Objective Turret & Slider Operation

The MS-2000 and TG-1000 controller supports several clocked devices, such as motorized nosepiece objective turrets, filter cube turrets, and filter wheels. ASI's motorized turret systems only power the motor when actually making the move to position. The motors are disconnected otherwise, allowing the user to manually move the turret to any position. Gears and encoders remain connected, so the actual turret position is always known by the controller.

For instructions on how to remove the C60 filter slider cover, refer to C60 Slider Cover Instructions

Setting the #1 Position

The turret positions are number from 1 to N, where N is the number of positions available. The controller remembers the positions of all motion axes through power cycling. However, a controller RESET will set all of the position encoder values to zero. This provides a simple way to synchronize the turret controller to the turret. **Simply manually move the turret to the "#1" position. Then briefly press the RESET button on the back of the controller**. The controller will remain synchronized until the controller is forced to RESET again. If the controller and turret become misaligned, the above procedure will restore the correct alignment. **However, this will reset the positions of the other axes at the same time.**

Another option is to use the HERE command. Move the slider or turret to Position/Slot #1 and issue the serial command HERE <axis char>=1 to set the current position to #1. No reset or restart will be required after. Note: this feature was always available on MS2000; on TG-1000 it has been only available since v3.17.

To make aligning the slider easier, an index line is marked on the slider block. This mark is visible when the covers are removed. Move the slider block manually such that the mark is aligned to the right side of the cube body, as shown in figure below. This puts the 1st position in optical path. Now RESET or use the HERE command to set this position as #1 i.e. synchronizing the controller to slider.

If you notice vignetting you can adjust the position of the filter slider if you have a joystick or knob available on your system. You can change the assignment of a joystick using the JOYSTICK command. Change one of the knobs to your filter slider's axis (most often S). Now you can rotate the knob until the vignetting is gone.

Index line marked

Adjusting the Nth position

This is not usually necessary. It is for adjusting the standard spacing programmed into the controller. On clocked devices (filter slider, turret etc) use the H <Axis char>+ (plus) operator to set the spacing of the nth position. Example, On a 2 position objective slider, if the user wants to adjust the spacing of the 2nd objective so that it's better aligned to the optical path, they can adjust 2nd objectives position with a manual input device, then save it by issuing serial command H [Axis char]+. Only available on MS2000 version 9.2m and above, TG1000 version 3.28 and above.

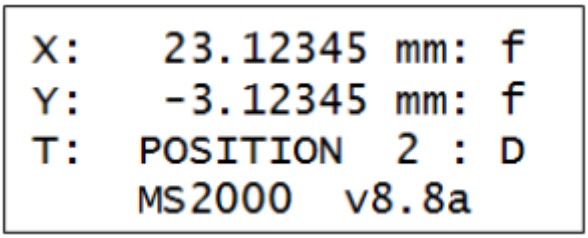
Manual Control

A brief press of the @ button on the controller will advance the turret to the next position. The turret can also be driven by hand.

LCD Display

This applies to MS2000 and RM2000 only

The LCD display shows the current position for the turret (MS-2000 controllers only)



The ‘D’ on the display indicates that the motors are not engaged and the turret can be turned by hand (accessible via serial command RS <axis>-). The axis lettel in this case ‘T’, is shown on the left side of the display.

Computer Control

The turret changer is controlled via the serial USB or RS-232 interface just like any other axis. The turret will respond to the MOVE (M) command, and its position can be queried using the WHERE (W) command. For instance, the command to move turret ‘T’ to position four would be:

```
M T=4
:A
W T
:A 4
```

Units

By default discrete-position devices including filter sliders and turrets the Command:WHERE (W) command reports the integer position-value. If the user prefers that the position reported by Command:WHERE (W) be in millimeter, then set the UM [Axis Char]=1. The move command continues to work, but relative move doesn't work. This feature is meant for troubleshooting and diagnostic usage only and not for regular operation.

Shortest Path

By default, the move on circular devices including turrets will move the shortest direction to the target position. Alternatively, the firmware can be set never to wrap around from the last position to the first one (useful if something is attached to the turret). This default can be changed with the CCA Z command.

For example, to change to never wrap (NOT taking the shortest path) with a turret on the 2nd axis of the card address 2 (using the Tiger controller) send `2 CCA Z=18` and then issue a `2 SS Z` to save the setting.

Safe Turret

Retract Z before move

On some microscope configurations, the objective turret and slider must be lowered before the objective is moved in place to avoid crashes. The SAFE_TURRET module does this automatically. It can be enabled and disabled with AFMOVE Y command. When enabled, when the turret/slider is asked to change (via MOVE, MOVREL, button press, or TTL trigger), the the stage carrying the turret or objective slider moves to its upper limit, then the turret/slider moves, and then the stage moves to its original position.

The SAFE_TURRET module is available on Tiger firmware version 3.29 and MS-2000 firmware version 9.2m and above.

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