

Mechanism Requirements for AO and the on/off-axis camera systems

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This document will specify requirements for the Adaptive Optics system and the new acquisition camera/offset guider system.

Adaptive Optics System

AO Relay

Fiber source translator – The fiber source will be used for calibration and checkout of the AO system. The fiber source is mounted on a NEAT translator driven by an Animatics motor. When the source is moved into the in position the fiber should be turned on. When moved to the out position it should be turned off. It will be turned on and off using the Baytech. The in position will not be at a limit and should be user adjustable. The out position can be at a limit. The limits switches in the translation stage will be fed into the motor via an interface board.

Mechanism Software Name: FibCalSrc
Communication PortServer->Animatics
Power control:Baytech->Power Supply.

Pick off mirror translator – There are two pickoff mirrors in the relay that intercept the science beam and send it through the AO system. These mirrors are used to select AO mode or to deselect AO mode and pass the science beam unperturbed. The translator is a NEAT stage with an animatics motor. The in position will not be at a limit and should be user adjustable. The out position can be at a limit. The limits switches in the translation stage will be fed into the motor via an interface board.

Mechanism Software Name: POM
Communication: PortServer->Animatics

Wave Front Sensor

Steering Mirror – The steering mirror will be used to define the WFS boresight and to correct for differential track errors from flexure, atmospheric refraction, and planetary object tracking issues. The steering mirror will tilt +/- 1.25 degrees (.022 radians) with a 2 micro radian step size. The control of the mirror position is via two analog voltages +/- 10 volts and there is an analog position output, which is also +/- 10 volts. When powered up the mirror will come to it's zero position which will not be the system zero position so a user specified zero is required.

Mechanism Software Name: **TBD**
2 channels D/A, +/- 10 Volts, 16 Bits preferred (14 OK).
2 channel A/D, +/- 10 volts, 16 Bits.
Communication: TBD

Membrane mirror focus – There is a NEAT focus stage under the membrane mirror, which adjusts the focus of the WFS. It will be used for continuous positioning of the membrane mirror and will have a nominal starting position in the middle of the range. Travel required is about +/- 1.5 inches with a step size of about .010 inches.

Mechanism Software Name : **TBD**
Communication PortServer->Animatics

ND Filter Wheel – There is a 6 position Filter wheel made by Optomechanics Research Control is via a BCD connector. A digital code is applied to the BCD connector and the wheel will go to that position.

Mechanism Software Name: **TBD**
Communication: **TBD**

Overcount Shutter – There will be a rotary solenoid shutter that will rotate into the beam when the count rate is above a user set level. This will be controlled from the inner loop and out the fiber to the multi-function board output control bit. When the shutter is in a large red something will display on the user screen to indicate the condition. We will not want to stay in this state for long since the shutter will be energized and heating up.

Mechanism Software Name: **TBD**
Communication: **TBD**

Acquisition Offset Guider

Tip.tilt pickoff mirror – The pick off mirror for the acquisition camera needs to tilt toward the secondary when the system is used in an offaxis position. It is a gimbal mount with two Newport linear actuators to tilt the mirror. These actuators will be controlled by a Newport ESP-300 controller, which is controlled via a serial port. The linear actuators have absolute encoders on them so we will not have to home to find the position. Tip and tilt will be calculated from the offaxis distance and direction and be set automatically when the pickoff mirror is moved off of center.

ND Filter Wheel - There is a 6 position Filter wheel made by Optomechanics Research Control is via a BCD connector. A digital code is applied to the BCD connector and the wheel will go to that position.

Camera Select mirror translator – There is a NEAT stage translator with a mirror on it to select the camera desired for use. One position will feed the Apogee camera and the other position, the out position will allow the beam to pass to the Collins camera. The motor is a anamatics.

Focus translator for Collins camera – There will be a Neat stage with a Anamatics motor to adjust the camera position. This will be a continuous movement translation over the range of the translator.

Focus translator for Apogee camera – There will be a Neat stage with a Anamatics motor to adjust the camera position. This will be a continuous movement translation over the range of the translator.

X/Y Translator – the Whole acquisition camera assembly will be mounted on an X/Y stage to allow the camera to be positioned +/- 5 inches from the center to acquire off axis objects. There will be a nominal center position which is not necessarily 0,0 for the on axis position. There are positions that will have to be locked out so that the probe does not intersect the science beam. The translator will have two Anamatics motors.

ND dead-man filter – The Collins intensified camera will have an ND filter on a rotary solenoid that is normally in the beam. To get high sensitivity the Telescope Operator will have to push and hold a button. This will be hard wired and will not need software control.

Summary:

Tip.tilt pickoff mirror	port server>Newport Actuators x 2
ND Filter Wheel	??>DIO>Optomechanics BCD input filter wheel
Camera select	port server > Animatics
Collins focus	port server > Animatics
Apogee Focus	port server > Animatics
X&Y Translator	port server > Animatics