

Microscope support in EPICS

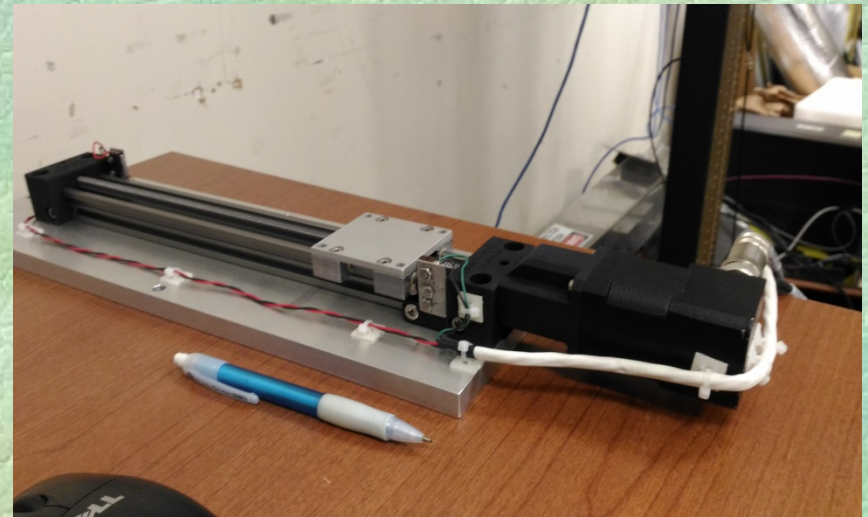
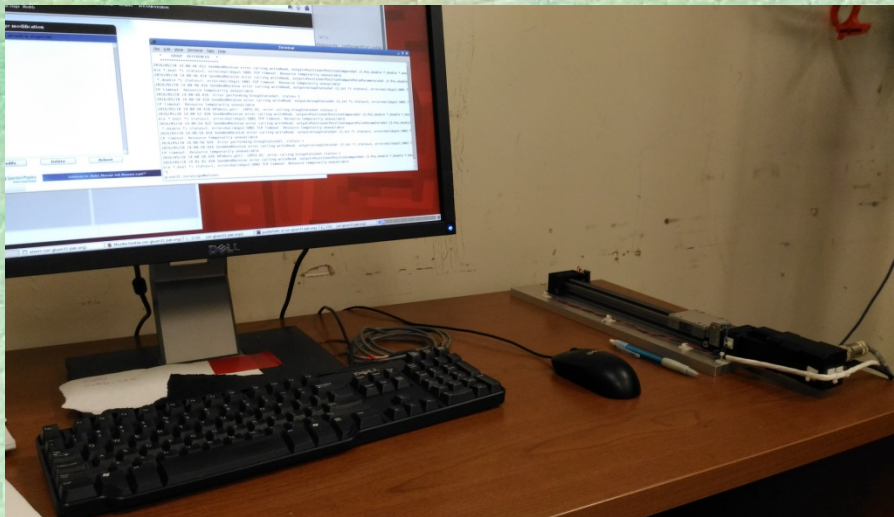
(status report)

Vanik Kakoyan

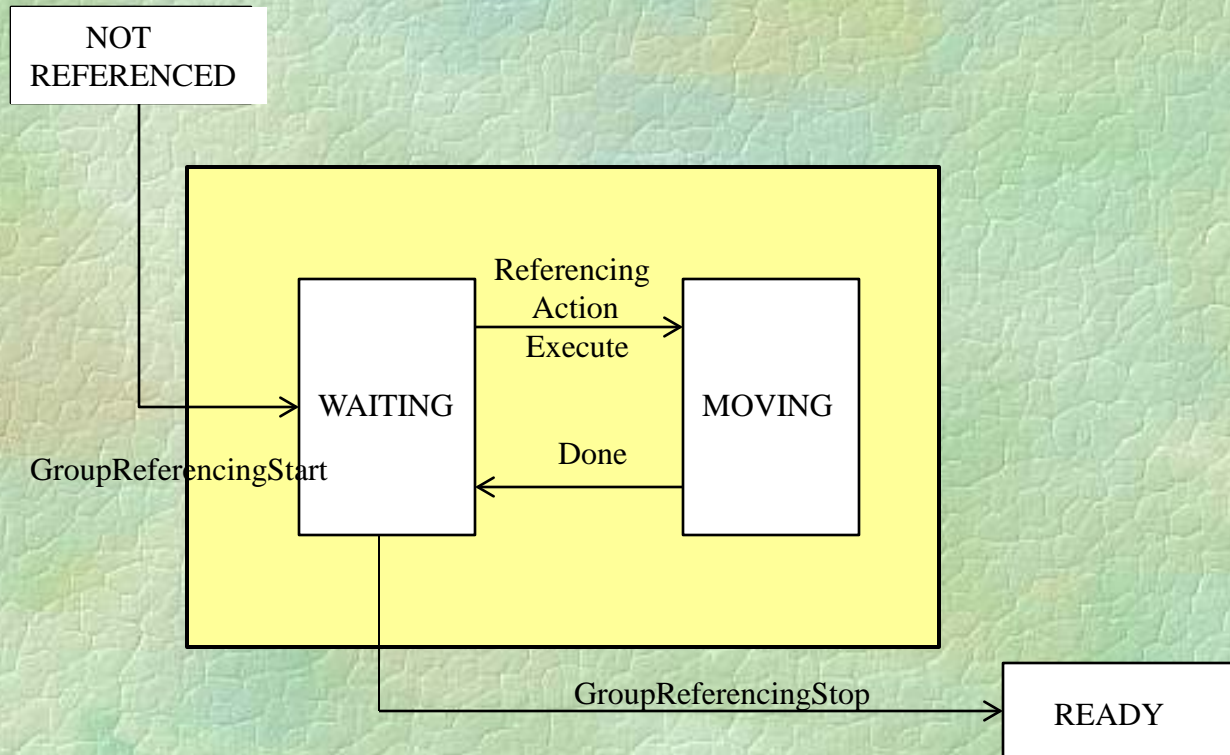
Hall D Controls Meeting 12-May-2016

Test setup

XPS - C8 Universal Motion Controller



REFERENCING



Software

- 100+ functions - using the WEB interface
- EPICS compatible

(Mark Rivers from APS developed EPICS support but it does not support functions for the Referencing)

- ***GroupKill(GroupName)***
- ***GroupInitialize(GroupName)***
- ***GroupReferencingStart(GroupName)***
- ***GroupReferencingActionExecute(Posit,Action,Sensor,Parameter)***
- ***GroupReferencingStop(GroupName)***

IOC

using the “motor” record and EPICS Sequencer which is using State Notation Language.

GUI using CSS

GroupReferencingActionExecute(Posit,Action,Sensor,Parameter)

The syntax and function of the function

GroupReferencingActionExecute(PositionerName, Action, Sensor, Parameter) will be discussed in detail. With this function there are four parameter to specify:

- PositionerName is the name of the positioner on which this function is executed.
- Action is the type of action that is executed. There are eight actions that can be distinguished in three categories: Moves that stop on a sensor event, moves of certain displacement, and position counter reset actions.
- Sensor is the sensor used for those actions that stop on a sensor event. It can be MechanicalZero, MinusEndOfRun, or None.
- Parameter is either a position or velocity value and provides further input to the function.

The following table summarizes all possible configurations:

Action	Sensor			Parameter	
	MechanicalZero	MinusEndOfRun	None	Position	Velocity
LatchOnLowToHighTransition	v	v			v
LatchOnHighToLowTransition	v	v			v
LatchOnIndex			v		v
LatchOnIndexAfterSensorHighToLowTransition	v	v			v
SetPosition			v	v	
SetPositionToHomePreset			v		
MoveToPreviouslyLatchedPosition			v		v
MoveRelative			v	v	

Base GUI

The screenshot displays the 'Base GUI' interface for 'Group Referencing Operations' within the 'CSS (on gluon31.jlab.org)' application. The window title is 'CSS (on gluon31.jlab.org)' and the menu bar includes 'File', 'Edit', 'Search', 'CSS', 'Window', and 'Help'. The toolbar contains various icons for file operations and a search bar showing '79%'. The main content area is titled 'Group Referencing Operations' and features several sections:

- Group Information:** XPS: haldxps1, Group: S, Positioner: S.Pos, Group State: STANDBY, Ref State: STANDBY.
- Group Status:** 64, Referencing state. Includes a 'Run Refer...' button.
- Positioner Status:** 0x400104, Minus end of run activated - ZM high level - First driver powered on. Includes an 'ABORT' button.
- Positioner Error:** 0x0.
- Control Buttons:** GroupKill, GroupInitialize, GroupHomeSearch, GroupReferencingStart, GroupReferencingStop.
- Status:** Kill Status: Undefined, Init Status: Undefined, Home Status: Undefined, Start Status: Undefined, Stop Status: Undefined.
- Action and Sensor Selection:** Action dropdown (LatchOnLowToHighTransit, LatchOnHighToLowTransit, LatchOnIndex, LatchOnIndexAfterHighT..., SetPosition, SetPositionToHomePreset, MoveToPrevLatchedPos, MoveRelative), Sensor dropdown (MinusEndOfRun, MechanicalZero, PlusEndOfRun, None), and Parameter spinner (0).
- Additional Buttons:** PStatDetail, MotorExpert, GroupReferencingActionExecute.
- ActionExecute Status:** Undefined.
- Referencing Error Message:** A text area for error messages.
- Positioner Scale:** A horizontal scale from -100 to 160 with a red indicator at -22.28.

CSS (on gluon31.jlab.org)

File Edit Search CSS Window Help

OPI Runtime

Referencing.opi

Group Referencing Operations

XPS: **halldxps1** Group: **S** Positioner: **S.Pos** Group State: **END REF** Ref State: **FINISHED**

Group Status: **11** Ready state from homing Run Refer...

Positioner Status: **0x400000** ZM low level - First driver powered on ABORT

Positioner Error: **0x0**

GroupKill GroupInitialize GroupHomeSearch

Kill Status: **Success** Init Status: **Success** Home Status: **Undefined**

GroupReferencingStart GroupReferencingStop

Start Status: **Success** Stop Status: **Success**

Action	Sensor	Parameter
SetPositionToHomePreset	None	0
LatchOnLowToHighTransit	MinusEndOfRun	
LatchOnHighToLowTransit	MechanicalZero	PStatDetail
LatchOnIndex	PlusEndOfRun	MotorExpert
LatchOnIndexAfterHighT...	None	
SetPosition		
SetPositionToHomePreset		GroupReferencingActionExecute
MoveToPrevLatchedPos		
MoveRelative		

ActionExecute Status: **Success**

Referencing Error Message:

-10

-100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160

positionerStatus_detail.opi

101%

Positioner Hardware Status Detail

XPS: **halldxps1** Positioner: **S.Pos**

- Second driver powered on
- First driver powered on
- Second driver in fault
- First driver in fault
- Unused
- Unused
- Hard interpolation encoder quadrature error
- Hard interpolation encoder error
- Unused
- Unused
- Encoder frequency or coherency error
- Encoder quadrature error
- Plus end of run glitch
- Minus end of run glitch
- Plus end of run activated
- Minus end of run activated
- Unused
- Unused
- Unused
- Unused
- ZM high level
- Unused
- General inhibition detected

motor_expert.opi

Drive	User	Dial	Limit	Raw
Hi limit	10,000.00	10,000.00	<input type="radio"/>	
Readback	320.00 320.00	320.00	Done	320
MoveAbs	320	320	<input type="radio"/>	320
Lo limit	-1,500.00	-1,500.00	<input type="radio"/>	Stop
MoveRel	0.00	JogR JogF		Pause
Tweak	< 1.00 >	HomR HomF JogF		Move
				Go

Dynamics	Normal	Backlash	Calibration
Speed	300	1.00	Cal Use Set
Base Speed	0.00		Variable
Accel.	10.00	0.20	Off 0.00
Backlash distance		0.00	Dir Pos Neg
Move Fraction		1.00	

1000 2000 3000 4000

Setup	Status
Motor res. 1.0	GroupStatus 12
Encoder res. 1.0	MotorStatus 0x4902
Readback res. 0.0	CurrDirection 0
Retry deadband 1.0	Moving Done
Retries 1 max: 10	At Home 0
Use Encoder No Yes	MotorPos 320
Use Readback No Yes	Encoder 320
Precision 2	MIP 0x 0x0
supervisory closed_loop	Err 0.00
	Version 6.70
	VME Card# -1
	MotorStatusDetail

Run Referencing

```
kakoyan@halld-sc:~/Desktop
File Edit View Search Terminal Help
iocRun: All initialization complete
## Start any sequence programs
seq groupRef,"GRP=S,pref=halldxps1,POS=Pos"
Sequencer release 2.1.12, compiled Wed Nov 20 10:32:16 2013
Spawning sequencer program "groupRef", thread 0x85a9ca0: "groupRef"
seq posRef,"GRP=S,POSIT=S.Pos,pref=halldxps1,POS=Pos,R=m1"
Sequencer release 2.1.12, compiled Wed Nov 20 10:32:16 2013
Spawning sequencer program "posRef", thread 0x85abf48: "posRef"
#seq posRef,"GRP=uScope,POS=Middle"
#seq posRef,"GRP=uScope,POS=Downstream"
groupRef[0]: all channels connected & received 1st monitor
posRef[0]: all channels connected & received 1st monitor
epics>
epics>
epics>
epics>
epics>
epics>
*****
*   Group: S   START Referencing
*****
Group: S - GroupKill - OK
-----
Group: S - GroupInitialize - OK
-----
Group: S - GroupReferencingStart - OK
-----
**** Positioner: S.Pos --- Low Limit Switch is ON --> MoveRelative
Positioner: S.Pos * Action=MoveRelative; Sensor=None; Param(position)=10.000000
Positioner: S.Pos - MoveRelative - OK
-----
Positioner: S.Pos * Action=LatchOnLowToHighTransit Sensor=MinusEndOfRun Param(velocity)=-1.000000
Positioner: S.Pos - LatchOnLowToHighTransition - OK
-----
Positioner: S.Pos * Action=LatchOnIndexAfterHighToLo; Sensor=MinusEndOfRun; Param(velocity)=1.000000
Positioner: S.Pos - LatchOnIndexAfterHighToLowTransition - OK
-----
Positioner: S.Pos * Action=MoveToPrevLatchedPos; Sensor=None; Param(velocity)=1.000000
Positioner: S.Pos - MoveToPreviouslyLatchedPosition - OK
-----
Positioner: S.Pos * Action=SetPositionToHomePreset; Sensor=None;
Positioner: S.Pos - SetPositionToHomePreset - OK
-----
Group: S - GroupReferencingStop - OK
-----
*****
*   Group: S   REFERENCED
*****
epics> █
```


THANK YOU