model: Lemo 0B
Mating connector: FGG0B304CLAD52Z

Pin	Name	Description	Note
1	-DIFF	-Bridge Input	
2	+DIFF	+Bridge Input	
3	FG Output	Drive	
4	0V	Ground (electrical connected to mechanical)	

Connector 3 (Lemo 8-way for Encoders)

The 6 way LEMO connector will connect directly to an ETherNDE C-Scan Frame or alternatively to any standard 2 wire (A & B) encoder that can be powered from 5V. The table below shows how to connect 1 or 2 encoders.

Pin	Port Configuration
1	5v
2	GND/0v
3	Encoder 2B
3	Encoder 2A
4	+5V
5	TX
6	Rx
7	Encoder 1A
8	Encoder 1B

10. Software Update and System Recovery

10.1. Updating AMCheck software

1. To update the AMCheck software, the new file must be present on the micro SD Card in the instrument; this is accessible under the flap on the side of the instrument. The file name is in the format EtherCheckv0000.hex.
2. There are 2 methods of getting the file on to the micros Card:
    - 1 Remove the card and place it in a micros Card Reader connected to a PC. Then use the PC to copy the file on to the card. The file MUST be in the ***\ETherCheck*** directory!!
    - 2 Use the PC package ETherRealtime that is available from ETherNDE for controlling and communicating with a AMCheck. See the section below on using ETherRealtime to copy the file on to the micro SD card, again, ensuring that it is in the ***\ETherCheck*** directory.
3. Now that the file is present on the card and in the ***\ETherCheck*** directory:
    - Power OFF the AMCheck.
    - Hold the LEFT key and turn the AMCheck ON using the POWER key. This will start the Boot Loader software and the screen will display “Searching for files…”

- Below this, a list of compatible files in the \ETherCheck directory will be displayed. If there are more than 1, the UP and DOWN arrows will move the highlight. Once the desired file is highlighted, press Enter.
- First, the AMCheck will erase the existing software from the flash, this will take approx. 10 seconds.
- Now the new version will be installed. Its progress in percent is shown. It will take approx. 1.5 minutes.
- When instructed to Reboot, hold the power key until the screen goes BLACK, this will take approx. 10s. Now release the key.
- Installation is now complete and the instrument can be used as normal. If there was a problem during installation the AMCheck may be unusable as an Eddy Current Instrument until a successful installation has occurred. If this was due to a corrupt version of the firmware on the micros Card (this is the usual cause) then a valid version will need to be copied on to the card, see removing the micros Card in 2) above.

10.2. Default Mode

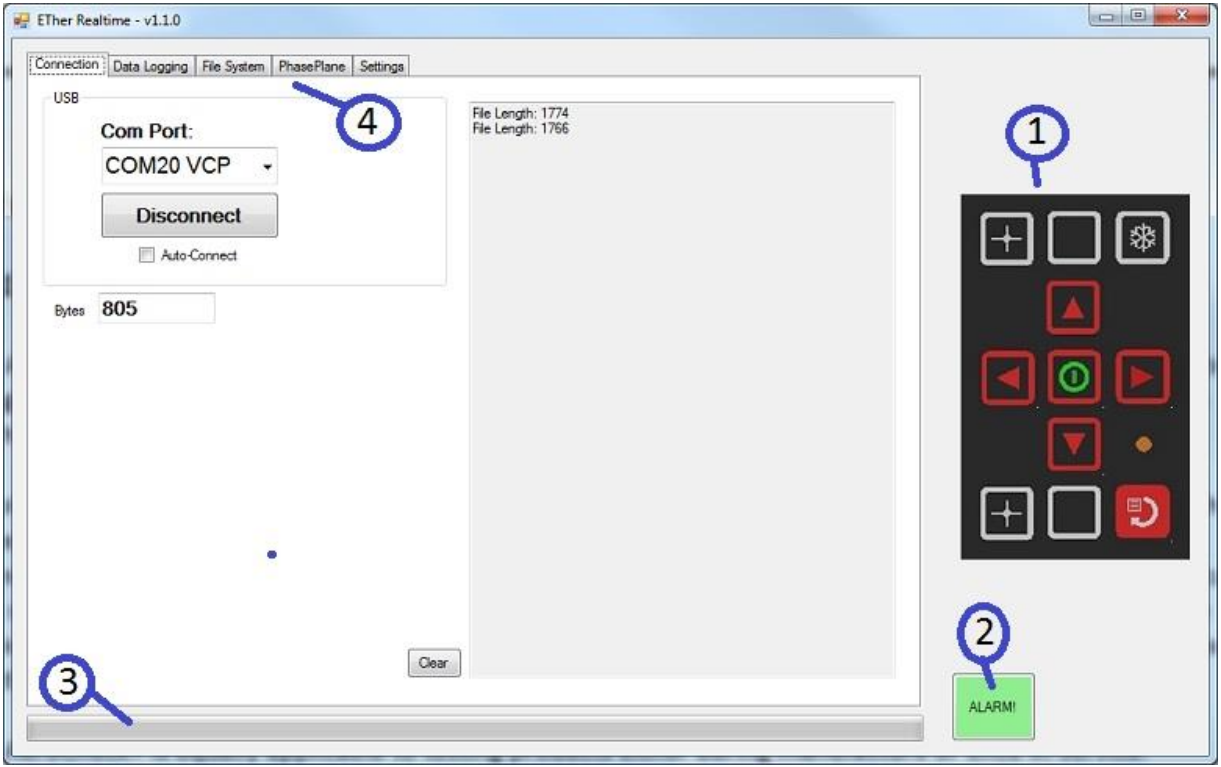
In the Load Save Menu there is a DEFAULT setting that cannot be altered by the user. Use this to put the instrument into a pre-defined state.

10.3. ETherRealtime PC Package

To connect to the AMCheck from a PC, the ***ETherRealtime*** package can be used. This package is freely available from ETherNDE and is present on the supplied USB Memory Stick, or downloadable from our Website. ***ETherRealtime*** allows remote control of the AMCheck instrument, displays real-time values from the instrument and allows files (Settings, Screenshots and Software Update files) to be taken from and loaded on to the instrument micro SD Card. ***ETherRealtime*** PC main screen:

Description of components:

1. 11-key Keypad. This is the same as the keypad on the instrument. Clicking on a key here has the same effect as pressing the real key on the instrument, with the exception of the Power Enter key.
2. ALARM indicator. If the instrument has an alarm configured this button will glow RED in sync with that of the instrument.
3. Progress Bar. If a file transfer is in progress, this bar shows the progress.
4. 5 Tabs offering different information on the connected instrument, Connection, Data Logging, File System, Phase Plane, Settings. See below for a description of each.


EThor Realtime - v1.1.0
Connection
Data Logging
File System
PhasePlane
Settings
USB
Com Port:
COM20 VCP
Disconnect
Auto-Connect
Bytes
805
File Length: 1774
File Length: 1766
Clear
1
2
3
4
ALARM!

10.3.1. EThercheck Tabs

10.3.1.1. Connection

When a AMCheck is connected to the PC via USB its COM port will automatically be displayed in the drop down. Click ***Connect*** to connect to the instrument or check Auto-Connect to do exactly that when an instrument is plugged in.

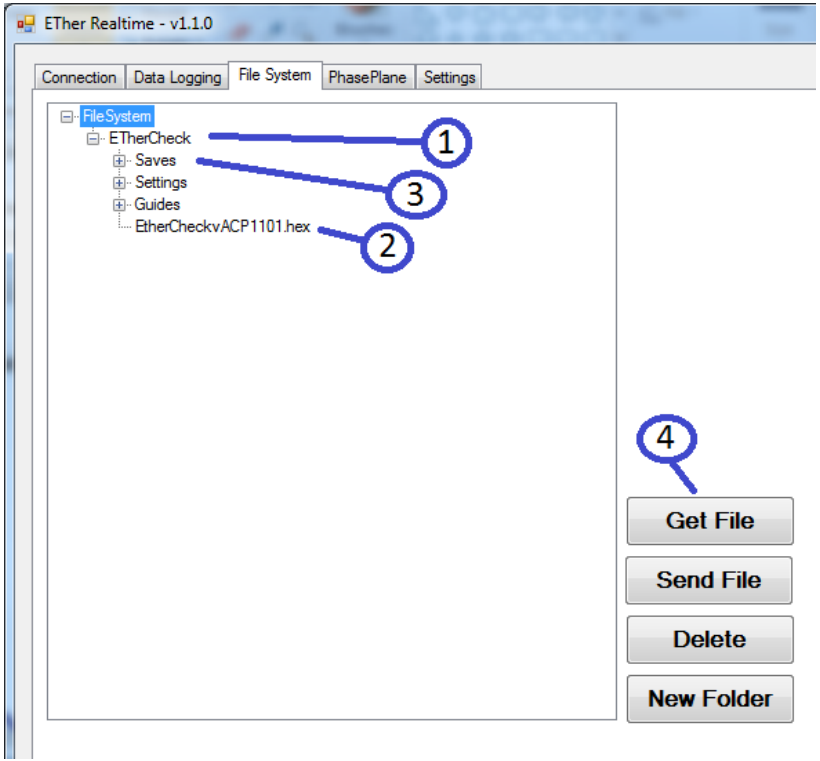
10.3.1.2. Data Logging

The 6 radio buttons select what sort of data is to be transmitted by the instrument:

- Conductivity – Only use when the instrument is in Conductivity Mode. The Conductivity and Lift-Off are shown, along with the other technical values of Radius and Theta.
- Non-Realtime – The values of X & Y for channel 1, 2 & Mix and Radius & Theta of Channel 1 are shown. The data rate is slower and not suitable for automated systems but more than sufficient for use by a person.
- Single Channel Post – This is post-processed data that has been offset to show actual screen coordinates. This setting must be used for the Phase Plane tab to show data.
- Post Process – This shows real-time post processed data for Channels 1, 2 & Mix.
- Raw – Raw Eddy Current data from the probe for channels 1 & 2.
- None – Shows nothing.

10.3.1.3. File System

When a AMCheck is connected to CheckPC and the ***File System*** Tab is selected ***ETherRealtime*** will download the file system that is present on the micro SD card, accessible under the flap. The file system is displayed in a window. Each folder can be expanded or collapsed by clicking on the + or – symbol. An example screen shot is shown below:



Description of components:

1. This is a Folder. It can be expanded and collapsed using the + and – icon to the left of the text.
2. This is a Software update file (ends in .hex). These MUST be in the Ether Check folder to be recognised by the Boot Loader.
3. In the Saves folder are the Settings folders and files that are used by the

instrument. Several are present by default on a new machine. Users create others. They can be retrieved or sent to a AMCheck (see below).

4. File action buttons; Delete (File or Folder), Get File, Send File and New Folder. These buttons, are only available once a file or folder is highlighted. See below for detailed explanation of their use.
    a. Deleting a File (or Folder)
    If a File or Folder is highlighted, clicking on ***Delete File*** will delete the specified file. BE VERY CAREFUL when doing this, deleted files cannot be undeleted afterwards. A folder MUST be empty before it can be deleted.
    b. Get File (getting a file FROM the AMCheck):
    Click on a file so that it is highlighted. Click on ***Get File***. The file will upload to the PC; its progress will be shown on the progress bar on the main screen. Once complete, a file save dialog window will appear. Use this to choose a location and filename of the uploaded file.
    c. Send File (Sending a file FROM the PC to the Weld Check) :
    Click on a folder (or file within a folder) that will receive the file. Click on Send File. A File Open dialog window will appear, find and choose the file to send TO the AMCheck. Click Enter. The file will begin downloading; its progress will be shown on the progress bar on the main screen. Once complete, the File System window will refresh and the new file should be visible.
    d. New Folder.
    With an existing folder highlighted, click on this button to create a new folder within the highlighted one. A new window will appear requesting the name of the new folder to be created.

10.3.1.4. Phase Plane

This tab attempts to mimic the real-time display of the instrument. For this to work the ***Single Channel Post*** button must be selected on the previous Tab.

10.3.1.5. Settings

This displays a full set of the instruments settings that it is currently using. Please note, these values are not all human readable but are what the instrument requires should commands need to be sent by automated equipment.

11. Specification

Probe	Connectors	12 Way Lemo 2b - Absolute, Bridge, Reflection, Conductivity and Rotary. 4 Way Lemo 1b - Bridge and Reflection Simultaneous probe operation possible using Lemo 12 way and Lemo 4 way
	Rotary	600-3000 rpm - EThер Mercury Drive (ADR002) and Saturn (ARD001), Hocking 33A100, Rohmann MR3, SR1 and SR2 Drive (special adapter needed)
	Conductivity	Option becomes active with use of AMCheck conductivity probe and cable
Frequency	Dual Freq.	10 Hz to 12.8 MHz
Gain	Overall	-18 to + 104 dB, 0.1, 1 and 6dB steps
	Input	0dB or 12dB
	Drive	0dB, 6dB and 10dB (0dB reference 1mW into 50 ohm)
	Max X/Y Ratio	+/-100.0 dB
Phase	Range	0.0-359.9°, 0.1° steps
Filters	High Pass	DC to 2kHz or Low Pass Filter, whichever is the lower in 1 Hz steps. Plus variable adaptive balance drift compensation 0.01 - 0.5 Hz (6 steps).
	Low Pass	1Hz to 2KHz or a quarter of the lowest test frequency whichever is lower in 1 Hz steps.
Balance Load	Manual	14 internal balance loads; 2.2µH, 5.0µH, 6.0µH, 6.5µH, 7.0µH, 7.5µH, 8.2µH, 12µH, 15µH, 18µH, 22µH, 30µH, 47µH, 82µH,
	Automatic	Optimised balance load selection.
Mix Channel	Frequency	Full frequency range available on both channels

	Probe Mode	Simultaneous reflection / bridge and absolute including simultaneous two probe Differential and Absolute
	Mix Gain	X/Y -18 to +18dB
	Mix Phase	0.0-359.9°, 0.1° steps
Alarms Gates	Box	Fully configurable, Freeze, Tone or visual.
	Sector	Fully configurable, Freeze, Tone or visual.
Display	Type	5.7" (145mm), 18 bit Colour, daylight readable.
	Viewable Area	115.2mm (Horizontal) x 86.4mm (Vertical)
	Resolution	640 x 480 pixels
	Flip	Manual or automatic screen orientation change to enable left or right handed use.
	Colour Schemes	User configurable Dark, Bright and Black & White
	Configurable Screen	Full Screen, Single, Dual Spot or Dual Pane with variable size and location and function e.g. XY, Timebase, Waterfall and Meter.
	Display Modes	Spot, Time base (0.1-20 seconds x 1-200 sweeps and up to 55 seconds), Waterfall, Meter with peak hold and % readout, Distance (single axis, changes with direction), Strip Chart (single axis, unidirectional) and C-Scan
	Graticules	None, Grid (4 sizes 5, 10,15 and 20% FSH), Polar (4 sizes 5, 10,15 and 20% FSH)
	Offset	Spot Position: Y =-50 to +50, X =-65 to +65%
	Digital Spot Position Readout	Display in X,Y or R,θ
	Summary	Display of all settings in Legacy Format
	Media	Micro SD HC Card 32GB

Removable Data Storage	Setup Storage	Over 10,000 settings
	Stored Screen Shots	micro SD up to 32GB, holding over 10,000 screen shots
	Recorded Data	Over 500 2.5 minute long data recordings
	Guides	10,000 Slides plus
	C-Scan	Max no of C-Scan Data Files 1,000

Advanced Features	Data logging	Real-time recording of signal data and Replay on instruments and desktop PC up to 164 seconds
	Guides	Create and display a slide show containing instructions, tutorials and procedures using Microsoft PowerPoint.
	Attachments	Screenshots and Data Recordings are saved in a folder with the name of the Settings.
	Loop	Capture a live repetitive signal and then optimise the instrument settings (Phase, Gain, Filters) to simplify optimising the parameters
	Trace	Allows a calibration reference signal to be stored on the screen and then compared with the live signal
	Auto Phase	Allows phase angle to be automatically set to a pre set angle
C-Scan	Resolution	Max size 1 million data points

	Scaling	.1-999.9 Ticks/mm
	Typical Scan	120 by 100 mm at 0.1mm resolution
	Data Saved	Data stored as XY Pairs for 2 Channels. Data presentation X, Y, R or theta on CH1, Ch2 or Mix.
Scanning	Connector	8 Way Lemo 1b for encoder and scanner control
	Encoder	2 phase 2 axis; =X/Y or R Theta .
	Automatic	Controls and Acquires data from a Stepper Motor Driven XY Scanner
	Count rate Max	100kHz
Outputs	PC Connectivity	USB (Full PC remote control plus Real Time data)
	Digital volt free Alarm	On Lemo 12 way Open collector transistor (36v dc at 10mA max).
	VGA	Full 15 way VGA output (EC screens only)
Languages		Selectable from English, French, Spanish, Italian, Portuguese, Russian, Japanese, Chinese, Turkish, Czech, and Norwegian.
Verification Level		The system includes on delivery a 2 year validity Verification Level 2 detailed functional check and calibration as per ISO 15548-1:2013
Power on self test		The system performs a self test on start up of external ram, sd ram, accelerometer, Micro SD card, LCD screen buffer.
Power	External	100-240 v 50-60Hz 30 Watts
	Battery	Internal 7.2V nominal @ 3100mAh = 22.32 watt.hr
	Running Time	Up to 8 hours with a 2MHz Pencil Probe 30% Back Light and up to 6 hours with a Rotary Drive 50% duty cycle.

	Charging Time	2.5 hrs. charge time, Simultaneous charge and operation
Physical	Weight Including Internal Battery	1.3 kg, 2.9 lbs.
	Size (w x h x d)	237 x 146 x 53 mm / 9.3 x 5.7 x 2.1 inches
	Material	Aluminium alloy Mg Si 0.5 powder-coated epoxy
	Operating Temperature	-20 to +60 °C
	Storage Temp	Storage for up to 12 months -20 to +35 °C Nominal +20 °C
	IP Rating	IP54

12. System Self-Test Codes

Error	Name	Description
2	External RAM Initialisation	Configures the internal RAM IO lines.
8	SDRAM Initialisation	If SDRAM config. times out, report ERROR.
32	Memory Tests	Required memory configured and cleared.
512	Accelerometer Initialisation	Configuration over I2C. I2C Comms error returned.
1024	uSD Disk Initialisation	If disk not present or failure, error returned.
8192	LCD Screen Buffer test.	Write and read a coloured pixel. Error if different.

13. Safety and Environmental

13.1. Safety

Safety: Even classified as lithium ion batteries UN3480 or UN3481 (Contained in Equipment or Packed with Equipment), the product is handled as Non-Dangerous Goods by meeting the UN Recommendations on the Transportation of Dangerous Goods Model Regulations Special Provision SP188 and IATA Dangerous Goods Regulations Packing Instruction 965-967 General Requirement and Section Ⅱ (Excepted) is applied for air transportation, IMDG Code SP188 is applied for marine transportation. Battery has passed the UN T1-T8 tests and may be shipped as excepted from these regulations. Battery MSDS sheet available on request.

13.2. EC Declaration of Conformity

EC Declaration of Conformity - this product is CE marked; CE marking signifies that the product conforms with all EU directives or EU regulations that apply to it.

Environmental Protection: This product should not be disposed of with household waste. Please recycle where facilities exist. Check with your local Authority or retailer for recycling advice.

We

ETherNDE Ltd

Of

ETher NDE Ltd.
Endeavour House,
Unit 18, Brick Knoll Park,
Ashley Road,
St Albans,
Hertfordshire,
AL1 5UG
United Kingdom

Hereby declare that:

Equipment: AMCheck Eddy Current Flaw Detector

Model Number: IAM001

Meet the intent of Directive 89/336/EEC for Electromagnetic Compatibility.

Compliance tested to:

Test Specification:	EN 61326-1:2006
Title:	Electrical equipment for measurement, control and laboratory use.
Test Specification:	EN 55011:2009 + A1:2010
Title:	Industrial, scientific and medical (ISM) radio frequency equipment. - Radio disturbance characteristics
Test Specification:	EN61000 Part 4
Title:	Electromagnetic compatibility (EMC) - Part 4. Testing and measurement techniques.
Sections:	EN61000-4-2: 2009 - Electrostatic discharge immunity test. EN61000-4-3: 2006+A2:2010- Radiated radio frequency electromagnetic field immunity test.