

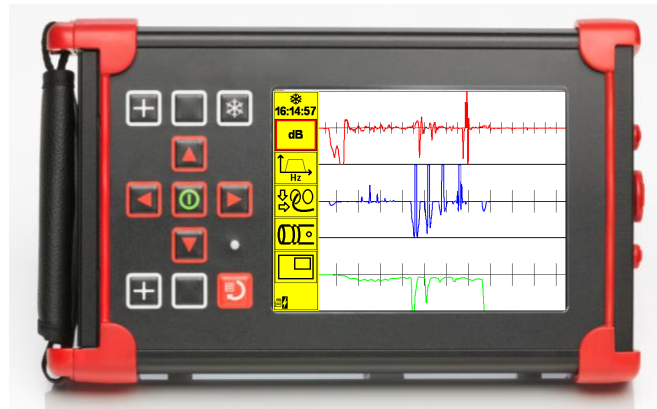
**ETHER NDE**



**Eddy Current Solutions**

## ***SteelCheck – User Manual***

SteelCheck - General Purpose MFL Tube Testing Instrument



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## 2. Introduction

### ***2.1 About the SteelCheck***

The SteelCheck is a dedicated MFL instrument for tube inspection, particularly suited to inspection of corrosion in heat exchangers. SteelCheck can perform a great many ....

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 User Manual of the ETher NDE SteelCheck portable inspection instrument (referred to as the "instrument") is intended to explain the operation principles of the instrument.

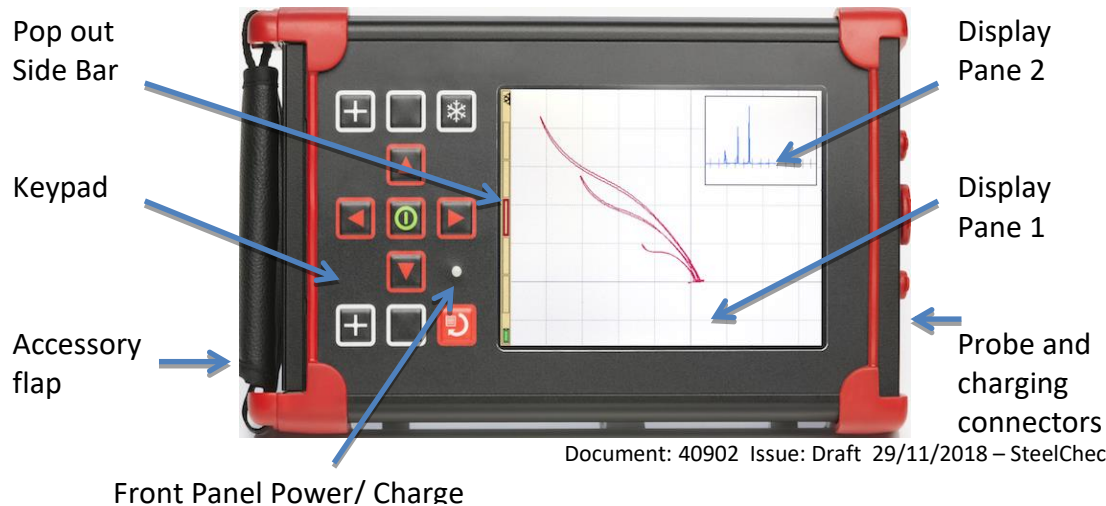
Note that this version of the manual refers to a pre-release version of the software. It is to be expected that this manual, and the instrument to which it refers, will be modified over the next few months as various features are added and improved.

Please contact ETHER NDE, or your distributor, to ensure you have the latest version of instrument firmware and documentation.

## 2.2 A first look at the instrument.






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

Fig. 1– SteelCheck Front panel





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

 <b>2:19:50</b> <b>dB</b>    	<b>Inspection</b> <b>Probe</b> <b>Gain</b> <b>Filters</b> <b>Job</b> <b>Summary</b> <b>Inspect</b> <b>Calibrations</b>	<b>Configure</b> <b>Appearance</b> <b>Power save</b> <b>Time &amp; Date</b> <b>Language</b> <b>Load &amp; Save</b> <b>About..</b> <b>Lock</b>
	<b>Display</b> <b>Graticule</b> <b>Spot</b> <b>Offset</b> <b>Persistence</b> <b>Panes</b>	<b>Advanced</b> <b>Alarm</b> <b>Alarm Zone</b> <b>Attachments</b> <b>Guides</b> <b>Record &amp; Replay</b>

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

## 2.3 Keypad

### 2.3.1 Cursor keys



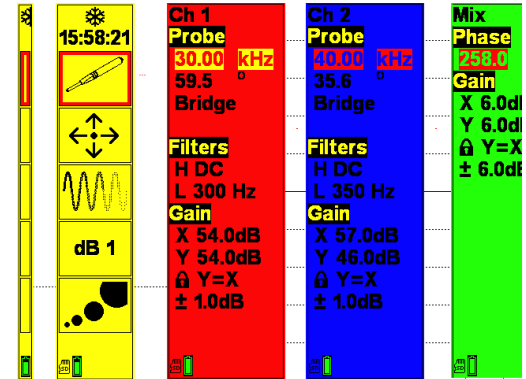
Long press (greater than 3 seconds) on the centre/enter key switches the instrument on.

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.

## 2.3.2 Menu/Back Key



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



Signal balance (1 top one bottom of unit).



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.
- 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. Second press erases this trace from the Graticule layer. Good for making comparative tests.
- Streaming – Streams inspection data to CSV file
- Trigger – Arms the strip chart trigger mode

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.

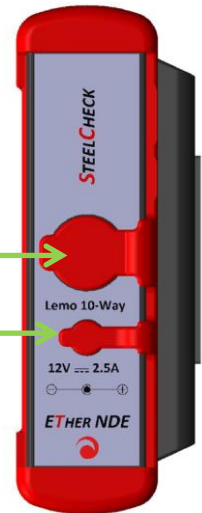


LED indicator Green indicates external power applied, amber indicates power applied and charging in progress. Green indicates charging complete and instrument on external power.

## ***2.4 Connector Side of the instrument (probe and charger connector):***

**MFL Probe Connector** - (10-way Lemo) connects MFL tube testing probe to the instrument

**Power Connector** - Only use the factory supplied charger/power supply.



## ***2.5 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.

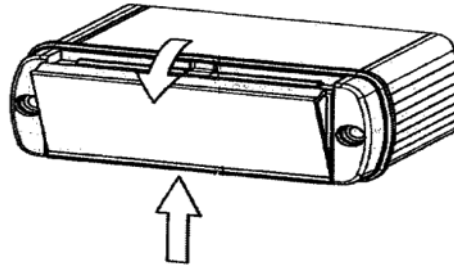


NOTE: Do not use tools to open, as this will damage the instrument.

**VGA** - for video output using a display

**Micro SDHC Card** - can add up

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



monitor, projector or head up

to 32GB of removable memory

To Open Flap  
1 Press centrally on hinge axis  
2 Simultaneously pry open cap operation.

## 3. Standard Package and recommended accessories

### 3.1 Standard Package

Description	Part. No.	Qty.
KIT, SteelCheck, MFL Tube Testing kit Including:	KISTL001	1
SteelCheck Instrument including USB Stick with manual	ISTL001	1
Accessory, SteelCheck, Power Adapter + Input Plugs (UK, EU, US & Australia)	AWEL002	1
Accessory, Adjustable Padded Shoulder Strap Quick-Release Clips	AWEL003	1
Accessory, Instrument Soft Carry Case , (AeroCheck/Vantage)	AC006	1
USB CABLE - A to MINI B, 1m	A090	1
Quick Reference Card	40833	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

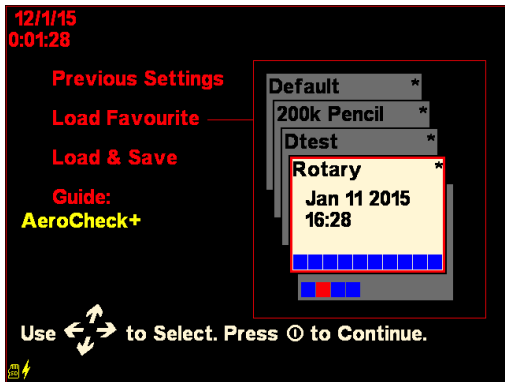
1. Press the POWER key until the display turns on (should be within 3 seconds).
2. The instrument will first display the product splash screen for 3 seconds



### 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.

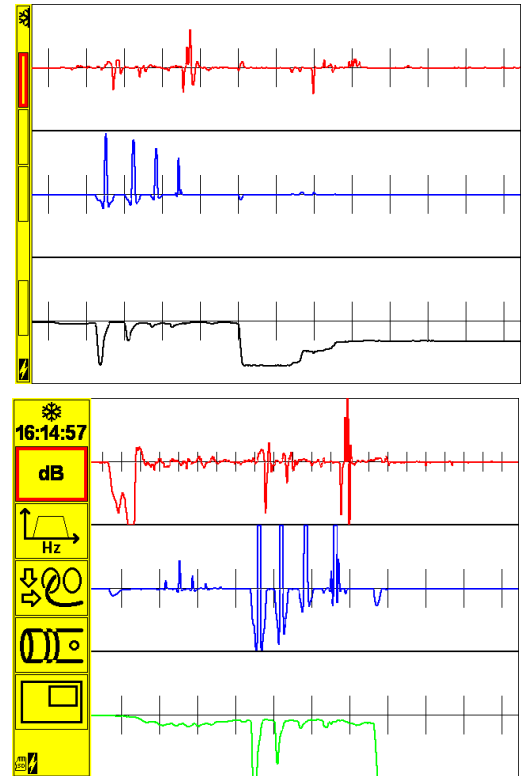
1) If favourites have been set then a Welcome Screen is displayed.








- 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 SteelCheck, which is a quick guide to operating the instrument. On the left there are three functions.

2) Otherwise the operating screen is shown. On the left on the side bar are 4 icons 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.

- 3) 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.
- 4) One left press then returns to the Icon Side Bar.
- 5) 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.
- 6) Pressing then Menu/Back Key reveals the main menu. Pressing the Menu/Back Key then returns to the Real Time display.



 <b>2:19:50</b> <b>dB</b>    	<b>inspection</b> <b>Probe</b> <b>Gain</b> <b>Filters</b> <b>Job</b> <b>Summary</b> <b>Inspect</b> <b>Calibrations</b>	<b>Configure</b> <b>Appearance</b> <b>Power save</b> <b>Time &amp; Date</b> <b>Language</b> <b>Load &amp; Save</b> <b>About..</b> <b>Lock</b>
	<b>Display</b> <b>Graticule</b> <b>Spot</b> <b>Offset</b> <b>Persistence</b> <b>Panes</b>	<b>Advanced</b> <b>Alarm</b> <b>Alarm Zone</b> <b>Attachments</b> <b>Guides</b> <b>Record &amp; Replay</b>

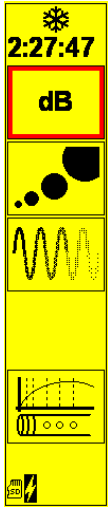
#### ***4.4 Switching the Instrument Off***

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

# 5. Operation in MFL Mode

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 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.

## 5.2 Main Menu

Press the Menu/Back Key to reveal the Main Menu. Depending on operation mode the screen may look different:

 <b>2:19:50</b>    	<b>Inspection</b> <b>Probe</b> <b>Gain</b> <b>Filters</b> <b>Job</b> <b>Summary</b> <b>Inspect</b> <b>Calibrations</b>	<b>Configure</b> <b>Appearance</b> <b>Power save</b> <b>Time &amp; Date</b> <b>Language</b> <b>Load &amp; Save</b> <b>About..</b> <b>Lock</b>
	<b>Display</b> <b>Graticule</b> <b>Spot</b> <b>Offset</b> <b>Persistence</b> <b>Panes</b>	<b>Advanced</b> <b>Alarm</b> <b>Alarm Zone</b> <b>Attachments</b> <b>Guides</b> <b>Record &amp; Replay</b>

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 5<sup>th</sup> 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.

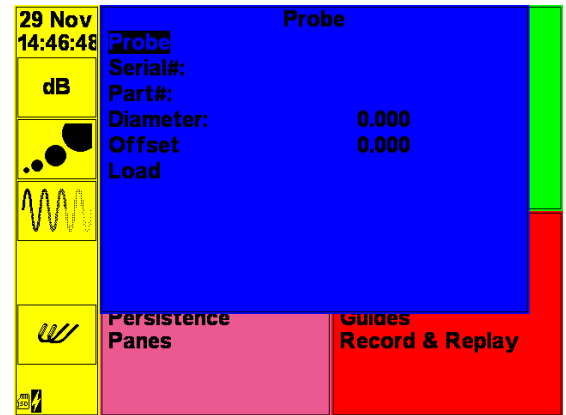


## 5.2.2 Inspection Pane

Parameters that can be adjusted are:

### 5.2.2.1 Probe

- Probe: Displays the model of probe connected
- Serial#: Displays the serial number of the probe
- Part#: Displays the part number of the probe
- Diameter: The diameter of the probe, which should suit the tube diameter to be tested
- Offset:
- Load: Loads and Saves probes from flash memory



### 5.2.2.2 Gain

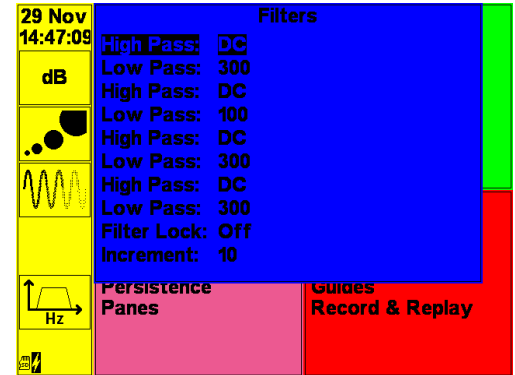
- Gain 1: Sets the gain applied to the remote field sensing coil
- Gain 2: Sets the gain applied to the active field sensing coil
- Gain 3: Sets the gain applied to the Hall Effect sensor
- Gain Lock: Locks the gain between channels as follows:
  - Off – gain adjustment is fully independent
  - Fixed – the relative gain between channels is preserved
  - Y=X – all the channels are set to the same gain
- Increment: Sets the gain step size.

29 Nov 14:46:59	<b>Gain 1</b>
dB	Gain 1: 48.0
	Gain 2: 32.0
	Gain 3: 31.0
	Gain Lock: Off
	Increment: 1.0
	Persistence Panes
	Guides Record & Replay



### 5.2.2.3 Filters

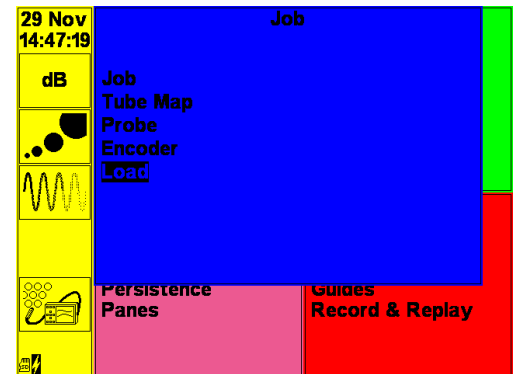
- Low Pass: For each channel allows the low pass filter cutoff frequency to be set
- Filter Lock: Locks the filters as follows:
  - Off: Filters can be independently adjusted
  - Ratio: The ratio of cut-off frequencies between channels is preserved as adjustments are made.



### 5.2.2.4 Job

Displays information about the inspection job

- Job
- Tube Map
- Probe
- Encoder
- Load – Allows job details to be opened from the SD card.

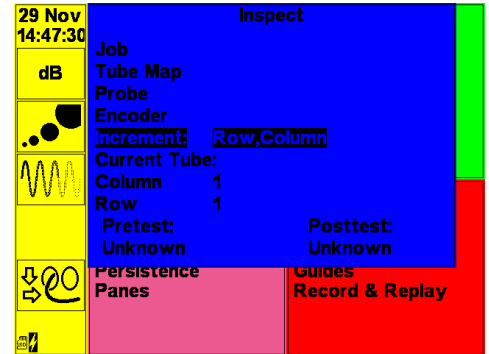


### 5.2.2.5 Summary

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

### 5.2.2.6 Inspect

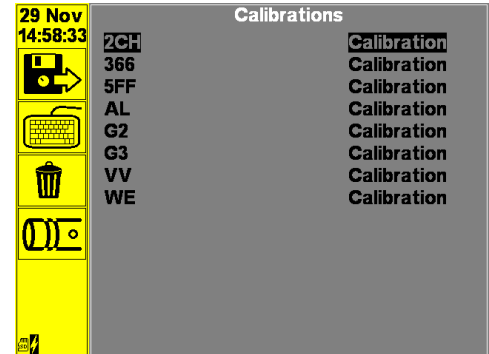
- Job: Displays the name of the inspection job
- Tube Map: Displays the tube map reference name
- Probe: Displays the probe reference name
- Encoder: Displays the encoder reference name
- Increment: Selects the order in which tubes should be inspected.
- Current Tube: Selects the row and column to inspect
- Pretest and Posttest: Displays the test result for the tube



### 5.2.2.7 Calibrations

Lists the calibrations that are stored on the instrument.

Clicking on a calibration presents a summary pane at the bottom of the screen

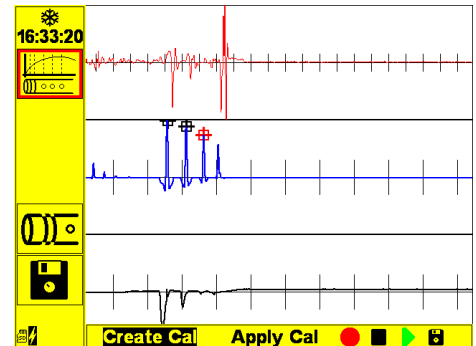


Selecting the tube icon displays a table showing the locations, percentage wall loss and type of each defect in the calibration tube.

This will be used to automatically use the data captured from a calibration tube to generate a calibration data set.

29 Nov 14:48:09		Calibration Tubes		
Name:		Serial#: 000002		
Part#: ATBC-254-14SWG				
Defects				
#	Location:	Loss%	Type	
1	28.0	20.0	Inner	
2	100.0	20.0	Ring	
3	152.0	40.0	Ring	
4	203.0	65.0	Ring	
5	254.0	15.0	Outer	
6	333.0	25.0	Outer	
7	384.0	40.0	Outer	
8	435.0	60.0	Outer	
9	586.0	20.0	Through	
10	637.0	55.0	Through	

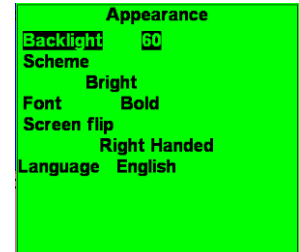
### 5.2.2.8 Performing a calibration



## 5.2.3 Configure Pane

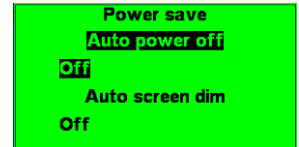
### 5.2.3.1 Appearance

- 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)



### 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 Language

Currently only supports English.

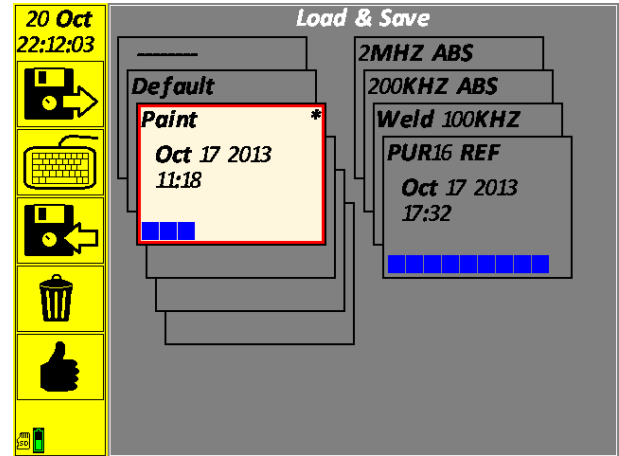
### 5.2.3.5 Load & Save.

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 press 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.

### **5.2.3.6 About**

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

### 5.2.3.7 Lock

The SteelCheck 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 **Up, Down, Left, Right** 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 waveform displays

- Type: None, Grid, or Timebase
- Size: 5 – 50 % in 5% sets the major tick mark intervals

### 5.2.4.2 Spot

Settings for line thicknesses of waveforms

- Size: To enhance the spot visibility choice of 1\*1 or 2\*2 pixels
- Colour: Sets spot colour

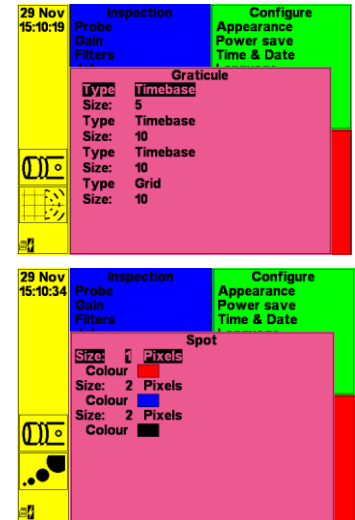
### 5.2.4.3 Offset

- Offset: Spot position offset in the Y axis

### 5.2.4.4 Persistence

Persistence and Time-base settings for strip chart displays

- Sweep – Time taken for a single sweep across the screen in Timebase mode.





## 5.2.4.5 Panes

- Alignment: Selects horizontal or vertical stripcharts
- Pane 0-3: Enables or disables the strip chart view
  - Invert - Inverts the trace in the Y axis
  - Trigger – Automatically pause stripchart if waveform triggers on this pane.

The screenshot shows the SteelCheck software interface. On the left, a yellow vertical bar displays the date and time: "29 Nov 15:10:49". Below this are three icons: a strip chart icon, a square icon, and a small logo. The main interface is divided into three colored sections: a blue section for "Inspection" (containing "Probe", "Gain", and "Filters"), a green section for "Configure" (containing "Appearance", "Power save", and "Time & Date"), and a red section at the bottom. A pink menu titled "Panels" is open, showing a table of pane configurations.

Alignment	Horizontal	Invert	Trigger
Pane 0	Strip Chart	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pane 1	Strip Chart	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pane 2	Strip Chart	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pane 3	Off	<input type="checkbox"/>	<input type="checkbox"/>

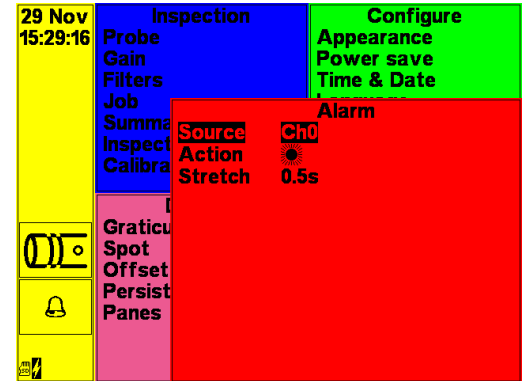
## 5.2.5 Advanced Pane

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

### 5.2.5.1 Alarm

Alarm: Audio and Visual Alarm is triggered once the waveform in the selected strip chart crosses the threshold

- Source: Sets the sensor channel which triggers the alarm
- 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.



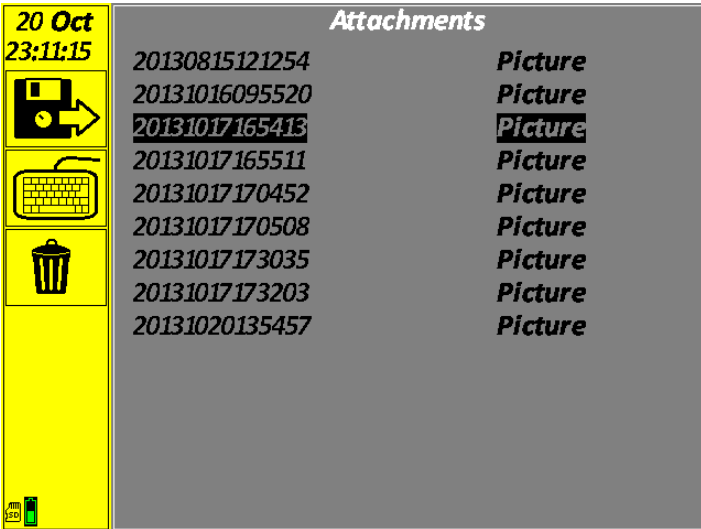
### 5.2.5.2 Attachments

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 →



The screenshot shows a vertical yellow bar on the left with three icons: a floppy disk with an arrow, a keyboard, and a trash can. To the right is a grey area titled "Attachments" containing a list of timestamps and the word "Picture".

Timestamp	File Type
20 Oct 23:11:15	
20130815121254	Picture
20131016095520	Picture
<b>20131017165413</b>	<b>Picture</b>
20131017165511	Picture
20131017170452	Picture
20131017170508	Picture
20131017173035	Picture
20131017173203	Picture
20131020135457	Picture

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.

### 5.2.5.3 Guide Tool

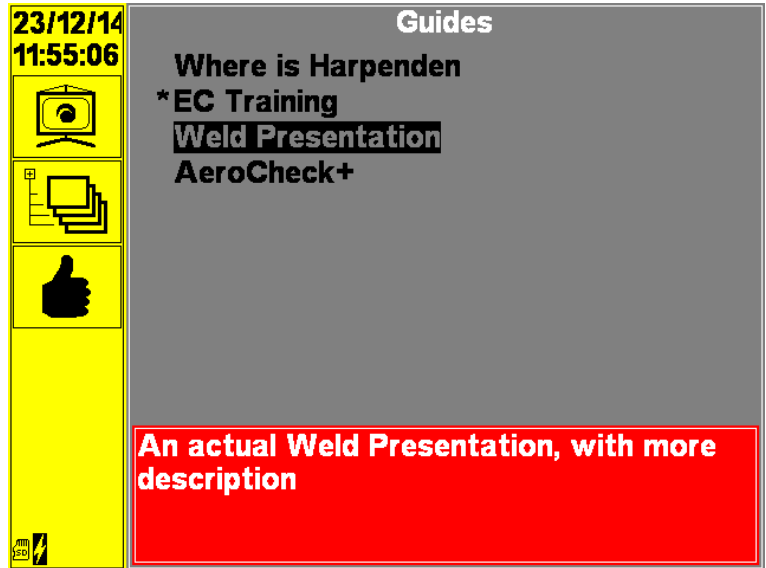
The Guide Tool allows presentations uploaded to the instrument using SteelCheck PC Software to be viewed on the instrument whilst performing an inspection.

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

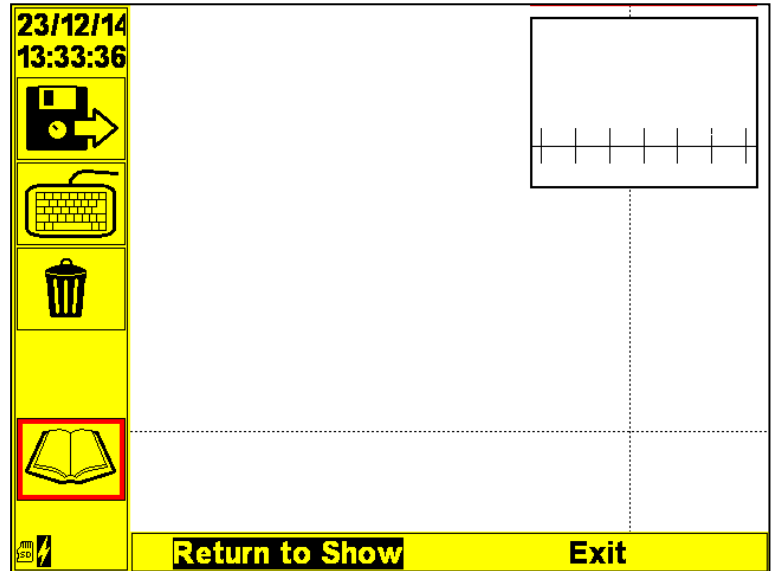
To exit a Guide permanently press the Back/Menu Key.



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

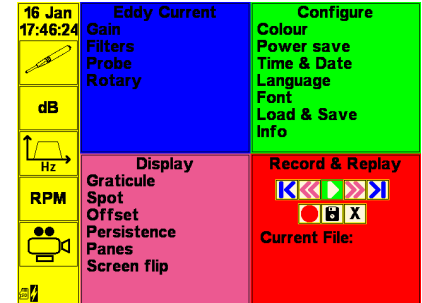
If a Guide is exited temporarily then the Guide Icon appears in the Menu Side Bar.

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.



## 5.2.5.4 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 SteelCheck PC. 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)

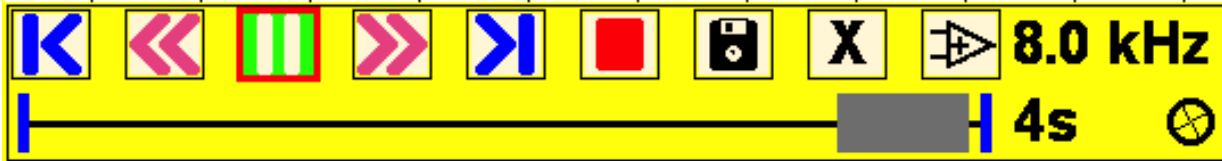
2. Then return to the operating screen and select the Record & Replay Icon (camera).



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.

## **6. Setting the SteelCheck to perform a tube inspection**

***6.1 With a configuration file***

***6.2 With no configuration file***

## 7. Connectors

Connector 1 (10 way Lemo) for MFL probe

Model: Socket 10 Way Panel Mounted LEMO EEG2B310CNN (PCB PINS) –CLN

Mating Connector: Plug 10 way Free Lemo FGG2B310CLAD52Z

Pin	Description	Note
1	Signal Ground	
2	Active Coil	
3	Signal Ground	
4	Active Coil	
5	Signal Ground	
6	Residual Coil	
7	-5V Hall sensor supply	
8	Signal Ground	
9	Hall sensor signal	
10	+5V Hall sensor supply	

# 8. Software Update and System Recovery

## 8.1 Updating SteelCheck software

1. To update the SteelCheck 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 is in the format SteelCheckv0000.hex.
2. There are 2 methods of getting the file on to the microSD Card:
  - Remove the card and place it in a micro Card Reader connected to a PC. Then use the PC to copy the file on to the card. The file **MUST** be in the **\SteelCheck** directory!!
  - Use the PC package SteelCheck PC that is available from ETHERNDE for controlling and communicating with an SteelCheck. See the section below on using SteelCheck PC to copy the file on to the micro SD card, again, ensuring that it is in the **\SteelCheck** directory.
3. Now that the file is present on the card and in the **\SteelCheck** directory:
  - Power OFF the SteelCheck.
  - Hold the LEFT key and turn the SteelCheck 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 \SteelCheck 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 SteelCheck 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 SteelCheck may be unusable until a successful installation has occurred. If this was due to a corrupt version of the firmware on the micro Card (this is the usual cause) then a valid version will need to be copied on to the card, see removing the micro Card in 2) above.

## **8.2 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.

## **8.3 SteelCheck PC Package**

To connect to the SteelCheck from a PC, the **SteelCheck PC** package must be used. This package is freely available from ETherNDE and is present on the supplied USB Memory Stick, or downloadable from our Website.

**SteelCheck PC** allows remote configuration and control of the SteelCheck 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. **SteelCheck PC** PC main screen:

## **8.3.1 SteelCheck PC Functionality**

### **8.3.1.1 Connection**

### **8.3.1.2 Jobs**

### **8.3.1.3 Graphs**



#### **8.3.1.4 Inspections**

#### **8.3.1.5 Tube Maps**

#### **8.3.1.6 Probes and Encoders**

# 9. Specification

## 11.1 MFL

Probe	Connectors	10 Way Lemo 2b
Gain	Active field coil	-18dB to +82dB in 0.1, 1, and 6 dB steps
	Residual field coil	-18dB to +82dB in 0.1, 1, and 6 dB steps
	Hall effect	-18dB to +82dB in 0.1, 1, and 6 dB steps
Bandwidth	Coil channels	0.2Hz to 1kHz
	Hall effect	DC to 1kHz
Filters	Low Pass	10Hz to 500Hz in 1 Hz steps selectable per channel
Offset null	Automatic	Zero response from all channels for nominal tube wall thickness
Alarms Gates	None	
Display	Flip	Manual or automatic screen orientation change to enable left or right handed use.
	Colour Schemes	User configurable Dark, Bright and Black & White
	Display Modes	Horizontal strip chart with sweep time from 0.1s to 20s
	Graticules	None, Grid, Strip chart
	Summary	Summary screen of all parameters and settings

Advanced Features <sup>1</sup>	Data logging	Real-time recording of signal data and Replay
	Job	Displays jobs created with SteelCheck PC software
	Inspect <sup>1</sup>	Selects tube to inspect
	Calibration <sup>1</sup>	From calibration tubes with defined defect types and position
	Guides <sup>1</sup>	
	Attachments <sup>1</sup>	

### ***11.3 General specifications***

Display	Type	5.7" (145mm), 18 bit Colour LCD, daylight readable.
	Viewable Area	115.2mm (Horizontal) x 86.4mm (Vertical)
	Resolution	640 x 480 pixels
Outputs	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)
Encoder <sup>1</sup>		To encoder position of probe in tube

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<sup>1</sup> Implementation not complete

Languages		English, others TBC
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 12 hours
	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

Removable Data Storage <sup>1</sup>	Setup Storage	Micro SDHC up to 32GB, holding over 10,000 settings
	Stored Screen Shots	micro SD up to 32GB, holding over 10,000 screen shots
	Recorded Data	micro SD up to 32GB, holding over 500 2.5 minute long data recordings
	Guides	micro SD up to 32GB, holding 10,000 Slides

## 10. 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.

# 11. Safety and Environmental

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.



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.

## ***11.1 EC Declaration of Conformity***

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: SteelCheck MFL Flaw Detector

Model Number: ISTL001

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.