

TESSONICS

RSWA

Resistance Spot Weld Analyzer

User's Guide

2008-02-05

Tessonics Corporation has made every effort to ensure the accuracy and completeness of this document; however, because ongoing efforts are made to continually improve the capabilities of our products, we cannot guarantee the accuracy of the contents of this document. We disclaim liability for errors, omissions, or future changes herein.

Tessonics and the Tessonics logo are trademarks of Tessonics Corporation.

Fujitsu and the Fujitsu logo are registered trademarks of Fujitsu Limited.

Intel and Pentium are registered trademarks of Intel Corporation.

Microsoft is a registered trademark of Microsoft Corporation. Windows 2000 and Windows XP are trademarks of Microsoft Corporation.

All other trademarks mentioned herein are the property of their respective owners.

Copyright 2007 – Tessonics Corporation. All rights reserved. No part of this document may be copied, reproduced, or translated, without the prior written consent of Tessonics Corporation.

Contents

1 Getting Started	1
1.1 Damage in Transit	1
1.2 Setting Up	1
2 Hardware	3
2.1 Overview	3
2.2 Probe	4
2.2.1 Usage	4
2.2.2 Cleaning and Maintenance	4
2.3 CPU Unit	5
2.3.1 Features	5
2.3.2 Status Indicators	6
2.3.3 System States	7
2.3.4 Screen Protector	8
2.3.5 Storing	9
2.3.6 Using the Hotpad	9
2.3.7 Using Hovering Mode	10
2.4 DSP Board	11
2.5 External Battery	12
2.5.1 PowerPad 80	12
2.5.2 Universal Battery	13
2.6 Charger/AC Adapter	14
2.7 Soft Case	14
3 Common Software Features	15
3.1 On-Screen Keyboard	15
3.2 Login Prompt	17
4 Launcher	19
4.1 Main Window	20
4.2 Logging In and Out	20
4.3 Turning Off	21
4.4 Switching Between Applications	22

4.5	Accessing a USB Drive	22
4.6	Launcher Tabs	23
4.6.1	Settings Tab	24
5	Array Explorer	27
5.1	Main Window and Terminology	28
5.2	Button Area	29
5.3	C-Scan Area	30
5.4	A-Scan Area	31
5.5	Measurement History	32
5.6	Settings (Standard)	32
5.6.1	Cont. Mode	32
5.6.2	User Interface	32
5.7	Settings (Advanced Mode)	33
5.7.1	Algorithm	33
5.7.2	Hardware	33
5.8	Settings (Admin Mode)	34
5.8.1	Waveform	34
5.8.2	Adjust Signal	34
5.9	Information	34
5.10	Inspections	35
5.10.1	Custom Inspection	35
5.10.2	Part Inspection	38
5.10.3	Opening Inspections	40
A	Specifications	43
	Index	45

Chapter 1

Getting Started

The Tessonics Resistance Spot Weld Analyzer (RSWA) has been designed and manufactured as a high quality instrument. Under normal working conditions the RSWA will provide long, trouble-free service.

1.1 Damage in Transit

Inspect the unit thoroughly and immediately upon receipt, for evidence of external or internal damage that may have occurred during shipment. Immediately notify the carrier making the delivery of any damage, since the carrier is usually liable for damage in shipment. Preserve packing materials, waybills, and other shipping documentation in order to claim any damages. After notifying the carrier, contact Tessonics to receive assistance in the damage claims, and provide replacement equipment, if necessary. Please note that your shipping container is re-usable and may be used in the future when returning the unit for recalibration or repair.

1.2 Setting Up

Check the list of supplied items. Verify that you have received all items listed on the RSWA Packing List. If anything is missing, please contact Tessonics Sales and Service office.

Please check the battery charge gage after receiving it. Refer to Section 2.5 on page 12 on how to interpret the batteries fuel gage indicator.



Note: The external battery is shipped DISCONNECTED

Open the battery pocket cover of the soft case and connect the battery connector to the internal wiring cord connector. Connect the A/C adapter to the external battery and charge the battery for at least 4 hours before using it for the first time.

Chapter 2

Hardware

2.1 Overview

The Resistance Spot Weld Analyzer consists of several parts (Figure 2.1). The base unit consists of a Windows-based tablet PC with an attached DSP board and installed software. The probe has a 52-element matrix transducer which connects to the DSP board. An external battery provides up to 6 hours of run time when disconnected from a power source. A charger/AC adapter provides power for simultaneous device operation and battery charging. A soft case holds all these components together and provides protection against shock and mechanical damage in an industrial environment.

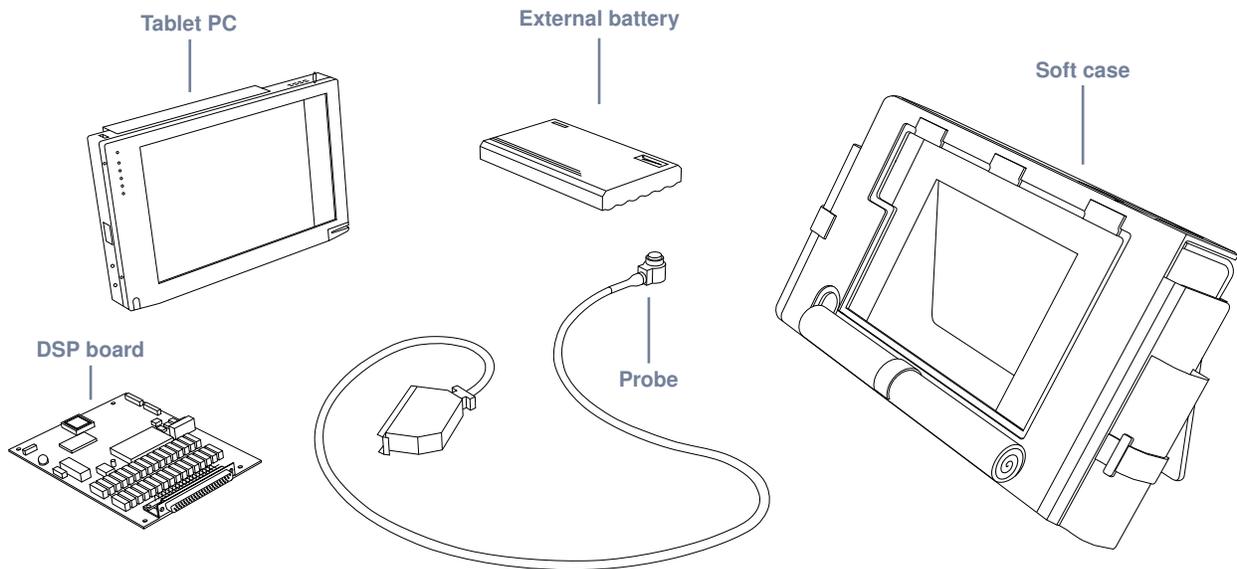


Figure 2.1 RSWA Hardware Components.

2.2 Probe

The probe consists of a multiple coax cable and an ultrasonic *transducer*. This is the most critical part of an RSWA. A malfunctioning or damaged transducer, as well as coax cable, will make measurements inaccurate or non-existent. Figure 2.2 shows the major parts of the probe.

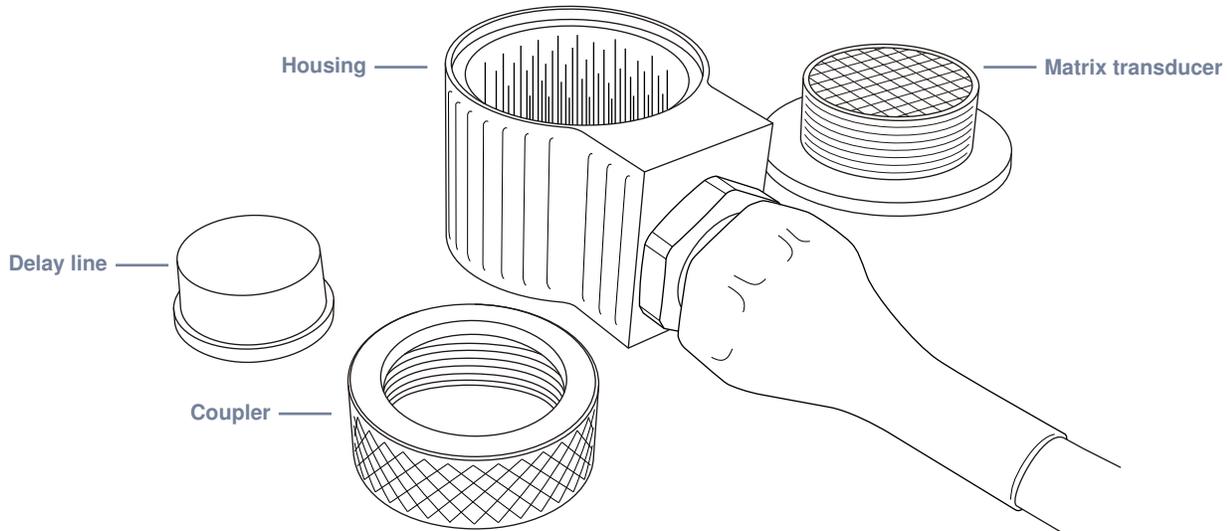


Figure 2.2 Probe components.

2.2.1 Usage

The front face of the transducer is very thin and fragile. Check that there is no dust, grease, or any other foreign particles between the front face of the probe and the delay line before mounting the delay. The delay and the coupler are the only replaceable parts on the probe. Please do not try to disassemble the protective case, take out the matrix transducer, or detach the cable from the protective case as this will damage the probe beyond repair.

2.2.2 Cleaning and Maintenance

- Clean the front face and the thread of the transducer. If possible, use isopropyl alcohol, dry using an air jet
- Clean the face of the delay which will be in contact with the front face of the transducer and the collar using the same technique, dry with an air jet
- For operation, a very thin layer of a standard ultrasonic gel should be applied between the transducer front face and the delay to provide sufficient acoustical contact

- Make sure the gel is clean and there are no air bubbles in it
- During storage or transportation, the front face of the transducer must be protected with the delay or with a protection cap
- When storing the transducer for long periods of time (longer than a month), make sure there is no gel left on the surface of the transducer
- Under normal operating conditions, the gel layer should be replaced each month; In a warm and dry environment the gel should be replaced more often



Warning: When re-assembling the transducer, ensure the delay line is face up before attaching the coupler

2.3 CPU Unit

The CPU unit is a fully functional computer (a *Tablet PC*) which runs the RSWA software.

2.3.1 Features

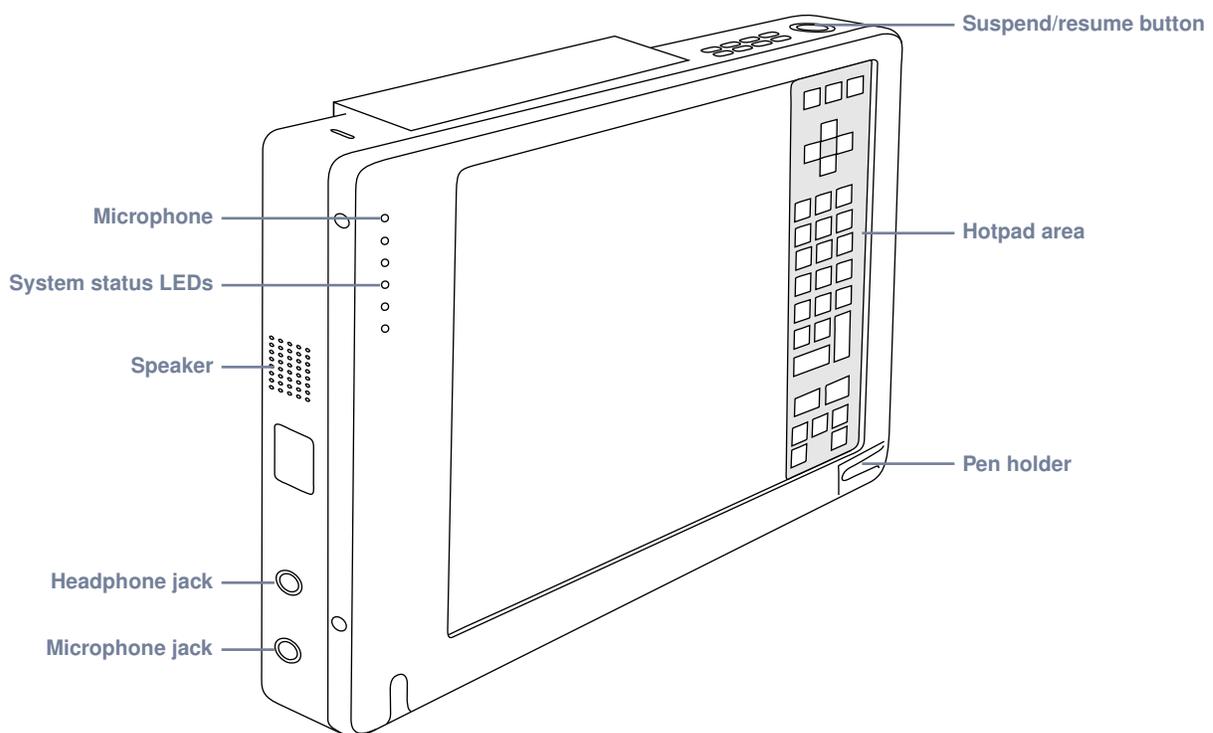


Figure 2.3 Tablet PC parts (front view).

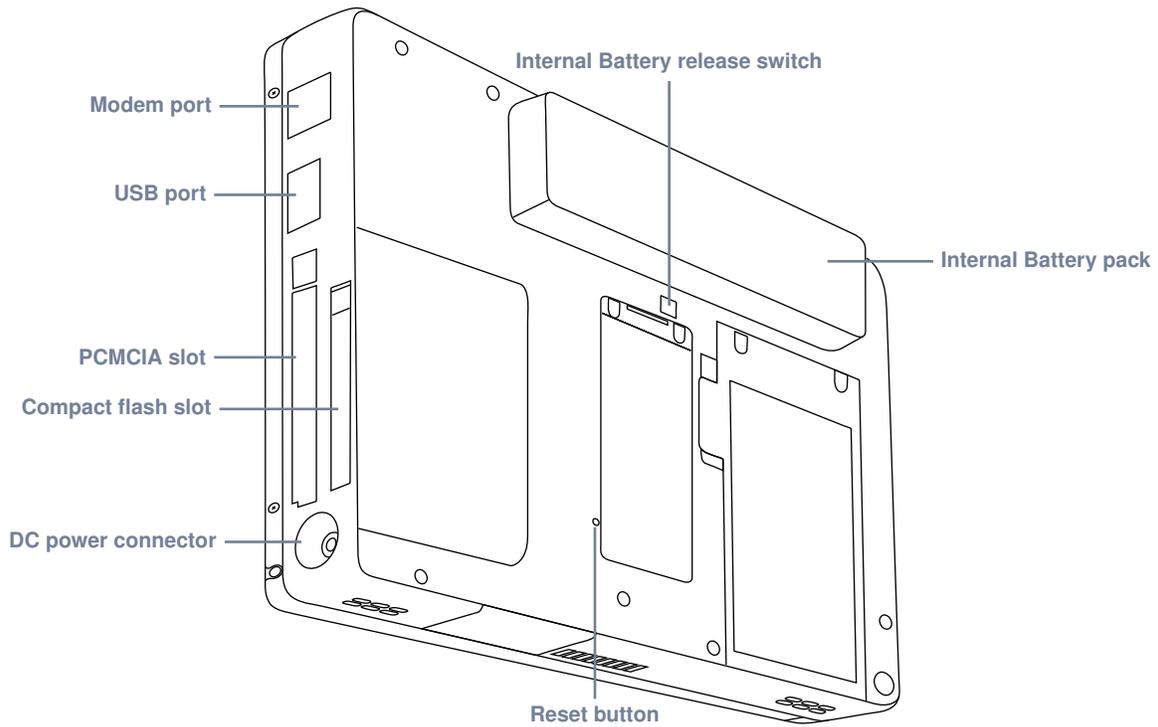


Figure 2.4 Tablet PC parts (rear view).

2.3.2 Status Indicators

Status indicators show the status of system functions such as system power and internal battery charge level. The location of these indicators is shown in Figure 2.5

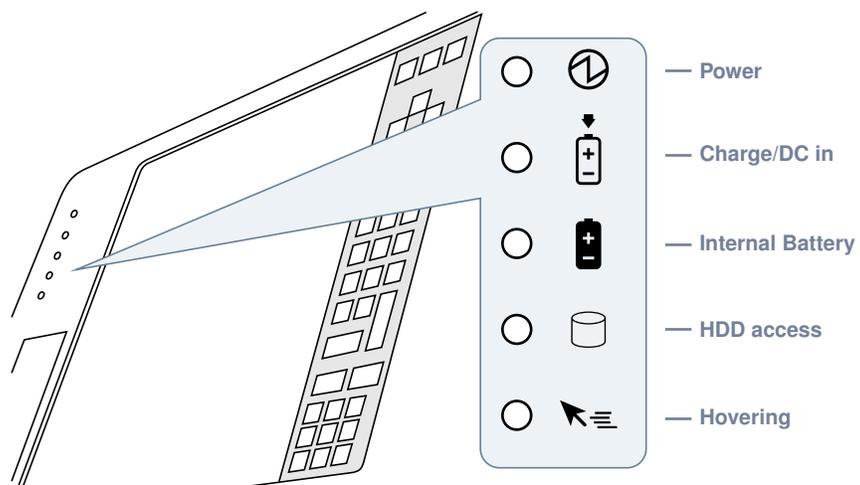


Figure 2.5 Status indicators.

Icon	LED State	Remarks
	Green (continuous)	On State or Idle Mode
	Green (blinking)	Suspend-to-RAM State
	Off	Off State or Save-to-Disk State
	Green	<ul style="list-style-type: none"> AC adapter and internal battery are available and system is not charging (internal battery fully charged). AC adapter is available but internal battery is not present.
	Amber (continuous)	AC adapter and internal battery are available and system is charging.
	Amber (blinking)	AC adapter and internal battery are available and waiting to charge (internal battery is out of thermal range).
	Off	AC adapter is not available.
	Green	Internal battery charge is 100% – 50%
	Amber	Internal battery charge is 49% – 13%
	Red	Internal battery charge is 12% – 0%
	Red (blinking fast)	There is an internal battery error.
	Off	Internal battery is not installed.
	Green	Displayed when hard disk drive is accessed.
	Off	Hard disk drive is not being accessed.
	Green	Hovering mode is enabled.
	Off	Hovering mode is disabled.

2.3.3 System States

On Mode – The system is running and the display screen is on.

Idle Mode – Some system functions are regulated or turned off to conserve power. The display screen may be turned off. The system returns to the On state when pen activity or other input is detected.

Suspend-to-RAM Mode – System operation is suspended. Most system functions are turned off to conserve power. Power to memory is on, maintaining data in programs that were running before system operation was suspended. The system does not respond to the pen or other input when in Suspend-to-RAM mode. Refer to the “Resuming System Operation” section later in this chapter for information on returning the system to the On mode.

Save-to-Disk Mode – System operation is suspended. All system functions are turned off to conserve power. Active data in programs that were running before suspending system

operation is stored on the hard disk drive. The system does not respond to the pen or other input. Refer to the “Resuming System Operation” section later in this chapter for information on returning the system to the On mode.

Off Mode – All system functions are turned off to conserve power. The system does not respond to the pen or other input. The system boots at the next system power-on.



Note: The system consumes the same amount of power whether it is in Save-to-Disk mode or Off mode.

Your system can be configured to enter some of these states automatically after a period of inactivity to conserve battery power.

2.3.4 Screen Protector

Using a screen protector will help insure that the screen remains as clear as possible. When installed, the screen protector becomes a durable, replaceable surface that protects the display from abrasion.



Note: The tablet PC is not waterproof. Do not pour liquids on the system or wash it with a wet cloth.

To install a new screen protector:

1. If a screen protector is already installed on the display screen, remove it before installing the new screen protector. The screen protector is held onto the display screen surface by a thin strip of adhesive around the edges. A notch in one corner of the screen protector allows you to slide your fingernail under the screen protector for easy removal.
2. Clean the display by wiping the screen surface gently using a soft cotton cloth dampened with denatured alcohol. Ensure that all residues have been removed from the screen before applying a new screen protector.
3. Remove the protective coating from the adhesive side of the screen protector first. Apply the screen protector to the display screen surface. When doing so, orient the screen protector with the adhesive side of the screen protector facing the display screen and the notched corner of the screen protector toward the lower left corner of the display screen.
4. Apply pressure to the screen protector with your finger using a continuous wiping motion along the edges. The adhesive sets completely within 48 hours. To ensure a good

seal between the screen protector and the display, do not lift the screen protector from the display once it has been applied.

5. Remove the protective plastic cover from the face of the screen protector.
6. Clean any residue remaining on the screen protector by wiping gently with a soft cotton cloth dampened with denatured alcohol. Wipe the screen protector with a soft dry cloth to remove any low-tack adhesive.

2.3.5 Storing

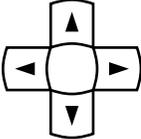
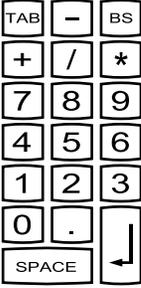
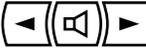
Store the equipment in the Off state with a fully charged external battery installed. The external battery always provides power to some system components even when the system is in the Off state. If the system is stored with the external battery removed, these components are powered by the system's internal battery. The internal battery is not designed for extended use and will discharge in a short period of time; this could result in damage to the internal battery. You can store the equipment in the Off state for about 30 days with a fully charged external battery installed. After this period, the external battery pack should be recharged or replaced with a charged external battery.

2.3.6 Using the Hotpad

The Hotpad area consists of several touch screen "keys" on the right side of the system display that you can use to change several settings. The hotpad allows you to:

- Adjust the display and speaker settings
- Invoke right mouse button
- Invoke hovering capability
- Use as a numeric pad
- Use as a NumLock key

To use a hotpad key, tap directly on it with the pen. You can also press and hold the pen tip against the Volume and Brightness hotpad keys to automatically repeat the previous hotpad function. The location of each hotpad key is shown in the table below.

Icon	Name	Description
	Escape	Functions the same as the Esc key on a typical keyboard.
	Display	Each time the Display Device hotpad key is tapped, the display unit is switched (in the following order): LCD – CRT – both LCD and CRT, back to LCD.
	NumLock	Acts in the same way as the NumLock on the keyboard. (Default is Off.)
	Cursor Control	Acts in the same way as the cursor keys on a keyboard.
	Numeric Keypad	Acts in the same way as the numeric keypad on a keyboard. (Note: “BS” signifies “Backspace”)
	Right Mouse Button	Switches the pen function from left mouse button to right mouse button emulation for a single mouse event after tapping the hotpad.
	Pen Hovering	Switches the hovering mode on or off. Throughout the hovering mode, the hovering status indicator is lit green.
	Speaker Volume	Decrease/Mute/Increase the speaker volume.
	Brightness Control	Changes the luminance of the display backlight. Changes in brightness level can be monitored with the on-screen indicator.

2.3.7 Using Hovering Mode

Selecting the Pen Hovering icon on the Stylistic LT P-600 keypad provides the user with better cursor control. When the hovering option is enabled, the cursor can be positioned over an icon without activating it. This is useful when you are performing procedures that

require accurate cursor positioning, such as when simulating a mouse rollover, selecting a small icon, or beginning a paint session.

- To enable hovering, tap the Pen Hovering icon on the keypad. The Hovering system status indicator light illuminates green when hovering is selected.
- To disable hovering, tap the Pen Hovering icon again. The Hovering system indicator light is off when hovering is not selected.

2.4 DSP Board

The *DSP (Digital Signal Processing) Board* connects the transducer with the computer. The major parts of the board are:

DSP – Handles communications with the computer, controls all the activity of various components on the board, provides certain stages in signal processing.

Pulser – Sends a short electrical pulse to the transducer.

Receiver – Receives electrical signals coming back from the transducer.

Multiplexer – Redirects signals from pulser to a particular element in the transducer.

ADC – Analog-to-digital converter – Converts electrical signals into a digital form.

2.5 External Battery

In addition to the battery that comes together with the tablet PC, an RSWA is equipped with the second external battery. This additional battery pack provides power for the DSP board and simultaneously charges and powers the tablet PC.

RSWA can be equipped with one of the following battery types (see Figure 2.6):

- PowerPad 80 (shipped with older units)
- Universal battery (shipped with newer units)

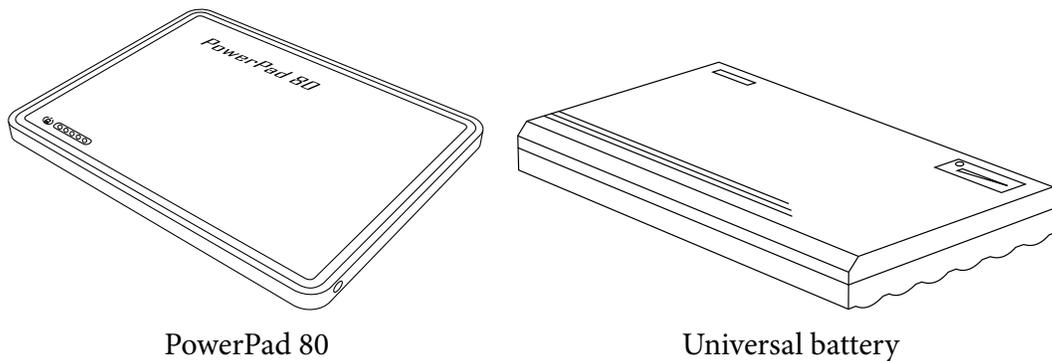


Figure 2.6 External batteries

2.5.1 PowerPad 80

This external battery uses a comprehensive *fuel gauge* system to indicate its state of charge. The fuel gauge, which consists of 3 green lights, 1 yellow light and 1 red light, will normally be lit and will turn off automatically when the battery is not in use.

Under abnormal operating conditions, such as extreme temperatures, the battery will not charge or discharge. Under these conditions the light panel will indicate 1 red light and 1 green light.

While the battery is charging, the fuel gauge lights will blink every 7 seconds until the battery is fully charged, at which time the fuel gauge lights will remain lit. The lights that are “ON” will indicate the state of charge at that time.

While the fuel gauge provides a relatively accurate state of charge during discharge, it more accurately shows the true state of charge when idle. It is therefore normal for the battery to alter its state of charge after it has been idle for more than an hour.



Note: When not in use for a month or more, fully charge the battery prior to storing.

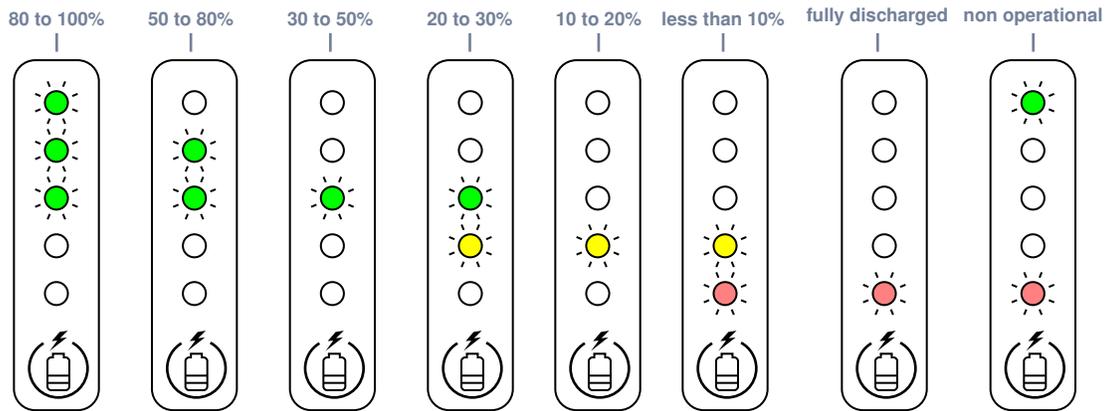


Figure 2.7 PowerPad 80 fuel gauge

2.5.2 Universal Battery

The universal battery has a DC out voltage switch at the back (Figure 2.8).

Note: This switch must be set to the 16V position (knob toward the center of the battery).

The *power meter* is activated by pressing Test button. The number of LED lights indicates the power level of the battery pack (Figure 2.8).

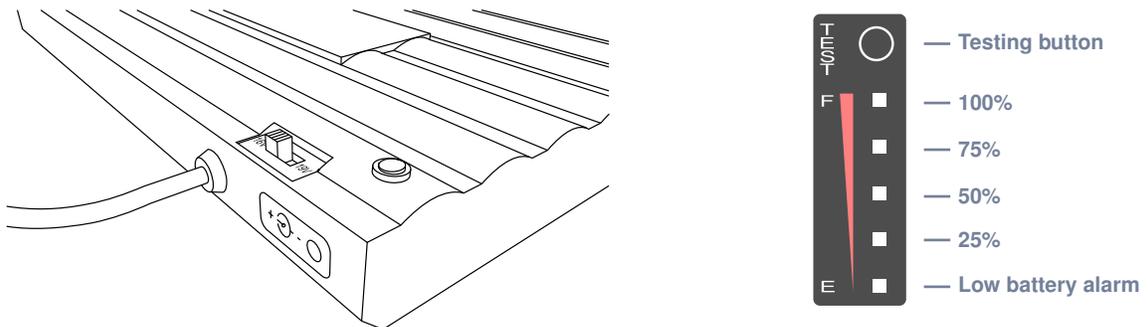


Figure 2.8 Universal battery DC out voltage switch (left) and power meter (right).

2.6 Charger/AC Adapter

The Universal AC adapter transforms power line voltage into DC voltage which is used for charging the external battery and/or simultaneous operation of the RSWA.

An input range 100–240 V at frequencies 50–60 Hz makes it possible to use the adapter in most countries around the world. It is strongly recommended to use the supplied power cord, as its plug determines the type of suitable power line.

The output cord connects to the charging input of the external battery. If you have a newer Universal Battery, you can also bypass the external battery and plug the adapter directly into the RSWA unit. (Useful if the external battery ever becomes faulty and you want to continue running the RSWA).



Note: Keep AC adapter clean and away from spilled liquids and shocks. If there is any type of visible damage to the adapter case or power cord, the item should be replaced.



Warning: Tessonics has no responsibility for damage caused by use of unauthorized power adapters or by connecting the power adapter to improper power lines.

2.7 Soft Case

A soft case holds the whole device together and protects it from shock and mechanical damage. Additional features are pockets for gel bottles and accessories. The rear part of the case flips out and can be used as a rest for convenient positioning of the unit.

Chapter 3

Common Software Features

This section describes features common to all software components.

3.1 On-Screen Keyboard

There are times during RSWA usage when you need to type text: entering passwords, file names, etc. Unfortunately, the RSWA unit does not have room for a built-in keyboard. Instead, when typing is necessary, you will see a virtual on-screen keyboard. This keyboard allows typing using the touch screen. The layout of the keys on the keyboard depends on the keyboard view. You can switch between standard view, special symbols, and numeric keypad view:



Figure 3.1 Virtual on-screen keyboard (standard view)



Note: The layout of the keyboard also depends on current user's language settings.

To switch to special symbols and back, use  button:



Figure 3.2 Virtual on-screen keyboard (special symbols)

To switch to numeric keypad and back, use  button:

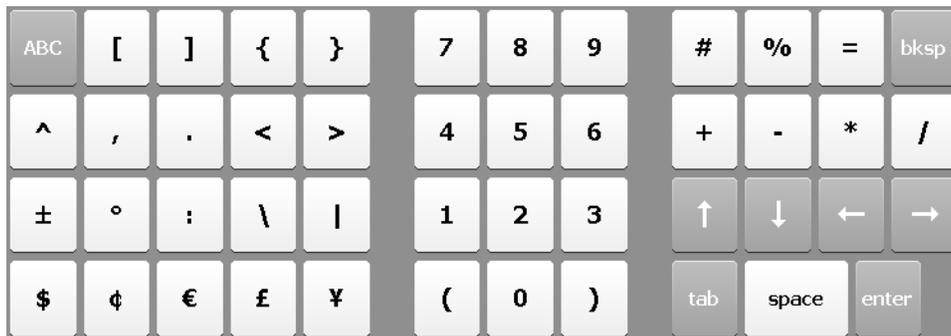


Figure 3.3 Virtual on-screen keyboard (numeric keypad)

3.2 Login Prompt

When someone tries to run a protected Tessonics application they will get the login prompt shown in Figure 3.4. Only the users who have permission to access to the protected application will be shown in the list. To login a user simply has to click their user name, enter their password, then click Log In.

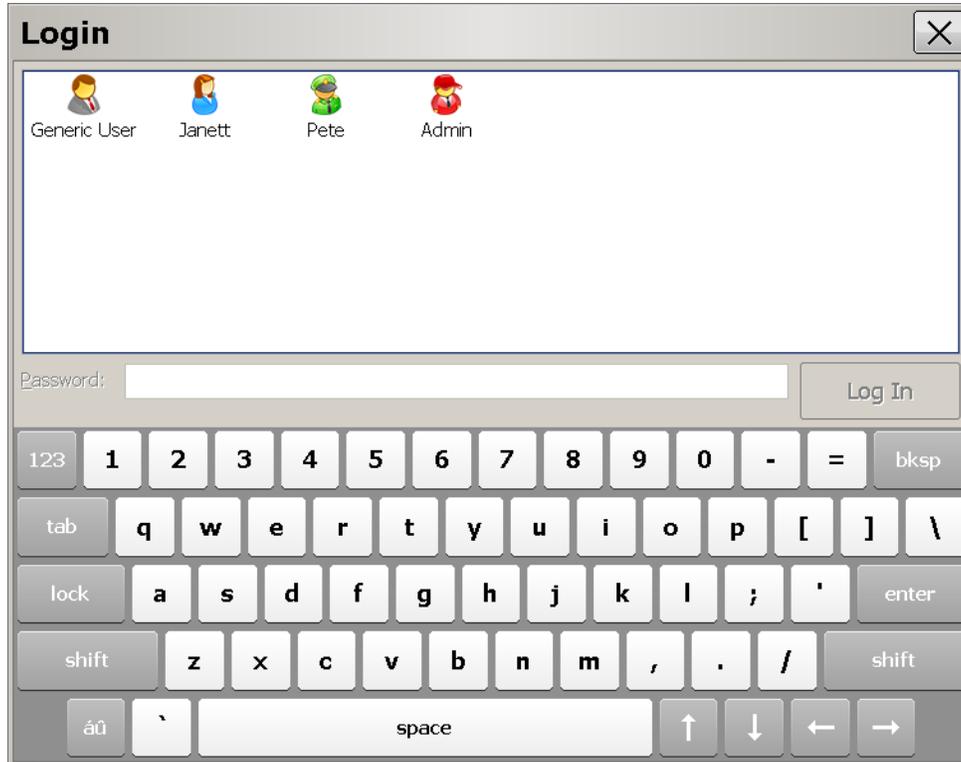


Figure 3.4 Login prompt.

Each user has an associated icon to help them find their name when logging in. It's best practice to assign each user a different icon. See the User Manager chapter in the RSWA Administrator Manual for information on how to create and manage users.



Note: If the user does not have a password the password edit box will be disabled.

Chapter 4

Launcher

The Launcher allows the user to start Tessonics applications, and normally loads when the RSWA starts up and replaces the Windows desktop. The Launcher was designed and built for touchscreens, and is more convenient than a regular windows desktop. It also limits and controls user access to critical system settings and programs.

4.1 Main Window

Figure 4.1 shows the main Launcher screen. For each application that is available, a button is placed in the center (gray) section of the screen. Applications can be started by simply pushing the corresponding button.

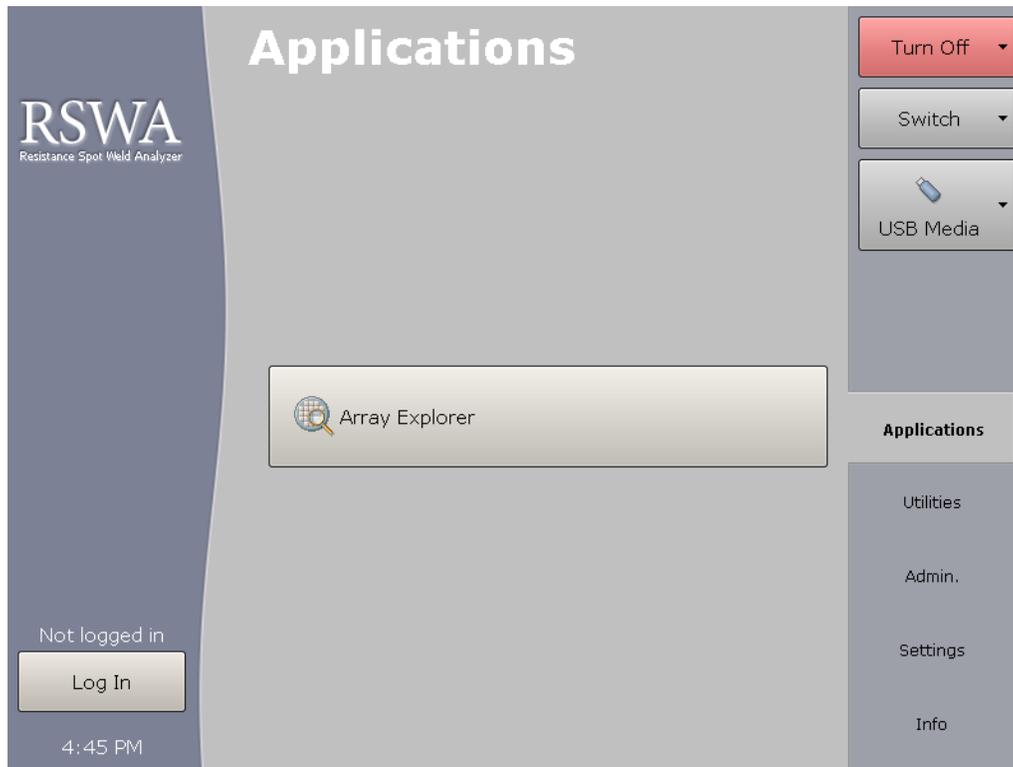


Figure 4.1 Main Launcher window

4.2 Logging In and Out

Certain Windows and Tessonics applications have been protected and require users to have special privileges in order to use them. Some protected applications will allow you to log in (for that application only) when you try to start them and others will not start at all unless you are already logged in.

Clicking the Log In button, shown in Figure 4.2, will bring up the Login prompt discussed in Section 3.2. When you log in this way your user information is retained, thus allowing you to start multiple protected applications without having to repeatedly log in. This is the recommended way to use the RSWA.

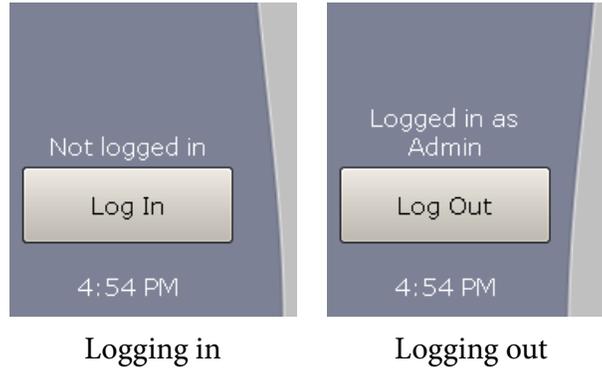


Figure 4.2 Logging in and out of Launcher.

After you log in, the label on top of the button shows the name of the current user. The button caption changes to Log Out and now you can use it to log out of the system.



Note: If the computer goes to standby while you are logged in, the system will automatically log you out to prevent unauthorized access by different users.

4.3 Turning Off

Clicking the Turn Off button will provide you with a list that allows you to Hibernate, Shut Down, or Restart the computer; see Figure 4.3. Shutdown puts the system into off mode, and Hibernate puts the system in Save-to-Disk mode. Restart simply reboots the system.

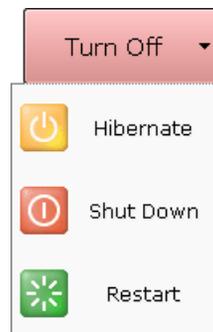


Figure 4.3 Turning system off

4.4 Switching Between Applications

When one or more applications are running the Switch button in Figure 4.4 becomes active. Clicking this button provides a list of all the running applications and allows you select which one you want to see or use. If an application is minimized this is the only way to bring it back into view.

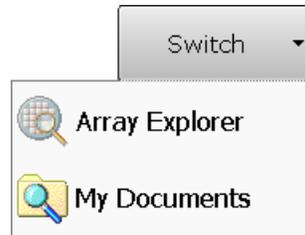


Figure 4.4 Switching between applications

4.5 Accessing a USB Drive

To access the USB port, open the flaps on the right hand side of the soft case. The location of the USB port on the CPU unit is shown in Figure 2.4 on page 6.

You can use any standard USB drive to transfer files to and from the unit.

When a USB drive is plugged in, the button in Figure 4.5 becomes visible. Clicking this button provides the following options:

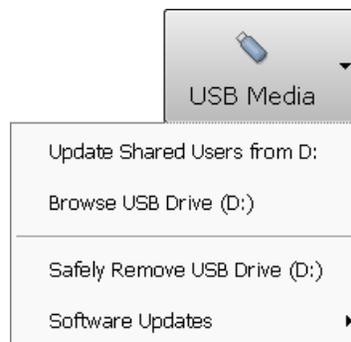


Figure 4.5 USB menu.

Update Shared Users – Visible when the USB drive contains updates to the shared users database. See the RSWA Administrators Guide for more information on user management.

Browse USB Drive – Opens Windows Explorer to work with files stored on the USB drive. This option is available only to users with Admin permissions.

Safely Remove USB Drive – Select this option before unplugging the USB drive from the USB port.

Software Updates – Selecting this option presents another list containing all the software that can be updated or installed from the USB drive. This option is only shown if there exists some updates on the USB drive. See Section ?? on page ?? for more information.



Warning: Always use the Safely Remove USB Drive option before unplugging the drive, especially if you written or changed files on it. Otherwise you risk loosing you data.

4.6 Launcher Tabs

The Launcher Tabs, shown in Figure 4.6, determine what is shown in the center (gray) section of the Main Window, shown in Figure 4.1. The Applications, Utilities, and Admin tabs show different groups of applications that can be started by the user; the Admin tab is restricted to users with admin permissions. The Settings tab is also restricted to users with admin permissions and it is discussed in Section 4.6.1. The Info tab provides some information about the RSWA and contact information for Tessonics.

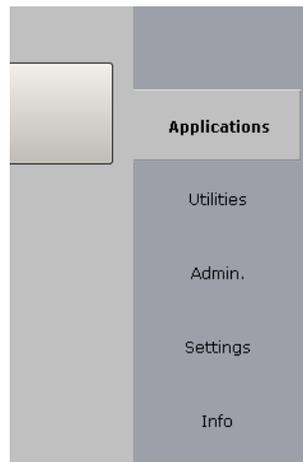


Figure 4.6 Launcher tabs.

4.6.1 Settings Tab

The Settings Tab is available only to users with Admin permissions. It contains the following sections:

- Control Panel
- Launcher
- Applications
- Utilities
- Admin
- Deleted Items

Control Panel Section

Provides access to the standard Windows Control Panel.

Launcher Section

Allows you to choose which desktop application will be activated when Windows starts; the Windows Desktop or the RSWA Launcher. Unless you have a good reason for doing so, it is highly recommended that the RSWA Launcher be used. Using the Launcher limits a user's access to the computer and helps prevent them from accidentally causing software problems. The Launcher Section also allows you to set the default language that is used with the Launcher and applications started from within the Launcher. The default language selected in this section is completely independent of the default language used by Windows and as a result will not have any affect if the Windows Desktop is used.



Figure 4.7 Launcher settings section.

Applications, Utilities, and Admin Sections

Allows you to add and remove programs from the Application, Utilities and Admin tabs in the main Launcher window. All three sections have similar appearance (see Figure 4.8).

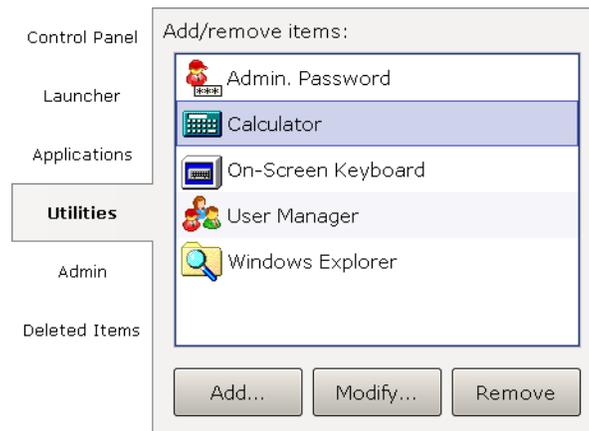


Figure 4.8 Launcher settings section.

Push the Add button to add a new item to the list. You will need to choose the name of the item, path of the executable file, command line options and an icon.

Push the Modify button to rename an item, change its icon or edit other options.

Push the Remove button to remove an item from the list. If you remove an item accidentally, you can restore it from the Deleted Items section.

Deleted Items

Allows you to restore any programs that were deleted from the Applications, Utilities or Admin tabs.

Select a deleted item from the list and click Restore to move it back to one of the tabs, or click Purge to delete the item permanently.

Chapter 5

Array Explorer

This chapter explains how to use Array Explorer to analyze spot welds. It is important to note upfront that the operation of Array Explorer depends on your permission level and whether or not you are working on a inspection. Currently, Array Explorer has two permission levels: Standard and Advanced. Some features are only available to advanced users, and some critical settings can only be modified by the Admin user. These features will be noted in the explanations that follow. Inspections are explained in Section 5.10, which are the only way to save the RSWA's measurements.

5.1 Main Window and Terminology

The Main window consists of five parts, which are explained in the following sections:

- Button Area
- C-Scan Area
- A-Scan Area
- Measurement History
- Information/Inspection Data Area

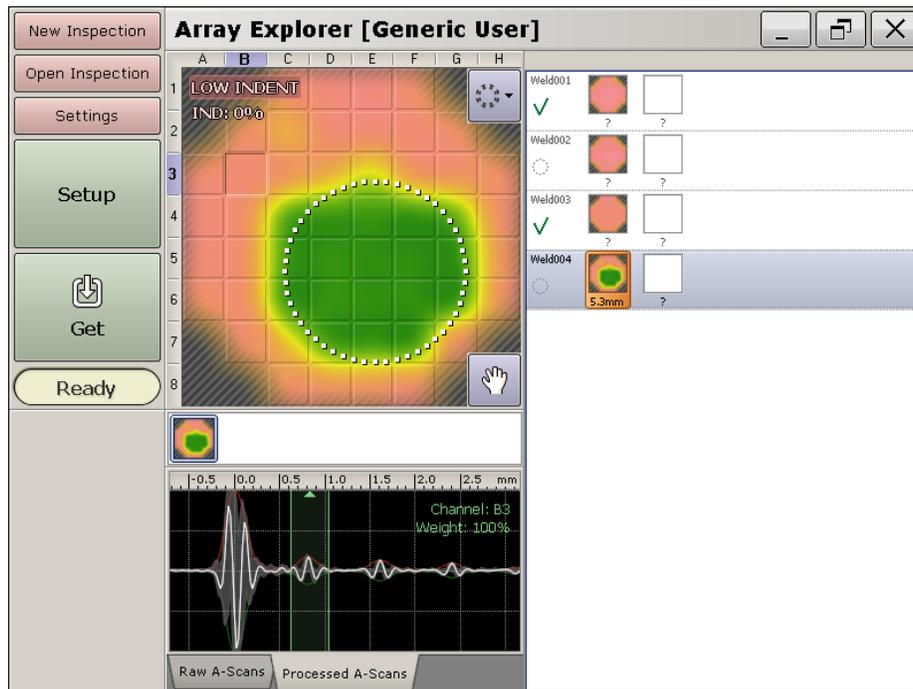


Figure 5.1 Main Array Explorer window

Some Terminology used in this chapter:

Inspection – A group of weld measurements that are saved together.

Part – A manufactured object that has checkable spot-welds.

Inspection Order – The order in which spot-welds on a Part are to be checked.

5.2 Button Area



Figure 5.2 Button area

New Inspection – Starts new inspection (see Section 5.10). Once an inspection is started, this button changes to **End Inspection** (see Section 5.10.1.2).

Open Inspection – Opens a previously stored inspection (see Section 5.10.3).

Settings – Allows changing various application settings (see Section 5.6).

Setup – Setup the unit for measuring welds on a specific metal stack.

Get – Takes a single measurement. (Push and hold to enter continuous mode; see Section 5.6.1.)

Status/Size Indicator – Shows the systems status and measured weld nugget diameter.

5.3 C-Scan Area

This area shows the image that is created from the collected measurement data. The green areas have fusion and the red areas do not have fusion.

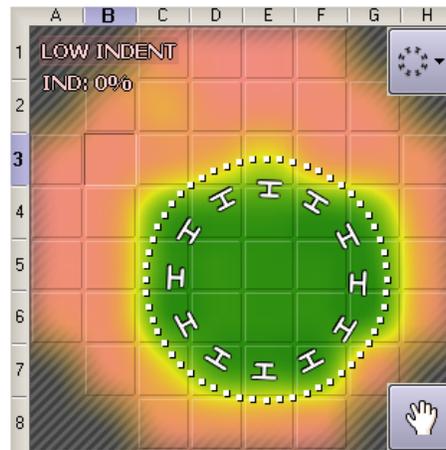


Figure 5.3 C-scan area

Dotted Circle – Shows the automatic estimation of weld nugget location and diameter. If the estimation is off it can be manually adjusted by clicking the hand icon. Dragging the edge of the circle will resize it and dragging the interior of the circle will reposition it. The dots turn blue when in manual mode. Clicking the hand a second time will undo any manual modifications.

Small Background Squares – Represent the transducer's elements. The currently selected elements waveform will be shown in A-scan area (see Section 5.4).

Spinning Wheel – Shows minimum/nominal size of the weld.

Hand Button – Switches to manual circle sizing and back.

5.4 A-Scan Area

The A-Scan area shows waveforms (A-Scans) for the individual elements in the transducers matrix.



Figure 5.4 A-scan area

You can choose which one out of the 52 matrix elements is displayed by making a selection in the C-scan area (see Section 5.3).

White Curve – Shows the A-scan for the currently selected element.

Shadow in Background – Shows the composed A-scans from all the elements.

Green Arrow – Shows the estimated depth of the top metal sheet.

Green Vertical Lines – Gates showing the range for C-scan acquisition. These gates are set automatically during setup. To adjust them manually, push and hold the touch screen inside the A-scan area.

Raw and Processed Tabs – Allow you to switch between viewing raw A-scans (A-scans without any signal processing applied) and processed A-scans (A-scans after noise filtering, automatic gain correction, and depth adjustment)

5.5 Measurement History

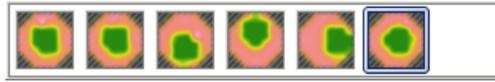


Figure 5.5 History area

This bar contains a history of all the measurements taken, stored in chronological order from the left. If you are not in an inspection it simply shows the history of the measurements taken. If you are in an inspection this bar contains all the measurements for a specific box in the Inspection Data section. Clicking on a measurement in the history bar will reload the measurement so it can be re-examined, and also change the measurement that is shown in the Inspection Data.

5.6 Settings (Standard)

This section discusses the settings that are available to all users.

5.6.1 Cont. Mode

This setting determines the number of measurements taken in continuous mode. It can be set to take between 5 and 100 measurements. (Determines how long continuous mode lasts for.)

5.6.2 User Interface

These settings allow you to configure some display settings.

Ruler Scale – Allows you to change the units on the ruler above the A-Scan panel.

Display Type – Allows you to choose between a smoothed color image and a gray-scale block image.

In-air Indicator – Allows you to choose if you want to be warned when the transducer is not coupled to a sample and a measurement is taken.

Indentation Indicator – Allows you to choose how to show the indentation.

Indentation warning – Allows you to decide when to show the indentation warning.

Setup Warnings – Warns the user if:

- Setup button wasn't pressed before the Get button on a weld that has no recorded front plate thickness
- Setup button acquires a front plate thickness that doesn't match the recorded front plate thickness (possibly checking the wrong weld)

The level of warning can be adjusted from none (Hide), to many warnings (Many). They correspond to how close the measured front plate thickness has to be to the recorded front plate thickness.



Note: The Setup Warnings are only meant to help inspectors. They should not be relied upon.

5.7 Settings (Advanced Mode)

This section discusses the settings that are available to Advanced users. These settings are only visible if you are an Advanced user.

5.7.1 Algorithm

Diameter Adjustment – A threshold for determining the cutoff between green and red sections of the C-scan; decreasing this value will decrease the circle diameter;

Absolute Adjustment – A constant value, between -2.0 mm and 2.0 mm, that is added to the diameter of every measurement.

5.7.2 Hardware

Current Status – Provides the status of the hardware; either Active or Inactive. The button below Current Status is used to Activate or Close the connection to the hardware.

Activate on Startup – Tells Array Explorer to try and activate the hardware when the software starts up

Demo Mode – Allows you to run Array Explorer without the required hardware

5.8 Settings (Admin Mode)

This section describes the settings that are only available to the Admin user. They are only visible if you login as the Admin user.

5.8.1 Waveform

Supersampling – The base sampling frequency is 66.6 MHz; supersampling is a multiplier that allows you to increase the sampling frequency (i.e. if supersampling is set to three the sampling frequency is tripled).

Averaging – This is a signal processing technique that reduces the amount of noise; multiple scans are taken and the average over the scans is used.

Inter-pass delay – Allows you to change the time delay between averaged scans.

5.8.2 Adjust Signal

To aid in setting these parameters a grid of transducer elements and an A-scan window is shown. Clicking on a transducer element will cause the signal from that element to populate the A-scan window.

Delay – controls the data acquisition delay. Then you change this parameter, the entire A-scan curve is shifted in the A-scan window. A properly calibrated tool must show the front surface reflection within the gates (green area in A-scan window).

Gain – controls the amplitude of the signal. The signal should be adjusted so that the peaks are close to the horizontal lines connecting the gates (green area in A-scan window).

Range – controls how much of the signal is shown in the A-scan window.

5.9 Information

When you are not in an Inspection this area provides some information about the RSWA and contact information for Tessonics.



Figure 5.6 Information and inspection data areas

5.10 Inspections

An Inspection is a group of measurements. (For example, all the welds inspected on one body part). Inspections allow the RSWA to organize and sort measurements for storage and future review, and eliminates the hassle of users saving measurements on their own. The Inspection area is only shown if you are currently in an Inspection.

There are two types of Inspections available to choose from: Part inspection and Custom Inspection.

5.10.1 Custom Inspection

The Custom Inspection type allows you to measure welds and assign names to these welds as you check them. A screen shot of a Custom Inspection can be seen in Figure 5.7.

Weld Name – Shows the welds name. The default names are numbered welds starting from one. Welds can be renamed individually by holding your finger on the weld until the pop-up menu appears (approximately 2 seconds) and then selecting Rename. There is also an advanced Auto-Generator feature, see Section 5.10.1.3 on page 38 for information.

Measurement Thumbnails – Each of these thumbnails represents a welds measurement. Clicking on a thumbnail brings the measurement back into the C-Scan for review, along

Weld Name	Weld001			
	✓	5.2mm	5.3mm	
	Weld002			
	✓	4.8mm	5.1mm	
	Weld003			
	✓	4.8mm	?	
Decision	Weld004			
	✓	4.4mm	4.3mm	
	Weld005			
	✓	6.3mm	?	
	Weld006			Failed: RSWA - Undersize
	✗	3.9mm	?	
	Weld007			
	○	?	?	

Figure 5.7 Array Explorer in a Custom Inspection

with the history of measurements taken for that weld. This history list can be used to choose which measurement appears in the thumbnail; only the chosen measurement will be saved. There are two thumbnails because 3T stacks are supposed to be measured from both sides, and these measurements should be paired together.

Decisions – Each weld can have an associated pass or fail. Either a checkmark for pass, a cross for fail, or a dotted circle meaning no decision is shown.

Reasons – Shows the reason chosen for failing a weld. Can also show the reason for passing a weld without measurement.

During an inspection, the Pass, Fail, and New Weld buttons appear in the bottom-left corner. (Figure 5.8).

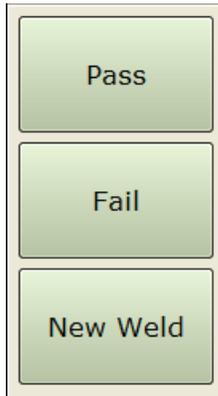


Figure 5.8

The list of reasons for passing or failing a weld are programmed into the RSWA and cannot be changed by users. To change a welds pass or fail reason, simply hold your finger on the weld until a pop-up menu appears (for approx. 2 seconds) and select Clear Decision. You can now re-pass or re-fail the weld and select your new decision.

Pass – Clicking this button passes the current weld in the weld list. If a measurement hasn't been performed on the current weld, you must select an appropriate reason for passing the weld from a pop-up list.

Fail – Clicking this button fails the current weld in the weld list. You must select a reason for failing a weld from the pop-up list that appears.

New Weld – Clicking this button creates a new weld to measure. This enables the user to not make a decision on a previous weld and continue working.

Starting A New Custom Inspection

A Custom Inspection can be started by clicking the New Inspection button in the top left corner of the screen. On the screen that pops up, choose Custom and press Next. You will be prompted to enter a name for the inspection. Entering a name is optional but doing so will make it easier to retrieve your inspection in the future. Now the New Inspection button changes to the End Inspection button.



Note: If no parts have been defined yet, pressing New Inspection automatically chooses Custom and prompts for a name for the inspection.

Ending and Saving a Custom Inspection

Clicking the End Inspection button or trying to close Array Explorer will ask you if you would like to save the inspection. If you choose to save the inspection, Array Explorer will do so without any further input from the user; i.e. you do not have to provide a filename or select a place to save the inspection.



Note: Once an Inspection is saved welds with decisions cannot be modified.

Weld Name Auto-Generator

If your weld names are similar, you can instruct the RSWA to name your welds for you using the weld name Auto-Generator.

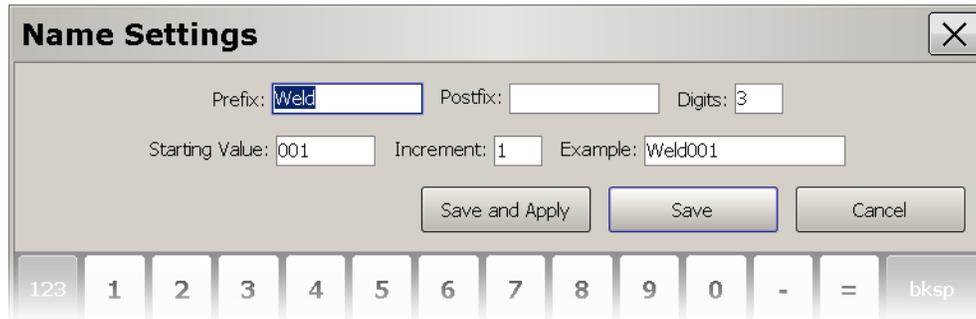


Figure 5.9 Weld name Auto-Generator window

First choose Name Settings from the pop-up menu instead of Rename. Doing so will launch the window shown in Figure 5.9. This window allows you to customize the prefix, postfix, number of digits, starting value, and increment. It also provides an example of what the resulting name will look like. To save the changes the user must click either the Save or Save & Apply button. Clicking save will apply the changes to all future welds; clicking Save & Apply will apply the changes to all existing and future welds.

5.10.2 Part Inspection

The Part Inspection type is an advanced inspection type that uses Administrator defined factory information. All of the factory information is stored in the RSWA and used by the RSWA to guide and organize an inspection. Its purpose is to help take care of the organizational work of the Inspector, so the Inspector can focus on checking welds. All of the factory data is created using the Template Designer application, and then imported into an RSWA via the RSWA Synchronizer program.

A screen shot of a Part Inspection can be seen in Figure 5.10.

Similar to a Custom Inspection, you can check welds and pass or fail them as you go along. Unlike a Custom Inspection, you follow a predetermined list of welds that an Administrator has created for you. They are already named and ordered, and all that needs to be done is to check the welds.

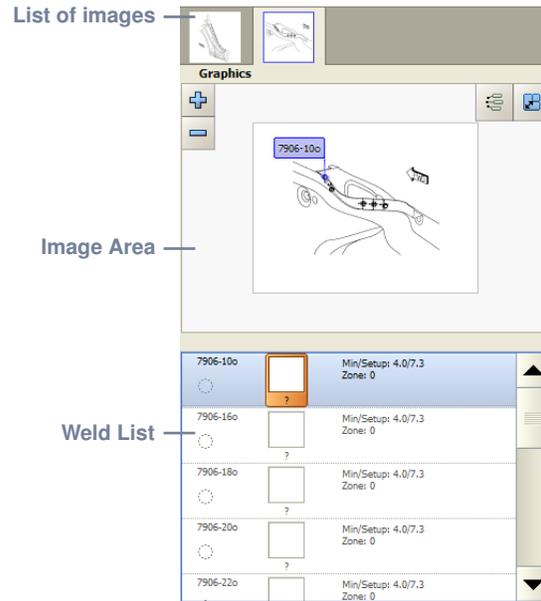


Figure 5.10 Array Explorer in a Part Inspection

List of Images

A part can have any number of images that show the part. (Left side of the part, right side, etc). This list shows all of the images that belong to the part being inspected. You can choose which image is shown by clicking on the image you'd like.

Image Area

Shows the current image and the welds that are on it. The currently selected weld that is being measured is shown highlighted to help an Inspector find the weld to be measured. The buttons in the image area are explained below:



Zoom in (+) and zoom out (-) the image. Zooming is done centered on the currently selected weld.



Toggle between showing all the welds or only the currently selected weld.



Toggle between showing a regular sized image or a very large image. (Useful to help find a weld before measuring it). Pressing Setup or Get returns the image to it's normal size.

Weld List

This shows the list of welds that are to be measured for this Part. An RSWA user can check the welds in any order they like by selecting the weld they want to check from the list. Just like in a Custom Inspection, a Part Inspection has Pass/Fail buttons to pass or fail the current weld being measured. Instead of a New Weld button however, a Next Unit button is provided. This lets you move to the next Inspection Order or repeat the same Inspection Order.

Starting a New Part Inspection

Press New Inspection, and in the window that pops up select Part and press next. A list of parts that have been programmed into the RSWA is shown. Choose the part that you want and press next. The next window asks you to name your Inspection, which is optional. If there are any Inspection Orders defined for this part, a final window pops up showing a list of Inspection Orders to choose from. Select one and press Finish. The window closes and you can start checking welds.



Note: If no Inspection Orders have been defined, the RSWA simply shows all welds on the selected part in alphabetical order.

Ending a Part Inspection

Pressing End Inspection anytime during a Part Inspection will save your Inspection to the RSWA.

5.10.3 Opening Inspections

To open a saved inspection, click the Open Inspection button in the top left corner of the screen. Doing so will launch the Open Inspection window shown in Figure 5.11.

This window helps you find the desired inspection by providing some filters and sorting.

Inspection Types: – Choose to only show inspections that are a certain type. Choose All to show all Inspection types.

Operator – Choose to only show Inspections performed by the selected operator. Choose All to show inspections from any operator.

Date Range – Choose either day, week or month. You will see the selection in the calendar change to reflect the chosen option.

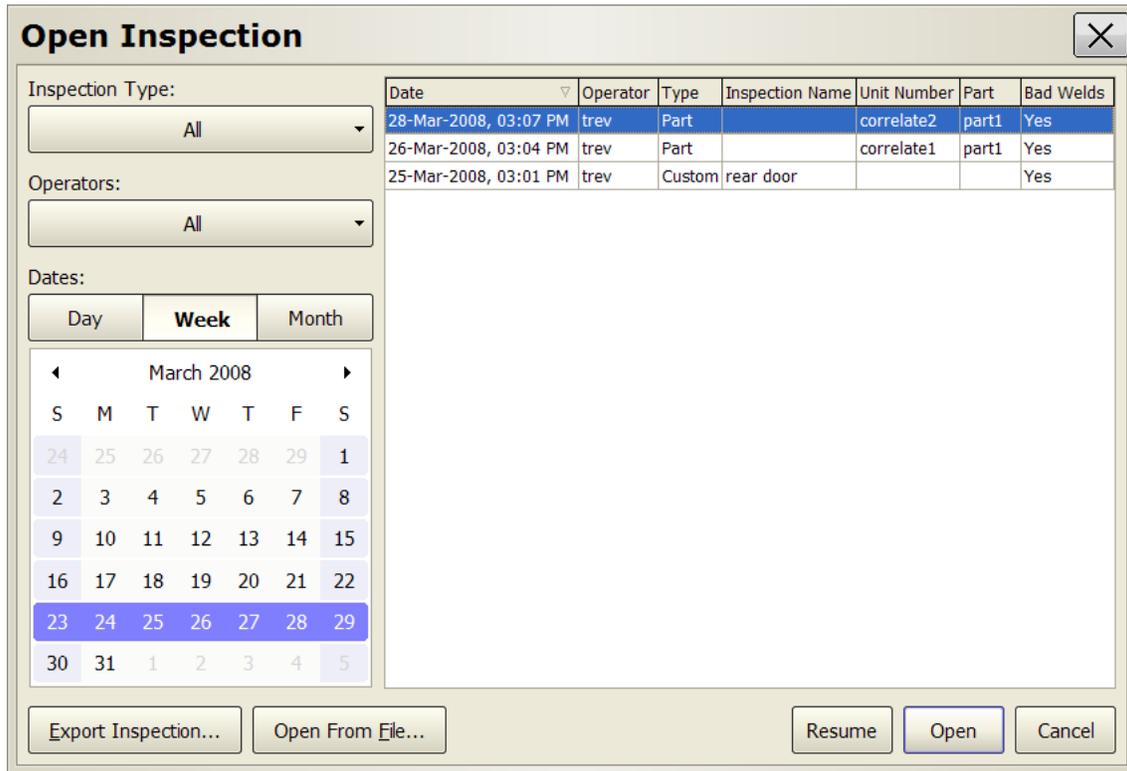


Figure 5.11 Open Inspection window

Calendar – Click to select which dates are shown in the Inspection List.

Open – Open the selected inspection in read-only mode for review.

Resume – Open the selected inspection and resume checking welds.

The table on the right shows all the inspections that meet the above criteria. The table headers can be used to sort the table based on a given attribute.

Upon saving, a resumed Inspection will update its date and time to the new save time. This may mean that the inspection moves from an older date to a newer one. Also, a resumed inspection needs to be synchronized again with the Administrator's PC if you want to see the newer data in the RSWA Reporter software.

 **Note:** Previously measured welds cannot be modified in a resumed Inspection.

By default, all inspections are stored in a database. This allows for fast storage, retrieval, and sorting of the measurements. Access to individual inspection files might be needed however, and the two below options permit this:

Export Inspection – Clicking this option allows you to save a copy of a single inspection in a new location.

Open from File – Clicking this option allows you to load an inspection from a file into the RSWA for review.

Appendix A

Specifications

Probe

- Frequency (–6dB): 20 MHz
- Bandwidth (–6dB): 60%
- Number of Channels: 52
- Elementary pitch: 1.25 ± 0.05 mm
- Inter-element spacing: 0.1 ± 0.05 mm
- Stainless steel housing
- 2 m cable made of 52 separate coaxial cables, common ground shield, protective sleeve
- Operating temperature: 10° – 30° C
- Storage temperature: 0° – 40° C

Tablet PC Unit

- Processor: Pentium III with Intel Speed Step technology 600/300 MHz
- Chipset: Intel 440MX
- Main RAM: 256MB
- Hard disk drive: 2.5" 40 GB IDE
- Digitizer: Resistive
- Display: 8.4" TFT/VE-TFT Color SVGA 800 × 600 pixels, 8 levels of brightness
- PC Card Slot: One Type-I or Type-II, PCMCIA CardBus version 3.0
- Compact Flash Card Slot: Standard 50-pin compact flash card connector
- Integrated interfaces: RJ-11 (modem), USB 1.0, DC-In, Expansion connector, Microphone In, Stereo Out, IrDA 1.1
- Internal battery: 6-cell warm-swappable lithium ion pack; 10.8 V @ 3400 mAh
- Operating temperature: 0° – 40° C (32° – 104° F)
- Storage temperature: -20° – 60° C (-4° – 140° F)
- Operating and storage humidity: 20 – 80% non-condensing

PowerPad 80 Battery

- Maximum Capacity: 80 Wh
- Charge time: 4 hours to 80%
- Weight: 1.5 lbs or 0.65 kg
- Operating Temperature: 0° – 60° C (32° – 140° F)

Universal Battery

- Maximum capacity: 130 Wh
- Maximum current: 4.5 A @ 16 V
- Charge time: 3.5 hours (4 hours for maximum charge)
- Weight: 1.5 lbs or 0.65 kg
- Operating temperature: 0° – 60° C (32° – 140° F)

Index

A

- A-scan 31
- AC adapter 14
- ADC 11
- Array Explorer 27
 - A-scan 31
 - Admin settings 34
 - advanced settings 33
 - C-scan 30
 - measurement history 32
 - settings 32

B

- Browse USB Drive 23

C

- C-scan 30
- charger 14
- control panel 24
- CPU unit 5

D

- DSP 11
- DSP board 11

E

- external battery 12

F

- fuel gauge 12

H

- hotpads 9
- hovering mode 10

I

- idle mode 7
- in-air indicator 32
- indentation indicator 32
- indentation warning 32
- inspections 35
 - creating 29
 - opening 29, 40
 - saving 37
 - starting 37
- Weld Name Auto-Generator 38

L

- Launcher 19
 - Browse USB Drive 23
 - Safely Remove USB Drive 23
 - settings 24
 - Software Updates 23
 - Update Shared Users 22
- logging in 20
- login prompt 17

M

- manual circle sizing 30
- measurement history 32
- multiplexer 11

O

- off mode 8
- on-screen keyboard 15
- on mode 7

P

- power meter 13
- PowerPad 80 battery 12
- probe 4
- pulser 11

R

- receiver 11

S

- Safely Remove USB Drive 23
- save-to-disk mode 7
- screen protector 8
- settings
 - Array Explorer 32
 - Launcher 24

- Setup Warnings 33
- soft case 14
- Software Updates 23
- status indicators 6
- suspend-to-RAM mode 7

T

- Tablet PC 5
- transducer 4

U

- universal battery 13
- Update Shared Users 22
- USB drive
 - accessing 22
- users
 - logging in 17, 20

V

- virtual keyboard 15

