# SPAT Accuracy Test

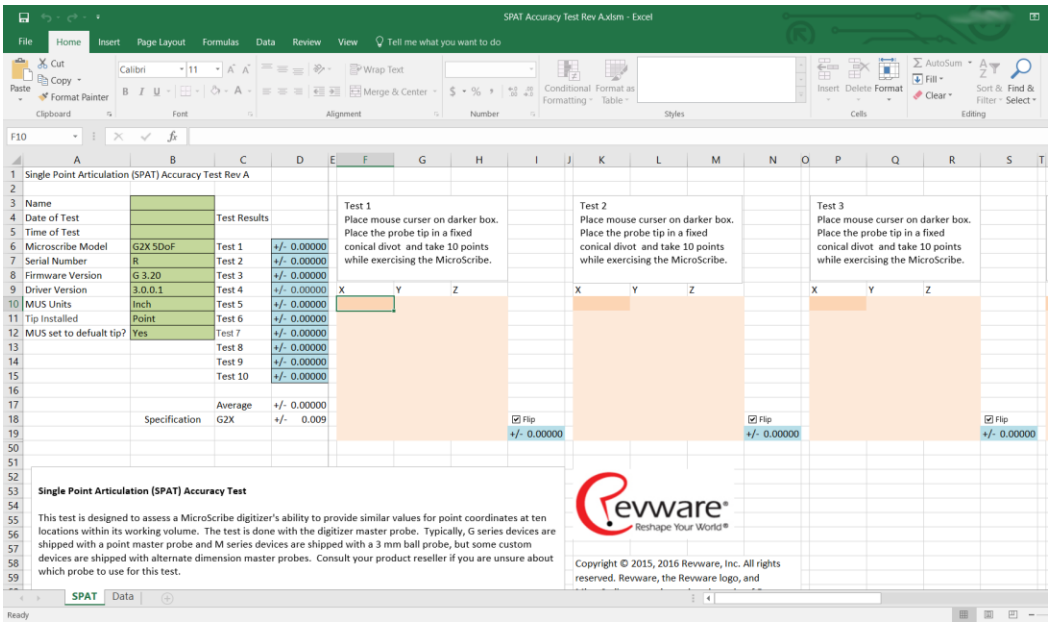
The SPAT (Single-Point Articulation) Accuracy Test is Revware's generic ten-point repeatability test used in combination with MUS (MicroScribe Utility Software™) which is applied in the assessment of all MicroScribe® digitizers at various stages of manufacturing and repair. This test is applied as a final assessment of all digitizers before shipping to the customer. It is based on the ASME B89.4.22 Methods for Performance Evaluation of Articulated Arm Coordinate Measuring Machines. In executing this test, ten sample points are taken from each of ten locations. Of the ten points taken per location, seven are taken with the MicroScribe wrist in the typical approach orientation and three are taken with the wrist flipped 180 degrees from typical. The sample points are taken with the arm manipulated into a different approach orientation for each point. Care must be taken before each position sample to be sure that:

- The probe center does not move relative to the preceding positions during data collection for a given location.
    - If a ball probe, the probe ball is properly seated in the location divot.
    - If a point probe, the point does not slide along the test surface.
- No joints are pressing against limits.
- The wrist joint is not extended such that the stylus and lower arm tubes are in straight alignment ("singular" position).
- No force, other than an axial load to hold the probe into the sample divot, is being applied to the MicroScribe probe stylus.

Generally, the first four points are taken on unique divots at various elevations around the left side of the MicroScribe digitizer, and the last four, similarly, on the right side of the digitizer. On each side, the flip orientation of the wrist is done by rotating the joint clockwise for two points and counter clockwise for the other two. Sample point sets five and six are taken in front of the digitizer using the same divot, with only the rotation to achieve the flip orientation changing.

This test spreadsheet contains macros to assist with moving between fields. If you have a version of MUS with CADpad™ activated, these macros allow you to move about by making selections with the MicroScribe probe. When starting the spreadsheet, you may get a message stating that macros are present and requiring you to explicitly allow them to be activated. Be sure to accept activation of the macros if you want to use them directly or with CADpad.

The report summary section of the spreadsheet can be printed by simply choosing the Print option. The default print area has been restricted to the summary information area of the spreadsheet to limit printing of excessive information. The test is passed if the calculated **Average** value is smaller than the identified **Specification** value.




# Data to Collect

| | |
|---|---|
| **Name** | Name of the technician that conducted the test. |
| **Date of test** | Enter today's date in mm/dd/yyyy format. |
| **Time of test** | Enter the current time, including AM/PM. Be sure to include a space between the time and AM or PM. |
| **MicroScribe Model** | Select the MicroScribe model from the drop down list. Related fields will be automatically adjusted. |
| **Serial Number** | Enter the device SN. Prepend "R" to Revware serial numbers. Older Immersion units do not get the leading R. You can confirm the presence of an “R” (or “L” for loaner units) by looking at how the serial number is presented on the identifier tag on the bottom of the MicroScribe base. |
| **Firmware Version** | Select the matching firmware version from the drop down list. Only listed firmware versions are authorized for release. |
| **Driver Version** | Enter the MUS driver version. Typically, this does not change and the current value should already be entered. |
| **MUS Units** | Select the units for values being collected from the drop down list. |
| **Tip Installed** | Select the tip installed from the drop down list. If the specific tip diameter is not listed, choose "Custom" and note the alternate accuracy specification. |
| **MUS set to default tip?** | Select Yes/No from the drop down list. |

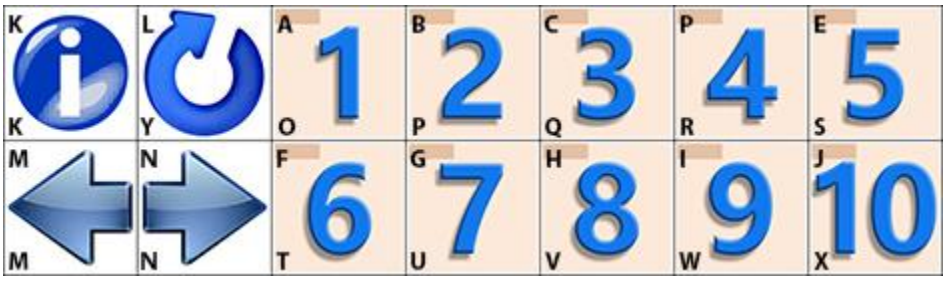
| | |
|---|---|
| **Test Blocks 1-10** | Select the top left cell, by mouse, macro, or CADpad, of the test location to be sampled and enter data by pressing an accessory switch button. |
| **Flip Checkbox** | Deselect if you do not collect wrist flip points at this test location. |

The MicroScribe Model, Serial Number (minus prepended R or L), Firmware Version, and Driver Version can be found by selecting the MicroScribe Info button on the MUS toolbar.

## Navigation

The SPAT Accuracy Test spreadsheet is designed to allow quick navigation using CADpad. You can also use the defined navigation macros directly as well as make spreadsheet cell selections with the standard keyboard and mouse methods. Once the following selection grid is aligned within CADpad, you can use the MicroScribe probe to identify which cell to select and the specific action to take by pressing the associated hand or foot switch button. Alternately, you can trigger the macros from the system keyboard by pressing the associated key pattern for the desired action as identified in the following chart.

This is a printable graphic for the SPAT Test CADpad:




| Icon | Button | Keyboard | Action |
|---|---|---|---|
|  | ***B1*** | Ctl+Shift+**K** | Position at the start of the information block. |
| | ***B2*** | Ctl+Shift+**K** | Position at the start of the information block. |
|  | ***B1*** | Ctl+Shift+**L** | Position at the start of the current block. (Test or info.) |
| | ***B2*** | Ctl+Shift+**Y** | Position at the start of the flip point position of the current test block, or the top of the info block. |
|  | ***B1*** | Ctl+Shift+**M** | Move to the start of the previous test or to test 10 if currently at test 1 or the info block. |
| | ***B2*** | Ctl+Shift+**M** | Move to the start of the previous test or to test 10 if currently at test 1 or the info block. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**N** | Move to the start of the next test or to test 1 if currently at test 10 or the info block. |
| ***B2*** | Ctl+Shift+**N** | Move to the start of the previous test or to test 1 if currently at test 10 or the info block. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**A** | Move to the start of the first test position. |
| ***B2*** | Ctl+Shift+**O** | Move to the start wrist flip section of the first test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**B** | Move to the start of the second test position. |
| ***B2*** | Ctl+Shift+**P** | Move to the start wrist flip section of the second test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**C** | Move to the start of the third test position. |
| ***B2*** | Ctl+Shift+**Q** | Move to the start wrist flip section of the third test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**D** | Move to the start of the fourth test position. |
| ***B2*** | Ctl+Shift+**R** | Move to the start wrist flip section of the fourth test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**E** | Move to the start of the fifth test position. |
| ***B2*** | Ctl+Shift+**S** | Move to the start wrist flip section of the fifth test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**F** | Move to the start of the sixth test position. |
| ***B2*** | Ctl+Shift+**T** | Move to the start wrist flip section of the sixth test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**G** | Move to the start of the seventh test position. |
| ***B2*** | Ctl+Shift+**U** | Move to the start wrist flip section of the seventh position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**H** | Move to the start of the eighth test position. |
| ***B2*** | Ctl+Shift+**V** | Move to the start wrist flip section of the eighth test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**I** | Move to the start of the ninth test position. |
| ***B2*** | Ctl+Shift+**W** | Move to the start wrist flip section of the ninth test position. |

| | | |
|---|---|---|
| ***B1*** | Ctl+Shift+**J** | Move to the start of the tenth test position. |
| ***B2*** | Ctl+Shift+**X** | Move to the start wrist flip section of the tenth test position. |