*LIGO Laboratory / LIGO Scientific Collaboration*

LIGO- E200632-v1 Advanced LIGO 6/15/2012

TwinCAT Library for
ALS Laser

Alexa Staley, Daniel Sigg

Distribution of this document:

LIGO Scientific Collaboration

This is an internal working note
of the LIGO Laboratory.

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| **LIGO Hanford Observatory****P.O. Box 159****Richland WA 99352**Phone 509-372-8106Fax 509-372-8137 | **LIGO Livingston Observatory****P.O. Box 940****Livingston, LA 70754**Phone 225-686-3100Fax 225-686-7189 |

http://www.ligo.caltech.edu/

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| **Library** |
| Title | ALSLaser |
| Version | 1 |
| TwinCAT version | 2.11 |
| Name space | – |
| Author | Alexa Staley, Daniel Sigg |
| Description | Controls the ALS Laser |
| Error codes | None |
| Library dependencies | Error |

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| **Hardware Input Type**TYPE ALSLaserInStruct :STRUCT LaserDiode1PowerMonitor: INT;LaserDiode2PowerMonitor: INT;LaserCrystalTECErrorSignal: INT;DoublingCrystalTECErrorSignal: INT;LaserDiode1TECErrorSignal: INT;LaserDiode2TECErrorSignal: INT;NoiseEaterMonitor: INT;LaserDiode1TempGuard: BOOL;LaserDiode2TempGuard: BOOL;InterLock: BOOL; END\_STRUCTEND\_TYPE |
| Type name | ALSLaserInStruct |
| Description | Structure of the hardware input that are wired up for the ALS laser |
| Definition | STRUCT |
| Element | Name: LaserDiode1PowerMonitorType: INTDescription: Laser diode 1 power monitor |
| Element | Name: LaserDiode2PowerMonitorType: INTDescription: Laser diode 2 power monitor |
| Element | Name: LaserCrystalTECErrorSignalType: INTDescription: Laser crystal, TEC error signal |
| Element | Name: DoublingCrystalTECErrorSignalType: INTDescription: Doubling crystal, TEC error signal |
| Element | Name: LaserDiode1TECErrorSignalType: INTDescription: Laser diode 1, TEC error signal |
| Element | Name: LaserDiode2TECErrorSignalType: INTDescription: Laser diode 2, TEC error signal |
| Element | Name: NoiseEaterMonitorType: INTDescription: Noise eater monitor |
| Element | Name: LaserDiode1TempGuardType: BOOLDescription: Laser diode 1, temp guard |
| Element | Name: LaserDiode2TempGuardType: BOOLDescription: Laser diode 2, temp guard |
| Element | Name: InterLockType: BOOLDescription: InterLock |

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| **Hardware Output Type**TYPE ALSLaserOutStruct :STRUCT CrystalTemperature: INT;DoublerTemperature: INT; END\_STRUCTEND\_TYPE |
| Type name | ALSLaserOutStruct |
| Description | Structure of the hardware output that are wired up for the ALS laser |
| Definition | STRUCT |
| Element | Name: CrystalTemperatureType: INTDescription: Crystal Temperature |
| Element | Name: DoublerTemperatureType: INTDescription: Doubler Temperature |

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| **User Interface Type**TYPE ALSLaserStruct :STRUCTLaserDiode1PowerMonitor: LREAL;LaserDiode2PowerMonitor: LREAL;LaserCrystalTECErrorSignal: LREAL;DoublingCrystalTECErrorSignal: LREAL;LaserDiode1TECErrorSignal: LREAL;LaserDiode2TECErrorSignal: LREAL;NoiseEaterMonitor: LREAL;LaserDiode1TempGuard: BOOL;LaserDiode2TempGuard: BOOL;InterLock: BOOL; CrystalTemperature: LREAL;DoublerTemperature: LREAL;Error: ErrorStruct;END\_STRUCTEND\_TYPE |
| Type name | ALSLaserStruct |
| Description | Structure of the user interface tags that are used to control the ALS Laser |
| Definition | STRUCT |
| Output Tag | Name: LaserDiode1PowerMonitorType: LREALDescription: Laser diode 1 power monitor |
| Output Tag | Name: LaserDiode2PowerMonitorType: LREALDescription: Laser diode 2 power monitor |
| Output Tag | Name: LaserCrystalTECErrorSignalType: LREALDescription: Laser crystal, TEC error signal |
| Output Tag | Name: DoublingCrystalTECErrorSignalType: LREALDescription: Doubling crystal, TEC error signal |
| Output Tag | Name: LaserDiode1TECErrorSignalType: LREALDescription: Laser diode 1, TEC error signal |
| Output Tag | Name: LaserDiode2TECErrorSignalType: LREALDescription: Laser diode 2, TEC error signal |
| Output Tag | Name: NoiseEaterMonitorType: LREALDescription: Noise eater monitor |
| Output Tag | Name: LaserDiode1TempGuardType: BOOLDescription: Laser diode 1, temp guard |
| Output Tag | Name: LaserDiode2TempGuardType: BOOLDescription: Laser diode 2, temp guard |
| Output Tag | Name: InterLockType: BOOLDescription: InterLock |
| Input Tag | Name: CrystalTemperatureType: LREALDescription: Crystal Temperature |
| Input Tag | Name: DoublerTemperatureType: LREALDescription: Doubler Temperature |
| Output Tag | Name: ErrorType: ErrorStructDescription: For error handler |

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| **Function Block**FUNCTION\_BLOCK ALSLaserFBVAR\_INPUTALSLaserIn: ALSLaserInStruct;END\_VARVAR\_OUTPUTALSLaserOut: ALSLaserOutStruct;END\_VARVAR\_IN\_OUT ALSLaser: ALSLaserStruct;END\_VAR |
| Name | ALSLaserFB |
| Description | Controls the ALS laser  |
| Input argument | Name: ALSLaserInType: ALSLaserInStructDescription: Input hardware structure |
| Output argument | Name: ALSLaserOutType: ALSLaserOutStructDescription: Output hardware structure |
| In/out argument | Name: ALSLaserType: ALSLaserStructDescription: User Interface structure |

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| **Visual** |
| Name | ALSLaserVis |
| Description | Displays power monitors, error signals, and alarms for temp guard and error. |
| Placeholder | Name: ALSLaserType: ALSLaserStructDescription: ALS laser structure |

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| Version | 1 |
| TwinCAT version | 2.11 |
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| Author | Alexa Staley, Daniel Sigg |
| Description | Controls the ALS Laser |
| Error codes | None |
| Library dependencies | Error |

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| **Hardware Input Type**TYPE ALSLaserInStruct :STRUCT LaserDiode1PowerMonitor: INT;LaserDiode2PowerMonitor: INT;LaserCrystalTECErrorSignal: INT;DoublingCrystalTECErrorSignal: INT;LaserDiode1TECErrorSignal: INT;LaserDiode2TECErrorSignal: INT;NoiseEaterMonitor: INT;LaserDiode1TempGuard: BOOL;LaserDiode2TempGuard: BOOL;InterLock: BOOL; END\_STRUCTEND\_TYPE |
| Type name | ALSLaserInStruct |
| Description | Structure of the hardware input that are wired up for the ALS laser |
| Definition | STRUCT |
| Element | Name: LaserDiode1PowerMonitorType: INTDescription: Laser diode 1 power monitor |
| Element | Name: LaserDiode2PowerMonitorType: INTDescription: Laser diode 2 power monitor |
| Element | Name: LaserCrystalTECErrorSignalType: INTDescription: Laser crystal, TEC error signal |
| Element | Name: DoublingCrystalTECErrorSignalType: INTDescription: Doubling crystal, TEC error signal |
| Element | Name: LaserDiode1TECErrorSignalType: INTDescription: Laser diode 1, TEC error signal |
| Element | Name: LaserDiode2TECErrorSignalType: INTDescription: Laser diode 2, TEC error signal |
| Element | Name: NoiseEaterMonitorType: INTDescription: Noise eater monitor |
| Element | Name: LaserDiode1TempGuardType: BOOLDescription: Laser diode 1, temp guard |
| Element | Name: LaserDiode2TempGuardType: BOOLDescription: Laser diode 2, temp guard |
| Element | Name: InterLockType: BOOLDescription: InterLock |

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| **Hardware Output Type**TYPE ALSLaserOutStruct :STRUCT CrystalTemperature: INT;DoublerTemperature: INT; END\_STRUCTEND\_TYPE |
| Type name | ALSLaserOutStruct |
| Description | Structure of the hardware output that are wired up for the ALS laser |
| Definition | STRUCT |
| Element | Name: CrystalTemperatureType: INTDescription: Crystal Temperature |
| Element | Name: DoublerTemperatureType: INTDescription: Doubler Temperature |

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| **User Interface Type**TYPE ALSLaserStruct :STRUCTLaserDiode1PowerMonitor: LREAL;LaserDiode2PowerMonitor: LREAL;LaserCrystalTECErrorSignal: LREAL;DoublingCrystalTECErrorSignal: LREAL;LaserDiode1TECErrorSignal: LREAL;LaserDiode2TECErrorSignal: LREAL;NoiseEaterMonitor: LREAL;LaserDiode1TempGuard: BOOL;LaserDiode2TempGuard: BOOL;InterLock: BOOL; CrystalTemperature: LREAL;DoublerTemperature: LREAL;Error: ErrorStruct;END\_STRUCTEND\_TYPE |
| Type name | ALSLaserStruct |
| Description | Structure of the user interface tags that are used to control the ALS Laser |
| Definition | STRUCT |
| Output Tag | Name: LaserDiode1PowerMonitorType: LREALDescription: Laser diode 1 power monitor |
| Output Tag | Name: LaserDiode2PowerMonitorType: LREALDescription: Laser diode 2 power monitor |
| Output Tag | Name: LaserCrystalTECErrorSignalType: LREALDescription: Laser crystal, TEC error signal |
| Output Tag | Name: DoublingCrystalTECErrorSignalType: LREALDescription: Doubling crystal, TEC error signal |
| Output Tag | Name: LaserDiode1TECErrorSignalType: LREALDescription: Laser diode 1, TEC error signal |
| Output Tag | Name: LaserDiode2TECErrorSignalType: LREALDescription: Laser diode 2, TEC error signal |
| Output Tag | Name: NoiseEaterMonitorType: LREALDescription: Noise eater monitor |
| Output Tag | Name: LaserDiode1TempGuardType: BOOLDescription: Laser diode 1, temp guard |
| Output Tag | Name: LaserDiode2TempGuardType: BOOLDescription: Laser diode 2, temp guard |
| Output Tag | Name: InterLockType: BOOLDescription: InterLock |
| Input Tag | Name: CrystalTemperatureType: LREALDescription: Crystal Temperature |
| Input Tag | Name: DoublerTemperatureType: LREALDescription: Doubler Temperature |
| Output Tag | Name: ErrorType: ErrorStructDescription: For error handler |

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| **Function Block**FUNCTION\_BLOCK ALSLaserFBVAR\_INPUTALSLaserIn: ALSLaserInStruct;END\_VARVAR\_OUTPUTALSLaserOut: ALSLaserOutStruct;END\_VARVAR\_IN\_OUT ALSLaser: ALSLaserStruct;END\_VAR |
| Name | ALSLaserFB |
| Description | Controls the ALS laser  |
| Input argument | Name: ALSLaserInType: ALSLaserInStructDescription: Input hardware structure |
| Output argument | Name: ALSLaserOutType: ALSLaserOutStructDescription: Output hardware structure |
| In/out argument | Name: ALSLaserType: ALSLaserStructDescription: User Interface structure |

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| **Visual** |
| Name | LTC |
| Description | Displays laser temperature control |
| Placeholder | Name: NoneType: Description:  |