QUICK GUIDE – Setting UCF and Reverting back to OCF on TAF - HST Revision 3.0-01 Firmware.

Official Calibration Factor, OCF - The OCF is set by the manufacturer when the HST is new, and will be set adjusted again when the HST is later returned for re-qualification to the manufacturer, or re-calibrated by an authorized agent of the manufacturer.

Before each new or re-calibrated unit is shipped, it is calibrated to our proprietary in-house master tile-set. The OCF is located on the Certificate of Calibration on the HST's booklet along with the user tile-set and acceptable reflectance ranges. The OCF is set after testing voltage levels in order to gain a set original reference point and to maintain standardization from one HST to another (maintaining *HERCULES* original standards as close as possible). This also explains why having a HST's historical data is important in maintaining an accurate standard to carry forward from one HST to another.

Machine Error, ME – Measures the deviation between a set point and actual readings. Revision 3.0-01 has been reformulated to eliminate any machine error that has shown on previous versions in the past mainly caused by diodes and too much forward bias from sensors. Revision 3.0-01 calculates 99.9% of that out. There should be no noted or observed machine error before shipment as before with Revision 3.0-01. 0.0 % machine error is noted on the Official Documentation along with the OCF set during manufacturer calibration and qualification procedure.

User Calibration Factor, UCF - The UCF is always the active value providing the Calibration Factor used by the HST. Users may change the UCF if they deem the HST to be out of calibration with readings of their tiles. The UCF will usually be set the same as the OCF before shipping. The UCF simply allows the user to adjust the HST's calibration higher or lower with the machine's tile set (user tile set) should the HST drift outside of tile range (written on pouch and calibration sheet). Ranges are set with a 2 % acceptable tolerance in accordance with industry standards. Should your green tile readings begin to drift outside that range the user will have the ability to dial back (or forward) the UCF within tolerance levels inside service mode. The UCF extends service life between manufacturer calibrations. TAF guarantees a 3 year service life between manufacturer re-calibrations. However, a 3 year service life can be extended through a user's regular maintenance and scheduled bulb changes and by adjusting the UCF when needed. During a UCF re-calibration, we recommend that the reflectance be set at 0.5% higher than the lower range limit of the green tile of the user tile-set to allow for upward drift and any additional deviations that can occur from bulb changes, and environmental factor that might affect sensor bias like heat, dust as the HST ages and accumulates operation hours.

Example of a target UCF value: A user tile-set acceptable range might read between 44.0 % - 46.0%, but the user green tile is reading at 46.2% (.2% higher than the upper limit 46.0%). So 44.5% would be the target UCF to set at. It is .5% higher than 44.0% and 1.5% lower than the upper limit of 46.0%. This will allows for a 1.5% upward drift or a lopsided drift set forth by the original anolog K Series Hercules Sizing Testers. It is suspected that Hercules wanted to allow for machine deviation of .5% after the initial warm-up, so a -.5% offset from the midpoint was necessary. We just carried that standard over into the digital series.

Setting the UCF will also allow for more service hours of an HST before between manufacturer re-calibrations.

When to send back to manufacturer for service ?

Though readings may vary from one HST to another there are circumstances you might get faulty readings after a regular routine maintenance and scheduled lamp changes, but before sending back to the manufacturer, we (TAF) recommend performing these checklist items.

- Unscrew three screws located on top of dish top and gently lift out the optical assembly keeping careful note of orientation (horseshoe should face forward right-side of HST upon reassembly) Without twisting the wires and cable inside, remove and dispose of both bulbs, use an air duster to blow away any debris and dust, use lens wipes or denatured alcohol to gently clean both sides of heat shields and bottom side of dish top lens being careful not to dislodge the thin glass. When satisfied, put new bulbs in and make sure nothing is obstructing the sensors when re-assembling. Then plug back in, power on, and reset lamp timer in service mode. (procedure for resetting lamp timer is in manual under firmware).

- Allow HST a solid 20 minutes **Tip: Drop the % REFLECTANCE SET POINT knob to 60% and start a test. When the HST reaches 1200 seconds it should be ready to get a settled in initial reading.**

- **After the 20-minute warm-up**, check the user tile readings again and note changes from original cold start-up readings to see how much it drifted (if any). **It is considered normal for a .1% upward drift, and acceptable for a properly warmed up HST to drift up by as much as .2% from the initial tile reading on a cold start up.** Anything more than .2% can mean the HST might need servicing. Also, it helps to dim the room lights or locate a more suitable lower light level room and make sure there is no interfering overhead light sources that might affect sensor readings. Also tile placement can cause the reflectance readings to jump around, so be sure that you are being consistent when laying the tile down from one side to the other. One suggestion is to try and make the TAF serial number on the edge of the tile-set point towards the open-end of the horseshoe so the light hits the same spot on the tile for both sides. Lastly, make sure the tiles-set is centered by aligning the four corners of the tiles to the four screws on the horseshoe and centering by looking straight down. Doing all this will help eliminate any operator error.

- Enter service mode by holding the CALIBRATE button and pressing SILENCE three times. Keep your finger on CALIBRATE until the long-lasting beep to alert you, you are now in Service Mode. You should see the Service Mode Banner Screen in all caps. If not, try it again.

Setting the UCF

Service Mode Navigation:

Service mode has 14 screens and a banner screen, but we are only concerned with the last two screens (#13 and #14) when setting the UCF**. Screens #13 and #14 work together when recalibrating the HST.**

To go forward we press the SILENCE button scrolling from banner screen to screen #14 (the last screen), before cycling back around to the banner screen.

To navigate backwards (or scroll the screens) we press TEST button to go from the banner screen to screen #14, 13, 12 … and so forth, until it cycles back around to the banner screen.

Press TEST, 2 times to navigate to **screen #13 or the Reflectance Percentage Display and Raw Sensor Data screen** that will display a reflectance percentage and raw sensor data readings. Raw sensor readings are the Measurement (M=) and Reference (R=) sensor readings representing milli-ohms.

Place the white tile of the user tile-set face down and press CALIBRATE to calibrate to **100.0%** and your raw sensor readings should read something like below.

Examples of good white tile raw data:

| Raw Sensor Data | | Raw Sensor Data | | Raw Sensor Data |
| R=1458 M=0983 | | R=1634 M=1716 | | R=2034 M=1274 |

ReCal See Instructions (screen #14)

Once the percentage is solidly calibrated at **100.0%** in **screen #13** you can flip the tile-set to the green side and press SILENCE, or press SILENCE then flip to green side. Either way should show you the current reflectance percentage of the green tile and a calibration factor "**CF=**" in **screen #14 or ReCal screen**.

In screen #14 just ahead of the **"CF=" there will be a centered dot illuminated**. If that dot is not illuminated, then adjustment cannot be done. The likely causes of that is either the tiles did not get turned over from white to green, or the green tile inadvertently got set to read 100% by the CALIBRATE button being pressed while in screen #13, Reflectance

This screen's lower line shows the % Reflectance reading and shows a mathematical constant in the formula that calculates reflectance called the **Calibration Factor** and is abbreviated **CF** on the screen. Turning the % Reflectance Set Point knob in this screen forces the reflectance reading to change (changing it up or down depending on which way the knob was turned) by 0.1% for each notch of the knob. After each change of reflectance, the CF is recalculated to the value that will maintain that adjusted reflectance reading.

Adjust to a percentage to +.5% of the lower limit of your tile-set range, leaving 1.5% to for any upward drift to your upper limit. Then take note of your new CF reading and percentage before saving. The new CF value and percentage is ready to be saved as the new active UCF to the memory.

To save a UCF, press and hold CALIBATE then press SILENCE, release SILENCE, then release CALIBRATE. It does not matter what order you release the buttons, but it does matter the order in which they are pressed. You will see a small **"U"** for (User) flash to the left of the **"CF="** confirming the save was successfully done. Congratulation you set the UCF! You can now exit service mode back to normal mode and check the tile calibration again before testing. If still off then try setting UCF again.

What to do when you adjust the CF or bump the knob and forgot the CF before saving and need it back. Simple, just navigate away from screen #14 and #13 in either direction, then go back to #14 and you will see the previous CF value. Ram just dumps it.

Reverting back to OCF. So you set the UCF, but not sure if like the new value and want to go back to factory settings. Simple, navigate to screen **#14 or ReCal screen** and press and hold CALIBRATE, then press and release TEST, and CALIBRATE. Does not matter the order the buttons are released, but it does the way they are pressed. You will see a small **"R"** for Reversion flash to the left of the **"CF="** to confirm the OCF has been restored as the active CF. If you do not see the "R" try again. Note: the restored CF should be the same as the OCF on the Certificate of Calibration. Re-adjust the CF and set the UCF as needed.

To understand more in depth the features of the firmware located under the Firmware Section of the HST Instruction Manual of our TAF Knowledge Base.