

# EPICS: CSS-Phoebus

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## EPICS Alarm System in Phoebus

I am developing an EPICS alarm system based on CS-Studio Phoebus. Phoebus will be used for new EPICS system development and will replace the existing applications using ALH for alarms and MEDM for monitoring and control screens. Phoebus will also be used to replace Eclipse-based CS-Studio applications ([DSG Note 2021-37](#)).

To develop and test EPICS client applications such as the Phoebus alarm system, a source of EPICS process variables (PVs) is needed. For the development of some systems, I've used detectors with readout hardware running EPICS as a source of signal PVs. However, using a detector for system development can be problematic. The detector and the supporting hardware to readout the signals must be correctly functioning and available to develop and test EPICS client applications.

To aid in the development and testing of EPICS client applications such as the Phoebus alarm system, I have developed an user controllable EPICS-based detector signal simulator. The NPS simulator has been developed using the Phoebus test system (FIG. 1) I designed. ([DSG Note 2022-06](#)).

The development of the detector signal simulator for NPS has been done in phases. In the first phase of development, I designed, programmed, and implemented a detector signal simulator for the 112 NPS crystal array thermocouples. ([DSG Note 2023-23](#)).

To simulate the thermocouples, an EPICS database template was designed specifically for the thermocouples using the EPICS Visual Database Configuration Tool program (VisualDCT). The template has a group of EPICS records that are common for the generation of all 112 thermocouple PVs. The template also contains the initial EPICS PV alarm limits for HIHI, HI, Low, and LOLO for the thermocouples.

The simulator runs on an EPICS host-based softIOc running in the Phoebus test system development computer. At softIOc boot, my

- **Developing CS-Studio Phoebus based controls, monitoring, and alarm system**
- **Implementing a NPS detector signal simulator via EPICS process variables**

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application startup script uses the thermocouple template and a substitution text file I wrote to form the EPICS database. Following the database formation, the my startup script initializes it and the NPS thermocouple simulation starts.

The next phase of development just finished, the complete complement of 148 signals from the NPS detector have been implemented in the simulator. In addition to the crystal thermocouple template, 11 more templates have been developed, tested, and implemented.

Designed using VisualDCT, each of the 12 templates are dedicated to a simulated signal type and a section of the detector. The 12 templates (Table 1) allows customization of the initial Phoebus alarm limits for the PV being simulated. The individual templates also set the initial simulated signal rate, maximum signal value, and the range of simulated signal.

I developed an interface which enables users to vary parameters for each of the individually simulated PVs once the simulation is running. The user interface screen (FIG. 2), allows adjustment of both the simulated signal and the Phoebus alarm limits. Efforts are underway to program the alarm system to monitor and alarm on the simulated signals.

Template Name	Signal Type	Signal Qty.
Crystal Thermocouples	Temperature	112
Detector Frame Temps	Temperature	4
Detector Frame Humidity	Humidity	4
Detector Frame Dew Points	Dew Points	4
Electronics Zone Coolant Temps	Temperature	8
Crystal Zone Coolant Temps	Temperature	4
Hall Temperatures	Temperature	2
Hall Humidity	Humidity	2
Hall Dew Points	Dew Points	2
CZ and EZ Chiller Temps	Temperature	2
CZ and EZ Chiller Flow	Flow	2
CZ and EZ Chiller Pressure	Pressure	2

Table 1. VisualDCT templates developed for the NPS Signal Simulator

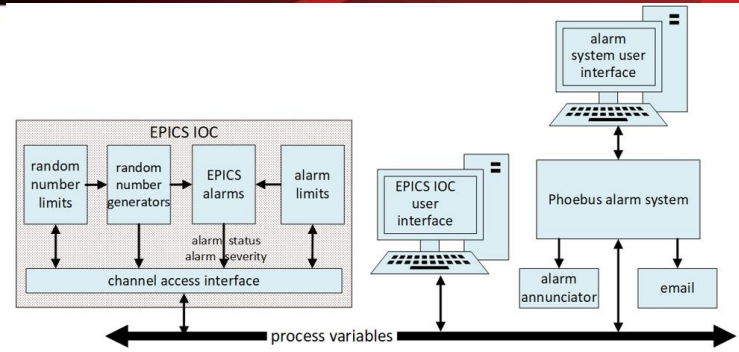


FIG.1. Phoebus Alarm Test System

2023-07-18 09:14:56														Back Crystal Zone Temperature Sensor Alarm Testing [°C]			
PV name	Crystal	read	HIHI set	HIHI read	HIGH set	HIGH read	LOW set	LOW read	LOLO set	LOLO read	Alarm status	Alarm severity	Scan rate	range [°C]	Min T [°C]	Max T [°C]	
hrcps_inrk_cz_1_back	0	7.68	23.00	23.00	20.00	20.00	5.00	5.00	0.00	0.00	NO_ALARM	NO_ALARM	1 second	18	4	22.00	
	5	8.55	23.00	23.00	20.00	20.00	5.00	5.00	0.00	0.00	NO_ALARM	NO_ALARM	1 second	5	5	10.00	
	10	6.37	23.00	23.00	20.00	20.00	5.00	5.00	0.00	0.00	NO_ALARM	NO_ALARM	1 second	5	5	10.00	
	15	6.45	23.00	23.00	20.00	20.00	5.00	5.00	0.00	0.00	NO_ALARM	NO_ALARM	1 second	5	5	10.00	
	20	7.13	23.00	23.00	20.00	20.00	5.00	5.00	0.00	0.00	NO_ALARM	NO_ALARM	1 second	5	5	10.00	
	25	6.45	23.00	23.00	20.00	20.00	5.00	5.00	0.00	0.00	NO_ALARM	NO_ALARM	1 second	5	5	10.00	
	30	8.61	23.00	23.00	20.00	20.00	5.00	5.00	0.00	0.00	NO_ALARM	NO_ALARM	1 second	5	5	10.00	

FIG.2. Phoebus Test Station User Interface