

Configuring Home and Park Position on V2 Impact Testers

Series 3020
Operation Manual Supplement

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Introduction

Configuration of the home and park positions is one of the more confusing procedures on a V2 Impact Tester. It's complicated, and there are a lot of moving parts. While the Operation Manual is technically correct, this document attempts to further clarify and guide the user in configuring a critical setting in the operation of the Impact Tester.

Absolute vs Relative Position

Understanding the difference between “absolute” and “relative” positions is key to understanding the homing procedure.

A “relative” position is one that is “relative” to the current position. For instance, let us assume you are standing at position 0. If I tell you to walk forward 10 feet from where you are standing, you are now at position 10 feet. I told you a relative distance, and you moved that distance. If I tell you again to move 10 feet from where you are standing, you are now at position 20 feet, but you only moved 10 feet from your previous position. You made a relative movement because your final position was relative to the position from where you started the move.

An “absolute” position is one that moves to real, defined positions. Let's put you back standing at 0 again. If I tell you to move to position 5 feet, you move 5 feet and are standing at position 5 feet. So far, it all sounds the same. Now, I tell you to move to position 7 feet. In this case, you move only 2 feet to position 7 feet. The distance you move is determined by the difference between the starting position and ending position. If I again tell you to move to 7 feet, you wouldn't move at all; you're already there. If I tell you to move to 3 feet, the distance you move will actually be -4 Feet.

In a relative move, your target position is dictated by the relative distance you moved.

In an absolute move, the distance you move is dictated by the target position.

The Servo Motor vs the Linear Encoder

The Impact Tester features a servo motor for moving the press axis, which is the magnetic devices that grabs and moves the Impact Head. Because the Impact Head and servo motor are often decoupled from each other, the position of the Impact Head is monitored by a separate, linear encoder.

The encoder of the servo motor on the system is a “relative” device. When the system turns on, it has no idea where it is, and always turns on with the position of 0, no matter its position in the real world. This is analogous to blindfolded and placed into a room. Unless someone tells you where you are, you have no idea.

The Linear Encoder on the system is absolute; it always has the same position because the magnetic strip it reads is encoded with absolute positions. The Linear Encoder is never blindfolded.

What are the problems?

The Linear Encoder always knows where it is based upon the positions listed on its magnetic strip, but the positions are stamped into the magnetic strip on a large roll in a factory far, far away; they have nothing to do with the impact tester.

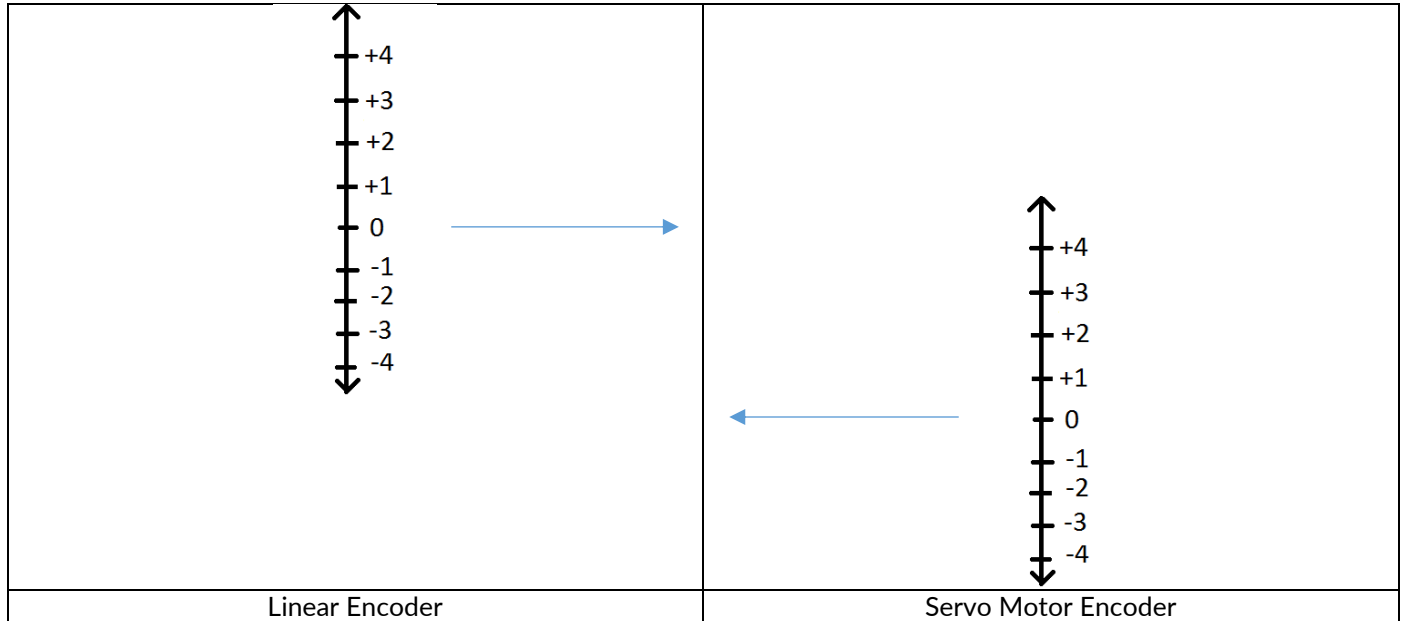
So, the first problem is that we have to adjust the absolute positions of the Linear Encoder to match your Impact Tester.

The second problem is that, as mentioned in the previous section, the servo motor has no idea where it is. When the system turns on, it is simply at 0, and that 0 is a random position completely based upon the varying condition of the

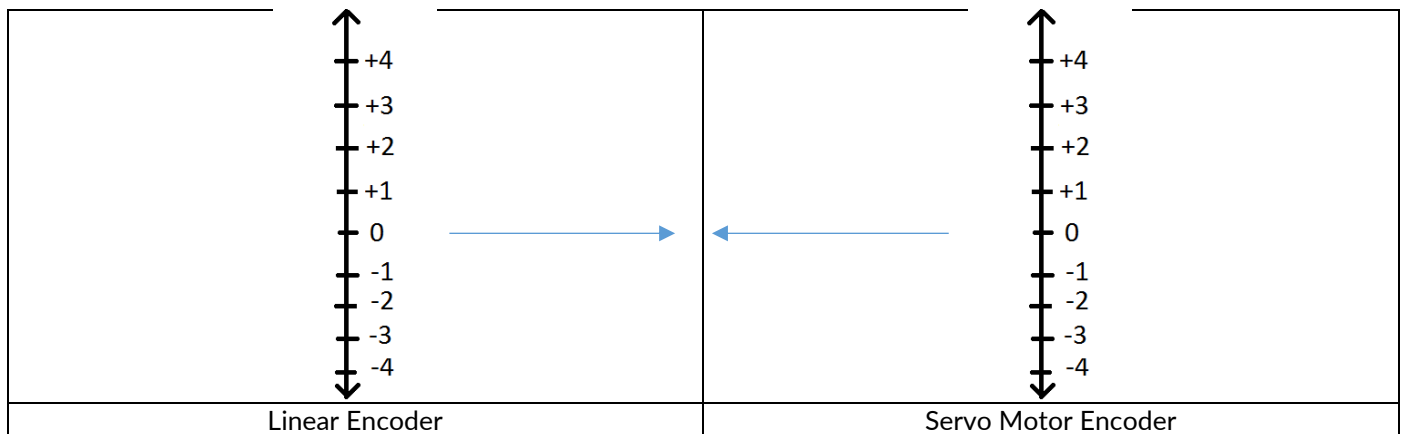
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impact tester when the machine is turned on. In other words, we need to align the coordinate system of the servo motor to the coordinate system of the Linear Encoder.

On startup, the coordinate systems of the linear encoder and servo motor are not aligned.



The homing sequence aligns the coordinate systems.



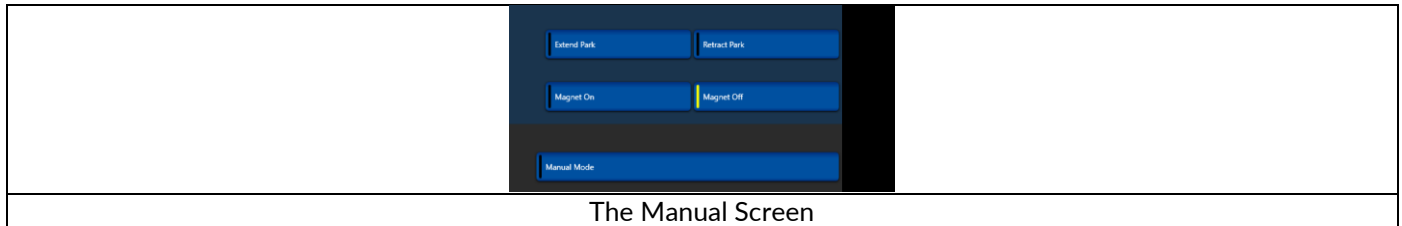
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Adjusting the absolute positions of the Linear Encoder to match your Impact Tester

The Plate Block Position is the setting that corrects the absolute positions of the Linear Encoder to match the Impact tester.

To set the Plate Block Position:

- Locate the 6.35mm gauge block included with the system. Set on the corner of the Impact Plate.
- The impact head must be lowered, by hand, to the bottom position. To do so:
 - Place the system into Manual Mode by pressing the Manual Mode button.
 - Grab the impact block by hand and hold it to prevent it from falling.
 - Press the Retract Park button. The park cylinders will retract, freeing the Impact Head. You will now be holding the Impact Head by hand.
 - Gently lower the Impact Head to the bottom position.
- Now, we need to place the Impact Head on the gauge block. Gently lift the Impact Head, slide the gauge block beneath it, then gently lower the impact head onto the gauge block. Careful! If you let the Impact Head slam into the gauge block, the load cell can become damaged!



- Now, navigate to the Size tab of the Settings page. To set the Plate Block Position, we simply set the Plate Block Position to the reading in Impactor Actual Position just above. Note that, in the example below, the value is 952.123mm, but the number on your machine will be different, random and have no inherent meaning.



You are now ready to set the home and park position.

What is Home Position?

The home position is the absolute position of the press when it is fully retracted. Because the servo motor is blind to its position before the homing sequence, it needs some help before it can go find the Impact Head. So, the press axis has a sensor that turns on when the press is fully retracted.

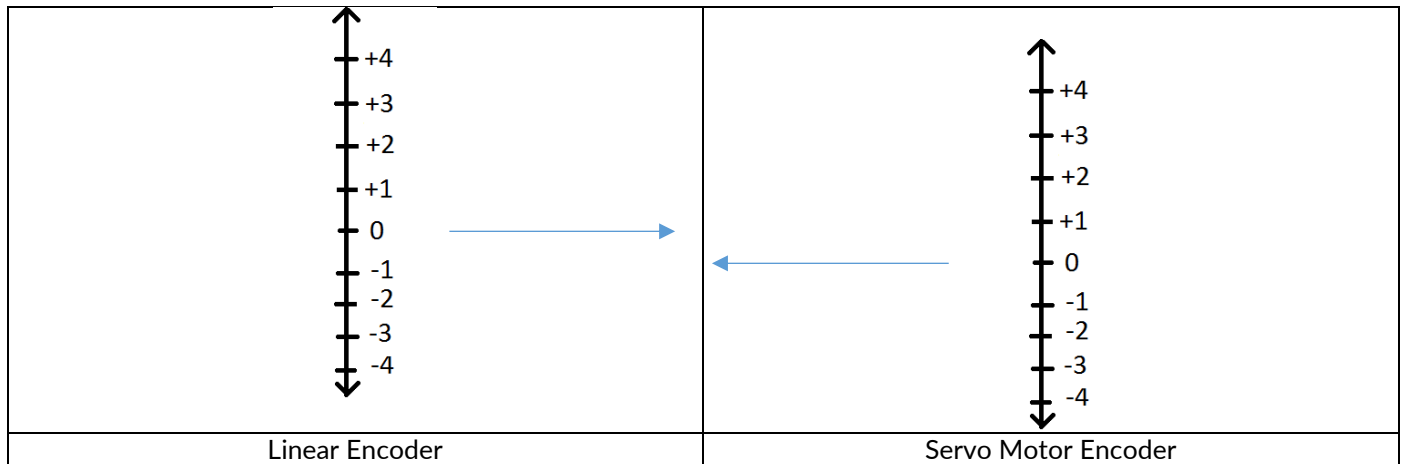
The first move of the press during the home sequence is to retract until it finds that sensor, then set its position to the Home Position. The Home position is an approximation of what the Linear Encoder would be reading at that position.

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It needs to be close so the press axis can later find the Impact Head, but not exact; once the press has made actual contact with the Impact Head, it will correct its position to perfectly match the Linear Encoder by taking an actual measurement.

So, the home position is an attempt to make the coordinate systems of the Linear Encoder and Servo Motor agree before the two have made contact with each other.

The home position is a value that will bring the Servo Motor Encoder into near-agreement with the Linear Encoder.



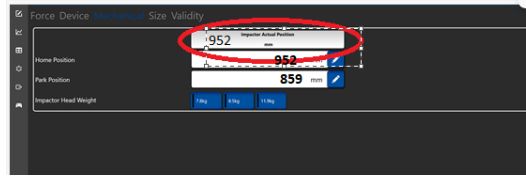
Can the Home Position be calculated from the Plate Block Position?

Unfortunately, no. The Home Position is tied to the position of the end-of-stroke sensor, which does not have a consistent position.

There is a good way to get very close, however.

- On the Manual Screen, enable Manual Mode.
- Grab the Impact Head by hand so that it will not fall.
- Open the park cylinder.
- Gently slide the impact head to the bottom position and let it rest there.
- Jog the press axis up until it stops on its own because it has reached the end-of-stroke sensor.
- Navigate to the Settings->Mechanical Page to display the Impact Actual Position.
- Slide the impact head up to make contact with press magnet. The Impact Actual Position reading there is a good setting for Impact Actual Position. Record that position, then set the Impact Head at the lower position again.
- Set the Home Position to the position you recorded. In the example below, the operator recorded a position of 952, so set the Home Position to 952 and the Park Position to 859. This values may require slight adjustment, but will be close. Note that, in the example below, the value is 952mm, but the number on your machine will be different, random and have no inherent meaning.

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What is the Park Position?

The Park Position is more obvious: it is the Linear Encoder position that will place the Impact Head just above the park mechanism pins. This position should allow the park pins to slide easily into the Impact Head Park Hooks, but not let the Impact Head drop too much when the magnet is turned off and the Impact Head falls to the pins. 2mm above the height of the park pins is ideal.

We use the Linear Encoder position in case the calibration of the plate block position has drifted, or was mis-calibrated. Because the Linear Encoder Actual Position can and shall never change, the system will safely park even when mis-calibrated, which avoids damage to the Impact Head and Load Cell.

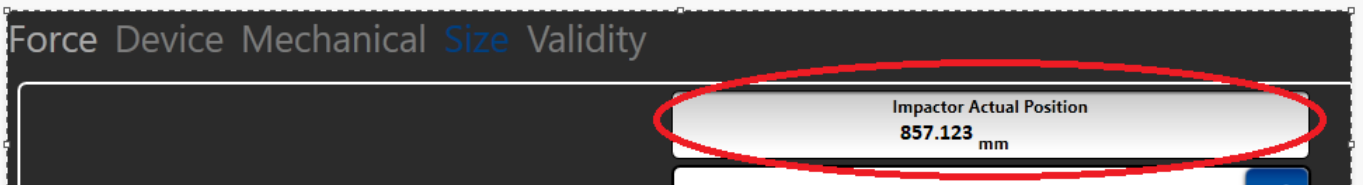
The Park Position is usually about 3mm less than the Home Position. So, if you set your Home Position to 952, set your Park Position to 859 to start, then adjust slightly, if needed.

Note: make sure that the park position is high enough that the impact head is not putting any load on the park pins in their extended position. When the press lifts the impact head off the park pins, it moves up to the park position. If the park position isn't high enough, the pins will not be able to retract and an alarm will occur.

The Park Position should never be greater than the Home Position, which will result in damage and alarms.

Reading the park position without much guessing.

The Park Position is easy to measure: place the Impact Head on the park pins, then read the position on the Settings->Size Screen, add 2mm, and use that value for the Park Position.



In this example, the system reads 857.123mm while the Impact Head is resting on the Park Pins. So, the setting for Park Position would be $857.123 + 2 = 859.123$.

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Testing that Home Position and Park Position is Valid

Before running auto, you need to make sure that these settings are valid. The best way to confirm is to use the home routine. However, we want to make sure that the impact head is sitting on a piece of foam on the impact plate when attempting to home, not resting and the park cylinders.

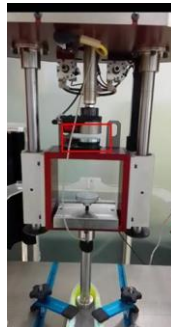
- On the Manual Screen, enable Manual Mode.
- Grab the Impact Head by hand so that it will not fall.
- Open the park cylinder.
- Gently slide the impact head to the bottom position and let it rest there.
- Place the impact head on a piece of foam. A foam with a thickness of 16mm or more is recommended.
- Press the Home button to run the home sequence.

If the system fails to pick up the impact head, or over-travels and slams into the impact head, pressing it into the foam more than 1.5mm, then the home position is incorrect and needs adjustment. See the section Troubleshooting and Adjusting.

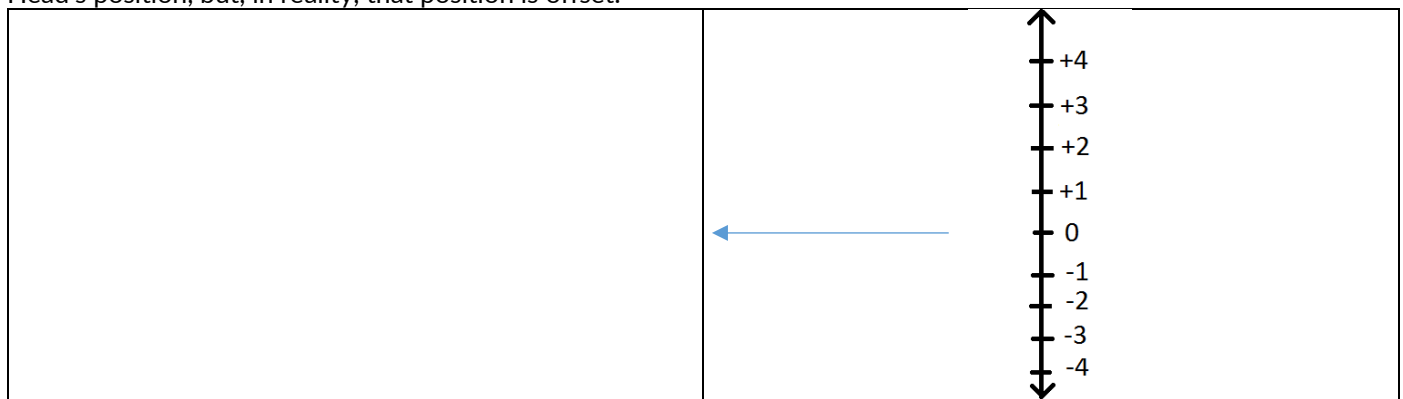
Troubleshooting and Adjusting

The press does not make contact with the Impact Head while homing.

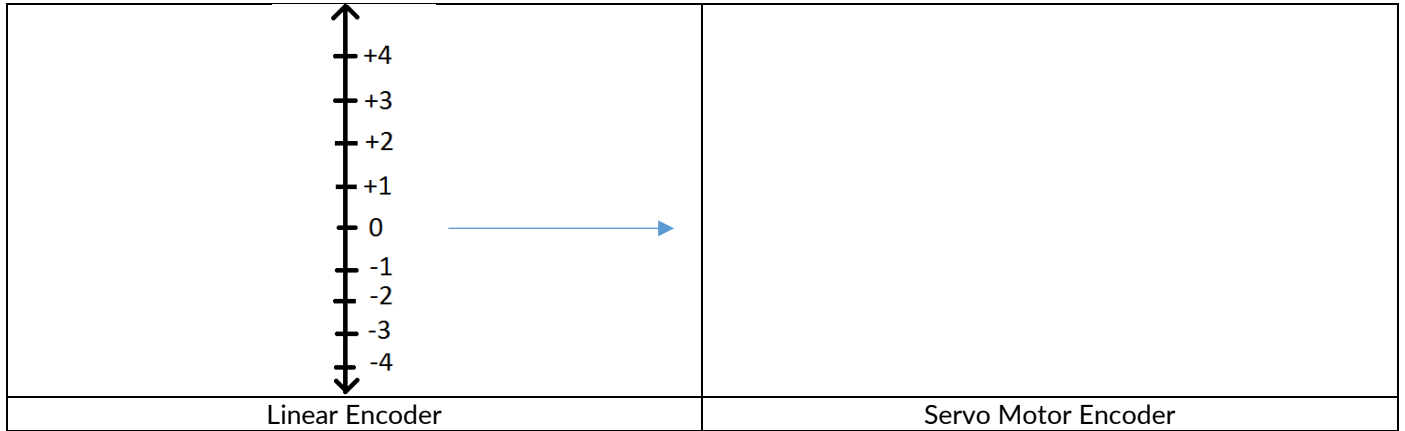
The most common problem when setting the Home Position is that the Press does not travel down far enough to make contact with the Impact Head in the lower position.



This means that the coordinate systems aren't aligned well enough. The press thinks it is travelling down to the Impact Head's position, but, in reality, that position is offset.



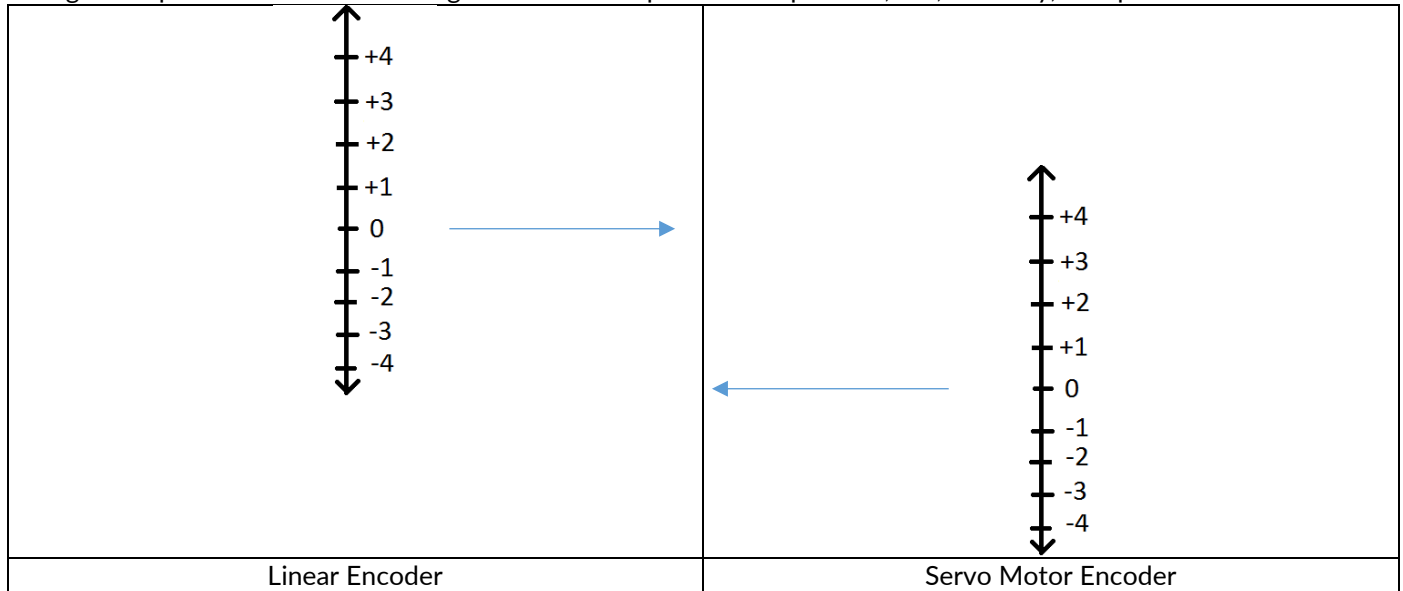
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Increase the Home Position in increments of 2mm to better align the coordinate systems, and re-try.

The press travels too far and crashes into the Impact Head while homing.

This is the opposite problem of the previous section, and again means that the coordinate systems aren't aligned well enough. The press thinks it is travelling down to the Impact Head's position, but, in reality, that position is offset.



Decrease the Home Position in increments of 2mm to better align the coordinate systems, and re-try.

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The Home Sequence Recovers the Impact Head, but then doesn't properly Park the unit on the Park Pins.

There are a few possibilities.

The Impact Head is too low at the Park Position to allow the park pins to extend.

The Park Position needs to be adjusted. Do not change the Home Position.

See the section "Reading the park position without much guessing" earlier in this document for guidance on properly setting the Park Position. For making small adjustments without measuring, follow these guidelines:

- If the Impact Head is too low when trying to park, increase Park Position.
- If the Impact Head is too high when trying to park, decrease the Park Position.
- Always make small adjustments.

The park cylinder is retracting, but the system is not detecting this.

In this case, the sensor that detects the park has retracted has either moved or is no longer functioning. Gently place the impact head on a pad, then use the manual functions to test retracting and extending the park cylinders. If you can retract the park, but the indicators on the screen don't change, then the sensor is probably the issue. The sensor also has an LED on its body that illuminates when it has detected the park cylinder in position.

The park cylinder is not moving.

1. Check the Main Regulator to confirm that you have pneumatic power to the system. The main regulator should read 60 PSI. If it does not, check your air supply and adjust the regulator accordingly.
2. Is the impact head resting on the park cylinders when it tries to open? The weight of the impact head will prevent the park cylinder from moving. If this is the case, first try calibrating the Plate Block Position, as described earlier in this document. If that doesn't solve the problem, adjust the Park Position so that the impact head is cleared from the pins during the home sequence.

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