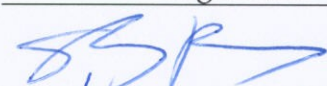
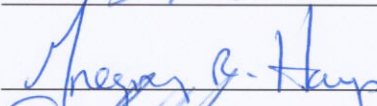
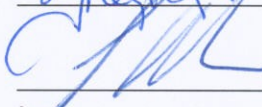

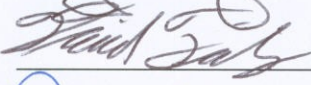
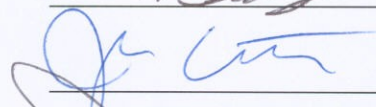
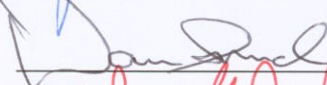
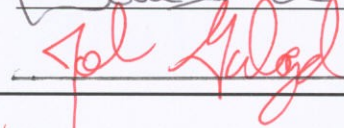


LCLS Interface Control Document	1.1-524	NEH Laser Transport Control System	Revision 1
NEH Laser Transport Control System ICD			
		Signature	Date
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Brief Summary:

This document describes the interface between the NEH laser transport control system and the NEH laser/optics for both AMO and XPP experiments. •

Change History Log

Rev Number	Revision Date	Sections Affected	Description of Change
000	5/2/08	All	Initial Version
001	9/12/08	2	Move from NEH Hutch 2 to Hutch 1

1 Introduction

This document defines the interface between the NEH laser/optics for both AMO and XPP and the NEH Laser Transport Control System. Input for this document comes from the Engineering Specifications for the LCLS/NEH Laser Transport Controls (ESD).

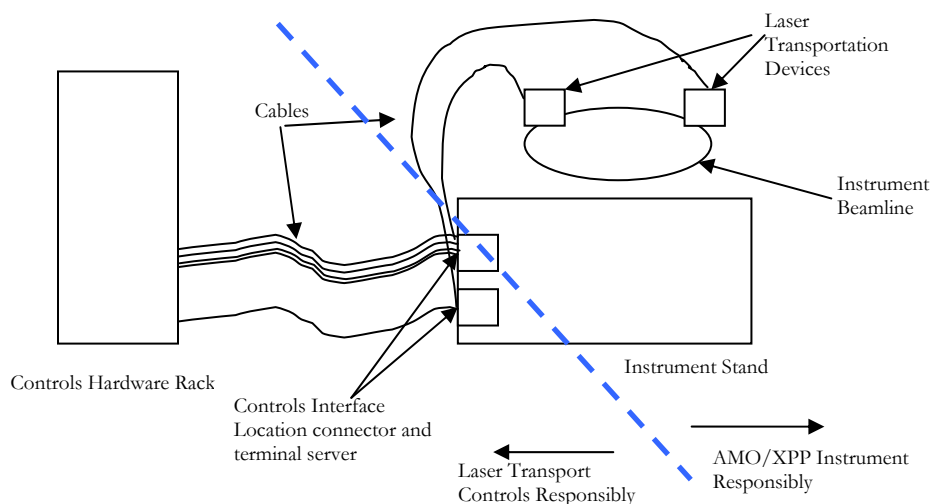
1.1 Scope

This document establishes the areas of responsibility for NEH Laser Transport Control System and defines the interface components. This includes all components for Mirror/Motion, Vision, Laser Power/Energy and Laser Diagnostics as well as interfaces to other services including MPS, networking, and timing systems.

1.2 Areas of responsibility

In general, the AMO/XPP Instrument is responsible for the acquisition and installation of all laser transport devices such as mirror mounts, cameras, power/energy meters and the cabling from these devices to the Controls Interface Location connector (specified below). The Controls/Data Acquisition Group is responsible for the Controls Interface Location connector, all cabling from the Controls Interface Location connector to the controlling hardware (rack based), and is responsible for the acquisition and installation of all controls hardware.

Figure 1.2.1 Conceptual layout showing areas of responsibility and interface points



1.3 Controls Interface Location Connector

The Controls Interface Location connector is a connection point between the Controls cabling and the device. This multipurpose connection point is generally located on the experiment stand containing the devices being controlled and read out. For serial controls such as power meter, the Controls Interface Location connector is an Ethernet connected terminal server located on the instrument stand.

2 Laser Transport Devices

2.1 Motion Systems for Mirror/Lens/Waveplate/Power Meter Sensor

Table 2.1.1: Motion System Devices

Device	Name	Budget	Install. Resp.	Device Location	Controls Interface Location
Power Meter Sensor	Motor-PM1	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Laser Hall	Connector to MOC01 Ch1
Waveplate	Motor-WP1	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Laser Hall	Connector to MOC01 Ch2
Power Meter Sensor	Motor-PM2	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Laser Hall	Connector to MOC01 Ch3
Mirror	Motor-M0	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Laser Hall	Connector to MOC01 Ch4
Newport XPS-C8	Motion Controller MOC01	Control	Control	Laser Hall	DRV01 to motors' connectors, Ethernet to IOC
IOC	IOC01	Control	Control	Laser Hall	Ethernet
Lens	Motor-L1	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	Connector to MOC12 Ch4
Lens	Motor-L2	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	Connector to MOC12 Ch5
Lens	Motor-L3	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	Connector to MOC12 Ch6
Mirror	Motor-M1	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	Connectors to MOC11 Ch1 & 2
Mirror	Motor-M2	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	Connectors to MOC11 Ch3 & 4
Pulse Compressor	Motor-Compressor	AMO/XPP	AMO/XPP	Pulser Compressor and Harmonics Generator, Hutch 1 and 3	Connectors to MOC12 Ch1 & 2
Delay Stage	Motor-DS1	XPP	XPP	Pulser Compressor and Harmonics Generator, Hutch 3	Connector to MOC12 Ch3
Power Meter Sensor	Motor-PM3	AMO/XPP	AMO/XPP	Pulser Compressor and Harmonics Generator, Hutch 1 and 3	Connector to MOC13 Ch6
Waveplate	Motor-WP2	AMO/XPP	AMO/XPP	Pulser Compressor and Harmonics Generator,	Connector to MOC13 Ch1

				Hutch 1 and 3	
Mirror	Motor-M3	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	Connectors to MOC11 Ch5 & 6
Mirror	Motor-M4	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	Connectors to MOC11 Ch7 & 8
Waveplate	Motor-WP5	XPP	XPP	Optical Transport to Experiments, Hutch 3	Connector to MOC13 Ch2
Waveplate	Motor-WP6	XPP	XPP	Optical Transport to Experiments, Hutch 3	Connector to MOC13 Ch3
Lens	Motor-L4	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	Connector to MOC12 Ch7
Waveplate	Motor-WP3	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	Connector to MOC13 Ch4
Lens	Motor-L5	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	Connector to MOC12 Ch8
Waveplate	Motor-WP4	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	Connector to MOC13 Ch5
Newport XPS-C8	Motion Controller MOC11	Control	Control	Hutch 1 and 3	DRV01 to motors' connectors, Ethernet to IOC
Newport XPS-C8	Motion Controller MOC12	Control	Control	Hutch 1 and 3	DRV01 to motors' connectors, Ethernet to IOC
Newport XPS-C8	Motion Controller MOC13	Control	Control	Hutch 1 and 3	DRV01 to motors' connectors, Ethernet to IOC
IOC	IOC11	Control	Control	One in each hutch	Ethernet

2.2 Vision Systems

Table 2.2.1: Vision System Devices

Device	Name	Budget	Install. Resp.	Device Location	Controls Interface Location
Camera	Cam-Csp	AMO/XPP	AMO/XPP	Master Oscillator, Laser Hall	CameraLink and power Connector
Camera	Cam-F1	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Laser Hall	CameraLink and power Connector
Camera	Cam-F2	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Laser Hall	CameraLink and power Connector
Slow Image Readout IOCs		Control	Control	Laser Hall	CameraLink cable and power to cameras. CameraLink and Trigger to EDT PMC, PMC-EVR on CPU with Fiber
Camera	Cam-C1	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	CameraLink and power Connector

Camera	Cam-C2	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	CameraLink and power Connector
Camera	Cam-C3	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor, Hutch 1 and 3	CameraLink and power Connector
Camera	Cam-C4	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	CameraLink and power Connector
Camera	Cam-C5	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	CameraLink and power Connector
Camera	Cam-VEC	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	CameraLink and power Connector
Camera	Cam-2 ω VEC	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	CameraLink and power Connector
Image Readout IOCs		Control	Control	Hutch 1 and 3	CameraLink cable and power to cameras. CameraLink and Trigger to EDT PMC, PMC-EVR on CPU with Fiber

2.3 Power/Energy Meters

Table 2.3.1: Power/Energy measurement System Devices

Device	Name	Budget	Install. Resp.	Device Location	Controls Interface Location
Power Meter	PMOsc	AMO/XPP	AMO/XPP	Master Oscillator , Laser Hall	Analog output to IOC ADC, RS232 to Digi
Energy Meter	PM1	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor , Laser Hall	Trigger from PMC-EVR on IOC, Analog output to IOC ADC, RS232 to Digi
Energy Meter	PM2	AMO/XPP	AMO/XPP	Amplifier Transport to Compressor , Laser Hall	Trigger from PMC-EVR on IOC, Analog output to IOC ADC, RS232 to Digi
Digi	Digi01	Control	Control	Laser Hall	RS232 to meters, Ethernet to IOC
Power/Energy Readout IOC	IOC01 (Share with Motion)	Control	Control	Laser Hall	EVR trigger output to meter, Analog meter signal to IP ADC, Ethernet to Digi
Energy Meter	PM3	AMO/XPP	AMO/XPP	Pulser Compressor and Harmonics Generator, Hutch 1 and 3	Trigger from PMC-EVR on IOC, Analog output to IOC ADC, RS232 to Digi
Energy Meter	PM4	AMO/XPP	AMO/XPP	Optical Transport to Experiments, Hutch 1 and 3	Trigger from PMC-EVR on IOC, Analog output to IOC ADC, RS232 to Digi
Energy Meter	PM5	AMO/XPP	AMO/XPP	Optical Transport to	Trigger from PMC-EVR on

				Experiments, Hutch 1 and 3	IOC, Analog output to IOC ADC, RS232 to Digi
Digi	Digi11	Control	Control	One in each hutch	RS232 to meters, Ethernet to IOC
Power/Energy Readout IOC	IOC11 (Share with Motion)	Control	Control	One in each hutch	EVR trigger output to meter, Analog meter signal to IP ADC, Ethernet to Digi

2.4 Laser Diagnostics Systems and Miscellaneous

Table 2.4.1: Laser Diagnostics System and Miscellaneous Devices

Device	Name	Budget	Install. Resp.	Device Location	Controls Interface Location
Femto-Laser Oscillator	Osc	AMO/XPP	AMO/XPP	Master Oscillator , Laser Hall	DB9 connector to MOC01 GIO1 and GIO2.
Thermocouples		AMO/XPP	AMO/XPP	Large Laser Table2: 15 Small Laser Table1: 8 Cooling Watch Table2: 5 LCW Supply: 2 Future: 10	Thermocouples to Beckhoff Ethernet-based IO
Beckhoff BK9000 with KL3114		Control	Control	Laser Hall	Terminal to thermocouples. Ethernet to IOC.
IOC	IOC01 (Share with Motion)	Control	Control	Laser Hall	Ethernet to XPS-C8, Ethernet to Beckhoff
Pockel Cell		AMO/XPP	AMO/XPP	Laser Amplifier , Laser Hall	TTL input connector on SLAC AND BOX
IOC	IOC02	Control	Control	Laser Hall	EVR TTL output to SLAC AND BOX, LBL timing
Oscilloscope	Oscope	AMO/XPP	AMO/XPP	Laser Amplifier , Laser Hall	Tektronix TDS2054B Ethernet
SoftIOC	SIOC01	Control	Control	Laser Hall	Ethernet to all oscilloscopes in laser hall/hutch1/hutch3
Ion Gauge	CCG1	AMO/XPP	AMO/XPP	Transport Tube	HV and readback on Connector
Pirani Gauge	TPG1	AMO/XPP	AMO/XPP	Transport Tube	HV and readback on Connector
Ion Gauge Controller		Controls	Controls	Hutch 1 and 3	RS232 to Digi
Ion Pump	ION1	AMO/XPP	AMO/XPP	Transport Tube	HV and readback on Connector
Ion Pump Controller		Controls	Controls	Hutch 1 and 3	RS232 to Digi
Thermocouples		AMO/XPP	AMO/XPP	Large Laser Table2: 15 Small Laser Table1: 8 Cooling Watch Table2: 5 LCW Supply: 2	Thermocouples to Beckhoff Ethernet-based IO

				Future: 10	
Beckhoff BK9000 with KL3114		Control	Control	Hutch 1 and 3	Terminal to thermocouples. Ethernet to IOC.
Digi	Digi11 (Share with power meters)	Control	Control	Hutch 1 and 3	RS232 to pump controller and gauge controller, Ethernet to IOC
IOC	IOC11 (Share with Motion)	Control	Control	Hutch 1 and 3	Ethernet to Beckhoff and Digi
Single-Shot Auto Correlator	AC	AMO/XPP	AMO/XPP	Hutch 1 and 3	Tektronix TDS2054B Ethernet
3 rd order Cross Correlator	3rdXCOR	XPP	XPP	Hutch 3	TBD
Oscilloscope	Scope3	XPP	XPP	Hutch 3	Ethernet
Oscilloscope	Scope4	XPP	XPP	Hutch 3	Ethernet
SoftIOC	SIOC01	Control	Control	Laser Hall	Ethernet to all oscilloscopes in laser hall/hutch1/hutch3

3 Other Services

3.1 MPS

Is the Pockel Cell part of MPS? TBD

3.2 AC Power

AC Power will be provided at each instrument stand location.

3.3 Machine Timing

Several devices require precise triggering with respect to the laser pulse. As noted in the tables above, this timing comes from the Controls system via equipment (EVRs) in the IOC.

3.4 LBL Timing

This will be described in a separate ICD.