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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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| **California Institute of Technology**  **LIGO Project – MS 18-34**  **1200 E. California Blvd.**  **Pasadena, CA 91125**  Phone (626) 395-2129  Fax (626) 304-9834  E-mail: info@ligo.caltech.edu | **Massachusetts Institute of Technology**  **LIGO Project – NW22-295**  **185 Albany St**  **Cambridge, MA 02139**  Phone (617) 253-4824  Fax (617) 253-7014  E-mail: info@ligo.mit.edu |
| **LIGO Hanford Observatory**  **P.O. Box 159**  **Richland WA 99352**  Phone 509-372-8106  Fax 509-372-8137 | **LIGO Livingston Observatory**  **P.O. Box 940**  **Livingston, LA 70754**  Phone 225-686-3100  Fax 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\_STRUCT  END\_TYPE | |
| Type name | ALSLaserInStruct |
| Description | Structure of the hardware input that are wired up for the ALS laser |
| Definition | STRUCT |
| Element | Name: LaserDiode1PowerMonitor  Type: INT  Description: Laser diode 1 power monitor |
| Element | Name: LaserDiode2PowerMonitor  Type: INT  Description: Laser diode 2 power monitor |
| Element | Name: LaserCrystalTECErrorSignal  Type: INT  Description: Laser crystal, TEC error signal |
| Element | Name: DoublingCrystalTECErrorSignal  Type: INT  Description: Doubling crystal, TEC error signal |
| Element | Name: LaserDiode1TECErrorSignal  Type: INT  Description: Laser diode 1, TEC error signal |
| Element | Name: LaserDiode2TECErrorSignal  Type: INT  Description: Laser diode 2, TEC error signal |
| Element | Name: NoiseEaterMonitor  Type: INT  Description: Noise eater monitor |
| Element | Name: LaserDiode1TempGuard  Type: BOOL  Description: Laser diode 1, temp guard |
| Element | Name: LaserDiode2TempGuard  Type: BOOL  Description: Laser diode 2, temp guard |
| Element | Name: InterLock  Type: BOOL  Description: InterLock |

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

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| **User Interface Type**  TYPE ALSLaserStruct :  STRUCT  LaserDiode1PowerMonitor: 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\_STRUCT  END\_TYPE | |
| Type name | ALSLaserStruct |
| Description | Structure of the user interface tags that are used to control the ALS Laser |
| Definition | STRUCT |
| Output Tag | Name: LaserDiode1PowerMonitor  Type: LREAL  Description: Laser diode 1 power monitor |
| Output Tag | Name: LaserDiode2PowerMonitor  Type: LREAL  Description: Laser diode 2 power monitor |
| Output Tag | Name: LaserCrystalTECErrorSignal  Type: LREAL  Description: Laser crystal, TEC error signal |
| Output Tag | Name: DoublingCrystalTECErrorSignal  Type: LREAL  Description: Doubling crystal, TEC error signal |
| Output Tag | Name: LaserDiode1TECErrorSignal  Type: LREAL  Description: Laser diode 1, TEC error signal |
| Output Tag | Name: LaserDiode2TECErrorSignal  Type: LREAL  Description: Laser diode 2, TEC error signal |
| Output Tag | Name: NoiseEaterMonitor  Type: LREAL  Description: Noise eater monitor |
| Output Tag | Name: LaserDiode1TempGuard  Type: BOOL  Description: Laser diode 1, temp guard |
| Output Tag | Name: LaserDiode2TempGuard  Type: BOOL  Description: Laser diode 2, temp guard |
| Output Tag | Name: InterLock  Type: BOOL  Description: InterLock |
| Input Tag | Name: CrystalTemperature  Type: LREAL  Description: Crystal Temperature |
| Input Tag | Name: DoublerTemperature  Type: LREAL  Description: Doubler Temperature |
| Output Tag | Name: Error  Type: ErrorStruct  Description: For error handler |

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| **Function Block**  FUNCTION\_BLOCK ALSLaserFB  VAR\_INPUT  ALSLaserIn: ALSLaserInStruct;  END\_VAR  VAR\_OUTPUT  ALSLaserOut: ALSLaserOutStruct;  END\_VAR  VAR\_IN\_OUT  ALSLaser: ALSLaserStruct;  END\_VAR | |
| Name | ALSLaserFB |
| Description | Controls the ALS laser |
| Input argument | Name: ALSLaserIn  Type: ALSLaserInStruct  Description: Input hardware structure |
| Output argument | Name: ALSLaserOut  Type: ALSLaserOutStruct  Description: Output hardware structure |
| In/out argument | Name: ALSLaser  Type: ALSLaserStruct  Description: 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: ALSLaser  Type: ALSLaserStruct  Description: ALS laser structure |

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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\_STRUCT  END\_TYPE | |
| Type name | ALSLaserInStruct |
| Description | Structure of the hardware input that are wired up for the ALS laser |
| Definition | STRUCT |
| Element | Name: LaserDiode1PowerMonitor  Type: INT  Description: Laser diode 1 power monitor |
| Element | Name: LaserDiode2PowerMonitor  Type: INT  Description: Laser diode 2 power monitor |
| Element | Name: LaserCrystalTECErrorSignal  Type: INT  Description: Laser crystal, TEC error signal |
| Element | Name: DoublingCrystalTECErrorSignal  Type: INT  Description: Doubling crystal, TEC error signal |
| Element | Name: LaserDiode1TECErrorSignal  Type: INT  Description: Laser diode 1, TEC error signal |
| Element | Name: LaserDiode2TECErrorSignal  Type: INT  Description: Laser diode 2, TEC error signal |
| Element | Name: NoiseEaterMonitor  Type: INT  Description: Noise eater monitor |
| Element | Name: LaserDiode1TempGuard  Type: BOOL  Description: Laser diode 1, temp guard |
| Element | Name: LaserDiode2TempGuard  Type: BOOL  Description: Laser diode 2, temp guard |
| Element | Name: InterLock  Type: BOOL  Description: InterLock |

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

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| **User Interface Type**  TYPE ALSLaserStruct :  STRUCT  LaserDiode1PowerMonitor: 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\_STRUCT  END\_TYPE | |
| Type name | ALSLaserStruct |
| Description | Structure of the user interface tags that are used to control the ALS Laser |
| Definition | STRUCT |
| Output Tag | Name: LaserDiode1PowerMonitor  Type: LREAL  Description: Laser diode 1 power monitor |
| Output Tag | Name: LaserDiode2PowerMonitor  Type: LREAL  Description: Laser diode 2 power monitor |
| Output Tag | Name: LaserCrystalTECErrorSignal  Type: LREAL  Description: Laser crystal, TEC error signal |
| Output Tag | Name: DoublingCrystalTECErrorSignal  Type: LREAL  Description: Doubling crystal, TEC error signal |
| Output Tag | Name: LaserDiode1TECErrorSignal  Type: LREAL  Description: Laser diode 1, TEC error signal |
| Output Tag | Name: LaserDiode2TECErrorSignal  Type: LREAL  Description: Laser diode 2, TEC error signal |
| Output Tag | Name: NoiseEaterMonitor  Type: LREAL  Description: Noise eater monitor |
| Output Tag | Name: LaserDiode1TempGuard  Type: BOOL  Description: Laser diode 1, temp guard |
| Output Tag | Name: LaserDiode2TempGuard  Type: BOOL  Description: Laser diode 2, temp guard |
| Output Tag | Name: InterLock  Type: BOOL  Description: InterLock |
| Input Tag | Name: CrystalTemperature  Type: LREAL  Description: Crystal Temperature |
| Input Tag | Name: DoublerTemperature  Type: LREAL  Description: Doubler Temperature |
| Output Tag | Name: Error  Type: ErrorStruct  Description: For error handler |

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| **Function Block**  FUNCTION\_BLOCK ALSLaserFB  VAR\_INPUT  ALSLaserIn: ALSLaserInStruct;  END\_VAR  VAR\_OUTPUT  ALSLaserOut: ALSLaserOutStruct;  END\_VAR  VAR\_IN\_OUT  ALSLaser: ALSLaserStruct;  END\_VAR | |
| Name | ALSLaserFB |
| Description | Controls the ALS laser |
| Input argument | Name: ALSLaserIn  Type: ALSLaserInStruct  Description: Input hardware structure |
| Output argument | Name: ALSLaserOut  Type: ALSLaserOutStruct  Description: Output hardware structure |
| In/out argument | Name: ALSLaser  Type: ALSLaserStruct  Description: User Interface structure |

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| **Visual** | |
| Name | LTC |
| Description | Displays laser temperature control |
| Placeholder | Name: None  Type:  Description: |