LIGO Laboratory / LIGO Scientific Collaboration

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

TwinCAT Library for ALS Laser

Alexa Staley, Daniel Sigg

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LIGO Scientific Collaboration

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of the LIGO Laboratory.

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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

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

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

User Interface Type

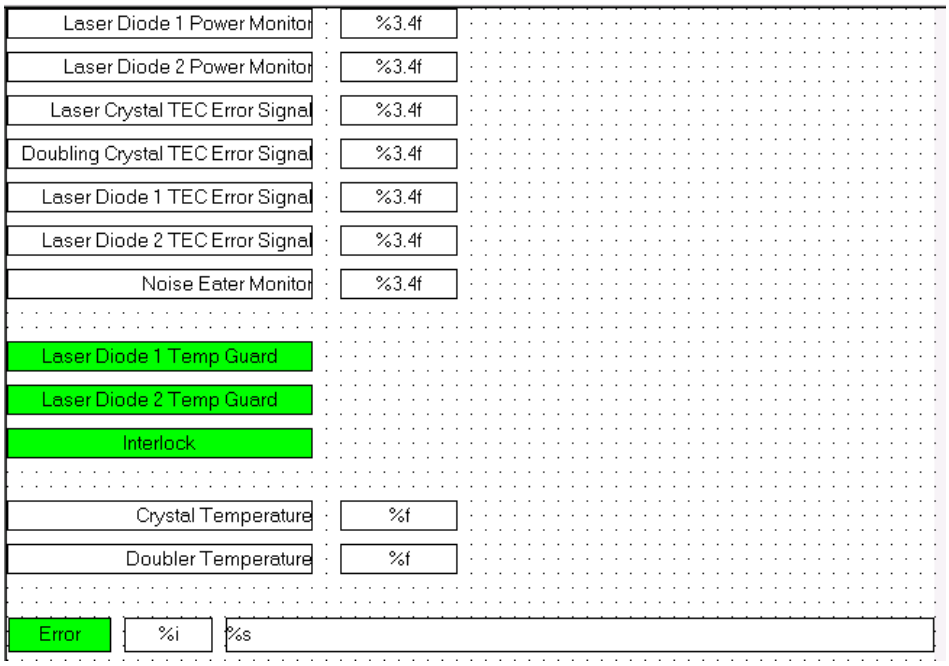
```
TYPE ALSLaserStruct :
STRUCT
        LaserDiode1PowerMonitor:        LREAL;
        LaserDiode2PowerMonitor:        LREAL;
        LaserCrystalTECErrorSignal:     LREAL;
        DoublingCrystalTECErrorSignal:  LREAL;
        LaserDiode1TECErrorSignal:      LREAL;
        LaserDiode2TECErrorSignal:      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

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

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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Hardware Input Type

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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

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

User Interface Type

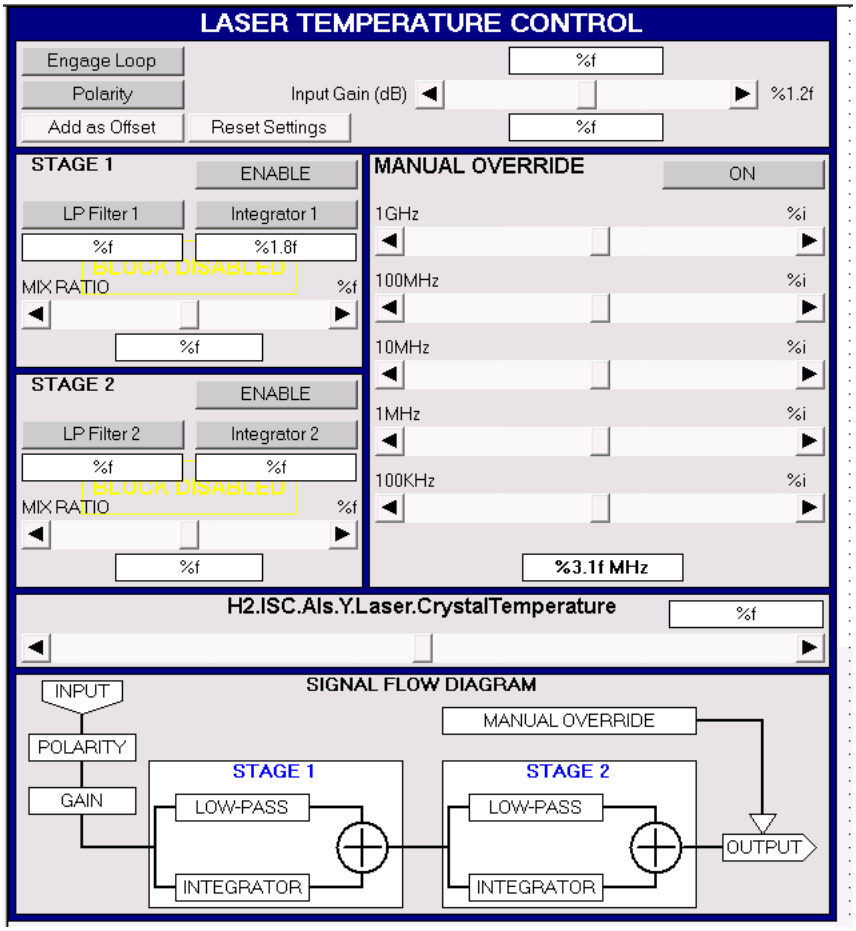
```
TYPE ALSLaserStruct :
STRUCT
        LaserDiode1PowerMonitor:        LREAL;
        LaserDiode2PowerMonitor:        LREAL;
        LaserCrystalTECErrorSignal:     LREAL;
        DoublingCrystalTECErrorSignal:  LREAL;
        LaserDiode1TECErrorSignal:      LREAL;
        LaserDiode2TECErrorSignal:      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

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

Visual



Name	LTC
Description	Displays laser temperature control
Placeholder	Name: None Type: Description: