# What's New in Version 2.40

## Update Type

V2-40T1U2-40T1-X.stf contains the following upgrade details.
1. Controller Firmware V2.40
2. HMI Touchscreen 2.40 (User Interface)
3. Profile Export pro-forma to suit version 2.40
This update includes all the patches (if any) applied to previous versions.

## Acknowledgements

I would like to give a special thanks to all the ad hock V2.40 investigation and beta testers, in particular Jeff Hillman & Franz K. Ronellenfitsch for their keen observations, the brilliant rock, Andy Howard who is on top of everything and has contributed with stimulating thoughts & ideas Andy also manages feature & bug tracking and to Steve Fine for his hard work on the documentation and many other aspects of the SuperTrickler.

## Purpose

Version 2.30 was the first step in adding some technology development gained from the work being done on V3. The changes were feature and skin changes with the exception of the pulsing system. The pulse system introduced some new features that aided difficult and heavy powders. Version 2.30 was always planned to be an iterative series 2.31, 2.32 etc., slowly introducing V3 features while maintaining the V1 & V2 profile format. However, many people reverted back to V2.20 after experiencing difficulties using V2.30. As a result, rather than continuing to introduce more V3 features we set up a team dedicated to find out why people were having difficulties with V2.30 with the aim of fixing the issues in V2.31. The result of this testing found no plausible reason other than a failing on our part to fully introduce the changes and the deeper understanding of the subtleties in the settings.

The testing and experimenting that took place during the investigation yielded some interesting findings resulting in the development of some new techniques and methods of control. Powder and especially gun powder with its many variations in weight, shape, and consistencies creates a challenging environment for precision delivery. Each new version has always at its core, introduced changes to overcome difficulties experienced from our operator feedback. V2.30 was a step to overcome pulsing of heavier powers such as Varget, V2.40 introduces some significant changes in the control system that will benefit the delivery of all powders, along with many more of the V3 features that will make operating and setting up powders even easier.

## Technical Note

Version 2.40 has been more thoroughly beta tested than was carried out in V2.3 as the improvements were more technically challenging to implement. As per the release of V2.30, proper and full documentation is not planned at this stage due to the time involved and this document will be considered the only owner's manual augmentation to the original documentation. For convenience, the V2.30 what's new document core changes have been included as an addendum to this document.

V2.40 is dynamically very different than previous version and will require some significant changes to the profile settings that operators will be use to and it is recommended to reset your exiting profiles and allow the system to relearn them. Once this has taken place you can look at optimizing them should you feel the need, take your time when optimizing, as your previous knowledge may no longer apply.

# Important: Roll Back Strategy

**With each version upgrade, as in any complex software system, the results of the upgrade may not yield desirable or beneficial results. You may wish to 'roll back' or return to the previous version where you were having more desirable results.  (There have been a few owners that preferred V2.20 over 2.30 for the powder they were using and made enquiries on how to roll back to V2.20). In general, rolling back the software is not an issue, however each version tends to modify your profiles a bit and this can make the roll back annoying, loosing your finely tuned profiles. Before upgrading, please follow the directions below to save the current version of your profiles in case you decide to roll back.**

**TO SAVE YOUR CURRENT VERSION PROFILES BEFORE UPGRADING:**

**When you take you Micro SD card out to load the upgrade file on it (as described in the Install section below), make a copy the BIN folder, either on your computer or on the SD card, you can name it anything OTHER than BIN ( e.g. BIN220 or BIN230, AND DO NOT REMOVE THE ORIGINAL BIN FOLDER).**
**Do your upgrade and if you find you would like to roll back, simply rename the existing BIN folder to BIN240 or delete it, then rename your BIN220/BIN230 back to BIN, do the roll back update and you are as you were before the 2.40 update.**

# Install

1.        With the SuperTrickler **powered on** and from the main sub menu, remove the Micro SD card (tweezers are a great help).
2.        Copy the V2-40T1U2-40T1-X.stf file on the root (top level) directory of the Micro SD card.
3.        Reinsert the card back into the SuperTrickler.
4.        The system should automatically take you to the Upgrade screen. (System – Setup - System Core – Firmware Update)
5.        Press & Hold the Start button for several seconds until the process starts.

## Changes are from the previous Version 2.20 / 2.30 firmware

## New Technologies

- Vibration Motor continuous charge operation (CCO): On of the challenges encountered with the vibrating motor is the need to start them at a high power, in version 2.30 we introduced 'Impulse Starting' as this technology gave a more reliable start over the manufactured recommended starting procedure and at the same time a softer start. Nevertheless, a start was still required and this could be problematic if only a kernel or two was required to complete the load as the starting could throw out more than required. CCO eliminated the need to operate the motor off and on, by starting the motor only once during the charge cycle and only stopping it at the absolute completion of the cycle.

  Rather than stopping the motor, the motor power is moved to an idle speed below the delivery speed of the normal operation, similar to the new pulse operation but at a much lower speed. When the vibrating motor is required, the system simply revs the motor up to the required speed and back down to idle when not required.

  The 'idle speed is a generalized value that sets the motor speed at 10% (nominal) below the vibrator minimum speed setting. A new setting for the 'idle off margin' is available in the system deep settings.
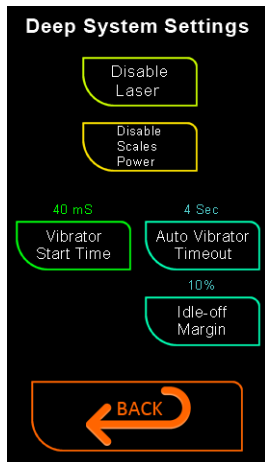
# TYPICAL CHARGE CYCLE OPERATION
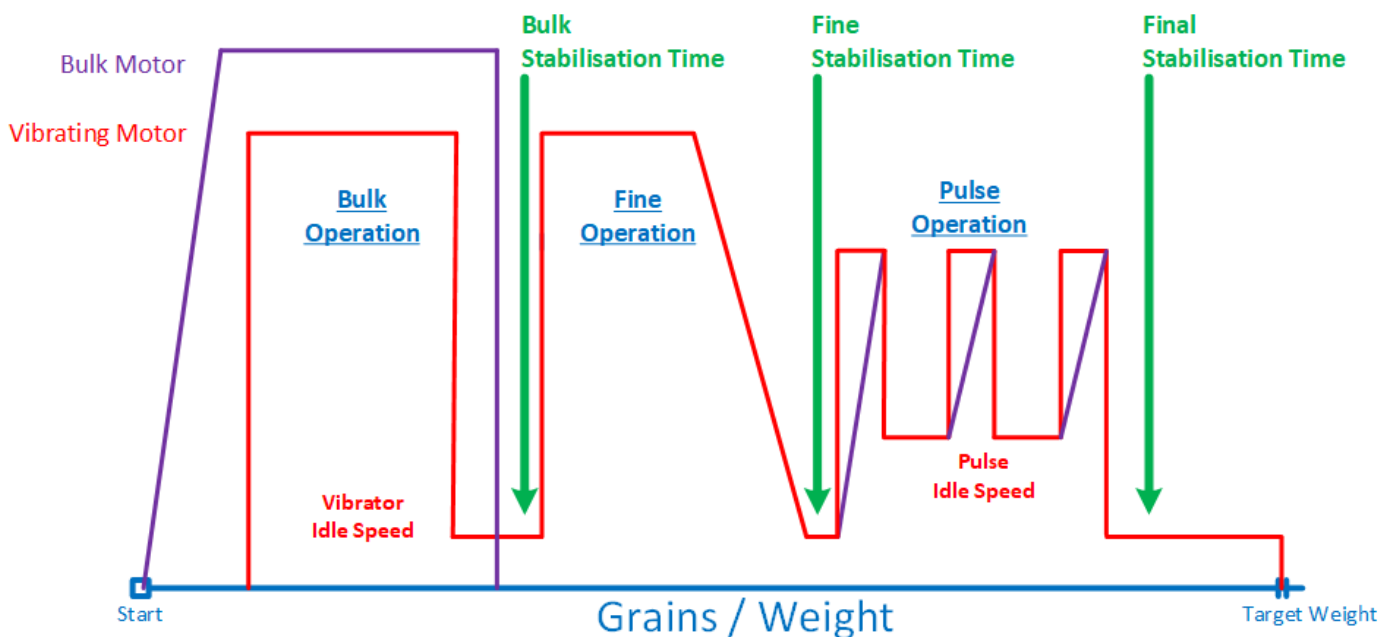


- Automatic Vibrator Minimum Setting has also been added (see details below). The deep setting has a new control 'Auto Vibrator Timeout' that manages how long, in seconds, is allowed for a stable reading. If this value is too high, the system may hunt and take a long time to resolve, and if too short, it may result in an undesirable vibrator minimal speed result.

## New Features & Changes

- Charge Screen: A timer has been added to the charge screen that if no drop takes place withing 15 minutes, the Auto mode is turned OFF.

- Quick Access from charge screen.
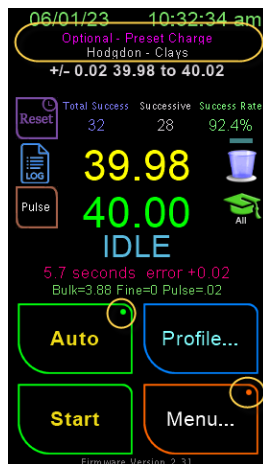


To access either the Powder / Preset Menus:
Touching the Hot spot at the top of the page shown in yellow or holding the Menu button for 1 second will take you directly to either the powder or preset menus depending on the current selection.

To access Mode Selection:
Holding the Auto Key for 1 second will take you directly to the Mode Selection Screen.

- Yellow hat
When the profile is new, reset or an instrument reset for self-learning the scholars' hat will display in yellow until the first run.



- Self-learning: The scholars' hats in the profile and self-learning page show the learning state for each instrument. This helps the operator know what instruments are still learning and which are only being monitored.
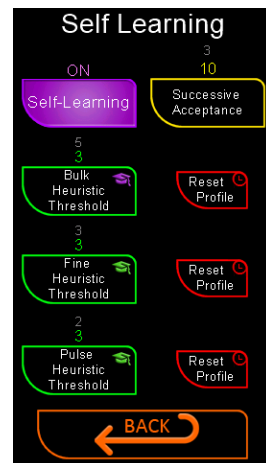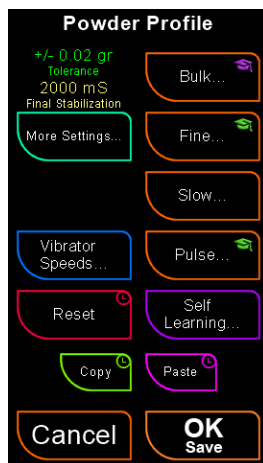


- Individual instrument resets have also been added to the self-learning screen. Holding the Red button will reset only that instrument in the event that you are unhappy with previous self-learning.

- Simple Mode added to the profile. The idea of the simple mode is to reduce the stress or overwhelming feeling for new operators, only the key setting are enabled.
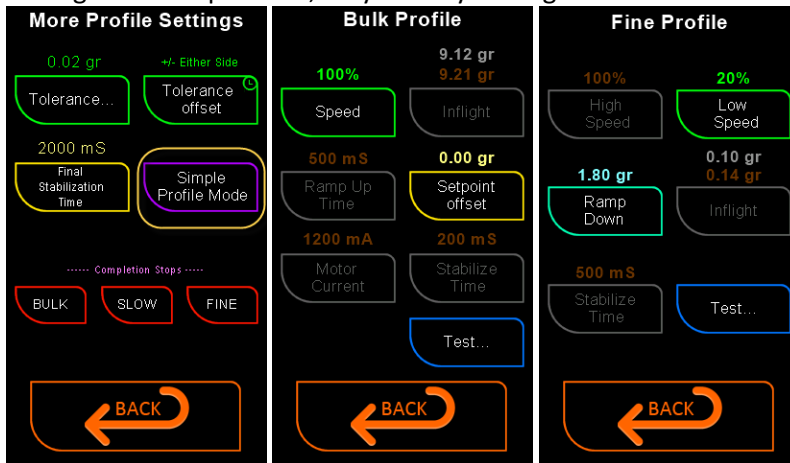
 etc

- Completion Stop Modes have also been added to the more profile settings. This feature is used for fine tuning where an individual instrument performance needs to be evaluated. Example turning on the BULK stop will at the end of the bulk drop, abort the charge operation, most likely resulting in an underthrow error. Turning on the FINE stop will run the bulk and the fine instruments and at the end of the fine drop then the charge operation will be aborted. More than one stop can be activated at the same time, and at the end of the first instrument used that has a stop, the charge will abort.

- OFF added to bulk, fine, slow and pulse idle. With these controls (except Idle) hitting the OFF button will preserve the original speed setting. The OFF is also added to various options and other controls.



- Inflight Tracking has changed from a weighted percentage filtered algorithm to a Median Average algorithm. Using a median naturally filters extreme values and should yield better result, however at a cost of a few more drops to get up to speed as to there the inflight are sitting in relations to the set inflight values.

- Inflight tracking has now been separated to individual instruments.
  When you turn off the tracking a warning screen will appear.
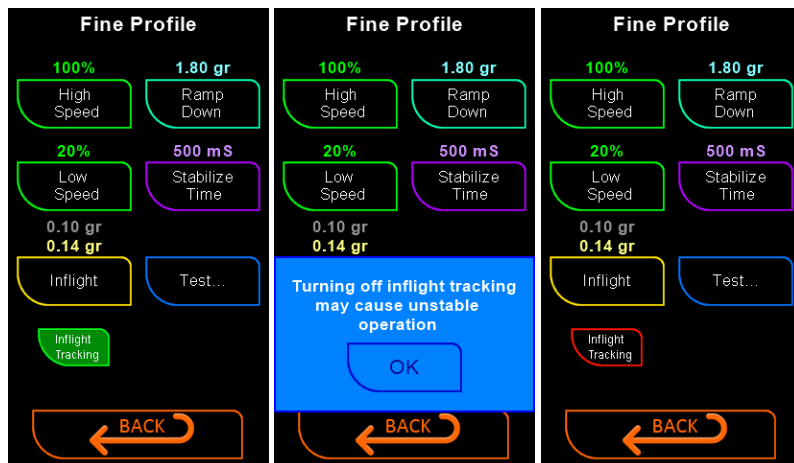


- Pulsing has been changed such that if Ramping Enabled is turned ON, it will ramp the pulse speed up rather than step it up (when deemed cautious). This has been tried experimentally several times before without success however in combination with pulsing idle speed (and the CCO technology) seems to be working well. The first pulse (as this is always an unknown) and the last few pulses will ramp up rather than step in an attempt to dispense the least amount of powder as possible.
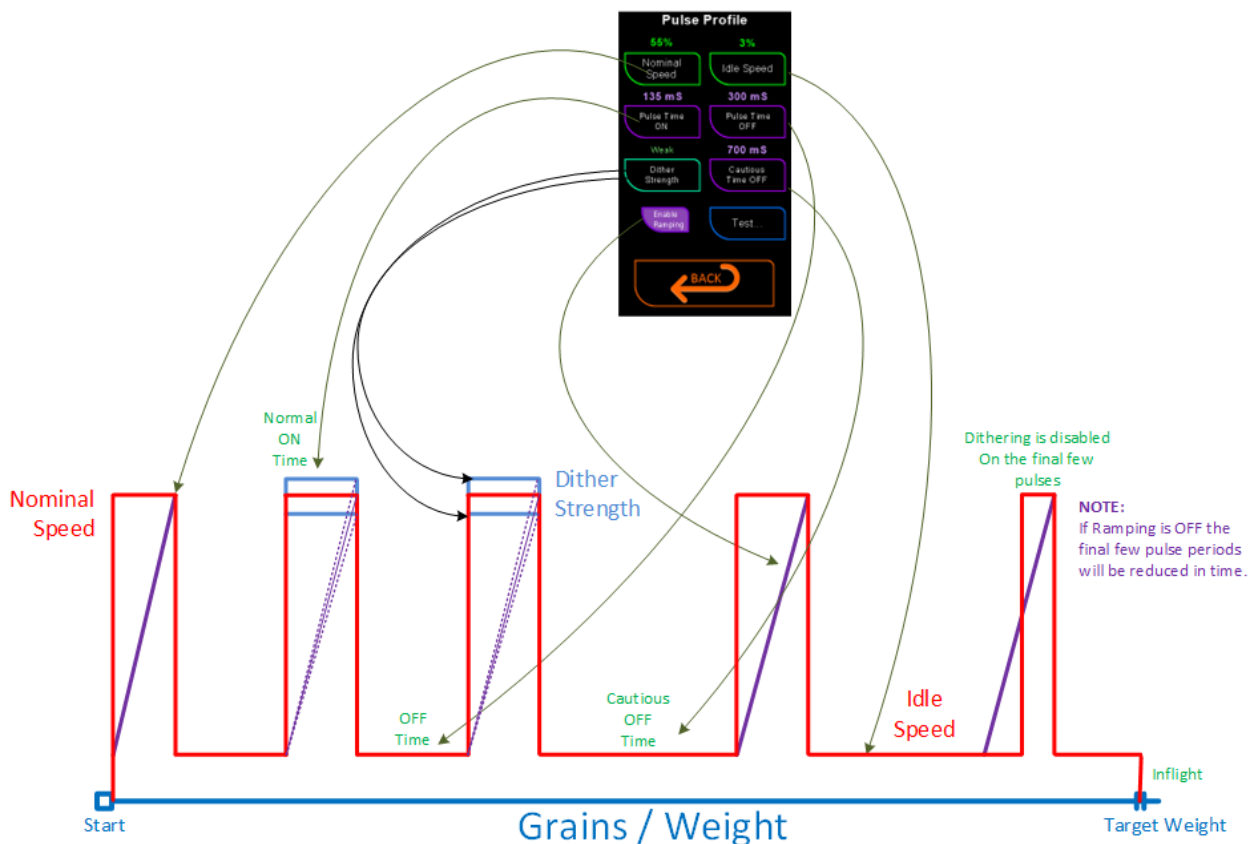


Further to this the pulse Idle speed can now turned to OFF, this will take the vibrator motor speed down to the idle off value rather the pulse idle value that will still allow ramping at stepping without the need of a motor start.

Dithering by default is now turned off as it has been found that the swapping between pulse speed and idle speed has a similar affect at reducing standing waves in most but not in all cases.

The High-Speed Limit has now been removed, as this attribute has been superseded by the dithering strength, idle speed and ramping combination to effectively prevent an undesired pulse strength.

Idle speed has been added to the AI Self-Learning.

- Flow Graph added to vibrator setting, motor flow test, bulk test, fine, test, slow test & pulse test.
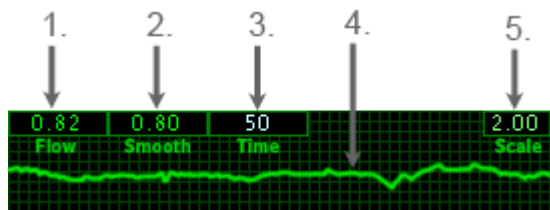


1, is flow.
2, is the filtered flow (smooth).
3, is the time (seconds or milliseconds) in between flow data changes from scales.
4, is the graph line showing the flow
5, is the graph resolution scales (full scales deflection)



- Automatic Vibrator Setting added.
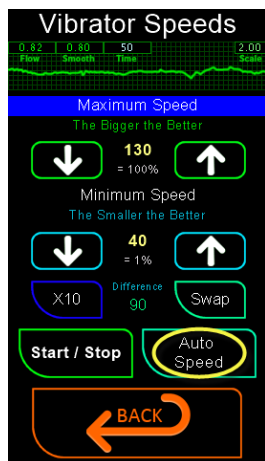
NOTE: By default, the maximum speed is set to 100 units above the minimum speed, see note* below.

Pressing the Auto Speed will initiate a program that will run the vibrator starting at a high speed and working its way down looking for a stable rate of a drop between 500 milliseconds and 2 seconds. (this operation can be carried out several times a day if you find the temperature is causing drifts in the vibrator flow rate.)

* Note: upon completion the maximum speed will be set to the same difference it was when the Auto Speed was started (initial default is 100). It is not possible for the maximum speed to be automatically set as this must be done by eye. This should be set as high as possible without kernels jumping out of the cup.
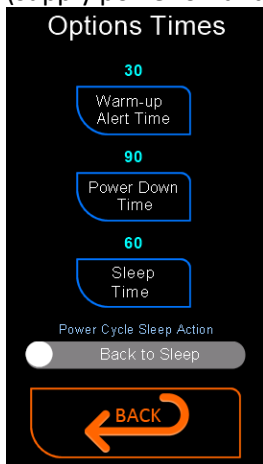
- Restore Menu has now been split into sections
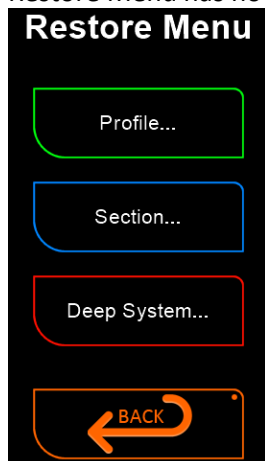
- Sub menu, shortcut to the charge page added.
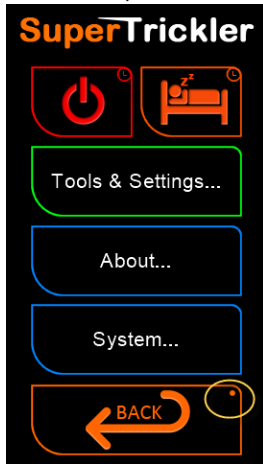
- Options Times has a new function that will disable the SuperTrickler returning to sleep after a power cycle (supply power off and on).

- Ladder Test Options sliders. Two new slider options have been added.  Step Up/Down: Allows the ladder to be loaded in either 'direction'; From smallest charge first (Up) or largest charge first (Down).  The 'Step Pause' button has been replaced with a slider, Step Normal/Pause. Turning this on to 'Pause' will create a pause between each step-batch of cartridges.  You will need to press Start to continue on to the next step-batch.
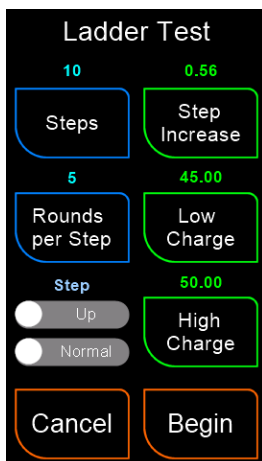
  The two settings for Beginning and End Charge weights have also been renamed to fit the new Options.  They are now Low Charge and High Charge instead of Start/Finish.

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END OF V2.40 CHANGES

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Version 2.40 What's New – Revision 1.0

**Previous Version 2.30 firmware changes from V2.20**

## New Technologies

- Advanced Scales Data Parsing (reading). This new system detects the scale data type (grains or grams) on the fly and should the scale inadvertently be switched to grams the new parser will detect the change and convert the grams data back to grains on the fly without interruption. The new data parsing process offers significantly faster parsing in general and especially for units that do not support the grain units.

- Vibrator motor Impulse Start. Starting the vibrator motor is not a straightforward task, it required a start operation that drives the motor at full powder for around 30 to 40 milliseconds. This can result is several problems when the remaining powder is only a few grains off the target and the pulsing instrument process requiring full power at the start of every pulse. The high-power start would often cause a spewing of powder and overthrow. So, the Impulse Start technology was developed to overcome these problems including starting the motor a low power levels.

## New Features

- Charge Weight Drift Monitoring. For five seconds after the charge (drop) is finished, the system will now monitor the weight for any change outside of the tolerance. In the event that the weight drifts outside the tolerance band the red work-light will begin flashing (the green-light will remain on) to indicate a drift was detected. From this point it's up to the operator to accept or reject the charge.
  The drift only monitors for 5 seconds because outside of this time frame the most likely cause of drift is scale drift and this is no longer indicative of the actual weight. The common causes of drift are after the charge a few kernels have fallen in or most likely the Final Stabilization time is too short; this is especially likely with large kernels that have much resonance and take a longer time for the scale to obtain a stable reading.

- Firmware version display on the charge screen. An on-going problem is people asking for help and the very thing that needs to be asked is what version are you running. This will be especially handy when people show pictures or video of the charge screen.

- Close buttons replaced with Back Arrow buttons for clarity, along with several other V3 skin changes.

- The short cut home buttons (the one with a dot in the top right corner) now take you to the Charge page.

- Self-learning Scholars Hat now have a basic text description underneath the hat, to help remind the operator as to what the hat colors mean.

- Charge screen manual pulse button. A brown button just below the LOG icon, this button is optional and must be selected from the charge screen options menu. (User request)
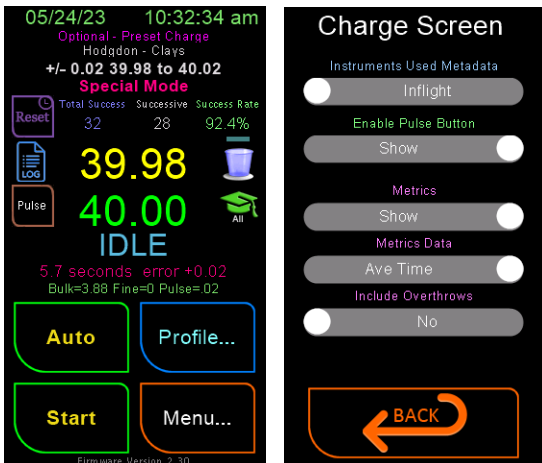


Holding the Pulse button down will initiate the pulsing operation as per the pulse instrument settings (without the AI operation), the operation stops when the button is released.

- Charge screen Ladder Controls. Repeat Last Charge & Skip
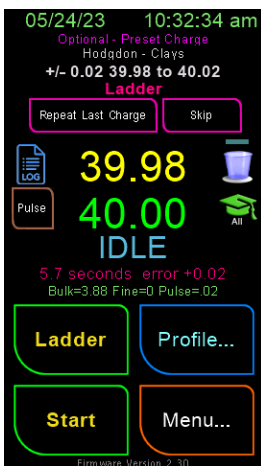


The Repeat button prevents the ladder from moving to the next charg/stage, thus repeating the last charge. This can be used if for some reason the operator is unhappy with the charge or the charge cannot be used for some other reason, e.g. spills.

The Skip button is used to skip the next pending charge. To save time some users prefer to see if the overthrow can be utilized somewhere in the laddering range and if so they then place in that position. Later when the SuperTrickler laddering stage gets to a spot that has already been utilized the skip can be pressed to jump over that point.

- New priming system for the Select & Motor screens.
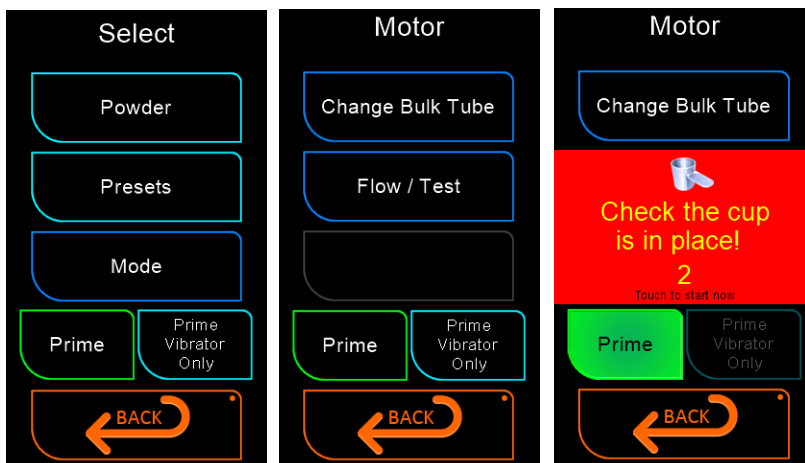


The priming system now has two buttons, Prime that primes both tubes for 6 seconds and a Prime Vibrator Only button that will prime only the vibrator tube for 46 seconds.
You can stop the priming process at any time by pressing the priming button again.

Each screen will also issue a warning to check a cup is in place before starting the prime, you can shortcut the delay by touching the red warning panel.

- The main profile has changed, where several controls have been moved to a sub screen "More Settings…" This includes the Inflight Tracking Control, that was never a part of the main self-learning system.
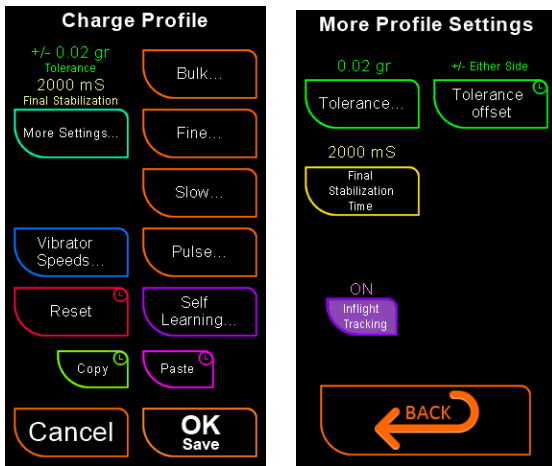


## Instrument Changes

- **Pulse Instrument**: The pulsing control has some new parameters, Idle Speed & Dither Strength.
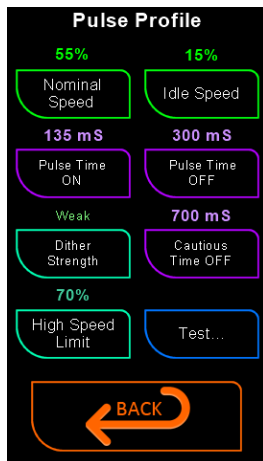


In previous versions, the pulse was a stop start operation that required a start procedure of the vibrating motor on every pulse along with the problems associated with that. Product development has revealed that in many cases it is better to keep the powder in a vibratory state rather than to simply stop the tube completely. When the tube starts there is considerable inertia involved before the kernels respond to the vibration and begin moving. This new system toggles the pulse motor between two on speeds, the nominal (pulse delivery) speed and the idle speed, the result is a more predictable and smoother delivery of kernels.

Dithering prevents the powder from forming a standing wave in the tube that results in the kernels failing to move in the tube, with the idle speed system this problem is less of an issue and as a result Dither Strength has been added to allow the operator to select the amount of dithering applied during pulsing. The dithering strength has 6 possible settings; Off, Very Weak, Weak, Normal, Strong & Very Strong.

Often with large kernel very little dithering is required as the large kernels tend to be resonant and vibrate well down the tube however other powders may need more dithering, flake powders are an example as they tend to be sticky and light weight. In many ways the dither strength makes the job of the High-Speed Limit almost redundant however has be left remaining and operational, time will tell if this control is required in the future.

Note: In the Idle Speed & Dither Strength control are not self-learning controls and must be set by the operator.

WARNING: This drawing been <u>superseded</u> by the 2.40 pulse operation drawing above.



Version 2.40 What's New – Revision 1.0