



# IR Scan

## Ultrasonic Inspection System

User Manual

Version 1.3 ~ 10/05/12

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# Overview

The **IR** Scan is a computerized package designed for ultrasonic inspection. It consists of:

1. Display Computer
2. Monitor (one or more)
3. Instrumentation Chassis (one or more)
4. Un-interruptible Power Supply (UPS)

The Display Computer is used to set up and control the system and displays the inspection graphs and data on the monitors.

The Instrumentation Chassis contains one or more **IR** Quad Ultrasonic Pulser Receiver boards. The chassis may be set up to handle from 1 to 40 independent channels.

The monitors are used to display real time inspection graphs and data. Some systems may have multiple monitors to display the necessary information.

The UPS provides AC power conditioning to the system.

On some systems, the UT chassis is mounted inside the operator's compartment. On others, the UT chassis is mounted outside on the moving carriage. The carriage mount units use a temperature monitoring program to monitor the temperature inside the chassis and to control the electrical power automatically so that the chassis can be powered down in the case of overheating.

## Starting the System

### *Units with UT Chassis in Operator's Compartment*

Follow these steps to start the system:

1. Turn on AC power breaker if necessary.
2. Turn on UPS.
3. Turn on the Display Computer and Monitor(s).
4. Log onto the Display Computer by clicking on the desired user name. The default is "Operator".
5. Open the front panel on the Instrumentation Chassis and turn on the power switch.
6. Go to section **Starting the Program** for instructions on starting the **IR Scan** software.

## ***Units with UT Chassis Mounted on Carriage***

Follow these steps to start the system:

1. Turn UT Chassis Air Cooling Valve on the carriage to the open position.
2. Turn on AC power breaker if necessary.
3. Turn on UPS.
4. Turn on the Display Computer and Monitor(s).
5. Log onto the Display Computer by clicking on the desired user name. The default is “Operator”.
6. Open the front panel on the Instrumentation Chassis and turn on the power switch.
7. Turn the **Electronics** switch on the PLC touchscreen to **On**.
8. Start the **Power Up!** program by double-clicking (using the left mouse button) on the appropriate icon on the main display.
9. Click the **Turn Chassis Power On** button. Wait for the **STATUS UNKNOWN** label to change to **POWER ON**.
10. Go to section **Starting the Program** for instructions on starting the **IR Scan** software.

## Starting the Program

The software may be operated on various operating systems such as Windows\*, Linux\*, or Apple\*. In general, the program is started by clicking or double-clicking on the icon with the left mouse button.

The icon will always have the IRNDT name along with a system name, such as:

- IRNDT Scan
- IRNDT Weld Line

\* Windows, Linux, and Apple are copyrighted and/or trademarked by their respective companies.

The Instrumentation Chassis should be turned on before starting the program. Refer to the user manual specifically written for the system in use for details regarding the Instrumentation Chassis used in the system.

Upon starting, a Log Window will be displayed which shows the progress of the chassis configuration. The first time the program is run after starting the Instrumentation Chassis, the FPGA code must be transmitted so the start up time is longer. (see **Figures 11 & 12**)

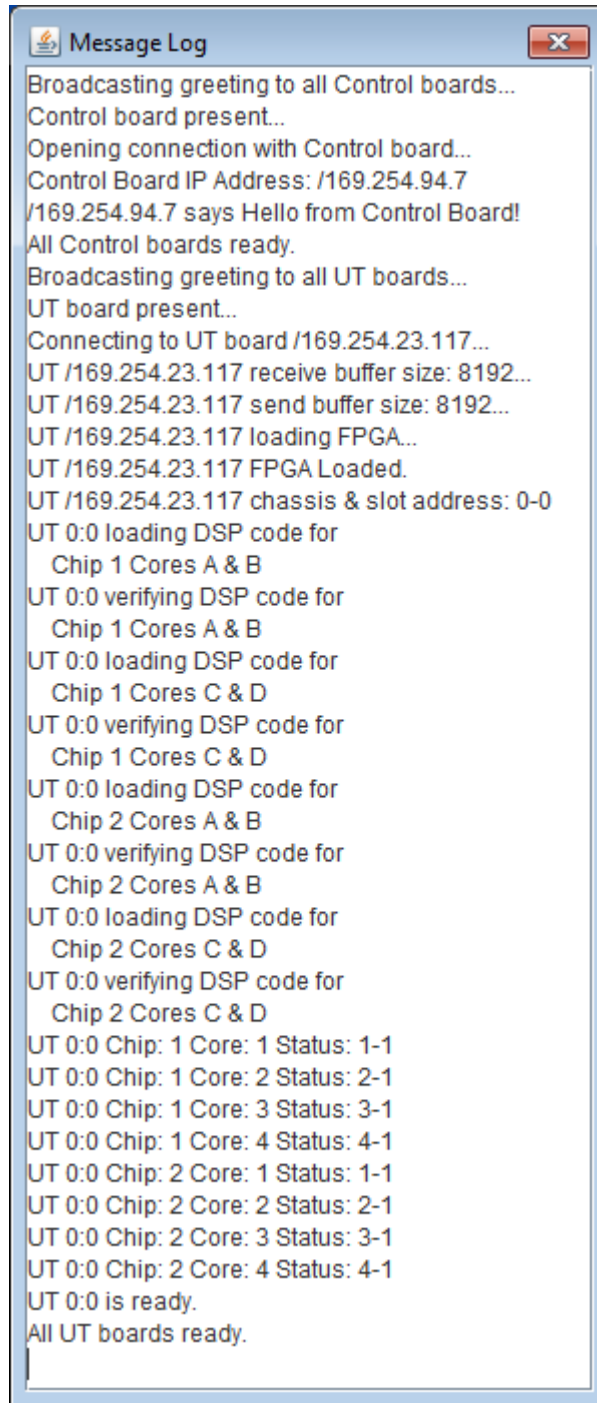
Figures 11 & 12 show the start up for a single board, four channel system. Systems with more boards and channels will have the same info repeated for the extra components.

If the configuration is successful, the last line displayed will be “**All UT Boards ready.**” The Log Window may then be closed and the program is ready for use.

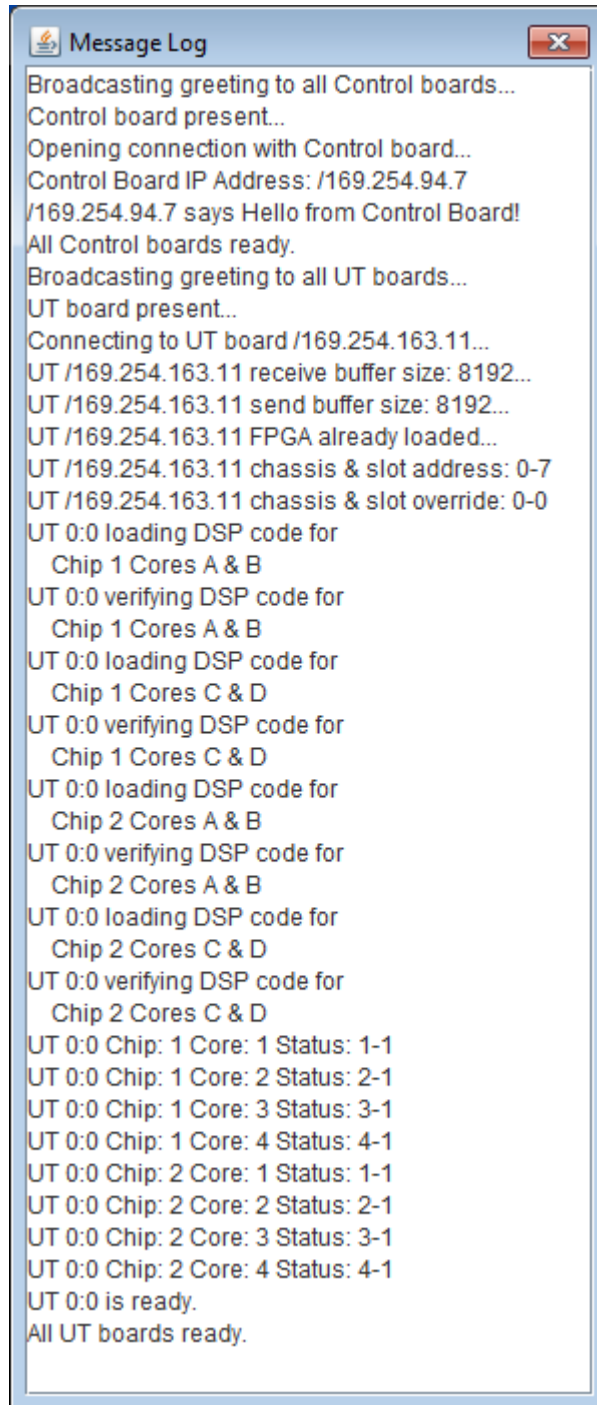
If the phrase “**All UT Boards ready.**” does not appear, other errors are displayed, or the program does not function properly:

- close the program
- turn off the Instrumentation Chassis for ten seconds, then turn back on
- restart the program

If the system still does not function properly, power everything down at the same time and restart. Make sure to actually shut the computer down and not place it into “sleep” or “hibernate” states.



*Figure 1: Start Up Message Log - with FPGA Load*



*Figure 2: Start Up Message Log - without  
FPGA Load*



## The Main Screen

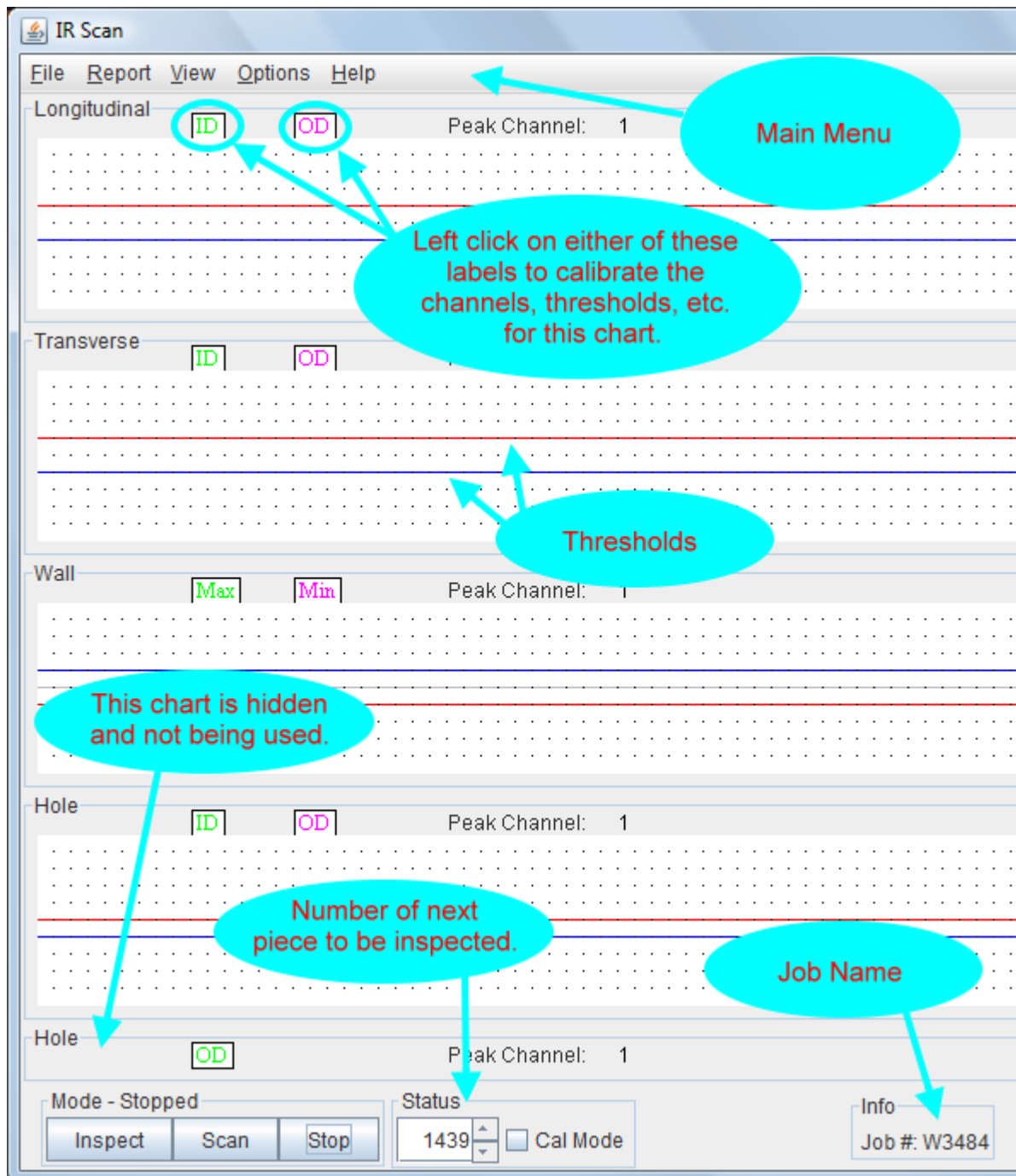


Figure 3: The Main Screen

## Creating or Switching Between Jobs

Inspection data is separated into “Jobs”. A new job can be used for each purchase order, work order, heat, lot, etc. It is important to select the proper job for the inspection to be done.

### ***Creating a New Job***

1. From the main menu, choose **File** and then **New Job**. The **Create New Job** window will appear.
2. Enter the desired job name. This can be the work order, purchase order, heat, lot, etc. Each company will have a different procedure for determining the job name.
3. Select a configuration by clicking on the down arrow. The configuration should be appropriate for the type of scan head, number of channels, or other mechanical settings.
4. Select a preset by clicking on the down arrow. Presets are stored copies of the user settings such as gains, gates, thresholds, and such. Setup time can be reduced by using a preset stored from a similar setup.
5. Click the **Create** button.
6. The software will take a few seconds to create the new job and then will restart. The UT chassis will be configured again at this time.

### ***Switching Between Jobs***

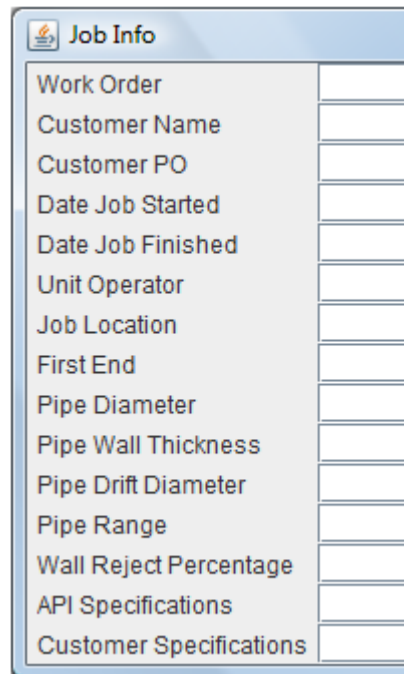
The user may switch between jobs in order to accommodate scheduling or to access information and reports for a completed job:

1. From the main menu, choose **File** and then **Change Job**. The **Change Job** window will appear after a few seconds.
2. Choose the desired job by clicking on the down arrow and clicking on the job in the list.
3. Click the **Change** button.
4. The software will take a few seconds to load the selected job and then will restart. The UT chassis will be configured again at this time.

## Job Info

The **Job Info** window is used to access information about the job such as purchase order, work order, customer name, inspection specifications, etc.

To access the **Job Info** window, from the main menu choose **File** and then **Job Info**. The **Job Info** window will appear. The information displayed may then be added or changed.



The screenshot shows a window titled "Job Info" with a list of fields for data entry. The fields are:

Work Order	
Customer Name	
Customer PO	
Date Job Started	
Date Job Finished	
Unit Operator	
Job Location	
First End	
Pipe Diameter	
Pipe Wall Thickness	
Pipe Drift Diameter	
Pipe Range	
Wall Reject Percentage	
API Specifications	
Customer Specifications	

*Figure 4: Job Info Window*

NOTE: Depending on the system, the **Job Info** window may have different entries available.

## Calibration

Each channel may be calibrated while viewing its signal on the **Calibration** window. This window is opened by left clicking on any trace label for the chart associated with the channel to be calibrated.

For example, to calibrate the **Longitudinal** channels in Figure 3, click on the “**ID**” or “**OD**” labels just above the **Longitudinal** chart. These labels are circled in Figure 3 for clarification.

Each chart will have trace labels just above it - clicking the labels above any chart allows the channels for that chart to be calibrated. Some channels may apply to more than one chart. Such channels can be calibrated by clicking on any chart for which the channel applies.

The **Calibration** window:

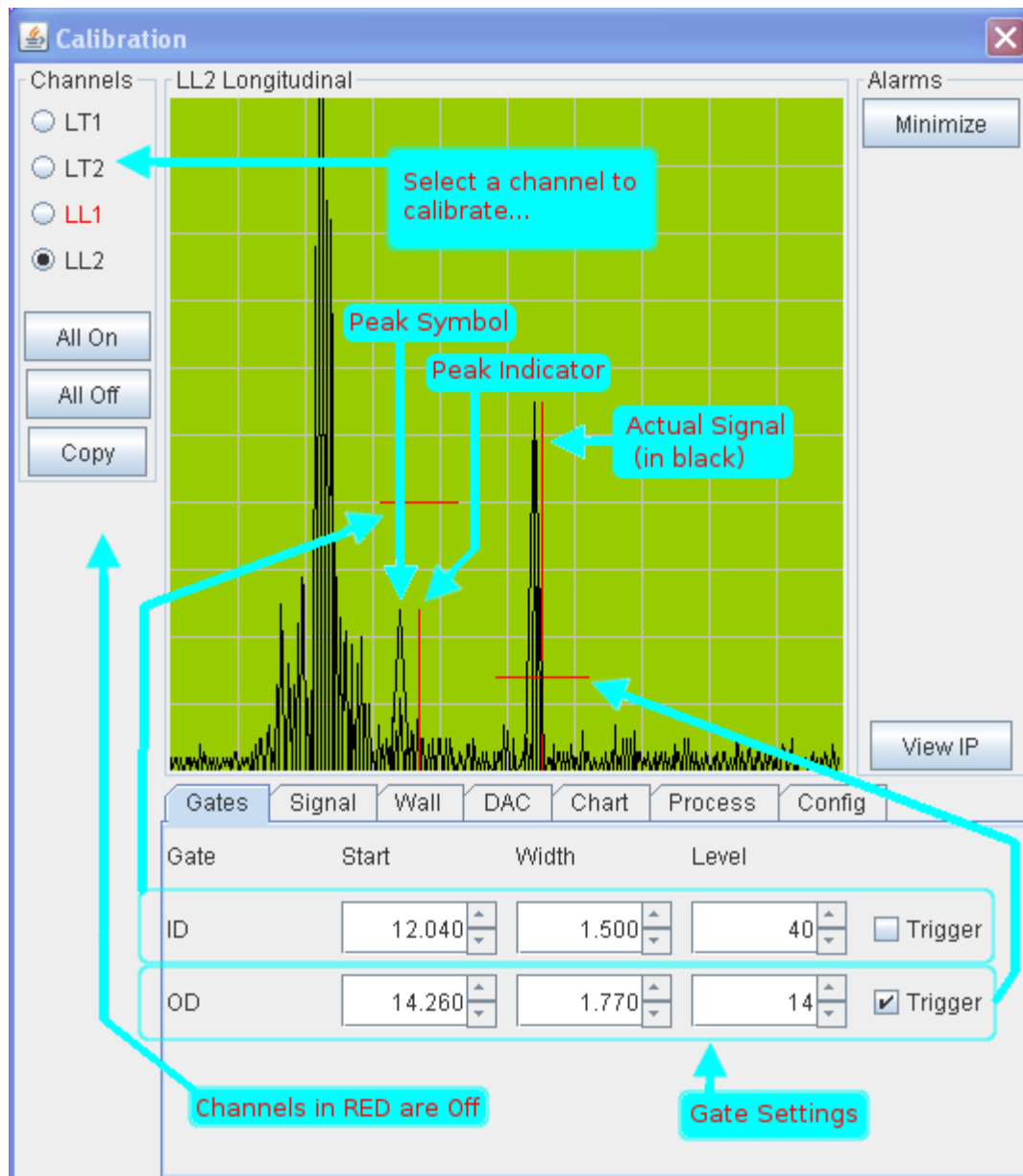


Figure 5: The Calibration Window

## *Basic Calibration Functions*

The **Calibration Window** displays a list of all channels which are associated with the trace for which the **ID** or **OD** label was clicked. Any channel can be selected from the list for viewing of its A Scan and calibration settings.

To quickly view the initial pulse, click the **View IP** button. This feature makes it easy to determine if the channel is working without having to change the **Delay** value.

The **Minimize** button shrinks the **Calibration Window** so that only the **A Scan** display is visible.

The **All On** button turns all the channel on.

The **All Off** button turns all the channel off

The **Copy** button allows the user to copy one or more settings from one channel to another. The channels must all be in the same group, i.e. they must appear together on the **Calibration Window**. This feature is explained further in the section **Copying Settings Between Channels**.

The **A Scan** window does not update quickly enough to display brief signals, so three types of peak indicators are used to represent the maximum signal in each gate:

- **red peak line at gate center:** shows the peak signal in the gate but is always positioned in the center of the gate
- **red peak line at the peak's position:** shows the peak signal in the gate at the actual time location of that peak
- **peak symbol at the peak's position:** shows the peak signal with a triangular symbol at the actual time location of that peak

These indicators can be turned on or off via options on the main menu:

- **Options / A Scan / Show Red Peak Line at Gate Center**
- **Options / A Scan / Show Red Peak Line at Peak Location**
- **Show Peak Symbol at Peak Location**

### **NOTE:**

To display any of the peak indicators, the program must be in **Scan** mode. Click the **Scan** button on the **Main Screen** (see Figure 3).

While scanning with the **Calibration Window** focused (click on the **Calibration Window** to give it focus) the traces on the selected chart will show only the one single channel (**Single Channel Mode**) selected in the left hand pane of the **Calibration Window**. This allows the user to see how that one channel affects the trace.

To see all the channels reflected on the trace, click anywhere on the **Main Screen**. This feature (**All Channels Mode**) allows the user to quickly switch back and forth between seeing a single channel and

all channels displayed on the trace by clicking either on the **Calibration Window** or on the **Main Screen**.

**IMPORTANT:**

It is easy to get confused regarding the **Single Channel** / **All Channels** modes. Switching to the **All Channels** mode will often cause the trace to suddenly ride higher or begin to spike. This is because one or more of the channels which were not being displayed might have noise present which will be displayed when the **All Channels** mode is activated.

**Summary**

Program must be in **Scan** mode to view peak indicators in the **A Scan** window.

To view signals on the trace from the selected trace only, click anywhere on the **Calibration Window**.

To view all signals related to the trace, click anywhere on the **Main Screen**.

**WARNING:**

Do not run in **Inspect** mode with the **Calibration Window** open. It requires significant processing and may reduce the accuracy of the inspection process. If it is necessary to view the **A Scan** during an inspection run, stop the carriage, open the **Calibration Window** for viewing, then close the **Calibration Window** before restarting the carriage. If the carriage must be moved in **Inspect** mode with the **Calibration Window** open, the carriage should be reversed and that section re-inspected after the **Calibration Window** is closed.

## *Using the Signal Gain and Hardware Gain Settings*

When adjusting the gain for any channel, follow these steps:

1. Set the **Gain** setting on the **Signal** tab to 38.0 dB
2. Adjust the **Hardware Gain 1** and **Hardware Gain 2** settings on the **Config** tab to achieve the closest possible signal amplitude.  
  
The values for **Hardware Gain 1 & 2** should be as equal as possible, i.e. 1 & 1, 1 & 2, 1 & 3, 2 & 2. For example, 2 & 2 are preferable to 1 & 4 as the former better balances the gain between the two stages.
3. Adjust the **Gain** setting to fine tune the signal amplitude as necessary.
4. If a 6 dB drop is needed, adjust the **Gain** setting. The **Hardware Gain** settings are not calibrated in decibels (dB).

## *Adjusting Calibration Settings*

After opening the **Calibration Window** for the appropriate chart and selecting the desired channel, the settings for that channel can be adjusted using the tabbed pages at the bottom of the window. Clicking on the different tabs (**Gates**, **Signal**, **Wall**, etc.) near the bottom of the **Calibration Window** allows

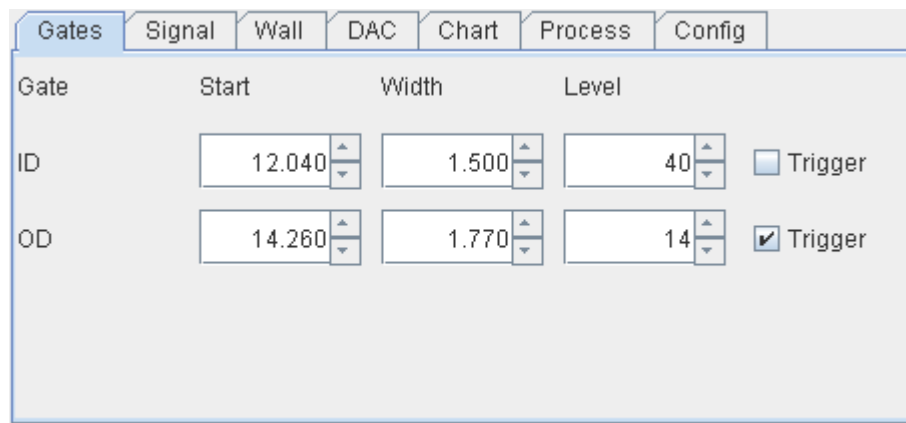
access to these settings. Most of the settings only pertain to the selected channel, but a few affect all channels.

## The Gates Tab

The **Gates** tab allows the user to adjust the starting position, width, and height of the gates. The number of gates and their names vary depending on the system.

When first scanning to peak up on the desired calibration notch, all **Trigger** boxes should be unchecked and at least one of the peak indicator types enabled. The peak indicator(s) can be used to find and peak up on the notch in either gate.

After peaking up on the notch, the **Trigger** box can be checked next to the gate in which the notch appears. This will “lock” in on the signal and display it as it actually appears and at the proper time location. While using the **Trigger** option is optional, it is useful to show the true width and appearance of the signal. Without it, the signal will flash only occasionally and very briefly on the screen as it passes by the head. The peak indicators are useful for showing the height and position of the peak, but do not show the width.



Gate	Start	Width	Level	Trigger
ID	12.040	1.500	40	<input type="checkbox"/>
OD	14.260	1.770	14	<input checked="" type="checkbox"/>

Figure 6: Gates Tab

## The Signal Tab

The **Signal** tab provides for adjustment to signal parameters such as delay, gain, range, and display mode (positive half wave, negative half wave, full wave, RF, off). If the channel is turned off, its name will appear in **red** in the **Channels** list at the left of the **Calibration** window (see Figure 5).

The **Rep Rate** control is used to adjust the repetition rate of all channels. This is the repetition rate per channel, not the overall rate (i.e. it is not divided by the number of channels). Thus, if set at 2000Hz, each channel will be pulsing at 2000Hz. Note that this setting applies to all channels in the system, not just the one currently selected for calibration.



The screenshot shows a software window with several tabs: Gates, Signal (selected), Wall, DAC, Chart, Process, and Config. The Signal tab contains the following controls:

- Delay:** A numeric input field set to 10.400, followed by the unit "inches".
- Range:** A numeric input field set to 2.547, followed by the unit "inches".
- Gain:** A numeric input field set to 39.0, followed by the unit "dB".
- Rep Rate:** A numeric input field set to 2000, followed by the unit "Hz".
- Mode:** A group box containing five radio buttons:
  - ☐ + Half
  - ☒ - Half
  - ☐ Full Wave
  - ☐ RF
  - ☐ Off

Figure 7: Signal Tab

## The Wall Tab

For systems which measure wall thickness, the **Wall** tab is used to set the related values such as nominal wall, nominal wall position on the chart, the chart scale, the velocity of sound in the material being inspected, and the number of reflections between the two wall gates.

The nominal wall is entered into the **Nominal Wall** box.

The **Nominal Wall Position on Chart** specifies the vertical position on the chart at which the trace will ride for nominal wall. A typical value is 50%, which puts nominal wall in the center of the chart. If the actual wall is running low, then this value can be increased so that the actual wall runs at 50% so that there is plenty of room below to measure thin wall areas.

The **Wall Chart Scale** is used to specify how many thousandths of an inch are represented by each 1% of chart height. Typical values are 0.002 and 0.003 inches. Setting this number lower will increase the amount of drop for a thin wall.

The **Velocity** tab is the speed of a compression sound wave in mild steel. A typical value is 0.233 inches/uS but it can be adjusted up or down as necessary to account for temperature or varying material characteristics. Adjusting this value will allow fine tuning of the amount of trace drop expected for a given decrease in thickness.

The **Multiples Between Wall Gates** entry is used to specify how many echoes are between the first and second measurement gates. If the gates are placed on adjacent echoes (typical), then a value of 1 is appropriate. If there is an echo between the echoes on which the gates are placed, then a value of 2 should be used, and so forth.

This tab is covered in more detail in section **Setting Up the Wall Measurement Channels**.

Parameter	Value	Unit
Nominal Wall	0.430	inches
Nominal Wall Position on Chart	50	%
Wall Chart Scale	0.003	inches per 1%
Velocity	0.2330	inches/uS
Multiples Between Wall Gates	1	

Figure 8: Wall Tab

## The DAC Tab

The **DAC** tab allows the use and adjustment of Distance Amplitude Curves. If the **Enable DAC** box is checked, the DAC outline will be shown on the calibration scope. If the **Lock DAC** box is checked, the DAC curve cannot be adjusted in order to protect it from accidental modification.

The DAC uses steps to adjust the gain over distance. Multiple steps can be added, each of which can be adjusted up or down to change the gain for the signal below it.

To use the DAC, check the **Enable DAC** box and un-check the **Lock DAC** box. Right click anywhere in the A Scan window to add the first gate. A blue line with a circle at the left end will appear at the location of the click. Placing the cursor on the circle of any DAC step and pressing and holding the left mouse button will allow the step's height to be adjusted, its width to be stretched to the left, or the entire step to be pushed to the right.

To add another step, right click anywhere on the screen. If the click location is to the left of the leftmost step, a new step will be added to the left; if the click location is to the right of the rightmost step, a new step will be added to the right. If the click location is between the left most edge and right most edge of the existing steps, the closest step will be split into two steps.

If a step is pushed farther to the right than intended, it cannot be moved back but should cause no problems as it typically does not matter what gain is in place out past the gates. If desired, the step can be deleted and placed again, or another step added to the right so that the errant step's width can be reduced by moving the circle connecting it to the new step.

The DAC steps work in conjunction with the **Gain** setting on the **Signal** tab. When a step height is set at 50% of screen height, the **Gain** value will be applied under that step. As the step's height is raised the gain will be increased; as it is lowered it the gain will be decreased under that step. At the top of the screen, the gain for that step will be **Gain + 20dB**. At the bottom of the screen, the gain for that step will be **Gain - 20dB**.

After clicking on the circle at the left end of a step, that step's color will change to white to show that it is selected. Clicking the **Delete** button on the **DAC** tab will delete that step. Clicking the **Delete all DAC Sections** button will delete all the steps.

**NOTE:**

The DAC steps can only be adjusted when the **DAC** tab is selected. Switching to a different tab will disable the DAC editing. The circles at the ends of the steps are displayed when the **Lock DAC** box is un-checked to show that the editing mode is active. These circles will still be visible if another tab is displayed, but no editing will be allowed until the **DAC** tab is selected again.

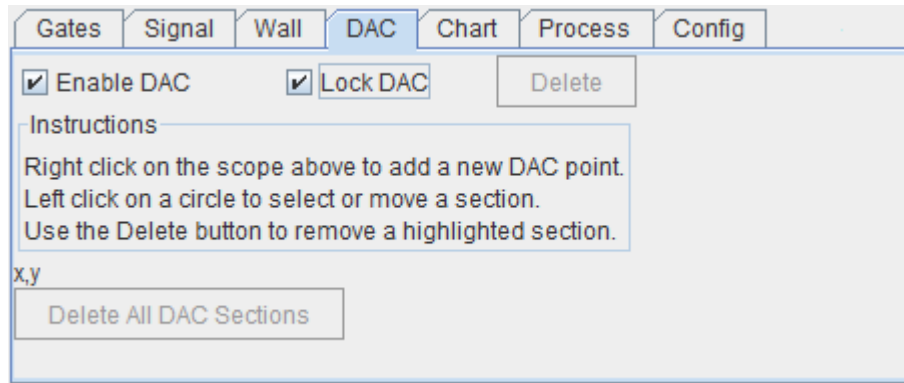


Figure 9: DAC Tab

## The Chart Tab

The **Chart** tab is used to adjust settings such as threshold levels, end mask positions, the chart name, and whether or not the chart is hidden. A chart may be hidden if it is not used for the current inspection process. See the chart at the bottom of Figure Figure 3 for an example of a hidden chart.

For shear inspection charts, the **Major** and **Minor** thresholds are set above the traces so that an indication will rise above one or both and create a flag. The **Major** threshold should be set above the **Minor** threshold.

For wall thickness charts, the **Low Wall** threshold is set below the nominal wall position so that thin wall indications will drop below it and create flags. The **High Wall** threshold is set above the nominal wall position to mark thick wall indications. The **Nominal** threshold is not used for flagging but rather is a convenience marker for the nominal wall position. It is normally set at the same height specified for the **Nominal Wall Position on Chart** entry on the **Chart** tab to clearly mark the vertical position of nominal wall.



Gates	Signal	Wall	DAC	Chart	Process	Config
Threshold	Color	Level	Display			
Major		<input type="text" value="60"/>	Chart Name (1-15 letters)			
Minor		<input type="text" value="40"/>	<input type="text" value="Longitudinal"/>			
			Short Name (1-4 letters)			
			<input type="text" value="Long"/>			
			<input type="checkbox"/> Hide Chart <input type="button" value="Set"/>			

Figure 10: Chart Tab

## Process Tab

The **Process** tab is used to control:

1. **Hits** - how many consecutive hits must occur above a gate before it is registered as a flagged indication; set to 0 to disable
2. **Misses** - how many consecutive misses must occur in a gate before an alarm is triggered; this is useful for flagging lost interface conditions; set to 0 to disable
3. **Signal Processing** -

For typical shear inspection applications, the **Signal Processing** for the **ID** gate should be set to **peak**, the **OD** gate should be set to **peak** and all **Threshold** values set to 0.

For typical thickness inspection applications, the **Signal Processing** for the **Interface** gate should be set to **ignore bad interface**, **First** gate set to **first crossing**, **Second** gate set to **first crossing**, and all **Threshold** values set to 0. The **Hits** and **Misses** values should be set to 0.

For other types of processing options, refer to document **IR Scan Signal Processing Options**.

Gates		Signal	Wall	DAC	Chart	Process	Config
Gate	Hits	Misses	Signal Processing			Threshold	
ID	0	0	peak			0	
OD	0	0	peak			0	

Figure 11: Process Tab for a Shear Channel

Gates		Signal	Wall	DAC	Chart	Process	Config
Gate	Hits	Misses	Signal Processing			Threshold	
Interface	0	0	ignore bad interface			0	
First	0	0	first crossing			0	
Second	0	0	first crossing			0	

Figure 12: Process Tab for a Wall Channel

## The Configuration Tab

The **Configuration** tab is used to adjust various features:

1. **Reject:** sets the level below which signals will be suppressed
2. **A Scan Smoothing:** this smooths the signal displayed in the **Calibration** window and is useful to dampen an excessively jittery display. The normal setting is **1 - no smoothing**.
3. **Hardware Gain 1 & Hardware Gain 2:** these adjust the hardware gain stage. When adjusting the gain for a signal, the **Gain** setting on the **Signal** tab should be set to 38.0 dB. **Hardware Gain 1 and 2** should then be used to adjust the signal height as closely as possible to the desired level. The **Gain** setting should then be used to fine tune the amplitude. The values for **Hardware Gain 1 & 2** should be as equal as possible, i.e. 1 & 1, 1 & 2, 1 & 3, 2 & 2. For example, 2 & 2 are preferable to 1 & 4 as the former better balances the gain between the two stages. The **Gain** setting should be changed when a 6 dB drop is needed as the **Hardware Gains** are not scaled in decibels.
4. **DC Offset:** this is used to adjust the entire signal up or down to account for any offset.

5. **inches/mm:** this is used to select between entering and displaying units in inches or mm.

**Note:** close the **Calibration Window** and re-open it after changing this setting. This option should be selected at the beginning of the job and not changed afterward.

6. **time/distance:** this is used to select between entering and displaying time related values in micro-seconds or inches of beam travel.

**Note:** close the **Calibration Window** and re-open it after changing this setting. This option should be selected at the beginning of the job and not changed afterward.

7. **Velocity Shear:** this is used to enter the speed of sound in shear wave mode in the material being inspected - this value is used to calculate the distance values when **time/distance** is set to **distance**. A typical value is 0.133 inches/sec.

8. **mark pulse/mark continuous:** this controls the mechanical marker used to mark indications on the test piece for units with this feature.

If **pulse** is selected, then a single mark will be triggered when a trace violates a threshold. No further marks will be made until the violation is cleared and the trace again violates the threshold.

If **continuous** is selected, then the marker will be triggered repeatedly as long as a trace is violating a threshold. If the violation is extended, the marker will be pulsed continuously until the violation is cleared.

9. The **Reset Channel** button is for use by a technician only. If it is clicked, it will be necessary to close the program and restart it before continuing.

The screenshot shows the 'Config' tab of a software interface. It contains several settings: 'Reject' is set to 0%; 'AScan Smoothing' is set to 1; 'Hardware Gain 1' is set to 3 Vo/Vi; 'Hardware Gain 2' is set to 2 Vo/Vi; 'DC Offset' is set to 0 mV. There are two sets of radio buttons: the first set has 'inches' selected over 'mm'; the second set has 'distance' selected over 'time'. The 'Velocity Shear' is set to 0.1330 inches/uS. There is another set of radio buttons with 'mark pulse' selected over 'mark continuous'. A 'Reset Channel' button is located at the bottom right of the configuration area.

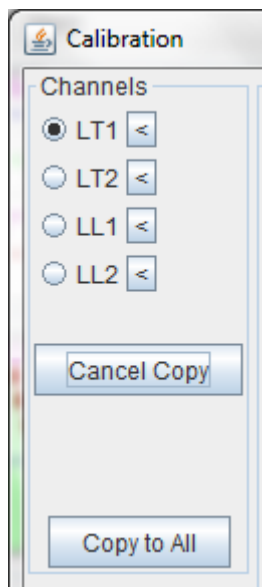
Figure 13: Config Tab

## *Copying Settings Between Channels*

The user may copy settings between channels as follows:

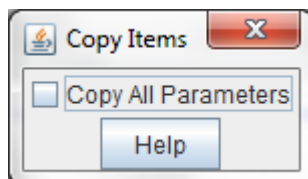
- one or more settings (such as **Gain & Range**) from one channel to any other channel
- one or more settings from one channel to all other channels
- all settings from one channel to any other channel
- all settings from one channel to all other channels

To begin the copy process, click the **Copy** button on the left pane of the **Calibration Window**. The left hand pane will appear similar to:



*Figure 14: Copy Buttons*

Also, the **Copy Items** window will be displayed to the upper right of the **Calibration Window**:





To exit the copy mode, click the **Cancel Copy** button.

## Copying All Parameters

To copy all parameters between channels, check the **Copy All Parameters** option in the **Copy Items** window.

To copy from the currently selected channel to all other channels, click the **Copy to All** button.

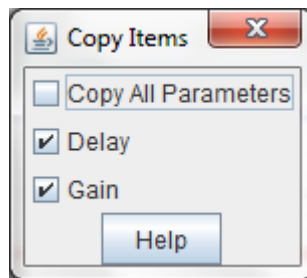
To copy from the currently selected channel to any other channel, click the  button next to the desired destination channel. Any number of the  buttons can be clicked to quickly copy to several different channels.

**NOTE:** Make sure the desired source channel is selected before copying.

## Copying One or More Parameters

Leave the **Copy All Parameters** option in the **Copy Items** window un-checked.



Right click on one or more settings on the tab pages, such as the **Delay** and **Gain** settings. After clicking, the selected setting will be added to the **Copy Items** window and will be already checked. If a setting is accidentally clicked, it can be removed from the copy set by un-checking it in the **Copy Items** window -- it will still be displayed in the window but will not be copied.



The DAC can only be copied in it's entirety by selecting the **DAC** tab and right clicking any where on that tab page.

Some settings cannot be copied. These settings are already applied to all channels and thus it is not necessary to copy them between channels.

To copy from the currently selected channel to all other channels, click the **Copy to All** button.

To copy from the currently selected channel to any other channel, click the  button next to the desired destination channel. Any number of the  buttons can be clicked to quickly copy to several different channels.

**Only the items checked in the Copy Items window will be copied.**

**NOTE:** Make sure the desired source channel is selected before copying.

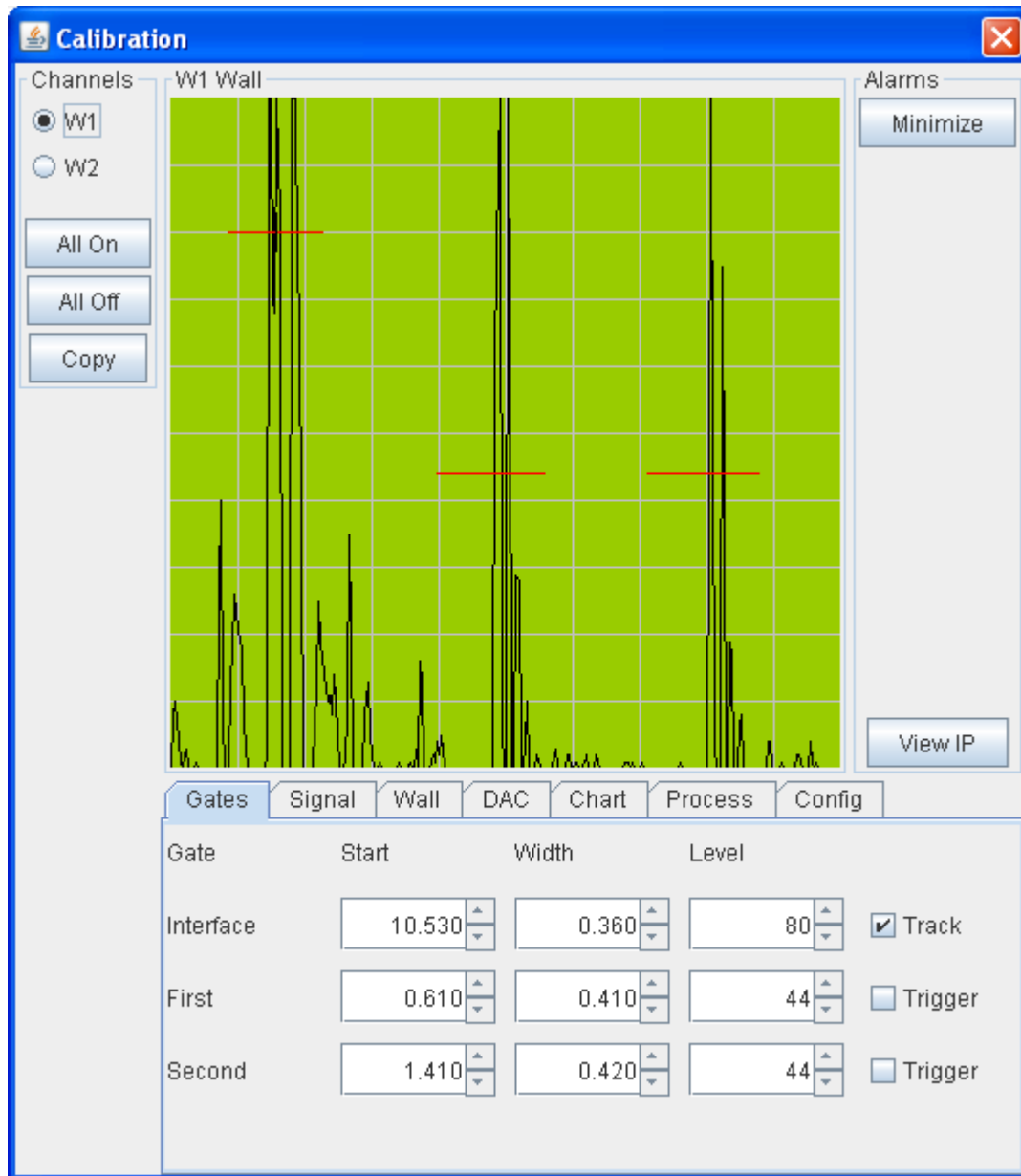
After the copying process is complete, click the **Cancel Copy** button. This will empty and close the **Copy Items** window and hide the copy buttons.

## Setting Up the Wall Measurement Channels

The wall channels are set up by positioning the **Interface** gate over the steel interface echo and the



**First** and **Second** gates over two different back-wall echoes. The figure below depicts a typical wall channel setup:



*Figure 15: Wall Calibration A Scan and Gates*

The steel interface echo is positioned near the left edge of the screen using the **Delay** on the **Signal** tab. The **Range** on the **Signal** tab is then used to spread out the back-wall echoes until two or three are visible on screen to the right.

The steel interface echo should be fully visible. The **Interface** gate is placed across this echo, making sure that the gate starting point is well to the left of the echo and the ending point is well to the right as shown above. The interface echo will move back and forth during the inspection; the **Interface** gate

must be wide enough such that the echo is always in the gate.

The system looks for the first edge of the interface echo to rise above the **Interface** gate and marks this location with a small tick mark on the A Scan display. This mark will follow the echo as it moves back and forth and is used to determine the positions of the **First** and **Second** gates.

**NOTE:** The **Tracking** box should be checked before setting up the remaining gates.

The **First** gate is positioned across the first back-wall echo and the **Second** gate is positioned across the second echo as shown above. Note that the **Start** values are rather small; this is because these values are the time (or distance) from the interface echo crossing point to the position of the gate.

The signal amplitude should be adjusted to give echo heights of 90% of screen height or better. The gate heights should be set above any random noise but well below the echo peaks. They can be adjusted to reduce noise spikes on the traces.

For the setup depicted above, the **Multiples Between Wall Gates** entry on the **Wall** tab should be set to 1 as the gates are placed on adjacent back-wall echoes. See sections **The Wall Tab** and **The Chart Tab** to complete the setup.

# Reports

## *Flag Reports ~Viewing and Printing*

After the completion of an inspection run, the **Main Screen** will reset and the traces will be erased. This signals that the run has been saved. At this point, a **Flag Report** can be generated and printed for that run.

To generate and save a **Flag Report** to disk, click on one of the following main menu options:

1. **Report / Flag Report for Last Complete Joint** - generates and saves a flag report for the last inspection run
2. **Report / Flag Report(s) for Selected Joints** - generates and saves a flag report for one or more inspection runs

The **Flag Report** window will always be displayed for the second option and will be displayed for the first option only if an inspection run has not been made since the program was last started.

To print a single report, type the number of the inspection run into the left box of the **Flag Report** window. The right hand box can be left empty.

To print multiple reports, type the number of the starting inspection run into the left box and the number of the ending inspection run into the right hand box.

To print normal inspection runs, leave the **Report for Cal Joints** box un-checked. To print reports for calibration verification runs, click the box.

Click the **Print** box to generate the reports.

Depending on the system setup, reports will be saved in one of two places:

### **Reports Path in Main Static Settings.ini file not set:**

The reports will be saved in the primary data folder.

The reports for any job will be saved in a separate folder, the name of which will be the job name with ~ **Reports** appended. Thus the reports folder for any job will be found next to that job's folder when viewed in the operating system's file browser if listed alphabetically.

For example, in a typical system the folders will be organized as such:

```
C:\Users\Operator\Documents\IR Scan Data Files - Primary\ (or similar)
    3434322
    3434322 ~ Reports
    3434398
    3434398 ~ Reports
```

### **Reports Path in Main Static Settings.ini file is set:**

Optionally, a separate folder can be specified to hold all report folders. This keeps all the reports

together and makes them easier to find. It also eliminates the need to browse through the job folders which could result in accidental renaming or deletion of important files.

This is done by setting the **Reports Path** option in the **Main Static Settings.ini** file found in the root folder of the IR Scan program. For example:

Reports Path=C:\Users\Operator\Documents\IR Scan Reports\ (or similar)

The above will cause all the report folders to be stored in the **IR Scan Reports** folder as shown below:

C:\Users\Operator\Documents\IR Scan Reports\ (or similar)  
3434322 ~ Reports  
3434398 ~ Reports  
3434402 ~ Reports

In this case, only report folders will be present. This reduces the amount of clutter. A shortcut to this folder can be installed on the main window for quick access.

The **Flag Report** files in a report folder appear as follows when viewed in an operating system's file browser:

3434322  
3434322 ~ Reports\  
0000001 Flag Report.txt  
0000002 Flag Report.txt  
0000013 Flag Report.txt

The numerical prefix of each name is the number of the inspection run. If a number is missing, the **Flag Report** for that run has not yet been generated. This can be done at any time.

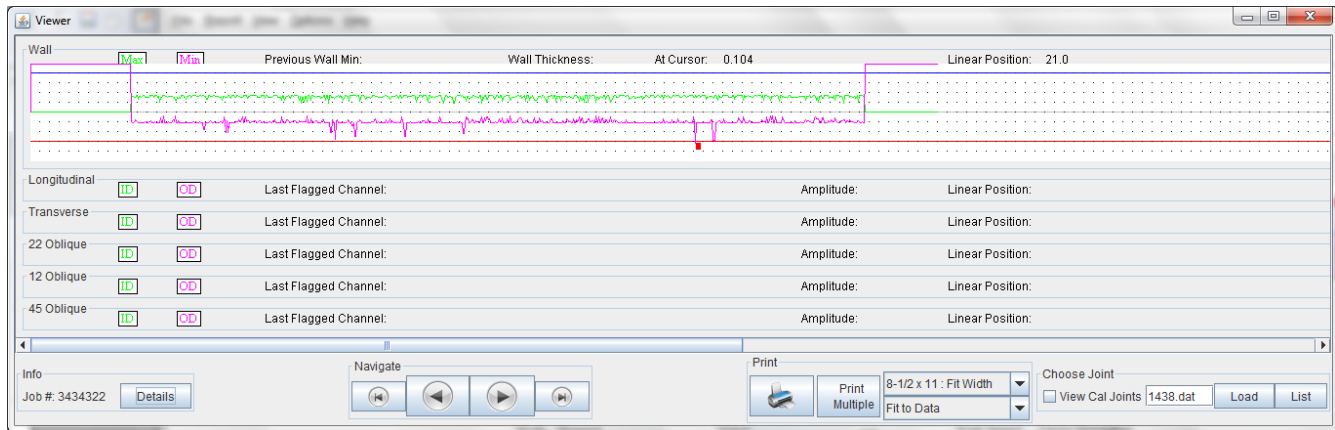
These files are simple text files and can be viewed in a text editor such as Window's Notepad. They can also be printed on paper from that same editor.

To view a **Flag Report**, double-click (using the left mouse button) on any file. Use **File/Print** to print a hard copy (this command may vary depending on the operating system).

# Viewing and Printing a Saved Inspection Run

## Viewing

After an inspection run has been completed, it can be examined in the **Viewer** window. This window is opened by clicking **View/View Chart** of a Completed Joint in the main menu. Upon opening, the last piece inspected will be displayed.



If the **View Cal Joints** box is un-checked, then normal inspection runs will be displayed. To view calibration verification runs, the box should be checked.

## Info Box


The **Info** box displays the job number. The **Details** button will display extra information pertaining to the inspection run, such as heat number and lot number. Depending on the system configuration, different types of information will be displayed.

## Navigation

The navigation buttons are used to move to the first run, the previous run, the next run, or the last run (the buttons are laid out in that order from left to right).

## Print



To print only the run currently on the display, click the  button.

To print multiple runs, click the **Print Multiple** button, type in the starting run and the ending run numbers, then click **Print**.

The paper size and fit options allow for the best fit of the printout to the paper. Typical settings are

**8-1/2 x 11 : Fit Width or 8-1/2 x 14 : Fit Width  
Magnify 1.0 or Fit to Data**

The **Fit Width** option makes sure that all of the data will fit while shrinking the height as necessary.

The **Fit to Data** option will truncate the printout at the end of the data -- thus eliminating wasted printing for the empty section of the charts. However, this does result in different printout sizes depending on the length of the inspection run.

In general, the **Fit Width** options and the **Magnify 1.0** option are the recommended settings.

**Choose Joint**

The user may pick any inspection run to display by entering its number into the box in the **Choose Joint** box and then clicking the **Load** button. Alternatively, the desired run can be selected from a list by clicking the **List** button.

## Archiving Data

For systems which store data, the information is stored in two folders in the Documents folder. The folders contain duplicate information to provide a backup in case one set becomes corrupted.

Periodically, the job folders should be moved to an archival media such as a memory stick, CD, DVD, a separate hard drive, or a remote computer and thus removed from the Display Computer.

The data folders generally look something like this:

### Documents

#### IR Scan Data Files - Primary

Job X99e49

Job X484x9

...and so forth...

#### IR Scan Data Files - Backup

Job X99e49

Job X484x9

...and so forth...

In this case, archiving **Job X99e49** is performed by moving one copy to an archival medium and then moving the second copy to a second archival medium (for instance, two different memory sticks).

It is recommended that one copy be moved to one stick, CD, DVD, etc. and the other copy be moved to a separate stick, CD, DVD, etc. Do not use the same copy (i.e. from the Primary folder) to store on both pieces of media - if that one copy has any corrupted files they will then be corrupted on both archival media pieces.

After copying/moving a job folder to archival media, make sure it is removed from the Display Computer.

# Reference

## Revision Log

- 1.0 12/12/10 dwnMKS/chkMKS/appMKS  
Initial Document
- 1.1 10/1/11 dwnMKS/chkMKS/appMKS  
Added more software features.
- 1.2 11/12/11 dwnMKS/chkMKS/appMKS  
Updated logo on cover page.  
In progress:  
Instructions for viewing saved data.  
Instructions for printing saved data.  
Instructions for handling wall mapping data.
- 1.3 10/05/12 dwnMKS/chkMKS/appMKS  
Extensive updates for all UT Calibration Window tabs.  
Added instructions for starting units with UT Chassis on carriage.  
Added instructions for printing flag reports.  
Added instructions for copying settings between channels.  
Added instructions for setting up the wall.

## Document Details

Authored in OpenOffice.org Writer.

Printed using HP Officejet 5610 printer.

Printed on Georgia Pacific Ink Jet & Laser Paper, 92 brightness, 24 lb weight, 8-1/2" x 11"

Exported to PDF and printed from Adobe Acrobat.

Screen Capture Images:

The computer screen capture images were cropped and processed in Gimp. For best fit, most were re-sized using the scale feature. **Important:** when scaling in Gimp, change the X and Y resolution on the Gimp Scale Image window to 96.012 pixels per inch. This makes the text appear more clearly in the OpenOffice Writer editor.