

EQUIPMENT MANUAL

BONDHECK

COMPOSITE INSPECTION EQUIPMENT



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2. Introduction

2.1 About the BondCheck

The BondCheck is lightweight and compact triple mode Bond Testing instrument, for the inspection of composite materials. These modes are Pitch-Catch, Resonance and Mechanical Impedance Analysis (MIA), they are suitable for the detection of disbond/unbond conditions in typical composite materials of both monolithic and cored sandwich construction, as well as metallic bonds. The wide frequency range and selection of available probes make it suitable for a wide variety of material types.

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.

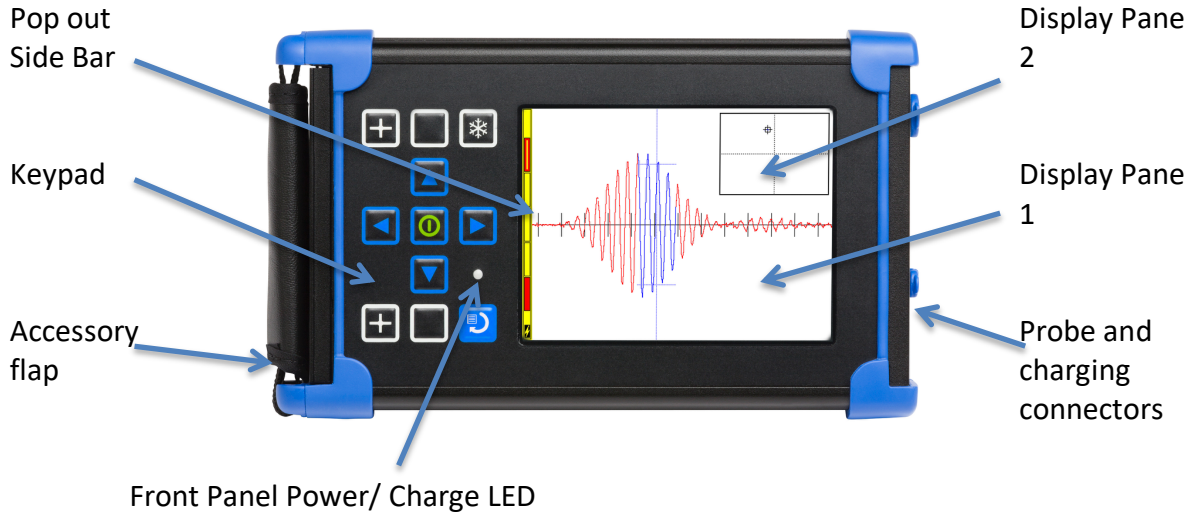
The User Manual of the Baugh & Weedon NDE BondCheck portable inspection instrument (referred to as the "instrument") is intended to explain the operation principles of the instrument.

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 Baugh & Weedon, or your distributor, to ensure you have the latest version of instrument firmware and documentation.

2.2 A first look at the instrument.

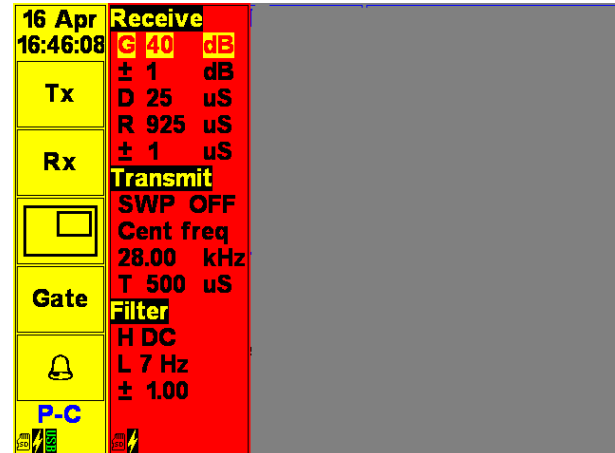
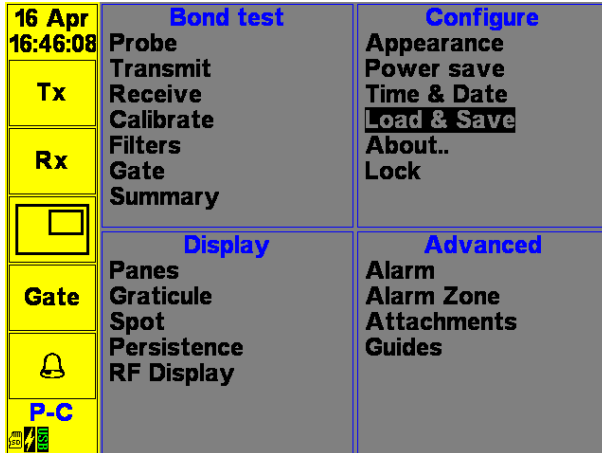
This section gives an overview of the various external features of the instrument.

Fig. 1– BondCheck Front panel –



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

Main Menu Screen



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



A long press (greater than 3 seconds) on the centre/enter key switches the instrument on and off. The 4 red arrow keys are cursor keys for navigating the menu system and changing parameter values.

In the operating screen pressing the right cursor key changes the yellow side bar from the default setting of the user programmable quick access icons to the red quick setting menu. 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.

A 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.



Bond test signal balance in X-Y mode. In RF mode the waveform is captured as a reference and subtracted from the displayed live waveform. To cancel, press and hold the key for 2 seconds. In Phase display mode use this key to zero the phase bar graph to the current phase reading.



There are two independent User programmable blank soft keys at the top and bottom of the keypad. A 3 second push on either of these will show a list of the programmable options. Use the Up and Down keys to select and centre key to select. 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.
- 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.
- Load Bond Probe – Loads setup data from connected probe and applies settings

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 returning live waveform display.



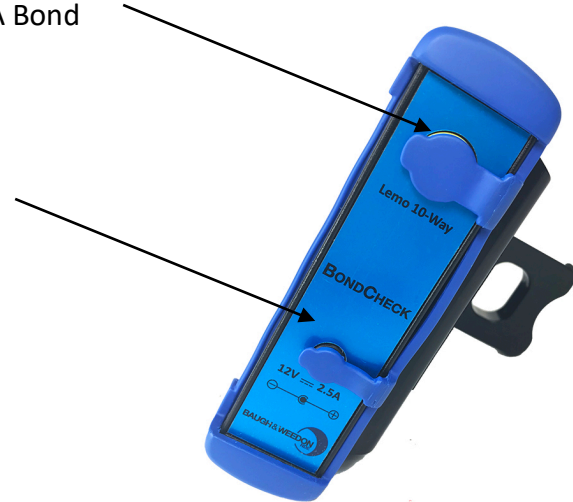
LED indicator Green indicates external power applied, amber indicates power applied and charging in progress. Green indicates charging complete and instrument on external power.

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

Bond Test Probe connector: 10-way Lemo

- Connects Pitch-Catch, Resonance and MIA Bond Testing Probes

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



2.5 Flap Side of the instrument (accessory connectors under side flap/door)

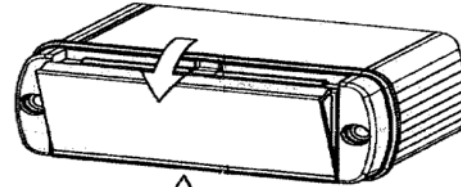
Open the flap by gripping the flap firmly, whilst pushing from the back and then rotate the flap open as shown below.

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

3. Standard Package and recommended accessories

3.1 Standard Package

Description	Part. No.	Qty.
KIT, BondCheck Instrument, Including:	IBON001	1
BondCheck Instrument including USB Stick with manual	IETH001	1
Accessory, BondCheck, Power Adapter + Input Plugs (UK, EU, US & Australia)	AWEL002	1
Test coupon for easy bond/disbond checking	ATB023	1
Accessory, Adjustable Padded Shoulder Strap Quick-Release Clips	AWEL003	1
Accessory, Instrument Soft Carry Case	AC006	1
USB CABLE - A to MINI B, 1m	A090	1
Quick Reference Card	40722	1

3.2 Recommended Packages

Pitch-Catch Probe Bond Testing Kit

KAETH001

Including:

- PETH001 Pitch-Catch Probe for Bond Testing
- ALL10-L08-015-BON Accessory, Lead, LEMO 10-way – LEMO 8-Way. 1.5m
(to fit pitch-catch bond tester probe PETH001)
- AC002 Accessory, Deluxe Probe Case PHDC1

Resonance 6 Probe Kit for Bond Testing

BondCheck & 75, 90, 165, 200, 250, 330kHz probes

KAETH002

- PETH075 Probe, Resonance, 75kHz Bond Testing
- PETH090 Probe, Resonance, 90kHz Bond Testing
- PETH165 Probe, Resonance 165kHz Bond Testing
- PETH200 Probe, Resonance, 200kHz Bond Testing
- PETH250 Probe, Resonance, 250kHz Bond Testing
- PETH330 Probe, Resonance, 330kHz Bond Testing
- ALL10-L08-015-BON Accessory, Lead, Lemo 10-Way - Lemo 8-Way, 1.5m
- AC012 Accessory, Hard Carry Case.

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 those by supplied by Baugh & Weedon, otherwise the warranty will be void and irreparable damage will occur to the instrument.
 - Options are AWEL002 (AC Charger),
 - AWEL006 (Dry Cell Pack) or
 - 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

When the BondCheck is powered up it will boot into a Pitch-Catch mode screen, as this is the default mode. Then depending on which probe is connected – the mode will change to Pitch Catch, Resonance or MIA mode accordingly.

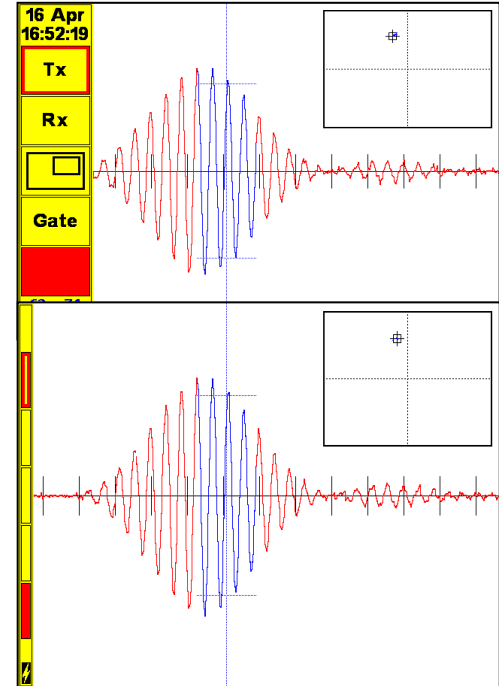
- Previous Settings – instrument will return to the settings used last time the equipment powered down.
- Load Favourite – select from one of the favourites on the right of the screen.
- Load & Save – short cut directly to the Load & Save Menu.
- Guide – the instrument can display guides. This item will 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 BondCheck, which is a quick guide to operating the instrument. On the left there are three functions.

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.

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.

One left press then returns to the Icon Side Bar.

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.



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

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 Bond Test Mode

The BondCheck provides operation with pitch-catch, resonance and MIA bond testing probes. Probes contain a Probe ID and memory for settings which can be used to automatically switch inspection mode and to store default and preferred settings for each probe.

5.1 Main Menu

Press the Menu/Back Key to reveal the Main Menu.

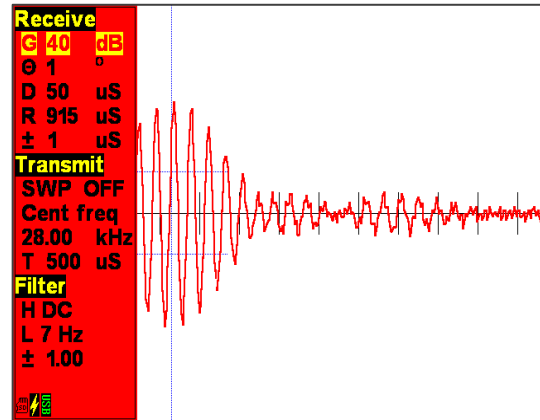
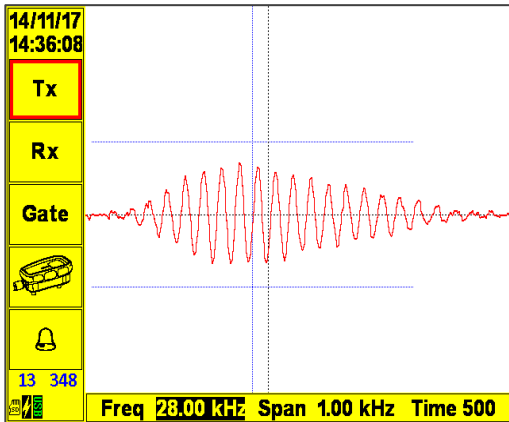
Depending on operation mode the screen may look different as menu items are automatically enabled and disabled depending on the mode that is currently being used.

19 Mar 9:48:36	Bond test		Configure	
	Probe	Transmit Receive Calibrate Filters Gate Summary	Appearance Power save Time & Date Load & Save About.. Lock	
	Tx			
	Rx			
	Gate			
		Display		Advanced
	Panes Graticule Spot Persistence RF Display	Alarm Alarm Zone Attachments Guides		
				

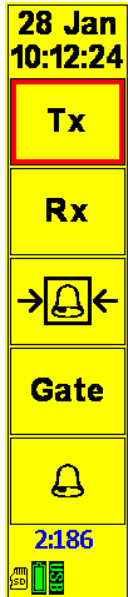
The Menu is divided into four panes for ease of use. The Right/Left Cursor Keys select the pane and the up/down cursor key select individual menu items. Press the Enter Key to select and the Menu/Back to

leave the item, then press the Enter Key to adjust the parameter and Enter once more to leave the parameter. Press the Menu/Back key again to return the user to the Operating screen.

From the Operating screen press the Right/Left Cursor Keys to show and hide the side bar. The red summary menu bar can be viewed by pressing Right twice.



5.1.1 Side Bar Programming Pane



Programming of the Side Bar icons is done via the Menu Screen. To remove one of the top 4 icons, select the un-needed 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 to add this item to the next available slot.

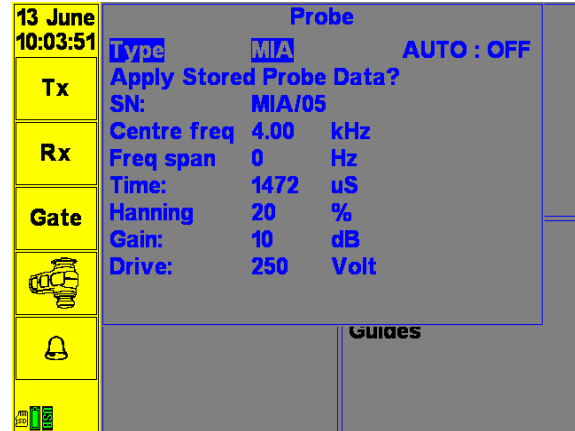
The 5th slot is always the last Menu Item that was viewed, provided that this is not already one of the top 4 items, or the alarm is activated.

5.1.2 Bond Test Pane

Parameters that can be adjusted are:

5.1.2.1 Probe

- Mode of attached probe.
- 'Apply stored probe data?' press to manually load the stored settings for this probe and switch inspection mode.
- SN: – Reports serial number of the probe.
- Config options allow current inspection settings to be saved to the probe, the probe settings to be returned to their default factory state, and for probe Auto-Detect to be turned on or off.



Displayed probe data – shows default settings:

Pitch-Catch / MIA	Resonance
Centre Frequency (kHz)	Centre Frequency (kHz)
Frequency Span (kHz)	Gain (dB)
Tone Burst duration (us)	Drive Voltage (V)
Hanning window (%)	Measured Resonant Frequency (kHz)
Drive Voltage (V)	

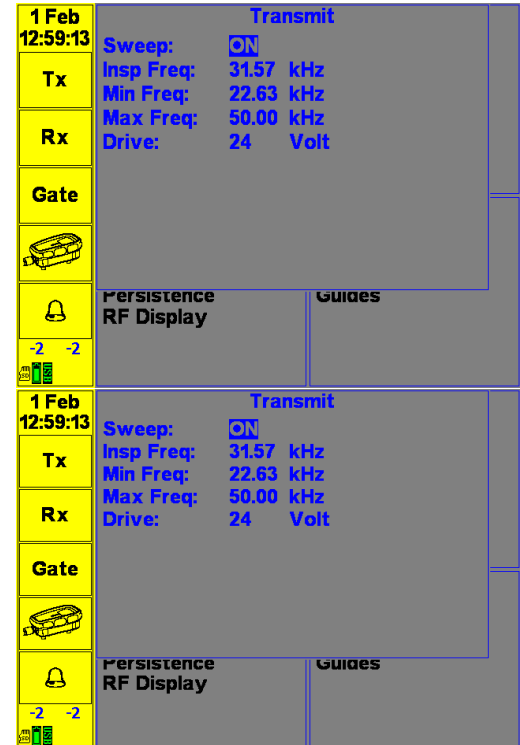
If the Probe is included in the side menu bar, an image of the probe type is displayed as a reminder of the current inspection mode.

5.1.2.2 Transmit

- Sets Transmitter – Frequency and Drive parameters.
- Sweep – Toggles frequency sweep mode between ON (bi-directional), ON- (unidirectional) or OFF in both pitch-catch and resonance modes.

In Pitch-Catch Tone-Burst

- Centre Frequency: Sets the inspection frequency, adjustable from 1kHz to 50kHz.
- Frequency Span: can be set to Zero (single frequency test) or to set up a short ‘chirp’ tone burst, range adjustable to 10kHz in 250 Hz steps.
- Time: Tone burst period, adjustable to 3.2ms maximum. The number of cycles is shown for information.
- Hanning: Applies a Hanning window to the drive signal to reduce unwanted harmonics, normally set to 50%.
- Drive Volts: Peak to peak voltage applied to transmit probe: 6V, 8V, 10V, 12V, 18V, 24V, 30V, 36V

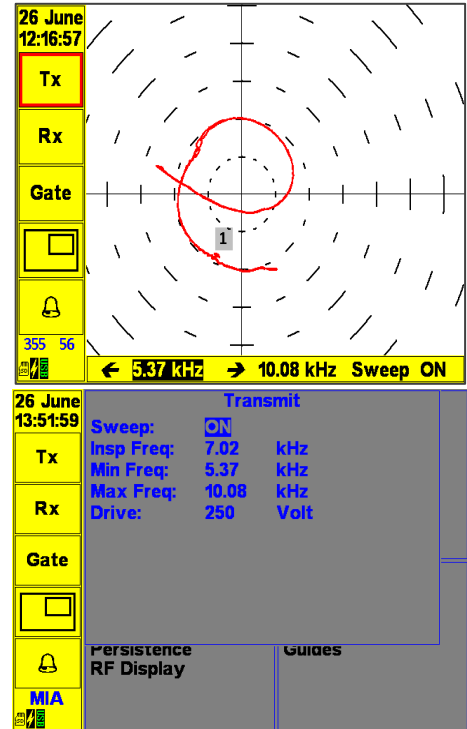


Frequency Sweep mode:

In frequency sweep mode, the BondCheck instrument scans continuously over a range of frequencies. The sweep may either be bi-directional or uni-directional.

Either the Inspection, Minimum or Maximum frequency may be adjusted depending on operator preference.

- **Sweep** -Toggles between Tone-Burst and Swept Frequency in Pitch-Catch/MIA modes and continuous wave Single Frequency and Swept Frequency in Resonance mode.
- **Inspection Frequency** – Frequency midway between Minimum and Maximum
- **Minimum frequency** – Start of the Frequency sweep.
- **Maximum frequency** – End of the frequency sweep.
- **Drive Volts:** Peak to peak voltage applied to transmit probe



In Resonance mode:

In Resonance mode tone-burst is not supported, but either single frequency or swept frequency inspections can be selected.

Inspection, Minimum and Maximum frequencies may be adjusted around the resonant frequency of the connected probe only.

In MIA mode:

For MIA inspections the instrument operates in tone-burst and continuous wave swept mode. Tone burst mode allows improvements to battery life over conventional continuous wave operation.

5.1.2.3 Transmit Lower Menu Operation

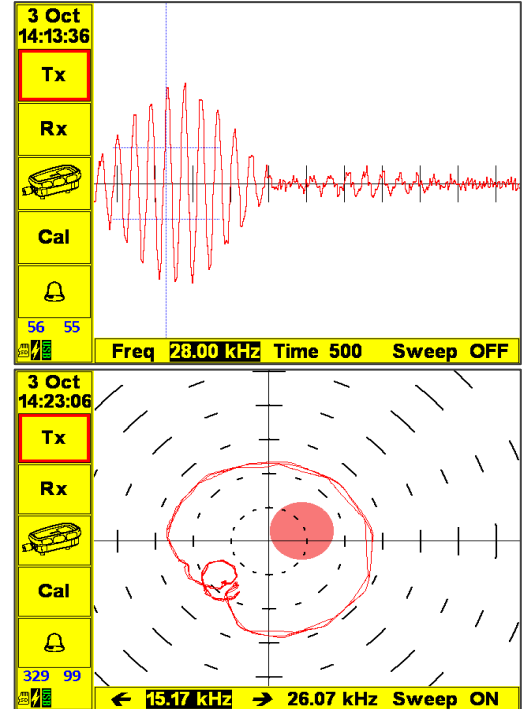
Pressing the Select key on the Tx menu item to view the Transmit Lower Menu allows the inspection frequency to be adjusted live whilst viewing the response.

In Pitch-Catch Tone Burst and MIA modes:

Freq: Displays the inspection frequency adjusted using the up/down keys. The Time will be automatically adjusted to maintain the same number of cycles.

Time: Displays the duration of the tone burst (pitch-catch in us, MIA in ms), adjusted using the up/down keys. The Frequency will be adjusted to keep the same number of cycles.

Sweep: Switches between OFF, ON. The display pane is switched between RF and XY automatically.

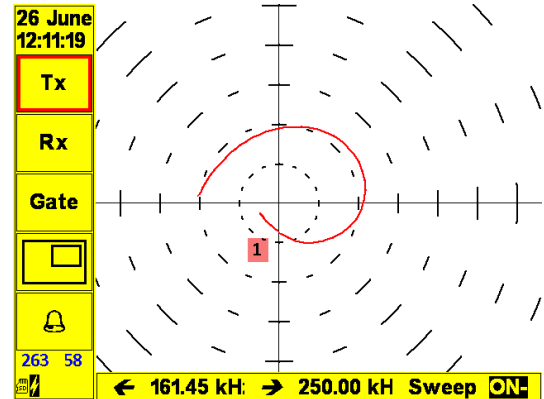


In Pitch-Catch and MIA Frequency Sweep mode:

<- and ->: Adjust the minimum and maximum range allowing coarse and fine adjustment of the Inspection Frequency.

In Resonance Sweep mode:

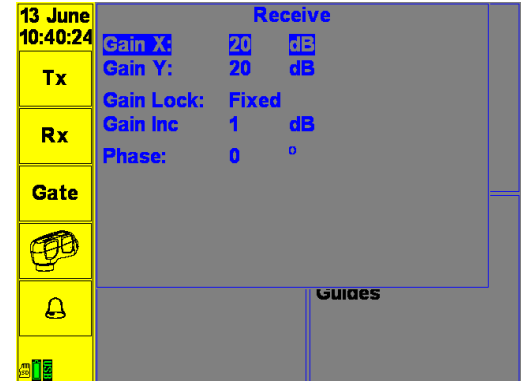
<- and ->: Adjusts the minimum and maximum range.
Uni-directional sweep mode can be selected with the “ON-“ option.



5.1.2.4 Receive

Receive parameters:

- Input Gain (dB) Amplifier gain in dB from 0dB to 60dB for Pitch-Catch tone burst and MIA modes, and from -30dB to 60dB for Pitch-Catch sweep and resonance modes.
- Gain Inc: Adjustment increment for Input Gain, can be set to 1, 3 or 6 dB
- Phase Rotation, in 1 degree steps



In Pitch-Catch tone burst and MIA modes:

- Time base Start, adjustable from zero to 1000us. Press left or right arrows to change increment size.
- Time base Range, adjustable from 100us to 2000us. Press left or right arrows to change increment size.
- Phase rotation is *not* applied to the RF view, but to the phase plane view only.

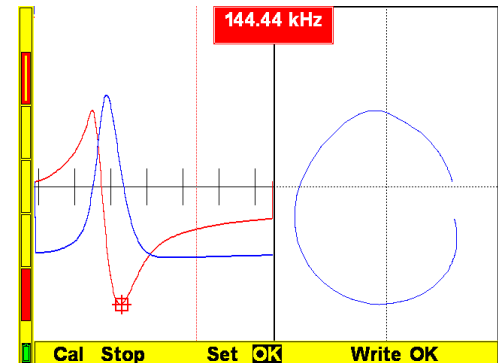
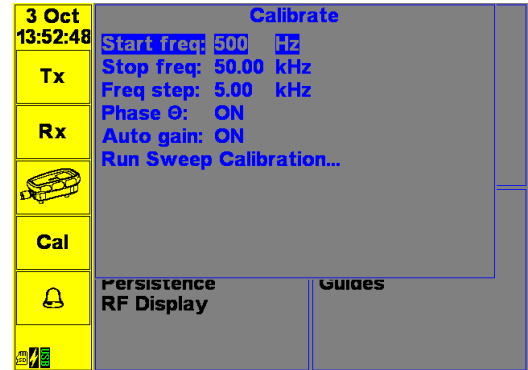
In Resonance mode:

- Gain X and Gain Y allow independent control of the phase plane gain.
- Gain Lock can be used to lock the Gain X and Gain to the same value.
- Phase applies a phase shift the phase plane view

5.1.2.5 Calibrate

The calibrate menu allows the operator to find the inspection frequency most sensitive to dis-bonds. In pitch-catch or MIA modes the tone-burst method is automatically selected. Amplitude is measured from the RF Gate and the phase is calculated at the current cursor position at the centre of the gate. Auto gain continuously adjusts the gain during the calibration process to improve the dynamic range of the measurement, and this is particularly useful on a new specimen where the likely inspection frequencies are unknown.

In resonance mode it's also possible to perform an air calibration to more accurately determine the exact resonant frequency of the probe. This is highly recommended in order to achieve the best measurement sensitivity. The Air Calibration view finds the resonant frequency of the probe in air.



The measured frequency is shown at the top of the screen.

Selecting Set OK sets the current inspection frequency to the resonant frequency measured.

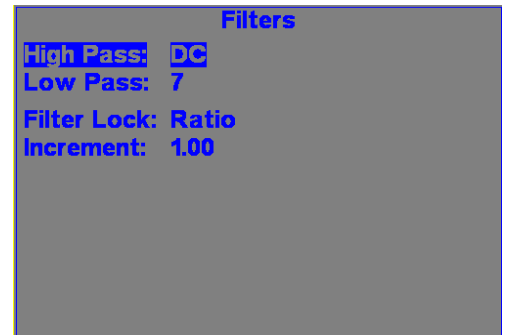
Selecting Write OK writes the air calibration frequency to the probe memory so that it can be recalled from the probe menu.

Selecting Cal Stop exits from the air calibration view.

Hint: The balance button may be used during air calibration to centre the probe response if required.

5.1.2.6 Filters

- **High Pass:** Fixed to DC in Tone-Burst Mode, and in Frequency Sweep mode settable from DC, 6 slow balance drift compensation filters from 0.01Hz to 0.5Hz and then conventional filters from 1 -2000Hz.
- **Low Pass Filter:** Selectable from 1 to 7Hz in Tone Burst mode and from 5-2000Hz in Sweep mode.

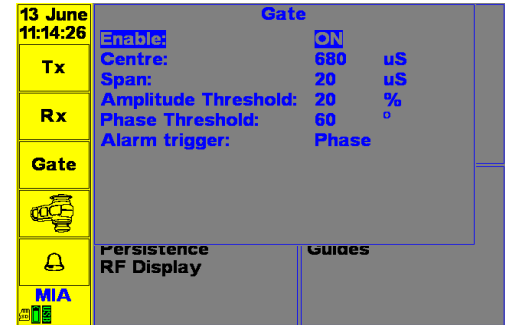


- **Filter Lock:** In Sweep Mode only, OFF = both filters may be adjusted separately and Ratio: where the filters stay a fixed ratio apart.
- **Increment:** Sets the step size for frequency adjustment.

5.1.2.7 Gate

Configures the A-Scan (RF Display) Gate in Tone Burst mode. This menu is not available in resonance mode.

- Status – Switch ON or OFF
- Centre: Position (us) of the centre of the gate at which phase measurements are made.
- Span: Active duration (us) of gate on either side of the centre over which amplitude measurements are made.
- Threshold: Signal Level (%) at which gate is triggered for the alarm. Amplitudes are measured if the gate is triggered or un-triggered.
- Alarm Trigger:
 - Amp normal – the alarm is triggered if the signal amplitude is larger than the gate amplitude threshold



- Amp inverted – the alarm is triggered if the signal amplitude is less than the gate amplitude threshold
- Phase – the alarm is triggered if the difference in phase compared to the balance point is greater than the phase threshold.

Hint: Pressing select on “Gate: ON” in the lower Gate menu automatically centres the gate on the waveform peak.

- RX -		Summary		- Alarm 1 -	
Gain	21 dB	Low	50	Type	Circle
Start	50 uS	- RF Display -		Height	17
Range	915 uS	Mode:	RF	Width	17
Phase	5 °	- Gate -		X Loc	57
- TX -		Status	ON	Y Loc	56
Sweep	On	Centre	301	- Alarm 2 -	
I-Freq	184.5kHz	Span	99	Type	Off
Min	149.0kHz	Thres	20	(0,0,0)	
Max	250.0kHz	Trig	Normal	- Alarm 3 -	
Drive:	12 V	- Alarm Setup -		Type	Off
- Calibrate -		Source	XY	(0,0,0)	
Start	500 Hz	Action	☉	- Alarm 4 -	
Stop	50.00 kHz	Stretch	2.0s	Type	Off
Step	500 Hz			(0,0,0)	
Phase	Off				

5.1.2.8 Summary

This menu item shows a single screen view of all the instruments current settings. Selecting a category heading and pressing the Select button will show the appropriate menu. Selecting an Alarm heading will display an expanded view of the alarm settings.

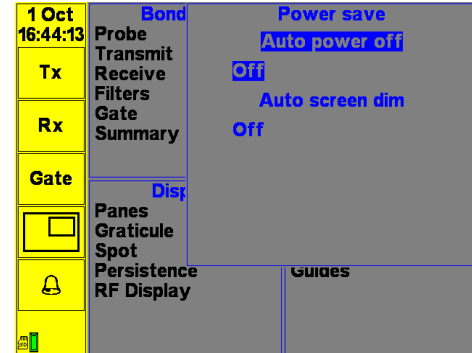
5.1.3 Configure Pane

5.1.3.1 Appearance

- Backlight: 10-100%. Lower backlight settings give substantially longer battery life.
- Screen Flip: Right Handed, Left Handed or Auto (uses internal sensor to set orientation)
- Scheme: Bright for outdoor use, Dark for indoor use, and Black & White.

Language

Allows selection of user interface language between English, French, Spanish, Italian, Portuguese, Russian, Turkish, Czech, Chinese and Japanese.



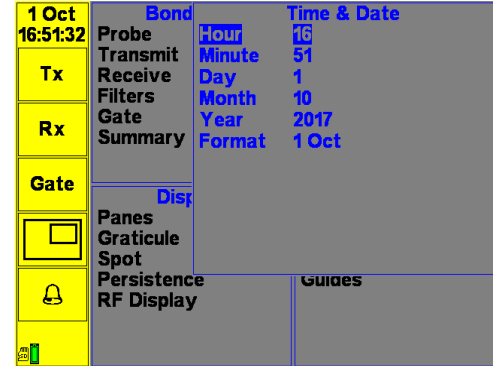
5.1.3.2 Power Save

Auto Power Off: Off, 5-60mins

Auto Screen Dim: Off, 5-60 mins

5.1.3.3 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 Mmm



5.1.3.4 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;

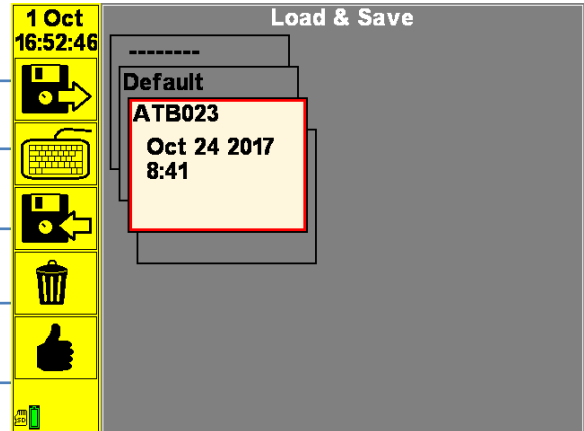
Recall from memory slot

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.

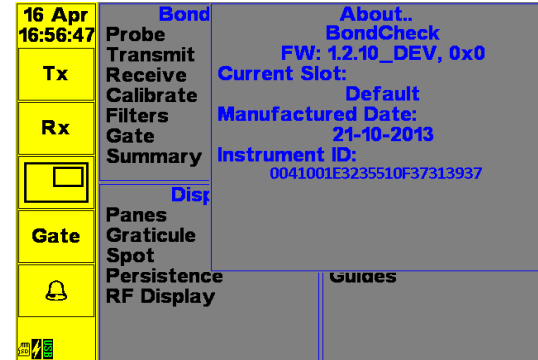


To create a new setting select the empty setting (with no name) and press enter.

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.



5.1.3.5 About

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

5.1.3.6 Lock

The BondCheck has the ability to restrict access to any menu item. Any menu item that is locked has a picture of a Padlock after its name in the main menu, and in the side bar.

A locked menu item 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.

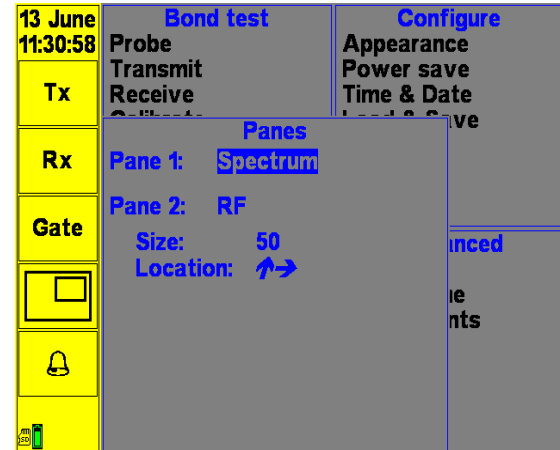
5.1.4 Display Pane

5.1.4.1 Panes

Each Pane can show a different waveform view type.

In Pitch-Catch and MIA Tone Burst modes, RF, XY and Spectrum views are supported.

The XY view is of the flying dot type.

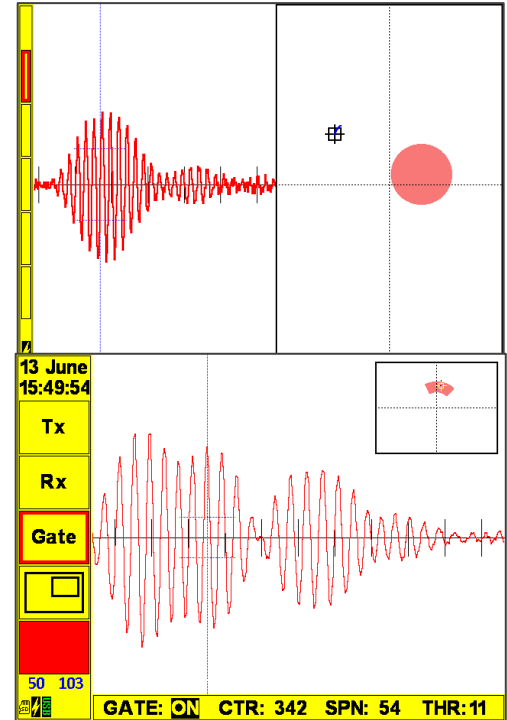


In Pitch-Catch Sweep and Resonance mode only the XY pane is supported, and the Pane menu item is not available.

The Spectrum view is not allowed in Pane 2 as there is insufficient space to display the required information in a reduced size pane.

Pane sizes and positions can be configured as follows.

- Pane 1: XY, RF or Spectrum
- Pane 2: Off, XY, RF or Spectrum.
 - Size: Size 5-50%
Note: 50% provides Equal sized left and right displays
 - Location: Up/Down to move Pane 2 position. Selectable from Top right, Bottom Right, Bottom Left, Top Left.



5.1.4.2 RF view

The RF view is available for Pitch-Catch and MIA inspections, the waveform may be rectified if desired although this is not recommended for phase measurements particularly in MIA mode where RF mode will provide the best results. Gain, delay and range can be set to suit the inspection requirements. If a gate is applied to the RF view, phase measurements are taken at the centre of the gate and the maximum amplitude measured across the width of the gate.

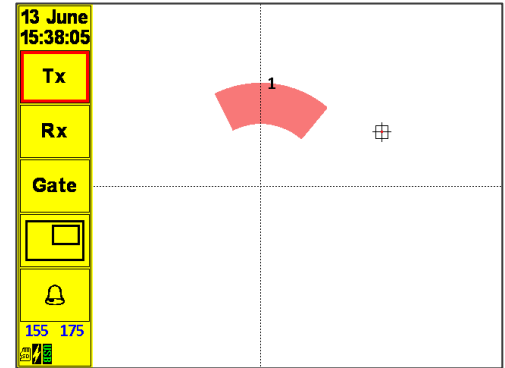
Hint: Highlight Gate ON and click Select to automatically set the gate position to the maximum amplitude of the response.

Hint: Pressing the Balance key in RF view subtracts the current waveform from the response. To reverse this operation press and hold Balance for 2 seconds.

5.1.4.3 XY View

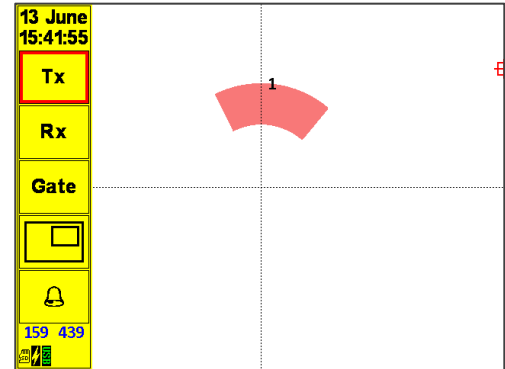
The XY view can be used in single frequency or swept frequency modes. In single frequency, a “flying dot” shows the current amplitude and phase measurement. For Pitch-catch and MIA probes the amplitude and phase are extracted from the gate on the RF waveform.

In swept mode the amplitude and phase at a number of frequency points throughout the sweep are shown with connected lines.



Alarms are triggered from numbered alarm zones on the XY plane.

If the measurement amplitude is sufficient to send the flying dot off screen, it's position is shown at the boundary of the display in red so that the phase angle can still be determined.



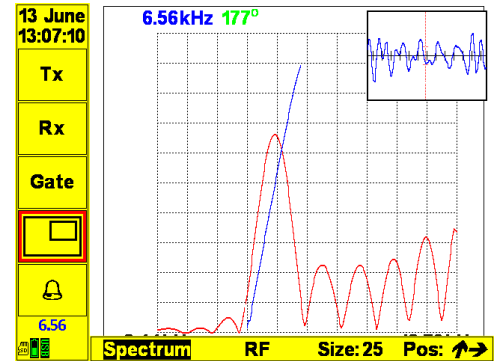
5.1.4.4 Spectrum View

The Spectrum view shows a Fast Fourier Transform frequency spectrum of the RF response from either Pitch-Catch or MIA probe types.

The peak frequency and phase are shown at the top of the display. The modulus FFT is shown with a red trace, and the phase spectrum is shown in blue. The phase display can be toggled on and off by selecting the Panes menu item in the side bar.

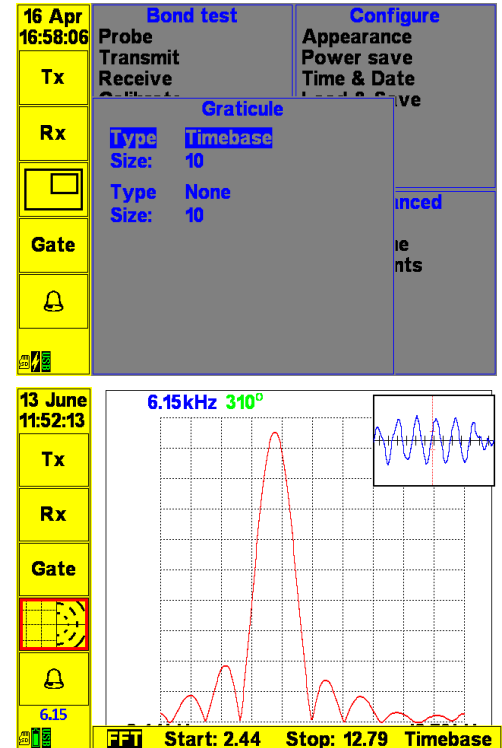
The start and stop frequency may be adjusted from the graticule menu.

There are currently no gates or alarms supported in Spectrum view.



5.1.4.5 Graticule

- Settings for the display graticule for pane 1 and panel 2
- For Pitch-Catch Tone-burst waveform views, only Time base Graticule is supported.
For Pitch-Catch Tone-burst, Frequency Sweep and Resonance modes, the XY plane views the Grid and Polar graticules are supported.
- For Tone-burst spectrum views, only the Frequency graticule is supported.
- The graticule lower menu can be used to set axis ranges in the Spectrum view.

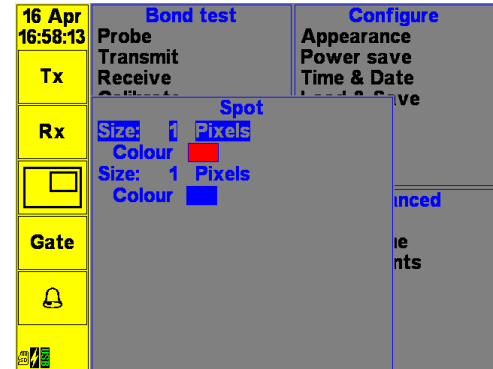


5.1.4.6 Spot

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

The setting also affects the line width in RF display modes.

- Size: To enhance the spot visibility choice of 1*1, 2*2 or 3*3 pixels
- Colour: Sets spot or line colour



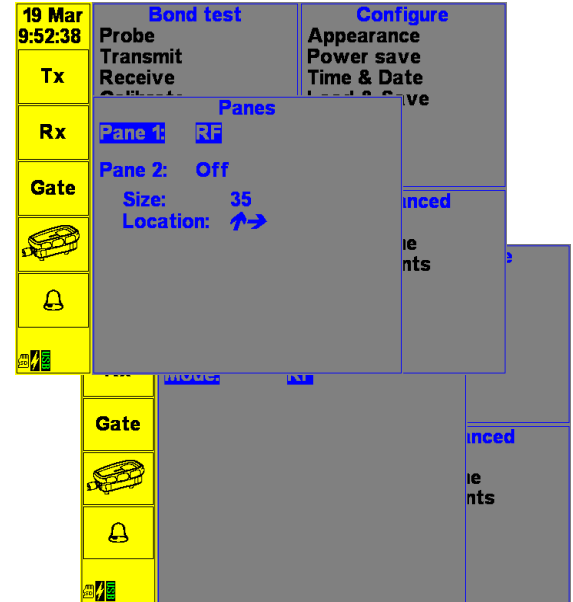
5.1.4.7 Persistence

Persistence and Time-base settings for Pane 1 and Pane 2 available in Sweep Mode only.

- Persistence – Time in Seconds that a point is visible in X-Y mode.

5.1.4.8 RF Display

- Rectification settings for A-Scan Display in Tone Burst mode
- RF – unrectified RF waveform.
- FW – Full wave Rectification.
- HWP - Half wave Rectified – Positive Half-cycle only.
- HWN - Half wave Rectified – Negative Half-cycle only.



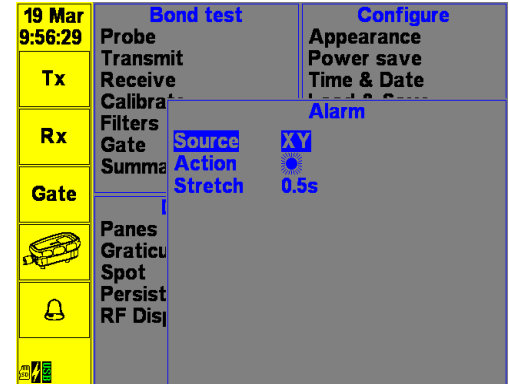
5.1.5 Advanced Pane

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

5.1.5.1 Alarm

Alarm: Audio and Visual Alarm

- It is important to remember to select the appropriate alarm source to suit the bond testing setup used.
 - XY - Alarm Zones from X-Y phase display
 - RF – Alarm Gate on A-Scan in Tone Burst mode
 - Both – Alarm triggered from both XY and RF sources
- Action: audio alarm, freeze, audio alarm and freeze, visual only
- To use the LED on the Bond Testing probes select the audio alarm setting.
- Stretch: Time alarm stays on after activation from 500ms to 10s.



5.1.5.2 Alarm Zones

Alarm zones are used in the XY plane, and are not used in the RF or Spectrum displays.

- Type: Off, Sector, Circle Box
- Up to 32 alarm zones may be added and each is identified with a number in the XY plane
- Any mixture of alarm zone types is permitted.

Sector type:

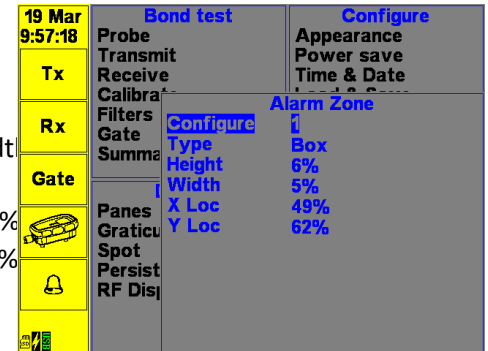
- Origin (%)
- Width (%)
- Angle (°)
- Span (°)

Circle type:

- Height/Width (%)
- X location (%)
- Y location (%)

Box type:

- Height/Width (%)
- X location (%)
- Y location (%)



Note:

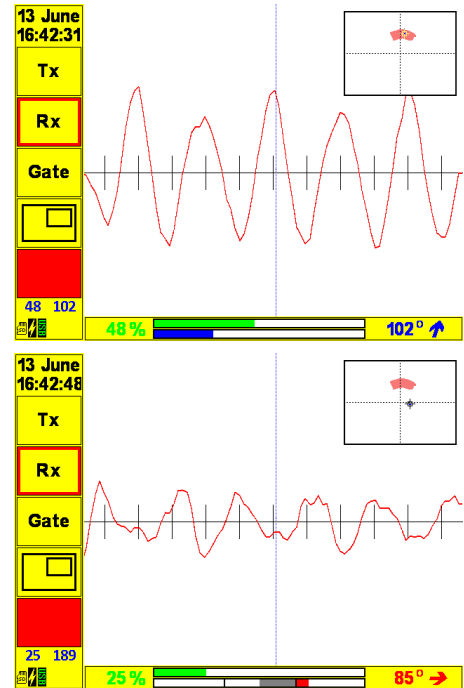
Alarm Zones may be added or edited in this menu as well as during live operation as shown in Section 8.3.4

5.1.5.3 Amplitude and Phase Bar Graphs.

To display a bar graph showing the current amplitude and phase measurement, press select on the Pane icon in the side menu. Depending on the Gate settings, a bar graph will be displayed with phase and amplitude thresholds, showing the current measurement.

The bar graph display is particularly useful for MIA inspections where the phase shift of the RF signal may be missed by the operator.

Pressing the Balance button will balance the phase measurement and the bar graph now displays phase gate thresholds. If the measured phase exceeds the thresholds the bar and the phase value are displayed in red.

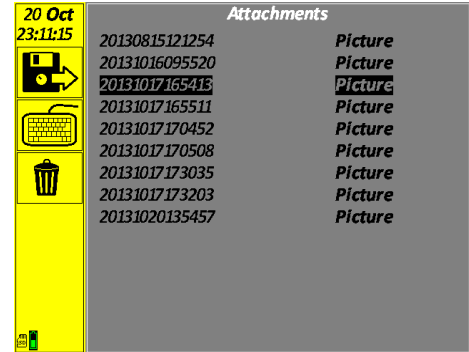


5.1.5.4 Attachments

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.

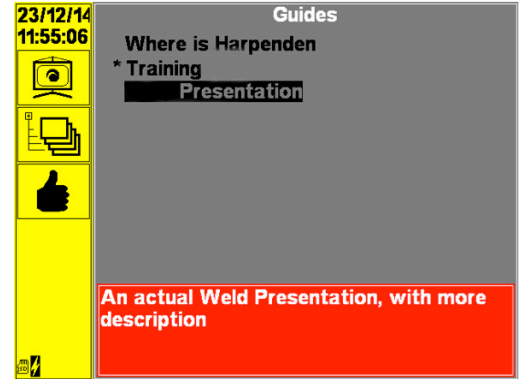


5.1.5.5 Guide Tool

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.



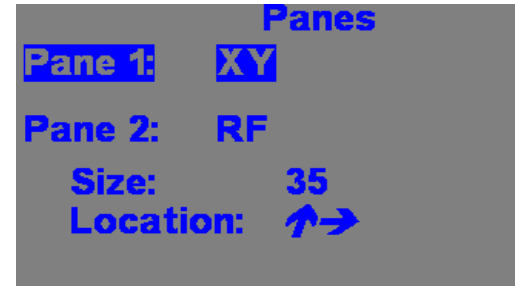
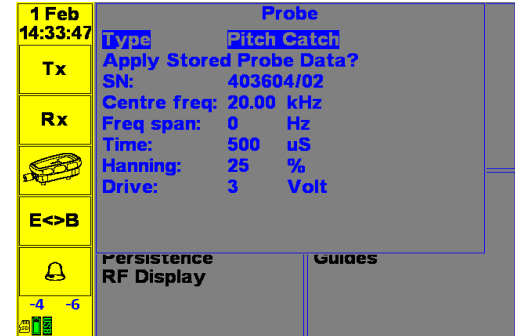
6. Setting the BondCheck to perform a Pitch-Catch Bond Testing inspection

6.1 With a configuration file

If you have a configuration file for the probe, load the setting file as described in section 5.1.3.4 It is a recommended practice to validate that the settings loaded by the software are correct for the probe type. 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. Ensure that the probe is plugged into the instrument, and in Probe Menu, check that the probe type is correct. Optionally select to Apply Stored Probe Data in order to set up probe defaults.



3. Transmit settings will depend on the application, suggested starting point Sweep OFF (tone burst mode), Centre Frequency 25kHz, Drive Volts 24V.
4. In Receive Menu set Gain to approx 20 dB. Set Delay to zero, set range to 1000us
5. In Filters set High Pass to DC, Set Low Pass to 6Hz
6. Gate settings will depend on the application, suggested starting point Start 150us, width 200us, threshold 20%
7. Set the display type you require to use with the Display configuration.
RF is recommended for tone burst mode,
8. Adjust the gain and phase to obtain the response required by the inspection procedure.

6.3 Sample application setup

By default the instrument has a number of factory settings.

These may be reviewed in the Load & Save function

- “ATB023” - Pitch Catch – Sweep OFF – Bond/Dis-bond Sample
- “ATB023 SMODE” – Pitch Catch - Sweep ON – Bond/Dis-bond Sample

The above settings may be used as a starting point for a wide range of inspections using, a specially machined test coupon with a machined window of reduced stiffness to simulate a near surface disband.

6.3.1 Using the default factory settings

Equipment Needed

Instrument: IBON001

Probe: PETH001

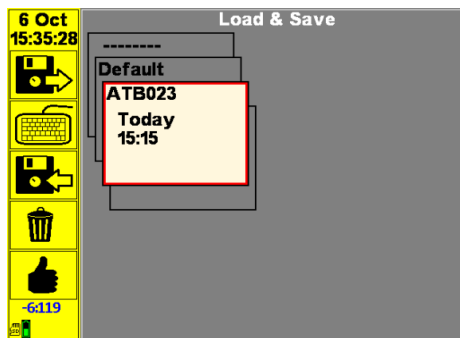
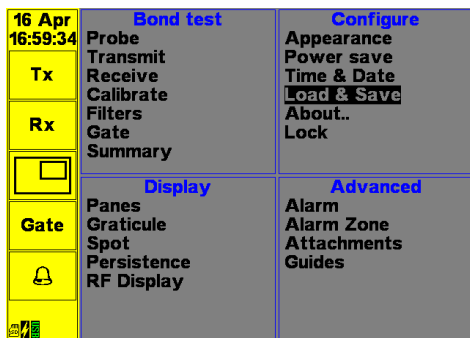
Lead: ALL10-L08-015PC

Test Block: ATB023



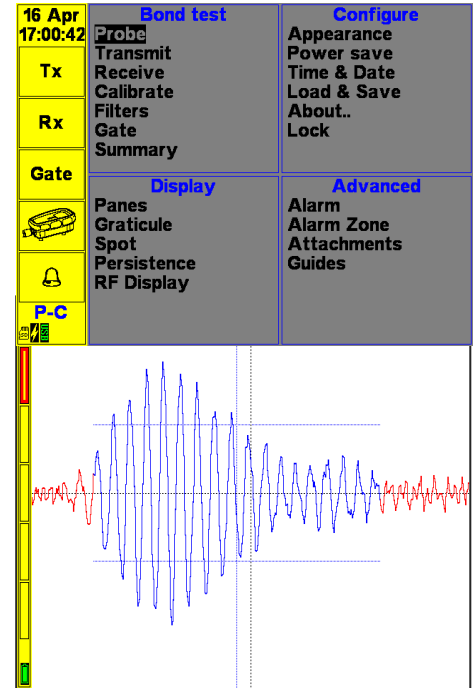
Procedure

1. Plug yellow end of lead into the instrument and the black into the probe as shown above.
2. Power on instrument with a long press on the green power button.
3. Using the down arrow button scroll to “Load & Save” under the Configure window, press OK, select “**ATB023**” folder, and press OK then press OK again.

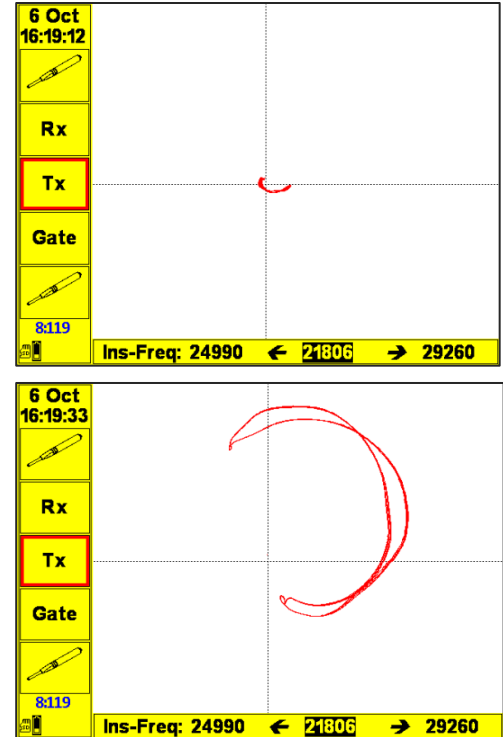


4. Scroll to “Probe” under the Bond test window, press OK. In Probe menu ensure that the probe type is detected and default settings are correct, as shown below:

5. Press the menu button twice.
6. Position Pitch-Catch probe on area away from the simulated defect area (as shown below), applying light pressure so that the guide feet touch the test coupon, the expected response is low amplitude (<5%)
7. Position Pitch-Catch centrally probe on area over the simulated defect area, the expected response is a high amplitude echo as shown below. It should be possible to achieve an echo amplitude of 25%-30%. **Ensure that the Alarm LED comes on when the gate is broken.**
8. Press the menu button, using the down arrow button scroll to “Load & Save” under the Configure window, press OK, select “ATB023 SMODE” folder, and press OK then press OK again. (**Settings can be found in Appendix 2**)



9. Scroll to “Probe” under the Bond test window, press OK.
In Probe menu ensure that the probe type is detected and default settings are correct
10. Press the menu button twice.
11. Position Pitch-Catch probe on area away from the simulated defect area applying light pressure so that the guide feet touch the test coupon, the expected response is as shown in the top figure
12. Position Pitch-Catch centrally probe on area over the simulated defect area, the expected response is a high amplitude as shown in the lower figure.



6.3.2 Honeycomb bond inspection – fixed frequency, manual calibration.

These notes are offered as a guide to help carry out a test for top surface dis-bonding. This uses the RF Display, with a simple A-Scan gate. This test is set up to operate at 25 kHz, which can be considered as a typical frequency for this type of test. On the first generation instruments using this principle (1970's) it was the only frequency available. Typically it will be suitable for sandwich structure with skin thicknesses of the order of 0.5 to 2mm or so. Optimal frequency for thin materials will be higher, and for thick skins will be lower

Probes and cables:

- BondCheck Pitch-Catch Probe type PETH001
- BondCheck Pitch Catch Cable ALL10-L08-015PC

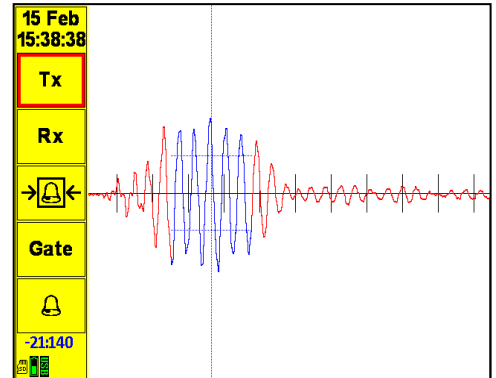
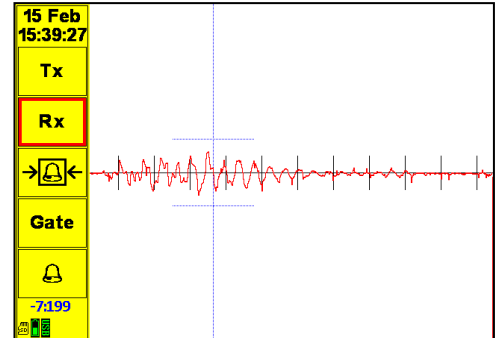
Test Blocks:

- Standard composite honeycomb test block as appropriate

6.3.2.1 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, (BT MAN-25k) 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 in a 'good' area. Hold the probe firmly down against the surface so that the probe tip springs are compressed slightly
7. A relatively low amplitude signal should be seen
8. The A scan should not go outside the gate region (blue lines). Move around the part and check that (away from the edges and programmed defects) this remains the case
9. Scan the probe over the Top skin defect and note signal response. The trace should go well above the gate threshold.
10. If more or less sensitivity is required, use the Gain (Rx key) or Quick-Menu to increase or decrease signal amplitude as required.
11. Carry out scan of the reference sample, ensuring that the gate is reliably triggered by the relevant programmed defects.

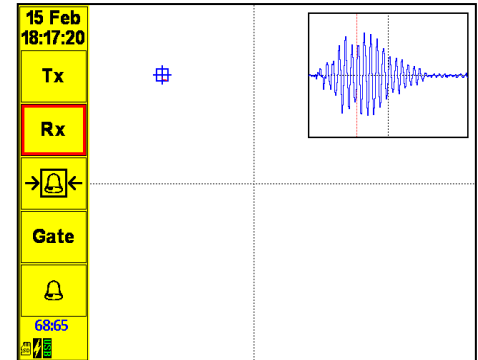


Notes:

- Where possible always use a Reference Standard, which is a similar material to that which is to be inspected.
- Always try and keep the probe pressure on the surface consistent.
- Scan in a regular pattern and at an even speed.

6.3.3 Using the XY Display

1. Set up as above
2. Press the menu key and select 'Panels'
3. Set Pane1 to 'XY' and Pane2 to 'RF'
4. Place the probe on a defect-free area of the Test Panel.
5. Press the upper balance Button
6. The Instrument will display 'Balancing' after a few seconds it should stabilise near the centre of the screen.
7. Move the probe over the dis-bond. The spot should move.
8. Rotate the Phase control to place the spot in the desired position.
9. Set up Box / Area gates as desired. (see next section)




6.3.4 Alarm Configuration

In Bond Test mode the XY display of the BondCheck allows up to 32 Box, Circular or Sector Gates to be configured.

6.3.4.1 To set an Alarm

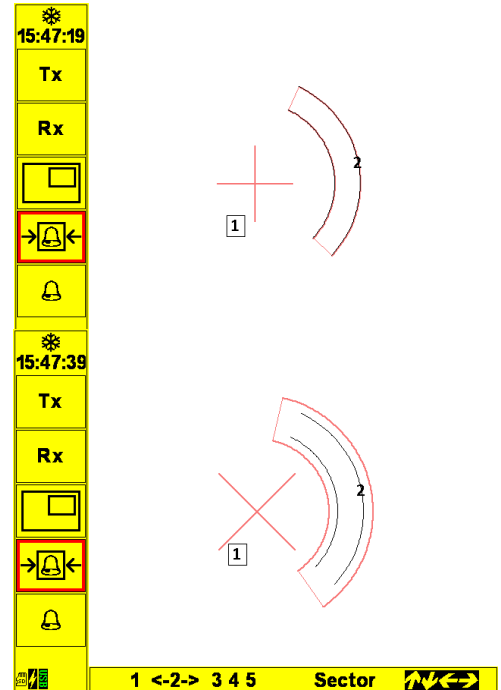
1. Select the Alarm Zone icon and press select.
2. The menu bar will show selected Alarm number, Alarm type and Arrow keys.
3. Select the Alarm number (up / down arrow key).
4. Select the desired alarm type (e.g. Sector).
5. select the Arrow key group and press the 'UP' key, a + symbol will appear in the middle of the alarm zone together with the alarm zone number,
6. Use the arrow keys to position the box.

7. To resize the box press the upper balance button.  The + symbol in the box will change to an X. The arrow keys can then be used to change the size of the box around the same centre position.
8. Once the alarm box is positioned and sized press the select key. To take the alarm zone back to the centre of the screen, long Press (greater than 3 seconds) the upper or lower balance button.
9. To create another alarm box, select the Alarm number and choose the type (note that only one is shown at a time in set up mode). The new Alarm zone can be positioned and re-sized as above once Gate sizing and positioning is complete press select, the + or X will disappear.

To delete an alarm zone, select the Alarm number and turn it OFF.

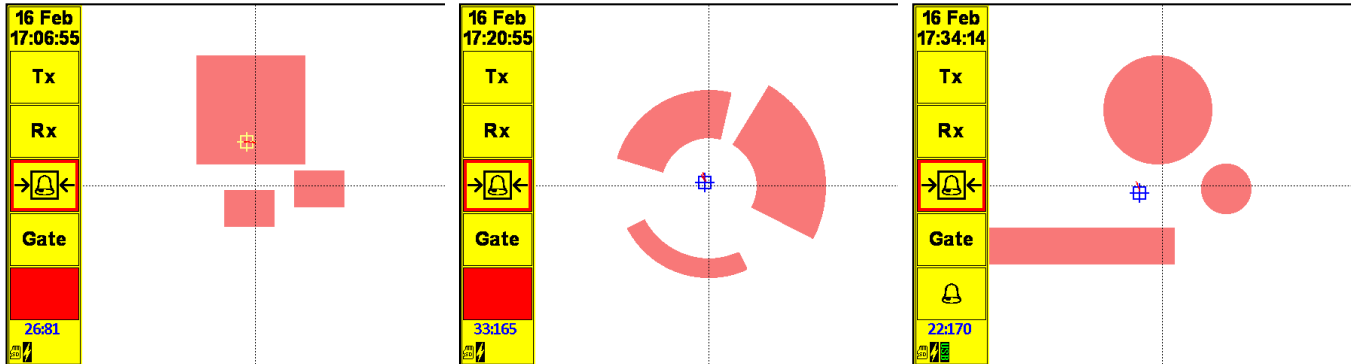
Once alarms are set up press the MENU / Back button. All Gates will now show on screen as coloured regions identified with numbers.

Note:



Alarm zones may also be added or edited in the Advanced main menu pane as explained in Section 7.2.5.2

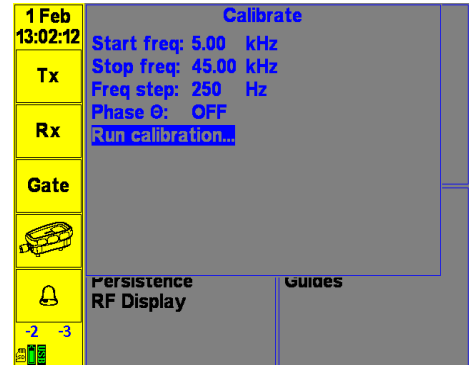
Alarm zones of different types: Circles, boxes and sectors are all set up in the same way.



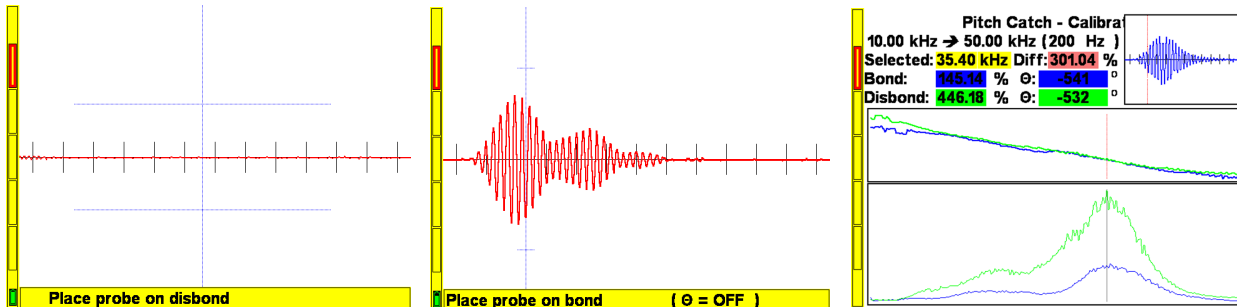
6.4 Using Automatic Frequency Optimisation

The BondCheck can automatically scan through a range of frequencies to select the optimal choice for a given application. To use this feature:

1. Select the Calibrate menu in the left menu bar
2. Set a suitable frequency range in the calibration menu section depending on the type and frequency of probe (for example 5kHz to 50kHz).
3. Set the step size, a smaller step size will result in a longer calibration time but a more accurate frequency selection.
4. Start the calibration process from the menu, or from the Transmit menu shortcut as shown in Section 7.2.2.3.
5. The instrument will provide a live display and prompt “Place Probe on bond”.
6. Press the Up/Down keys to switch between calibration in continuous mode ($\theta = \text{OFF}$) and tone burst mode with phase plot ($\theta = \text{ON}$). In continuous mode the average waveform amplitude is recorded, in tone burst mode the amplitude and phase measurement are made at the gate position.
7. Press the probe firmly on to a region of the part away from the defect and press the soft key again
8. The instrument will run through the available range of frequencies and log the results.
9. The instrument will provide a live display and prompt “Place Probe on disbond”



10. Press the probe firmly on to a region of the part away from the defect and press the soft key again
11. The instrument will run through the available range of frequencies and log the results. Ensure that as the frequency sweep takes place, that the signal displayed does not exceed 100%. Reduce the gain and repeat as necessary.
12. The instrument will then show the frequency at which there is the greatest difference in amplitude between the bond and dis-bond conditions as a suggested inspection frequency. This can be modified using the left / right arrow keys, the absolute amplitude and phase recorded together with the amplitude difference is shown.
13. In Tone burst mode ($\theta = \text{ON}$), amplitude and phase measurements will be shown. In continuous mode OFF) only the amplitude measurement is shown.
14. Press select to accept the selected frequency.



7. Connectors

Connector (8-way Lemo) pitch-catch and MIA configuration

Model: LEMO: ECG.1B.310.CLL

Mating Connector: LEMO FGG.1B.310.CLAD52Z

Probe Connector: LEMO FGG.1B.308.CLAD52Z

Pin	Name	Description	Note
1	Probe Drive 1	Connection to transmit piezo	
2	Probe Drive 2	Connection to transmit piezo	
3	RX+	Connection to receive piezo	
4	RX-	Connection to receive piezo	
5	Data I/O	1 wire serial comms for probe ID	
6	GND		
7	LED output	Open drain LED output drive	
8	+5V		

Connector (8-way Lemo) Resonance configuration

Model: LEMO: ECG.1B.310.CLL Mating Connector: LEMO FGG.1B.310.CLAD52Z

Probe Connector: LEMO FGG.1B.308.CLAD52Z	Name	Description	Note
1	Bridge +	Differential receive input	
2	Bridge -	Differential receive input	
3	Output GND ref	Output ground reference for transmit piezo	
4	Probe Drive	Signal output for transmit piezo	
5	Data I/O	1 wire serial comms for probe ID	
6	0V		
7	LED output	Open drain LED output drive	
8	+5V		

8. Software Update and System Recovery

8.1 Updating *BondCheck* software

1. To update the *BondCheck* 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 *BondCheckv0000.hex*.
2. There are 2 methods of getting the file on to the microSD Card:
 - Remove the card and place it in a micro SD Card Reader connected to a PC. Then use the PC to copy the file on to the card. The file **MUST** be in the **\BondCheck** directory!!
 - Use the PC package *ETHerRealtime* that is available from *ETHerNDE* for controlling and communicating with an *BondCheck*. See the section below on using *ETHerRealtime* to copy the file on to the micro SD card, again, ensuring that it is in the **\BondCheck** directory.
3. Now that the file is present on the card and in the **\BondCheck** directory:
 - Power OFF the *BondCheck*.
 - Hold the LEFT key and turn the *BondCheck* 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 \BondCheck 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 BondCheck 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 BondCheck may be unusable as an bond testing 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.

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.

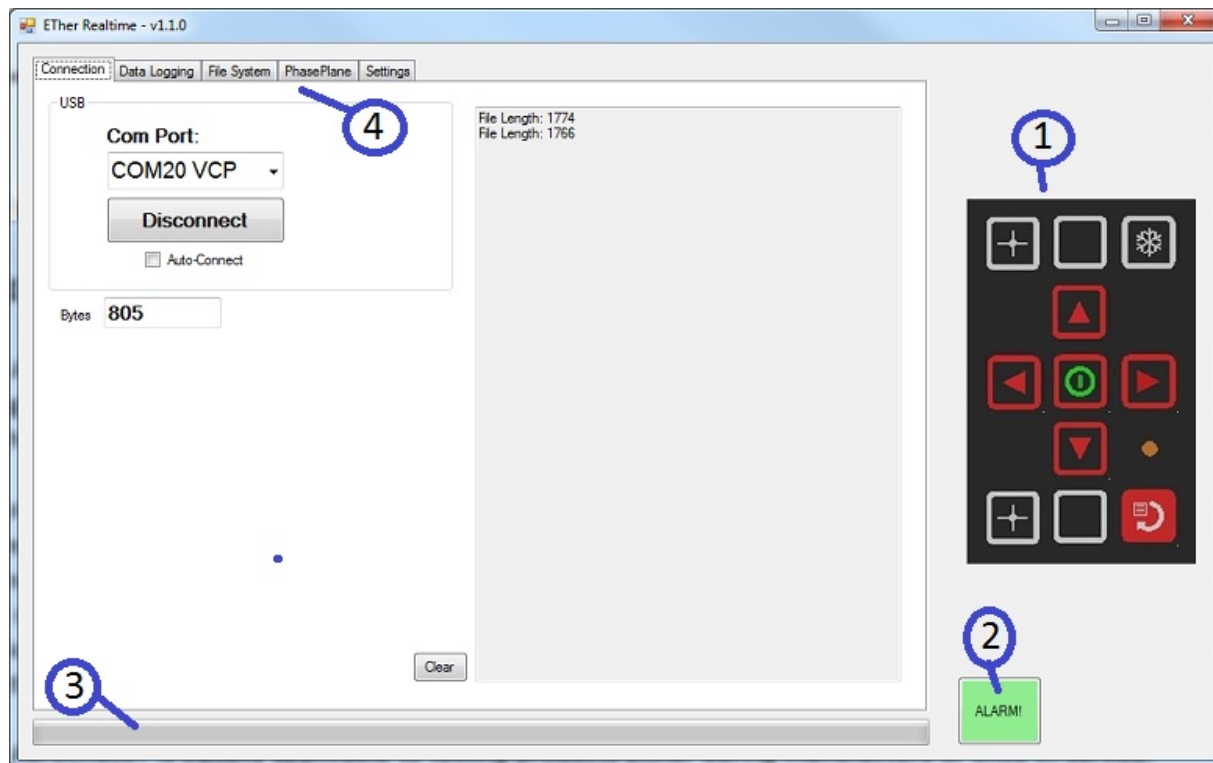
8.3 ETHERRealtime PC Package

To connect to the BondCheck from a PC, the **ETHERRealtime** 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.

ETHERRealtime PC allows remote control of the BondCheck 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 PowerEnter 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.



8.3.1 BondCheck Tabs

8.3.1.1 Connection

When an BondCheck 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.

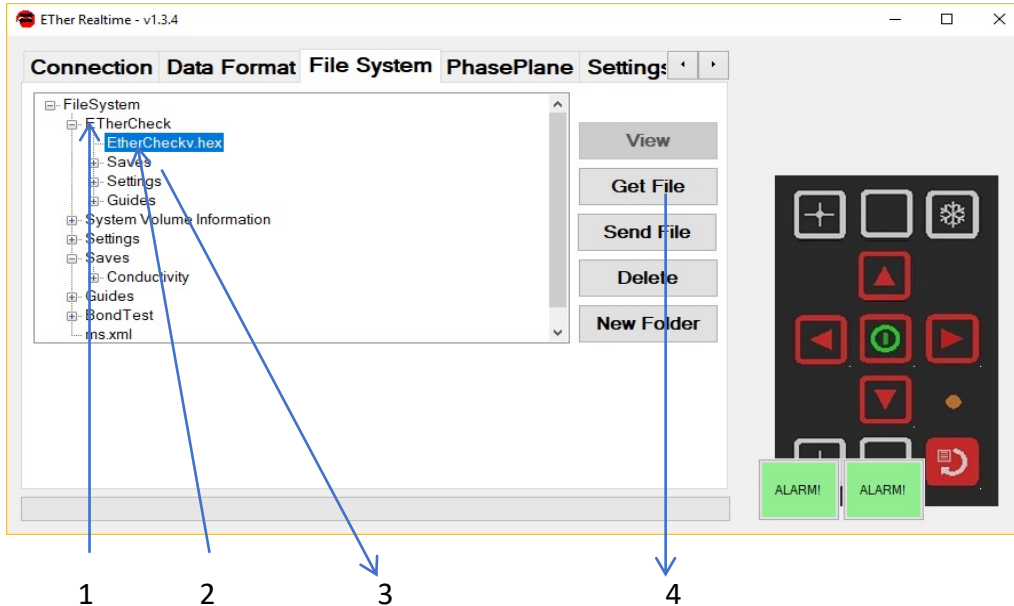
8.3.1.2 Data Logging

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 PhasePlane tab to show data.
- Post Process – This shows realtime post processed data for Channels 1, 2 & Mix.
- Raw – Raw Eddy Current data from the probe for channels 1 & 2.

- None – Shows nothing.

8.3.1.3 File System



When a BondCheck 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 EtherCheck 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 the BondCheck (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 the 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 BondCheck):
 - 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 BondCheck) : 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 BondCheck. 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.

8.3.1.4 Phase Plane

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

8.3.1.5 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.

9. Specification

9.1 Bond testing specifications

Pitch-Catch Probe	Connector	10w Lemo 1B series
	Identification	Probe type and serial number automatically recognised by instrument
	Alarm	LED indicator in probe triggered by Alarm/Gate
	Frequency	Wide band, 30kHz nominal
	Frequency range	500Hz – 50kHz, PRF: 14Hz
Resonance Probes	Connector	10w Lemo 1B series
	Identification	Probe type and serial number automatically recognised by instrument
	Alarm	LED indicator in probe triggered by Alarm/Gate
	Frequencies	75, 90, 165, 200, 250, 330kHz
MIA Probes	Connector	10w Lemo 1B series
	Identification	Probe type and serial number automatically recognised by instrument
	Alarm	LED indicator in probe triggered by Alarm/Gate

	Frequencies	1-10 kHz depending on application
Transmit	Pitch-Catch	
Tone Burst	Output Voltage	1, 3, 6, 8, 10, 12, 18, 24, 30, 36V _{pk-pk}
	Load Impedance	Minimum load impedance 300Ω
	Waveform Type	Configurable tone burst/chirp with variable Hanning window Transmit waveform points maximum: 8192 Waveform duration: Maximum 3.2ms
Sweep	Output Voltage	12, 24, 36V _{pk-pk}
	Frequency range	5kHz to 50kHz
	Load Impedance	Minimum load impedance 300Ω
	Waveform Type	Continuous sinusoidal bi-directional waveform sweep
Transmit Continuous Wave	Resonance	
	Output Voltage	12, 24, 36V _{pk-pk}
	Load Impedance	Minimum load impedance 300 Ω
	Frequency range	30-130kHz, 100-200kHz, 150-250kHz, 200-300kHz, 250-350kHz, 300-400kHz
	Waveform Type	Continuous sinusoidal single frequency, uni-directional or bi-directional sweep
	MIA	
	Transmit	
Tone Burst	Output Voltage	12, 24, 36V _{pk-pk} converted to 80, 150, 200, 250V _{pk-pk} in probe assembly
	Load Impedance	Minimum load impedance 300Ω
	Waveform Type	Configurable tone burst/chirp with variable Hanning window Transmit waveform points maximum: 8192 Waveform duration: Maximum 10ms

Sweep	Output Voltage	8, 12, 24, 36V _{pk-pk} converted to 80, 150, 200, 250V _{pk-pk} in probe assembly
	Frequency range	2kHz to 10kHz
	Load Impedance	Minimum load impedance 300Ω
	Waveform Type	Continuous sinusoidal bi-directional waveform sweep

Receive	Pitch-Catch	
Tone Burst	Sample rate	440ks/s
	Bit depth	16 bit
	Gain	0 to 60dB
	Bandwidth	5kHz to 100kHz
	Time base range	100us to 2ms
	Time base delay	0us to 1ms
	Rectification	RF, full wave, half wave negative, half wave positive
Sweep	Gain	-30 to 60dB
	Bandwidth	DC – >1MHz
	Filtering	Adjustable high and low pass filters
Receive	Resonance	
	Gain	Separate X and Y control -30 to 60dB in 1dB steps
	Phase rotate	1 degree steps
	Bandwidth	DC to >1MHz
	Filtering	Adjustable high and low pass filters to suit probe frequency
Receive	MIA	
Tone Burst	Sample rate	100ks/s
	Bit depth	16 bit

	Gain	0 to 60dB
	Bandwidth	2kHz to 10kHz
	Time base range	100us to 22ms
	Time base delay	0us to 22ms
Sweep	Gain	-30 to 60dB
	Bandwidth	DC to 10kHz
	Filtering	Adjustable high and low pass filters
Display	Display modes	Tone Burst, XY single frequency and sweep, and Spectrum with phase
	Configurable Screen	Full Screen or Dual Pane with variable size and location and function
	Live read-out	Amplitude and phase at gate position Bar graph of amplitude and phase
	Alarms/Gates	Up to 32 Box, Circle or Sector region alarms in XY mode Gate in RF mode: With adjustable position and amplitude.

9.2 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		
	VGA	Full 15 way VGA output (EC screens only)
Languages		English, French*, Spanish*, Russian*, Japanese*, Chinese*, Turkish*.
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 6 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	Setup Storage	microSDHC 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

Baugh & Weedon Ltd

Of

Baugh & Weedon Ltd
Burcott Business Park,
Burcott Road,
Hereford,
Herefordshire,
HR4 9JQ
United Kingdom

Hereby declare that:

Equipment: BondCheck Bond Testing Flaw Detector

Model Number: IBON001

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.