Command:SCANV (NV)

MS2000 or RM2000 syntax

Shortcut	NV
Format	SCANV [X=start] [Y=stop] [Z=number_of_lines] [F=overshoot_factor]
Units	X and Y in mm, Z in integer, F in positive real
Remembered	Using SS Z
Firmware Required	SCAN MODULE

Tiger motorized stage syntax

Shortcut	NV
Format	[addr#]SCANV [X=start] [Y=stop] [Z=number_of_lines] [F=overshoot_time] [T=scan_overshoot]
Units	X and Y in mm, Z in integer, F in ms
Type	Card-Addressed
Remembered	Using [addr#]SS Z
Firmware Required	SCAN MODULE

X, Y, and Z parameters set up the slow-scan (vertical) start and stop positions, with the position values expressed in millimeters, and the number of lines. The stage will move to the start position before beginning the scan. The scan range will be divided into number_of_lines lines. Following a completed horizontal scan, the stage will move vertically to the next scan line. The processes will conclude when the stage has moved to the vertical stop position and completed the last horizontal scan. If the start and stop values are identical then a 1-D scan will occur, repeated number_of_lines times.

The F and T parameters pertain to the fast-scan (horizontal scan) motion, and there is a difference between the behavior of the F parameter on TG-1000 vs. MS-2000.

On MS-2000, overshoot_factor (F) sets the additional amount of travel for the stage velocity to settle before reaching the start position. The additional distance beyond the initial ramp is given by (ramp-up distance) * (2 * overshoot_factor -1). So the default overshoot_factor=1.0 results in an additional settling distance of the ramp-up distance, which is traversed in half the AC time. Use a larger number to allow more time to reach constant speed before the start position. Using a value of 0.5 will result in the start position being reached approximately as the ramp up is completing.

On TG-1000, overshoot_time (F) sets an additional settling time in ms for the stage velocity to settle before reaching the start position (beyond the always-required ramp time set by the AC command). Thus the time required between scan line initiation and reaching the start position is given by summing the AC time and the NV F time. The same delay occurs after the stop position except for raster scans in firmware v3.20 and higher in which case the after-stop overshoot time is capped at 10ms. The default value is 50ms.

The T parameter was partially implemented for TG-1000 firmware versions 3.17 and 3.18, absent in 3.19, and then present in 3.20 and greater. It is intended mostly for scan-optimized stages that have a significant amount of physical backlash. The default value is 0.02 when the SCAN_OPTIMIZED define is enabled and 0 otherwise. If the value is non-zero there are several changes to the scan operation: (1) There is an extra overshoot move performed (with amplitude specified by the

parameter) before any scan move in either direction, which ensures that the physical backlash is removed correctly before beginning each scan pass. (2) Before the scan moves begin, an initialization move to the center of the range is made to ensure that the overshoot move happens correctly. (3) When the scan moves are complete, the stage moves to the center position (otherwise behavior is to move to the start position).

Tiger micro-mirror SPIM syntax

Shortcut	NV
Format	[addr#]SCANV [X=scan_delay] [Y=side_delay] [Z=repeat_delay] [F=scan_settle_time] [R=laser_delay] [T=camera_delay]
Units	X, Y, Z, F, R and T are in milliseconds
Type	Card-Addressed
Remembered	Using [addr#]SS Z
Firmware Required	MM_SPIM

Sets up various delays used in the high-level operation of SPIM state machine coordinated by Micro-mirror card. The delays are specified in ms with 0.25ms resolution. The lower limit is 0.0ms and the upper limit is a bit more than 16 seconds for all except repeat_delay which can be over a day.

scan_delay (**X**): sets the delay between the start of the slice and when the beam scan begins.

side_delay (**Y**): sets the delay between the start of a side and when slices start. Defaults to 50 ms in v3.14+ (in v3.13- default was 0). In v3.14+ cannot be less than 2.0 ms. It is highly recommended to use a value of at least 10 ms; the signal for the piezo to move to illumination position takes 2.5 ms to send and the piezo has a mechanical response time (typ. 10 ms for 90% settling). In most cases even more time should be allowed for any vibrations resulting from the piezo move to settle, e.g. a typical value of side_delay is 50 ms or 100 ms.

repeat_delay (**Z**): sets the delay after one volume (either one or two sides) before the next one begins. In v3.14+ cannot be less than 1 ms.

scan_settle_time (**F**): (v3.14+) sets the amount of time before the scan start that the scanned axis will reach its initial position; before that it will ramp smoothly from the previous position to the initial position. Defaults to 1 ms. If the value of scan_settle_time is equal to or greater than the value of scan_delay there will be an abrupt transition at the corresponding point. Such an abrupt transition can lead to undesired scanner ringing and happened in all cases prior to firmware v3.14.

laser_delay (**R**): sets the delay between the start of the slice and when the laser control output goes high.

camera_delay (**T**): sets the delay between the start of the slice and when the camera trigger output goes high.

commands, tiger, ms2000, scan