CarveWright User Calibration

Introduction

LHR has provided a series of user calibration options for the machine which allow the user to fine tune the machine and keep it in top operating condition. The calibration options are meant to support hardware additions (such as new jigs or new rubber belts) and minor adjustments to the machine accuracy over its lifetime.

Important Note

All CarveWright machines (whether new or refurbished) have been factory calibrated, and tested, with special precision equipment. There is generally no need to recalibrate a recently purchased machine.
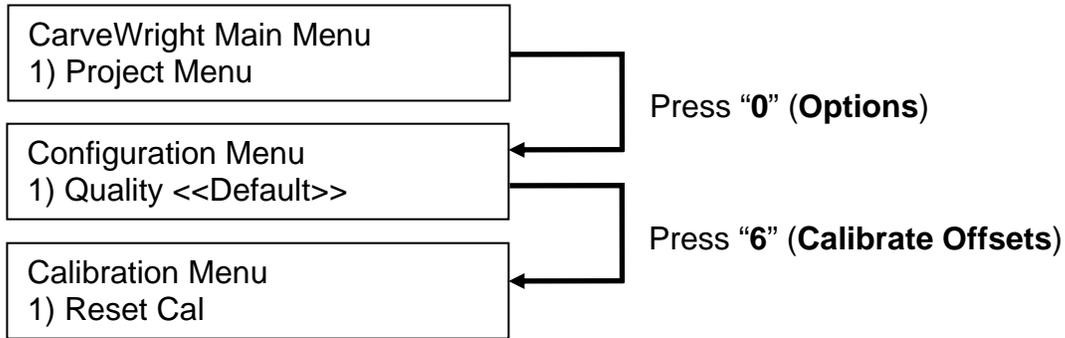
However, the shipping process may slightly alter the original calibration of the machine and over the machine lifetime, the sensors may change slightly. In the case where no hardware modifications have been made to your machine, you should be certain that the machine measurements are in error before changing the calibrated machine values.

Calibrating the CarveWright will change the way it measures the length, width, and depth of the board. This may lead to unexpected results during carving. For example, it may change the resulting measurement of the board, possibly leading to the machine requesting you to scale or center boards that were normally fine. It may also alter the placement of objects on the designed board. Be very certain of your need to run this calibration before beginning.

Overview

To begin, make sure you update your software to version 1.161 or later. Once that is done, make sure to update the firmware on your card by inserting it in the programmer and selecting *Flash Manager* from the *File* menu. It will tell you if you are not running the latest firmware version and prompt you to update. To get to the User Calibration menu, follow the instructions and flow chart below:

1. Insert the memory card, turn the machine ON, and navigate to the *Configurations Menu* from the *CarveWright Main Menu* pressing the "**0**" (**Options**) key on the keypad.

2. Navigate to the *Calibrate Offsets* menu item by using the **up/down arrows** and press **ENTER**, or select item 6 by pressing the "**6**" key.

```
┌─────────────────────────────┐
│ CarveWright Main Menu       │
│ 1) Project Menu             │
└─────────────────────────────┘          Press "0" (Options)
┌─────────────────────────────┐
│ Configuration Menu          │
│ 1) Quality <<Default>>      │
└─────────────────────────────┘          Press "6" (Calibrate Offsets)
┌─────────────────────────────┐
│ Calibration Menu            │
│ 1) Reset Cal                │
└─────────────────────────────┘
```

The *Calibration Menu* has 6 options.

    1) Reset Cal
    2) Cal Depth
    3) Cal Sensors
    4) Manual X Axis Cal
    5) Manual Y Axis Cal
    6) CO2 Car Offset

Calibration option 6, "*CO2 Car Offset*", is not covered in this manual. Please refer to the document "Setup and Use of the CarveWright CO_2 Car Jig" for more information.

Resetting the Calibration

Resetting the Calibration will automatically return the machine to its factory settings. Be sure that there is a good reason to do this as you may have changed settings for better performance in the past. You can also change each individual setting to the default using the options below. Load the board in to the machine and navigate to the *Configurations Menu* from the *CarveWright Main Menu* by using the **up/down arrows** or pressing the "**0**" (**Options**) key on the keypad. Navigate to or select item 6, *Calibrate Offsets*. Press "**1**" to reset the current calibration and you will be asked to verify your selection as shown:

```
┌─────────────────────────────┐
│ Reset User Calibration?     │
│ 1) Yes     2) No            │
└─────────────────────────────┘
```

Press "**1**" to complete the calibration reset.

Calibrating the Depth (or Board Thickness)

From the *Calibration* menu, use the **up/down arrows** or press "**2**" to begin the depth calibration. Measure the thickness of the board you selected for your calibration as accurately as you can near the center of its length. The accuracy of this measurement is very important as the machine calibrates itself to this measurement. Measure the board thickness on the edge facing the keypad, as this is where the machine will measure the thickness. Load the board into the machine as you would normally, crank the head down, and set the sliding plate (See Figure 1).

The machine will prompt you to enter the board thickness. Enter your measured thickness as a decimal point of up to three digits or a fraction, and press **ENTER**.

The machine will find the right and back edges of the board and the request the 1/8" cutting bit. Open the cover, insert the bit and press **ENTER**. The machine will touch the bit tip on the bit touch plate and then touch the board surface twice. If the machine returns to the *Calibration* menu, it has completed a thickness calibration. If an error is displayed, re-measure the board thickness and repeat the process again.
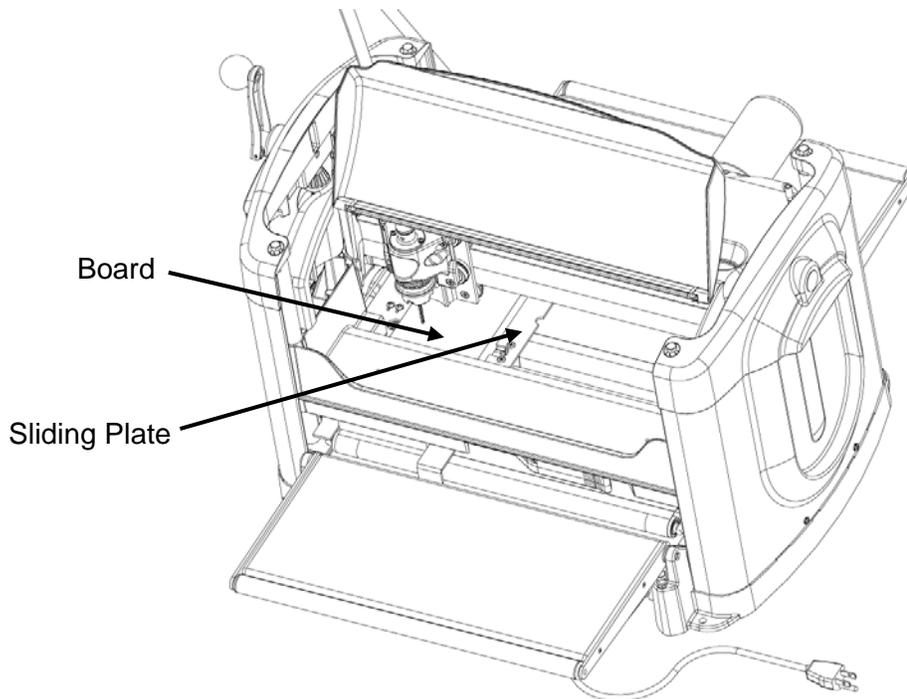
Board

Sliding Plate

FIGURE 1: PROPERLY SET SLIDING PLATE

Calibrating the Edge Sensor

From the *Calibration* menu use the **up/down arrows** or press "**3**" to begin the calibration on the sensors that find the edge of the board. Load the board (at least 12" long by 4" wide) into the machine as you would normally, crank the head down, and set the sliding plate (See Figure 1).

The machine will find the right and back edges of the board and the request the 3/8" jointing bit. Open the cover, insert the bit and press **ENTER**. The machine will measure the width of the board and will cut a slot on the back right edge of the board (as seen facing the front of the machine). A sensor measurement is taken at the edge of the slot and then small cuts are taken within the initial slot and measured again.

The machine will then drop the bit into the central hole in the sliding plate and make a series of small cuts on the edge of the board, re-measuring after each cut. Next the bit will drop into the central hole in the squaring plate (on the keypad side) and make

a series of small cuts on that edge, re-measuring after each cut. If the machine returns to the *Calibration* menu, it has successfully calibrated the board edge sensor. If an error is displayed, repeat the process again with a new board.

Manually Calibrating the X-Axis

The most frequently calibrated setting is the X-axis. You will want to consider calibrating the X-axis if you are consistently getting an incorrect board length measurement or if you are replacing the factory sandpaper belts with the rubber belts.

To do this calibration you will need a board roughly 36" long that is clean and straight. It is very important that the board edge that is placed into the machine up against the squaring plate be very clean and free of defects. This is the edge that the board tracking sensor roller will be running on and measuring.

Measure and record your board length with as much accuracy as you can get. Make sure to perform the measurement in the center of the board width, as this is where the machine will also measure (Hand Measured Length - _____inches). Load the board into your machine and measure it using the "Measure Board" function. This can be accessed by pressing the "**7**" (**Measure**) key on the keypad or by using the up/down arrows to navigate to the measure function from the CarveWright Main Menu. The display will then ask for the direction the user wishes to measure.

```
Select Dimension
1) Length
```

Press the "**1**" key on the keypad to measure the Length. Record the number (Machine Measured Length - _____inches) and compare it to the length you measured by hand. At this point you have to decide if the difference in the length measurements warrants recalibrating your machine. If you would like to recalibrate your machine continue reading this document.

Before recalibrating, make sure that you have the latest CarveWright firmware version running on your flash card (version 1.161 or later). From the *Calibration* menu use the **up/down arrows** or press "**4**" to begin the calibration of the X-axis.

You are now at the screen that shows you the default calibration numbers (factory calibrated) as well as the current calibration setting for the length measurement.

```
Dflt: ###.###   Cur: ###.###
1) Default        2) New
```

You now have two options:

1) Pressing "**1**" (**Default**) will restore the current value to the factory default value.

2) Pressing "**2**" (**New**) will allow you to type in a new value to adjust for the difference in measured lengths. New numbers can be entered with decimal or fractional values. Press **ENTER** to save once a value is entered.

To calculate the value to enter, first take a look at the difference in the measured lengths. If the hand measured length is **longer** than the machine measured length you will need to **add** units to the displayed current value, and conversely, if the hand measured length is shorter than the machine measured length you will need to subtract units from the current value setting

To find the magnitude of the change to the current value subtract the two numbers (Length difference - _____inches). Although not an exact correlation, you should change the current value setting by 1 unit for every 0.03" (or for every 1/32nd of an inch).

So now you have a direction (add or subtract) to change and a magnitude (number of units). As an example: say you have a board that measures exactly 36" long by your tape measure and the machine measures board at 35.875", adjust the X axis cal number by -4. If the current value was set to 890.000, change it to 894.000. Or if the machine measures 36.125", adjust the X axis cal number +4.

Once the new value is entered you will see it appear as the Current value on the display. Go back and measure the board with the machine again and see how much closer the measured values become. Rerun the calibration routine as many times as necessary to attain the level of accuracy that you desire.

Manually Calibrating the Y-Axis

You will want to consider calibrating the Y-axis if you are consistently getting an incorrect board width measurement or if you are seeing an offset in the centering of a project in the side-to-side direction. To do this calibration you will need a board at least 6" wide that has clean and straight edges. Wider boards allow for better calibration accuracy.

Before recalibrating, make sure that you have the latest CarveWright firmware version running on your flash card (version 1.161 or later). From the *Calibration* menu use the **up/down arrows** or press "**5**" to begin the calibration of the Y-axis.

You are now at the screen that asks for type of Y calibration you wish to do.

> Select Y Calibration
> 1) Calibrate Width

There are two options in the Manual Y-Axis Calibration menu:

1. Calibrate Width – This calibration will allow you to adjust the machine if it is measuring the width incorrectly.

2. Calibrate Y Offset - This calibration will allow you to adjust the machine's Y position if it is not placing a pattern in the right location in the side-to-side direction (i.e. not centering in the Y direction).

Calibrate Width Option

To begin the width calibration you will want to do a hand measurement and machine measurement of your board width. Measure and record your board width with as much accuracy as you can get in roughly the center of the length (Hand Measured Width - _____inches). Load the board into your machine making sure that it is centered under the Y-Truck, and measure it using the "Measure Board" function. This can be accessed by pressing the "**7**" (**Measure**) key on the keypad or by using the **up/down** arrows to navigate to the measure function from the CarveWright Main Menu. The display will then ask for the direction the user wishes to measure.

```
Select Dimension
2) Width
```

Press the "**2**" key on the keypad to measure the Width. Record the number (Machine Measured Width - _____inches) and compare it to the width you measured by hand. At this point you have to decide if the difference in the width measurements warrants recalibrating your machine.

If you would like to recalibrate your machine's width measurement, continue reading this document. If you wish calibrate the width measurement select "**1**" from the Select Y Calibration menu shown above. You are now at the screen that shows you the default calibration numbers (factory calibrated) as well as the current calibration setting for the width measurement.

```
Dflt: 0.###   Cur: 0.###
1) Default        2) New
```

You now have two options:

1) Pressing "**1**" (**Default**) will restore the current value to the factory default value.

2) Pressing "**2**" (**New**) will allow you to type in a new value to adjust for the difference in measured widths. A screen will then appear that prompts you to input whether your hand measurement was **Narrower** (option 1) or **Wider** (option 2) than the machine measurement. (For example, if your board measures 6.1" wide by hand but measures 6.05" by the machine, you will select "**2**" to tell the machine that the actual measurement is wider.

   The machine will then ask for the amount by which the measurement is off. Enter the new value in decimal or fractional form. In the example above type .05 and press **ENTER** to save the value. Repeat the board measure test and repeat the calibration steps as necessary.

Calibrate Y-Offset Option

If you are having issues with a pattern being carved off-center (even though it is centered in the software), select the Calibrate Y-Offset menu item.

The first step in this calibration is to carve a rectangular test region or shape centered on the board width. Run the project in the machine and tell it to center on width if it asks due to the board size. Measure the distance from each side of the board to the edge of the square. Obviously if the pattern is centered the offsets will be the same.

If they are not the same, record both the amount by which the two measurements differ (Difference = _____inches) and the direction in which the pattern needs to move in order to center it on the board. You will want to know whether the pattern needs to move **Towards** the keypad side of the machine or **Away** from the keypad side of the machine to achieve proper centering.

Once you select the Calibrate Y-Offset menu item you will see the screen that shows the default calibration numbers (factory calibrated) as well as the current calibration setting for the Y-Offset.

```
Dflt: 0.###   Cur: 0.###
1) Default        2) New
```

You now have two options:

1) Pressing "**1**" (**Default**) will restore the current value to the factory default value.

2) Pressing "**2**" (**New**) will allow you to type in a new value to adjust for the difference in measured offsets. A screen will then appear that prompts you to input whether the pattern needs to be moved **Towards** the Keypad (option 1) or **Away** from the keypad (option 2) for proper centering. For example, you carve a square and it is off-center by 0.1" in the direction away from the keypad side of the machine. In this case you want to select option "**1**" to tell the machine that the pattern needs to move **Towards** the keypad side of the machine.

    The machine will then ask for the amount by which the measurement is off. Enter the new value in decimal or fractional form. In the example above, type .1 and press **ENTER** to save the value. Repeat the cut test and repeat the calibration steps as necessary.