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NAOMI Adaptive Optical System
Project Report

Interface Control Document:

Mechanism Drama server task to
EPICS WFS mechanism control module.

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Introduction

In the NAOMI system, the wavefront sensor mechanism control module (or IOC) will be an EPICS system housed in a VME rack connected to the rest of the software infrastructure via the local area network. The mechanisms need to be controlled and monitored from a observing system wide DRAMA based control system. The implementation for this will have a server task running on one of the WHT workstations which provides the presence to the rest of the software system for the mechanisms. This document details the interface between these two systems.
The implementation is required to follow or build on existing ING standards, as used in ISISP and WYFFOS.
This document should be read in conjunction with the OMC mechanism ICD, Ref 2.

Physical layer.

The link will be established via the WHT LAN. The Mechanism control module is expected to be housed in the GHRIL annexe and the DRAMA server task will run on one of the workstations in the WHT control room. Any available physical link will be acceptable if the bandwidth is high enough to support at least a 10baseT connection. Drop cables to a 10baseT IEE 802.3 connection to the IOC from a thin wire co-axial cable are envisaged.

Transport Layer

This is expected to use the TCP component of the TCP/IP standard.

Routing protocol

This is expected to use the Internet protocol component of the TCP/IP standard.

Network protocol

This shall use the Channel Access mechanism to communicate with EPICS database entries on the IOC.

Application layer interface

This shall use the ING Mechanism Interface (IMI) layer to provide access to IOC database elements from a DRAMA server application. This is detailed in WHT-ISIS-9 (Ref 1). The application of this standard is described below.
A stream of control messages will be passed to the IOC processor and a stream of status messages will be returned from the IOC.
The IOC maintains a list of monitoring processes for each record and sends status messages to all of them when that record's state changes.

Mechanism Control Categories

?? **Control** These mechanisms can be moved at the request of the I-task and thus require the full set of EPICS interface records.
?? **Position and Status** These mechanisms will report an error condition when a value goes out of range. The EPICS interface for each such mechanism need only provide the current position, mechanism status and error description.
?? **Position only.** These mechanisms need only report their current position/state with no defined error condition. The EPICS interface for each such mechanism provides only the current position.

Naming convention

All EPICS records in the AO system will have the form:
ngs**:<mechname>:<rectype>**
There will be a separate mechanism for the individual axes in each multi-axis system sub-assembly. The following conventions for axis naming will be followed, assuming an optical beam travelling parallel to the bench:

Description of axes

When describing movement or alignment of individual components in the system The following co-ordinate system may be used which helps to relate the movement to the local optical axis.
Since the beam is folded around the Ghril table, co-ordinates relative to a single origin on the Ghril bench are not appropriate for each individual mechanism. These coordinates are therefore relative to the optical beam running through the device in question. Where the device folds the beam, the appropriate optical axis should be specified.

X	Movement parallel to the ghril bench and orthogonal to the optical axis of the input beam to the device. Origin on the nominal optical axis. +ve X is to the right when viewed from upstream
Y	Vertical movement orthogonal to the bench and also the beam. Origin on the nominal optical axis. +ve Y is up away from the bench.
F or focus	Movement along the optical beam, i.e. focus. Positive movement downstream.
R or rot	rotation around the optical axis. Positive rotation defined as clockwise when viewed from upstream.
L or El	Tip i.e. elevation rotation. Rotation about the X axis. Positive rotation moves a point in a downstream focal plane in the +ve y direction. .
A or Az	Tilt i.e. azimuthal rotation. Rotation about the Y axis. Positive rotation will move a point in a downstream focal plane in the +ve X direction. Looking from above, the object will rotate clockwise for +ve t.

Database record types

The standard channel access database record contains the following fields.

Record name	Type	Range or In Set	Usage
comm	mbbo	MOVE, STOP, DATUM, UPDATE	Command input from user
demand	mbbo/lo	Mechanism Range	Requested mechanism position(lo) or state(mbbo)
commstat	mbbi	0--5	Command validation status
commstr	stringout	0-40 ascii chars	Command error description string
clstat	bi	DONE, ACTIVE	Mechanism control status
mechstat	longin	0-255	Mechanism status
errstr	stringout	0-40 ascii chars	Mechanism error description string
current	mbbi/longin	Mechanism range	Current mechanism position(longin) or state(mbbi)
timeout	longin	Positive integer	Movement timeout period in seconds

A fuller description of each action pertaining to each field can be found in Ref 1.

Interface Record list

The following list will define each individual mechanism with its parameters.

Position Only mechanisms

Position only mechanisms simply monitor the position of the appropriate piece of hardware, for example a micro switch providing an interlock for a panel being in position.

Mechanism name	position/range	meaning
ngs:WFScover	int	WFS cover installed 0 = not present.
ngs:WFSpfilock	int	Limit Switch to detect possible collision between WFS X pick-off and fore-optics on WFS X/focus rail. 0 = slides apart 1 = slides within limit
ngs:WFSfcilock	int	Limit Switch to detect possible collision between WFS fore optics and camera slides on WFS X/focus rail. 0 = slides apart 1 = slides within limit

Position and status mechanisms

These mechanisms will allow monitoring only of parameters in their subsystem. The state of the mechanism may include information about the mechanism such as ``moving'' or ``error'' etc.

Mechanism name	position/range	meaning
ngs:wfscalsource	int	0 = off 1 = on

Fully Controlled mechanisms (WFS)

These mechanisms can be given a demand position as well as having their current position reported, as well as the mechanism status.

Mechanism name	position/range	meaning
ngs:WFSx	int	pick-off X position in microns
ngs:WFSy	int	pick-off Y position in microns
ngs:WFSfocus	int	Collimator focus position in microns
ngs:WFScalbs	0 out 1 in	Calibration source insertion fold mirror position.
ngs:WFScalsource	0 off 1 on	Calibration source lamp control.
ngs:WFSadcdira	int	direction of correction for prism A in degrees
ngs:WFSadcdirb	int	direction of correction for prism B indegrees
ngs:WFSnd	0 1 2 3 4 5 6	no filter ND 0 (glass) ND 0.5 ND 1.0 ND 2.0 ND 4.0 ND 10.0
ngs:WFSfilt	0 1 2 3 4 5	no filter clear opaque 400-600 400-1000 V

ngs:WFSlenslet	0	Clear
	1	Fiducial marks: pupil ring and crosshair
	2	Pinhole Grid
	3	1x1 Acquisition lens
	4	8x8 good seeing
	5	8x8 bad seeing
	6	4x4 bad seeing
WFSshutter	0	closed
	1	open
ngs:WFSccdfocus	int	position in microns

Appendixes

A. Document history

Version 1.0 - created from AOW/SOF/ABG/2.1/10/96 (abg)
/home/ngs/add/wfsmech.doc in /home/ngs/docs/worddocs/wfsicd.doc
Version 1.1 - Updated for current slide details. (abg)
Version 1.2 - Added fiducial lenslet wheel entry
Version 1.3 - Added calibration source beam splitter and lamp mechanisms
Version 1.4 - mod to description of axes (abg)
Version 1.5 - 10/1/97 abg Typos corrected, clarified axes description and added interlock limit switches between x pick-off, fore-optics and camera guides which are on common rail.

B. References

Reference 1 "WHT ISIS Polarisation Module, VAX Software Manual"

A N Johnson 23 Aug. 1996 RGO document number WHT-ISIS-9

Reference 2 "DRAMA server to OMC EPICS mechanism controller ICD"

A B Gentles 29 Nov 1996 WHT-NAOMI-2