



U.S. DEPARTMENT OF
ENERGY



clas Slow Controls

N. Baltzell
3rd 1st CLAS12 Experiment Workshop
June 15, 2016

Overview

Organization

- N. Baltzell, K. Livingston, B. McKinnon, W. Moore
- Biweekly Meetings: 9:00 on Fridays in L210A
- Wiki:
https://clasweb.jlab.org/wiki/index.php/CLAS12_Slow_Controls
 - With meeting agendas and minutes, planning docs, subsystem specs, improving documentation
- **First goal: KPP, full baseline support by summer's end**
- Working with DAQ and Detector Support Groups for integration (esp. J. Ballard, S. Boyarinov, B. Eng, G. Jacobs)

Framework

- Everything in EPICS (R3.14.12.15)
- CS-Studio for user interface
- BEAST alarm system (databases+servers+clients)
- JLab's MYA Archiving

Components

- Software and Servers
- Detectors
 - HV, LV, Gas, Temperature, Chillers, Flashers
 - FADC/DISC Scalers
- Torus/Solenoid
 - Power Supplies, Vacuum, Cryo
- Beamlne
 - Motors, Harps, Møller Polarimeter
- Targets
 - Saclay Cryotarget
- Hall
 - Weather, Cameras
- DAQ
 - Crate monitoring/reset
 - Trigger rates, config, livetime, BTA

Hall-B Servers/PCs

Linux

- Hall-B Counting House
 - NetApp filesystem clonfs1 (/home, /usr/clas12, ...)
 - Rackmounted
 - SoftIOC EPICS servers (clonioc1-4)
 - Alarm server, Notifier, EPICS gateway (clondb3)
 - Multipurpose / Remote usage (clonsl1-3)
 - Higher performance DAQ machines (clondaq3-6)
 - PCs
 - Shifters' workstations (clonpc11-19)
 - Torus/Solenoid Commissioning workstations (clonpc20-22)
 - Dual monitor, future upgrade to 2x2
- Mya Archiver (ops)
- WebOPI/VDI VMs (IT)



Mac Minis (clonxt##)

- Clients only (e.g. web browser, ssh)
 - Recently upgraded to modern OSX
- Hall-B (Entrance, Forward Carriage (3), Pie Tower)
- EEL & Test Lab (various detector areas)



Windows PCs

- Saclay Target Workstations
 - Hardware upgraded by Saclay in 2015 (fanless)
 - 3rd floor Space Frame and one in Counting House
 - Directly connected to PLC via FIP network
 - For Target Experts

https://clasweb.jlab.org/wiki/index.php/Slow_Control_Computing_Resources

Software / IT

- All CLAS12 online software is version controlled in JLab's github @ `clas12-epics`, `clas12-plc`, `clas12-coda`...
- On Hall-B counting house machines, users operate from `/usr/clas12/release/pro`, a github hotfix build
- 64bit RHEL7 Operating Systems
 - One RHEL6 and one 32bit RHEL5 still lingering for safety, disappearing soon
- Server/workstation installs and configurations are deployed and managed with Puppet by JLab IT
- And monitored with Nagios by JLab IT
 - cpu/disk/memory usage
 - automatic emails on overuse
 - ensure certain software is running on particular machines
 - alarm server, notifier, gateway

JeffersonLab / <code>clas12-epics</code>	
Code	Issues 0 Pull requests 0 Wiki Pulse Graphs
Branch: <code>hotfix-v1.3.3</code>	clas12-epics / apps /
	This branch is 22 commits ahead of master.
 wmoore28	torus cryo: updated alarm configs for weekend run, set delays and SMS
	Latest commit <code>fc989f8</code> 3 days ago
..	
 A6551App	A6551.adl: dunno
 DVME628App	DVME628App: fixed implicit declarations
 XY240App	added XYCOM documentation
 XY560App	opi cleanup after color naming changes
 asymApp	asymApp: opi cleanup after color naming changes
 beam_stopperApp	stopper.opi: update
 bornApp	bornApp: removed macro in comment, it was creating warnings during loc...
 btaApp	bta, struckDaq: latest import from HPS
 c370App	c370App: playing with setup
 cRioApp	SVT gas alarms: added 5s delay for emails
 caenHvApp	caenHvApp: increase display precision to 3 on voltage setpoint
 cagwApp	cagwApp: added to read PVs off a CA gateway on another subnet
 casApp	move access control pv to hv app
 chillerApp	css: minor opi updates
 clasTreeApp	clasTreeApp: removed all example code
 classc1App	classc1App: added all required dbd's and lib's
 classc3App	documented more XY560 channels
 classc4App	Makefile cleanup/organization
 classc6App	classc6/B: latest import from HPS
 classc8App	classc6/B: latest import from HPS
 configure	wf2rootApp: added for converting waveforms to root trees
 dynabcApp	dynabcApp: updated opis
 fcup_gainApp	fcup_gainApp: cleaned up db's
 frwd_scalerApp	frwd_scalerApp: converted adl's to opis
 ftcFlasherApp	another flasher script
 fthDividerApp	Updates to clasTreeApp plus new apps genFlasherApp and fthDividerApp
	a month ago

“I/O” Hardware

- **VME Crates** (from CLAS6 slow controls: classc#)
 - vxWorks OS
 - OMS Stepper Motor controllers (harps, collimators)
 - Beamline Scalers (Jorger, Struck)
 - Old Magnets' PS (xycom) (HPS, Moller polarimeter)
 - Terminal servers for remote reset
 - Some decommissioning, moving apps to softioCs
- **VXS Crates** (DAQ: adcftof#, tdcecal#...)
 - Linux OS (currently centos5)
 - EPICS: temperature, fans, status, remote reboot, FADC/DISC scalers
- **XPS Motor Controllers** (harps, collimators)
- **CompactRIO** (Gas system)
- **Allen Bradley PLC** (SC Magnets)
- **GPIB-ETH converters** (DCLV)
- **MOXA serial-eth converters** (various, RS232/422/485)
- **Omega Digital Transmitters** (Thermocouples, RTDs)
- **Anova/Lauda Chillers**
- **Flasher Controllers** (CTOF, HTCC, FTC, FTH)
- **AKCP Weather Monitors**
- ...



HV/LV Hardware

HV

- CAEN SY1527/4527 (mfg's API)
 - CTOF, ECAL, FTC, FTT*, FTH*, FTOF, HTCC, LTCC, PCAL, Beamline (16)
 - Various Modules
 - A few board failures
- CAEN 527 (CANBUS)
 - DC (4), CND* (1)
- MPOD (snmp)
 - SVT, MicroMegas*

LV

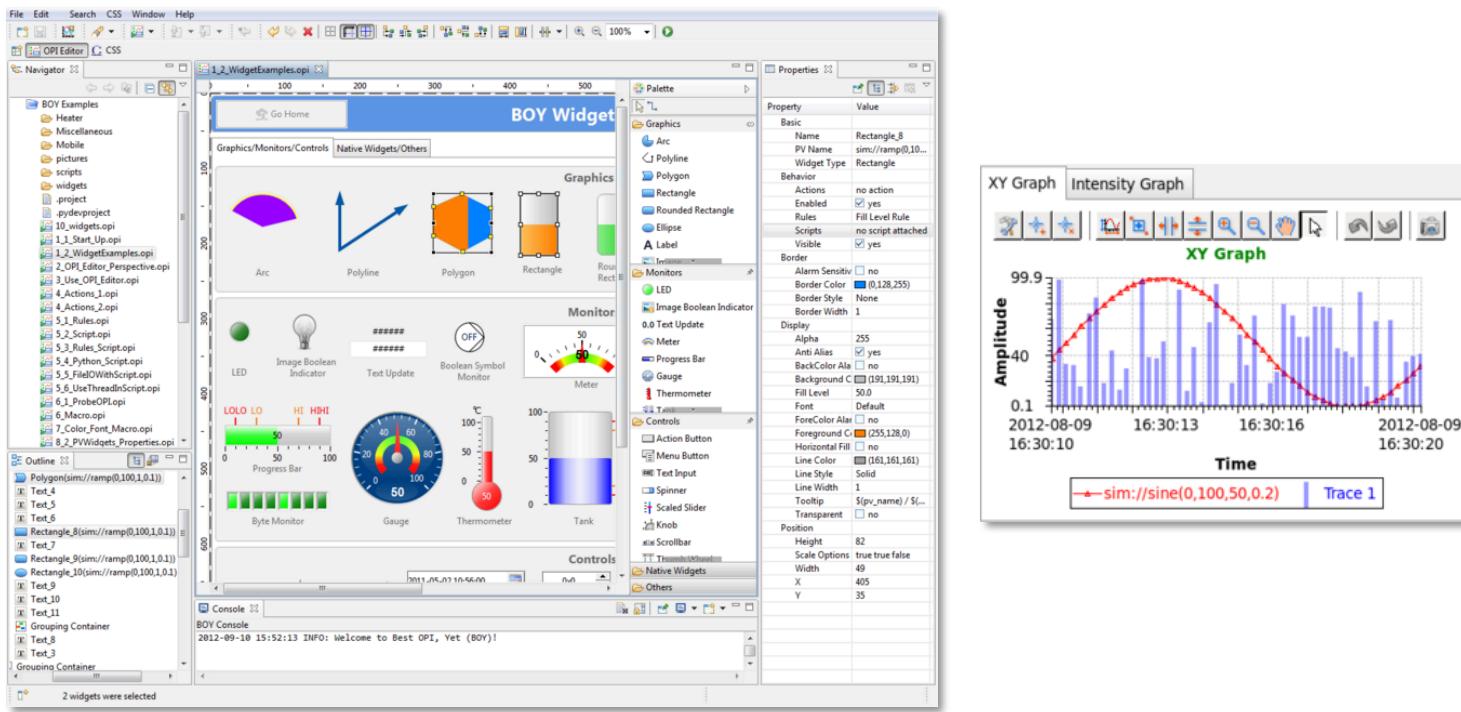
- CAEN SY2604 (asyn)
 - HTCC (CCoils)
- MPOD (snmp)
 - CTOF (CCoils)*
 - SVT
 - MicroMegas*
 - FTC



* = still needs work

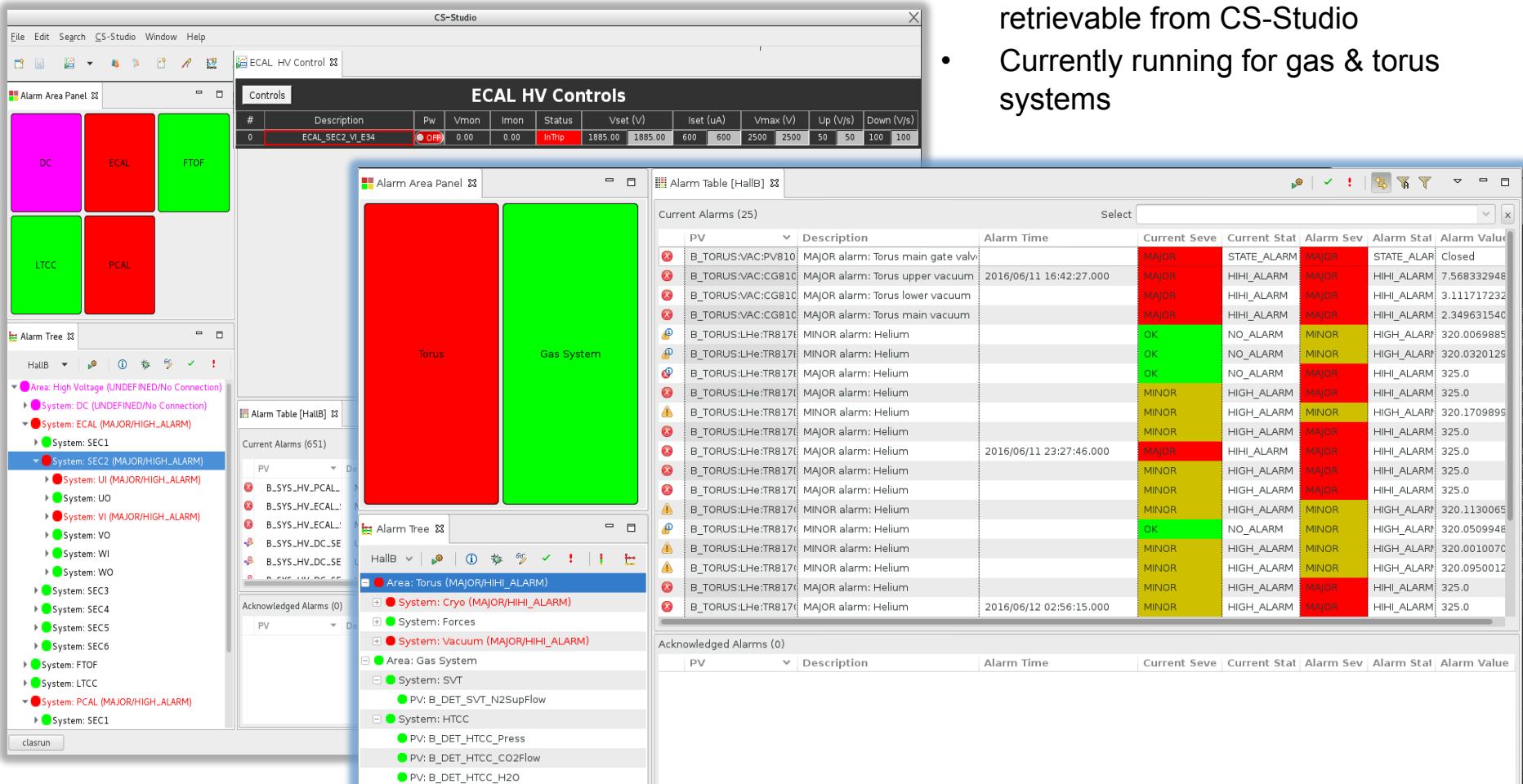
CS-Studio

- More powerful / flexible than medm or edm
 - Allows a more unified user-interface, faster development
- Java Eclipse based (linux/mac/windows)
- Used by **Hall-D**, and SNS, BNL, FRIB, DESY, ITER, ...
- Built in alarm handler, data browser, and much more



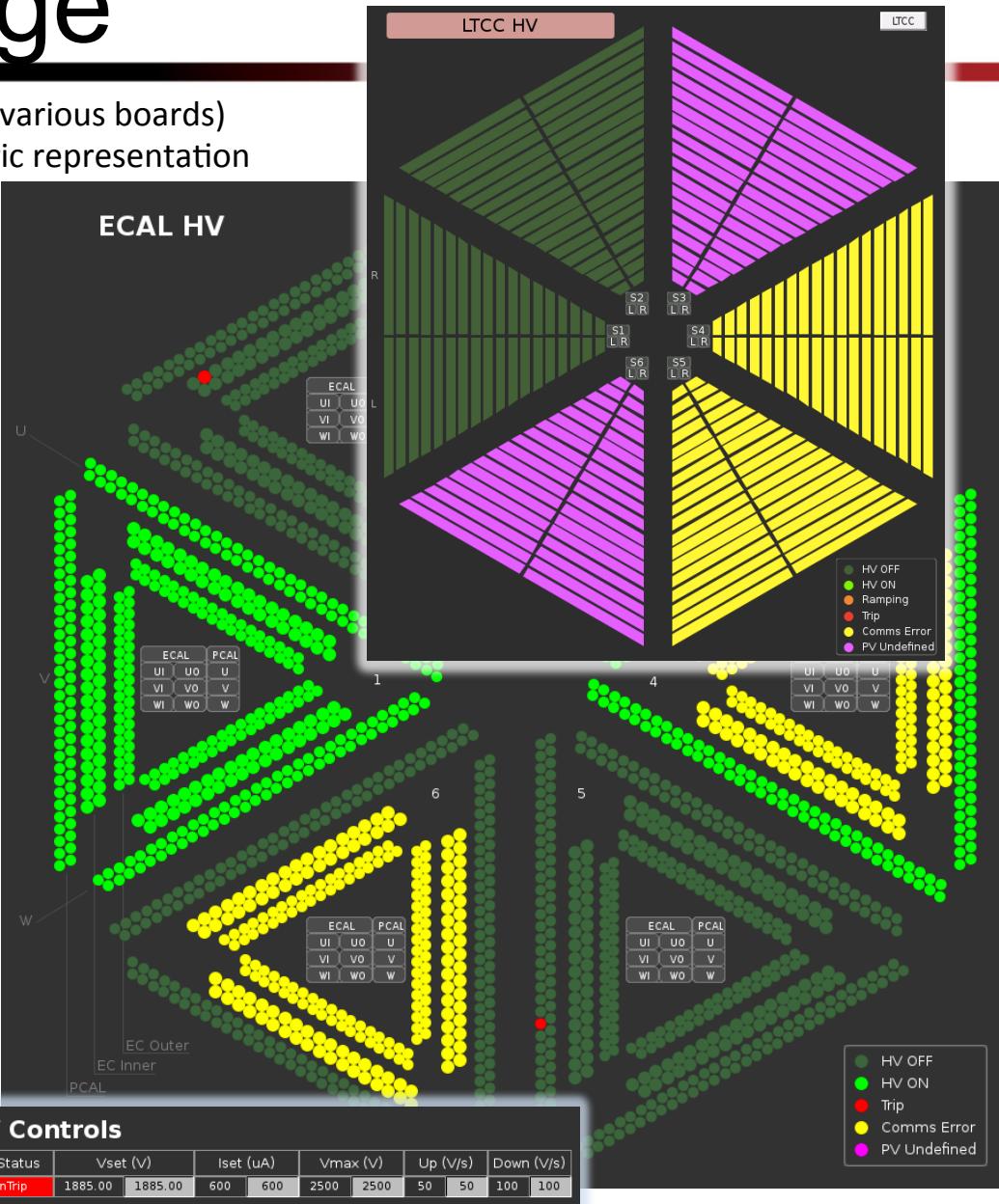
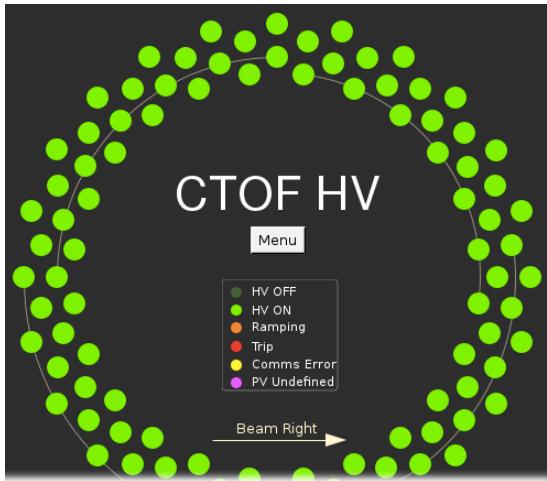
BEAST Alarm System

- Alarm, Notifier, Messaging servers and associated databases
 - Running on clondb3
 - Notifications (automatic emails) happen on server
- Client Alarm Handler and “Annunciator”
 - Audible/Visible alarms built into CS-Studio
- Alarms history logged to database & retrievable from CS-Studio
- Currently running for gas & torus systems



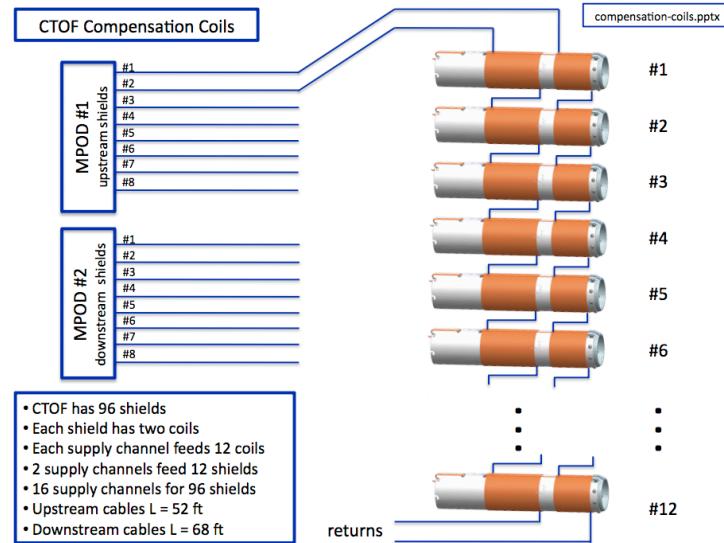
High Voltage

- All CAEN hardware (SY4527/1527/527 mainframes, various boards)
- GUIs for easy status viewing, global on/off, geometric representation
- Easy access to single channel and regional controls



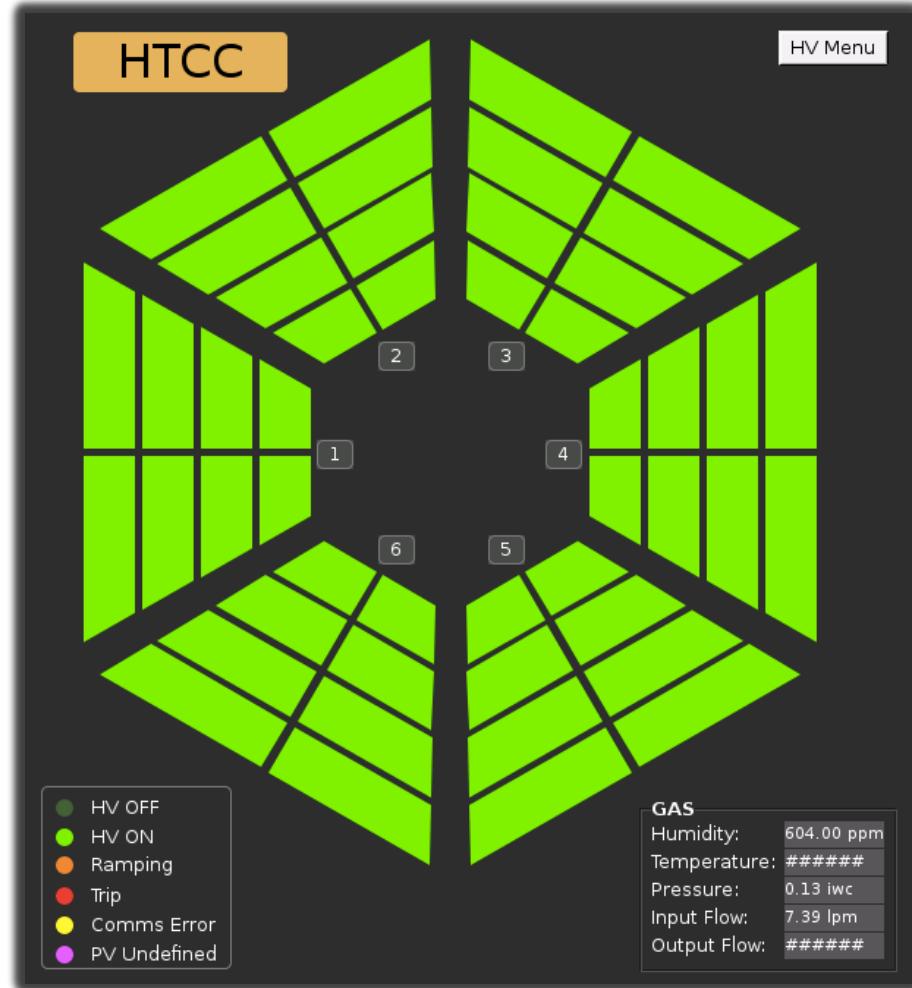
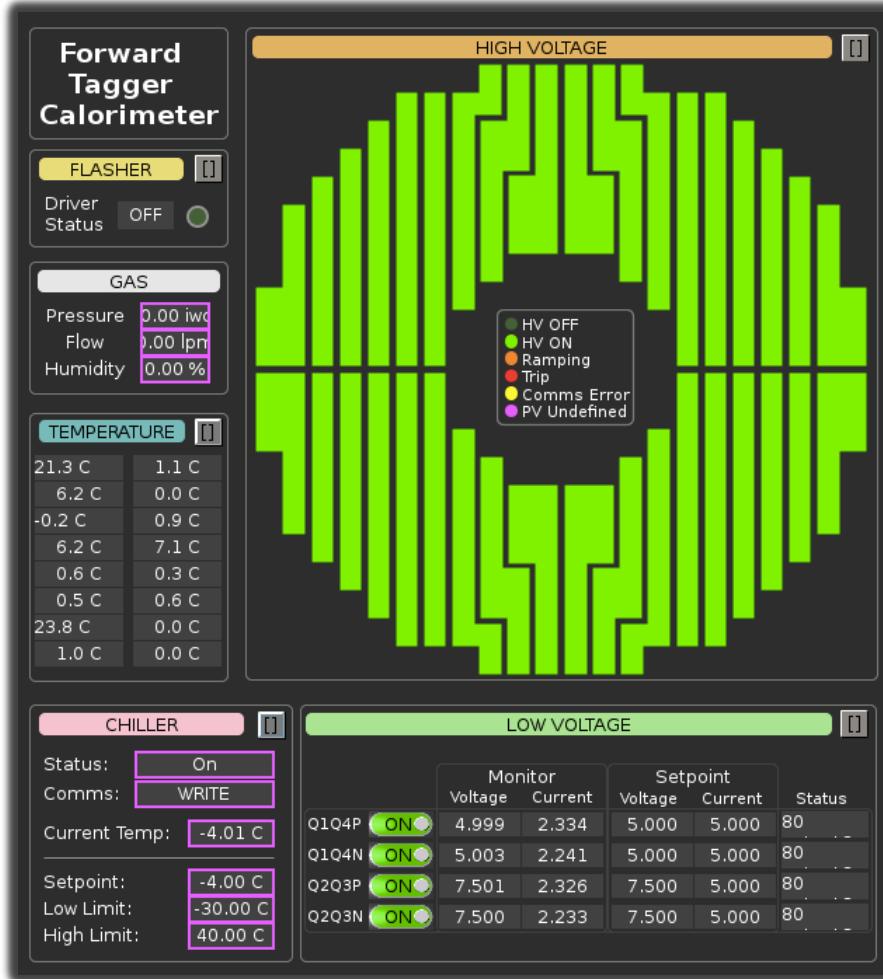
Low Voltage

- EPICS & GUI support for DC and HTCC LV ready
 - Aglient 6551 / CAEN SY2604
 - Add CTOF and MMs soon



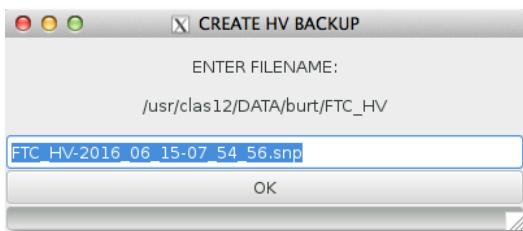
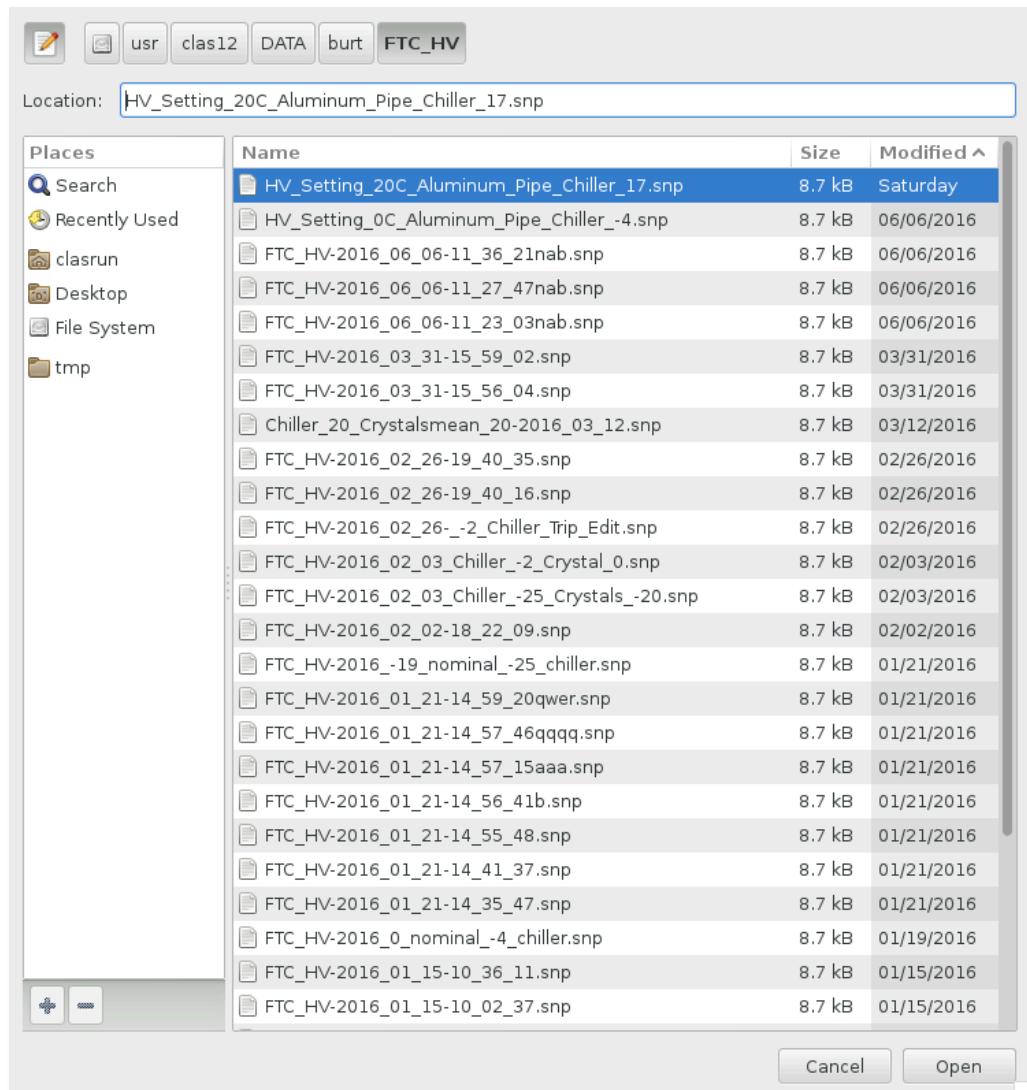
Detector Overview Screens

- At request of detector groups
- Combined HV, LV, Temp, Gas, Chillers, etc...
- Access to expert screens for each subsystem

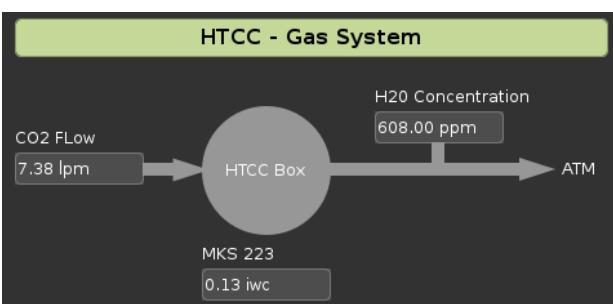
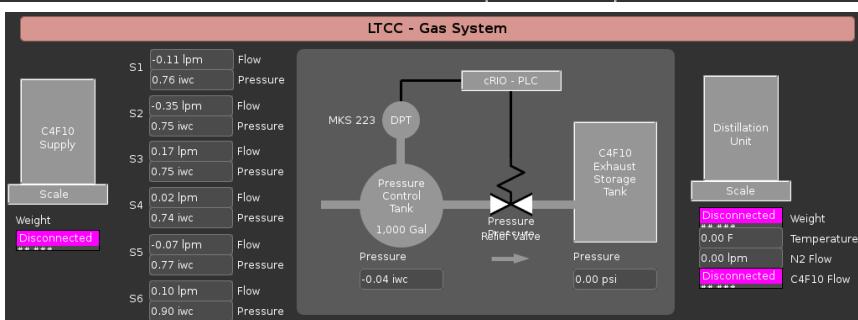
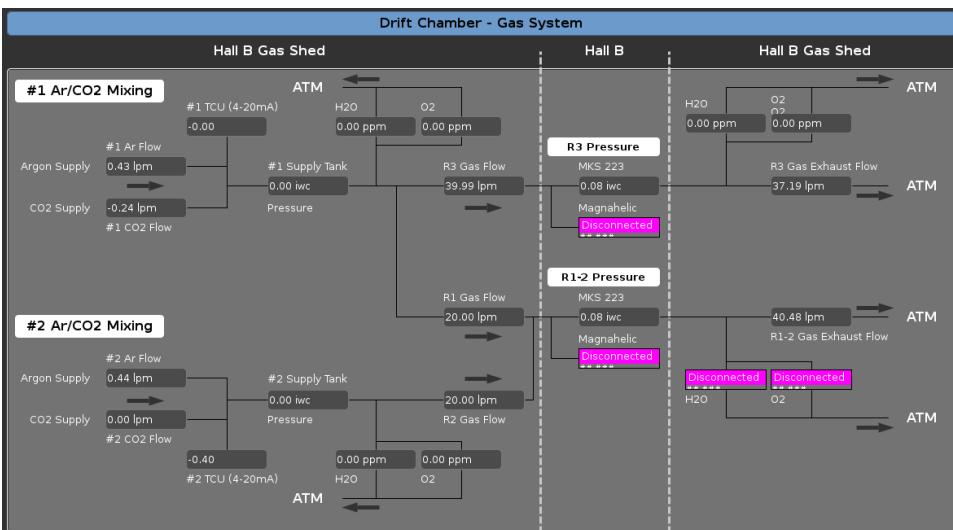


Save/Restore Settings

- Accessible from detector's screens
- Setup for most detectors' HV/LV setpoints
 - voltage, current limits, trip time, and ramp rates
- Same old “burt backup” software
 - reads/writes 1000s of PVs in seconds
 - stored in ascii files on clonfs1 (fully backed up)
 - time-stamped filenames
 - just new interface



Gas System



- CompactRIO pushes to EPICS softIOC
- EPICS integration mostly complete
 - a few already alarms in use (HTCC, SVT)
- Bubbler cameras delivered, to be installed

Hall B Gas System EPICS Process Variables									
Detector/System	Signal Name	Location	Units	Nominal Value	EPICSA farm	Alarms HI	Alarms LO		
Drift Chambers	DC_1_Mix_Ar_Flow	Gas Shed	slm	5-250	SGL	B_DET_DC_1_ArFlow	1		
	DC_1_Mix_Ar_Flow_Setpoint	Gas Shed	slm	5-250	SGL	B_DET_DC_1_ArFlowSet	2		
	DC_1_Mix_CO2_Flow	Gas Shed	slm	0.55-27.5	SGL	B_DET_DC_1_CO2Flow	3		
	DC_1_Mix_CO2_Flow_Setpoint	Gas Shed	slm	0.55-27.5	SGL	B_DET_DC_1_CO2FlowSet	4		
	DC_2_Mix_Ar_Flow	Gas Shed	slm	5-250	SGL	B_DET_DC_2_ArFlow	5		
	DC_2_Mix_Ar_Flow_Setpoint	Gas Shed	slm	5-250	SGL	B_DET_DC_2_ArFlowSet	6		
	DC_2_Mix_CO2_Flow	Gas Shed	slm	0.55-27.5	SGL	B_DET_DC_2_CO2Flow	7		
	DC_2_Mix_CO2_Flow_Setpoint	Gas Shed	slm	0.55-27.5	SGL	B_DET_DC_2_CO2FlowSet	8		
	DC_R1_Gas_Supply_Flow	Gas Shed	slm	12-80	X	90	12		
	DC_R1_Gas_Supply_Flow_Setpoint	Gas Shed	slm	12-80	SGL	B_DET_DC_R1_SupFlow	9		
	DC_R2_Gas_Supply_Flow	Gas Shed	slm	36-200	X	220	36		
	DC_R2_Gas_Supply_Flow_Setpoint	Gas Shed	slm	36-200	SGL	B_DET_DC_R2_SupFlow	10		
	DC_R3_Gas_Supply_Flow	Gas Shed	slm	24-160	X	370	24		
	DC_R3_Gas_Supply_Flow_Setpoint	Gas Shed	slm	24-160	SGL	B_DET_DC_R3_SupFlow	11		
	DC_Mix_H2O	Gas Shed	ppm	10	X	50	SGL		
	DC_R1-R2_Return_H2O	Gas Shed	ppm	50	X	100	SGL		
	DC_R3_Return_H2O	Gas Shed	ppm	50	X	100	SGL		
	DC_Mix_O2	Gas Shed	ppm	10	X	25	SGL		
	DC_R1-R2_Return_O2	Gas Shed	ppm	5	X	25	SGL		
	DC_R3_Return_O2	Gas Shed	ppm	5	X	25	SGL		
	DC_1_Pressure	Space Frame	"wc		SGL	B_DET_DC_1_Press	21		
	DC_2_Pressure	Space Frame	"wc		SGL	B_DET_DC_2_Press	22		
	DC_R1-2_Control_Press	Space Frame	"wc	0.05	X	0.1	0.025		
	DC_R3_Control_Press	Space Frame	"wc	0.05	X	0.1	0.025		
	DC_R1-2_GAS_Return_Flow	Gas Shed	slp		SGL	B_DET_DC_R1_RetFlow	25		
	DC_R3_GAS_Return_Flow	Gas Shed	slp		SGL	B_DET_DC_R3_RetFlow	26		
	DC_1_Gas_TC	?			X				
	DC_2_Gas_TC	?			X				
	DC_R1-2_Press	"wc	0.05	X	0.1	0.025	SGL		
	DC_R3_Press	"wc	0.05	X	0.1	0.025	SGL		
LTCC	LTCC_S1_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S1_Flow	31		
	LTCC_S1_Flow_Setpoint	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S1_FlowSet	32		
	LTCC_S2_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S2_Flow	33		
	LTCC_S2_Flow_Setpoint	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S2_FlowSet	34		
	LTCC_S3_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S3_Flow	35		
	LTCC_S3_Flow_Setpoint	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S3_FlowSet	36		
	LTCC_S4_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S4_Flow	37		
	LTCC_S4_Flow_Setpoint	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S4_FlowSet	38		
	LTCC_S5_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S5_Flow	39		
	LTCC_S5_Flow_Setpoint	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S5_FlowSet	40		
	LTCC_S6_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S6_Flow	41		
	LTCC_S6_Flow_Setpoint	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_S6_FlowSet	42		
	LTCC_Dist_Supply_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_Dist_SupFlow	43		
	LTCC_Dist_N2_Flow	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_Dist_N2Flow	45		
	LTCC_Dist_N2_Flow_Setpoint	Forward Carriage	slm	0-5	SGL	B_DET_LTCC_Dist_N2FlowSet	46		
	LTCC_Control_Tank_Press	Forward Carriage	"wc	0.1-2	X	2	0.025		
	LTCC_S1_Press	Forward Carriage	"wc	0.1-2	X	2	0.025		
	LTCC_S2_Press	Forward Carriage	"wc	0.1-2	X	2	0.025		
	LTCC_S3_Press	Forward Carriage	"wc	0.1-2	X	2	0.025		
	LTCC_S4_Press	Forward Carriage	"wc	0.1-2	X	2	0.025		
	LTCC_S5_Press	Forward Carriage	"wc	0.1-2	X	2	0.025		
	LTCC_S6_Press	Forward Carriage	"wc	0.1-2	X	2	0.025		
	LTCC_Dist_Temp	Forward Carriage	deg F	-40 to -10	X	-10	-40		
	LTCC_Return_Tank_Press	Forward Carriage	psig	<25	X	20	SGL		
HTCC	HTCC_CO2_Supply_Flow	Space Frame	slm	1-50	X				
	HTCC_CO2_Supply_Flow_Setpoint	Space Frame	slm		N/A	SGL	B_DET_HTC_Co2SupFlowSet		
	HTCC_ppm_H2O	Space Frame	ppm	50	X	50	SGL	B_DET_HTC_H2O	
	HTCC_ppm_O2	Space Frame	ppm	200	X	200	SGL	B_DET_HTC_O2	
	HTCC_Press	Space Frame	"wc	>0.025<0.1	X	0.1	SGL	B_DET_HTC_Press	
SVT	SVT_N2_Supply_Flow	Space Frame	slm	>1<50	X	<1	SGL	B_DET_SVT_N2SupFlow	
	SVT_N2_Supply_Flow_Setpoint	Space Frame	slm		N/A	SGL	B_DET_SVT_N2SupFlowSet		
RICH	Rich_1_N2_Flow	Space Frame	slm	>1<5	X	5	1	SGL	B_DET_RICH_1_N2Flow
	Rich_2_N2_Flow	Space Frame	slm	>1<5	X	5	1	SGL	B_DET_RICH_2_N2Flow
Forward Tagger Calorimeter	FTC_N2_Flow	Space Frame	slm		X			SGL	B_DET_FTC_N2Flow
	FTC_Pressure	Space Frame	"wc		X			SGL	B_DET_FTC_Press
	FTC_Humidity	Space Frame	%RH		X			SGL	B_DET_FTC_Humidity

Torus Power Supply

Allen-Bradley PLCs, interfaced with EPICS EtherIP driver. EPICS support and GUIs implemented and tested, according to DSG specs. Alarms in progress.

Torus MPS Control

Turn ON MPS

Status Rdbk	OFF
DAQ Rec.	WRITING

Status Bits

MPS On	Reg Module
Polarity (+)	Pre-Regulator
Polarity (-)	Phase
Reg Transformer	MPS Waterflow
DAC16	Leakage
DAC17	Overtemperature
Unit in %	Door
Fast Dump	Magnet Water
Transistor	Slow Dump
SUM Intlock	MPS Ready
Overcurrent	n/c
DC Overload	n/c

Current (MPS): 0.08 A
Current (ZFC1): 0.00 A
Voltage: 0.18 V
Polarity: POSITIVE

Local/Remote: Set to Remote | LOCAL

Fast Dump
Reset Interlocks
Reset COMM

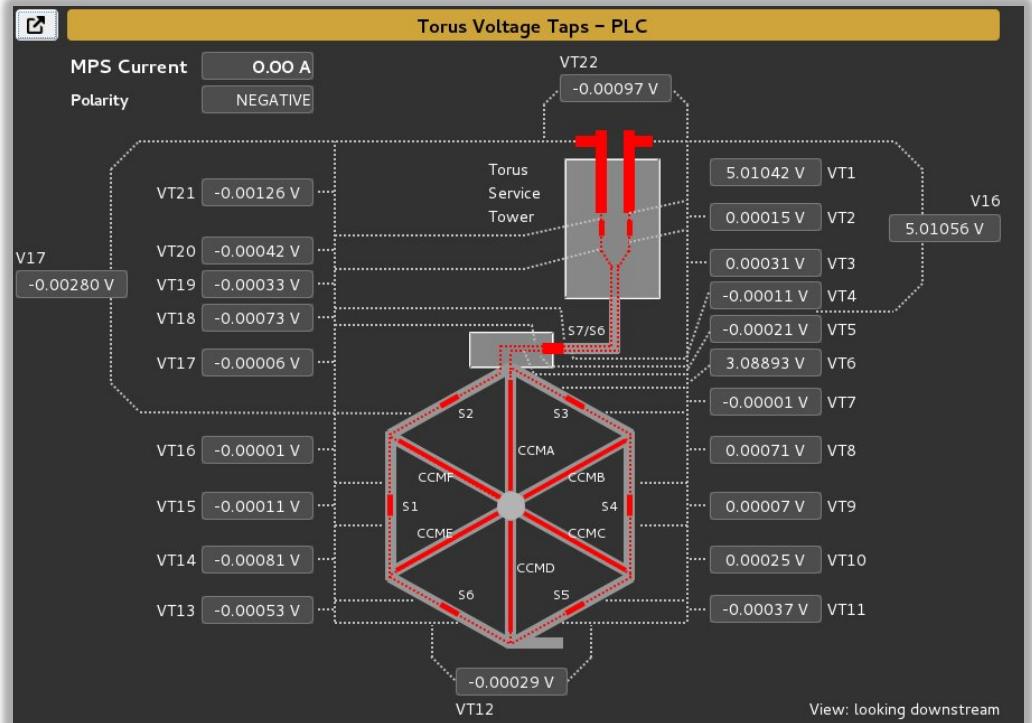
Torus Fast DAQ - ROOT File

Recording Status: WRITING

Directory Name: /usr/clas12/DATA/wf2root/
File Name: torus_20160414_095554.root
File Size (bytes): 2.827E8 | **Limit**: 2.000E9
File Progress (%): 14.13

Note: data is buffered before writing to disk, so file size may be static for periods of time.

ID	User defined datatype	EPICS Current EPICS IV	Tag	Torus_MPS MPS	EPICS EXPERT	EPICS OPERATOR	NOTES	
1	Torus_MPS.Commands	<not implemented>	MPS_O[64]	Array of commands sent to MPS	Y	N	This table should be on a separate screen for MPS Commands	
34	Torus_MPS.Command	<not implemented>	STRING[64]	Array to hold return data from each command	N	N		
35	Torus_MPS.Man_Cmd	output	SPIIManCmd	String placeholder for a manual command from the operator	Y	N		
36	Torus_MPS.Man_Values	input	SPIIManCmdResp	String placeholder for the response to the Manual Command	Y	N		
37	Torus_MPS.ADC_Values	<not implemented>	REAL[32]	Placeholder for the response to the ADC readback values after scaling	Y	N		
70	Torus_MPS.ADC_ScaleFactor	input	SPIIADCScale	DINT[32]	Array to hold the ADC scale factor for converting ADC values to REALS	Y	N	
71	Torus_MPS.Slew_Rate	output	SPIISlew	DOUBLE	Slew rate setting from operator HMI	Y	N	
104	Torus_MPS_fromHMI	output	SPIIMsW	REAL	Current setting from operator HMI	Y	Y	
105	Torus_MPS_fromMPS	input	SPIIMPs	REAL	Current readback from MPS	Y	Y	
106	Torus_MPS_.fromZFC1	input	SPIIZFC1	REAL	Current readback from ZFC1	Y	Y	
107	Torus_MPS_Setting	input	SPIISetpoint	REAL	Current setting from the MPS	Y	Y	
108	Torus_MPS_Capacity	input	SPIIMsCap	REAL	Maximum capacity that can be supplied by the MPS	Y	N	
109	Torus_MPS_Status	input	SPIIMsSt	DINT	User set current limit (in Amps)	Y	Y	
110	Torus_MPS.Max_Current_Soft	input	SPIIMsXW	REAL	User set current limit (in mA/s)	Y	N	
111	Torus_MPS.Status1_BOOLS	input	SPIISStatus1	BOOL[32]	MPS Status as BOOL Array	-	-	
144	Torus_MPS_Status1_1st_BOOLS	input	SPIISStatus1_1st	BOOL[32]	MPS Status 1st trip as BOOL Array	-	-	
210	Torus_MPS.Active_Tags	input	SPIIACTiveTags	BOOL[64]	Tags to determine if the command is active or not	Y	N	
210	Torus_MPS.CMD_Sent	<not implemented>	BOOL	A command has been sent	N	N		
211	Torus_MPS.RX	<not implemented>	BOOL	Received Data	N	N		
212	Torus_MPS.CommError	input	SPIICommError	BOOL	There is a communications Error	Y	Y	
213	Torus_MPS.Reset_sw	output	SPIICommReset	BOOL	Reset MPS Communications	Y	N	
214	Torus_MPS.Initialized	<not implemented>	BOOL	SPEC initialization complete	N	N		
215	Torus_MPS.LocalFlag	input	SPIIMode	BOOL	'ON' if MPS is in LOCAL, 'OFF' if in REMOTE	Y	Y	
216	Torus_MPS.Polarity	input	SPIIPolarity	BOOL	'ON' if polarity is positive, 'OFF' if negative	Y	Y	
217	Torus_MPS.Contactor_SW	output	SPIIOnOffs	BOOL	Switch from operator to turn on the main contactor	Y	Y	
218	Torus_MPS.LocalRemote_SW	output	SPIIModeSet	BOOL	Switch from operator to switch between Local/Remote	Y	N	
219	Torus_MPS.RemoteHead_SW	output	SPIIPrintReset	BOOL	Switch from operator to reset interlocks	Y	N	
220	Torus_MPS.V_fromMPS	input	SPIIV					

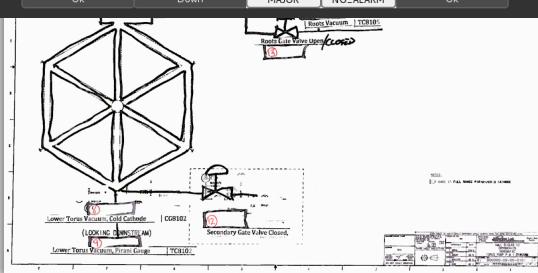


Torus Vacuum

Allen-Bradley → EPICS EtherIP and GUI support implemented and tested, according to DSG specs. Alarms running and in use.

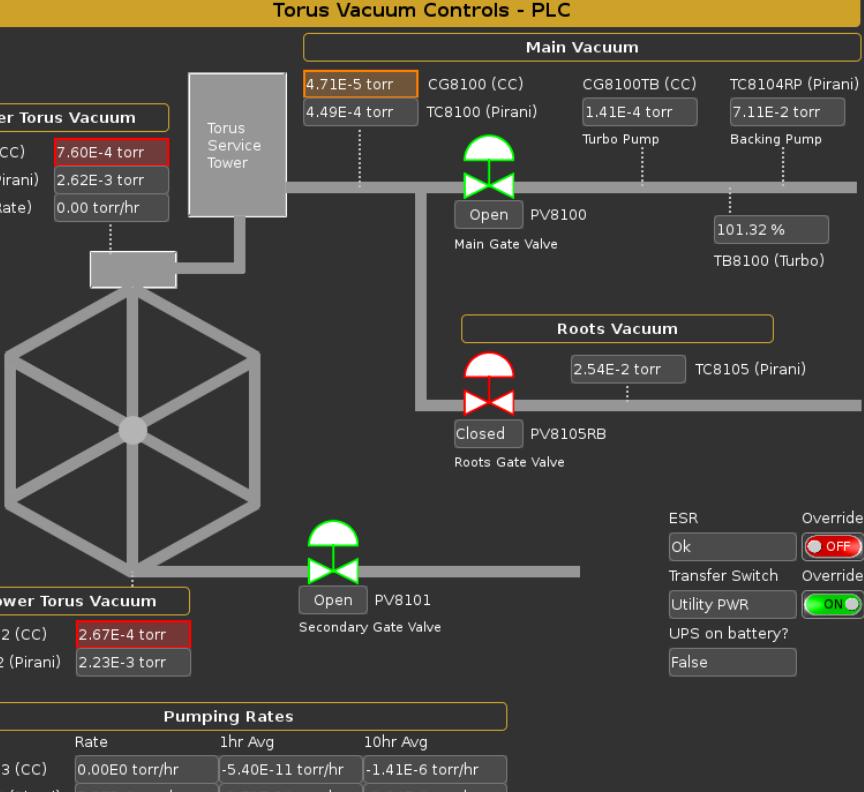
Torus Vacuum - EPICS Alarm Settings

Upper Torus Vacuum									
DESC	VALUE	LOLO	LOW	HIGH	HIHI	LLSV	LSV	HSV	HHSV
CG8103	6.90E-4 torr	1.00E-10 torr	1.00E10 torr	3.00E-5 torr	2.00E-4 torr	INVALID	NO_ALARM	MINOR	MAJOR
CG8103_RATE	0.00E0 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
CG8103_AVG1HR	1.60E-6 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
CG8103_AVG10HR	2.34E-6 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	0.00E0 torr/hr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
TCB103	2.50E-3 torr	5.00E-4 torr	5.00E-4 torr	1.00E2 torr	1.00E3 torr	NO_ALARM	NO_ALARM	MINOR	MAJOR
TCB103_RATE	-0.00 torr/hr	0.00 torr/hr	0.00 torr/hr	55.00 torr/hr	75.00 torr/hr	NO_ALARM	NO_ALARM	MINOR	MAJOR
TCB103_AVG1HR	0.00 torr/hr	0.00 torr/hr	0.00 torr/hr	0.00 torr/hr	0.00 torr/hr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
TCB103_AVG10HR	0.00 torr/hr	0.00 torr/hr	0.00 torr/hr	0.00 torr/hr	0.00 torr/hr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
Lower Torus Vacuum									
DESC	VALUE	LOLO	LOW	HIGH	HIHI	LLSV	LSV	HSV	HHSV
CG8102	2.05E-4 torr	1.00E-10 torr	1.00E-10 torr	5.00E-5 torr	2.00E-4 torr	INVALID	NO_ALARM	MINOR	MAJOR
TC8102	1.88E-3 torr	5.00E-4 torr	5.00E-4 torr	5.00E-5 torr	1.00E3 torr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
Main Vacuum									
DESC	VALUE	LOLO	LOW	HIGH	HIHI	LLSV	LSV	HSV	HHSV
CG8100	4.62E-5 torr	1.00E-10 torr	1.00E-10 torr	3.00E-5 torr	2.00E-4 torr	INVALID	NO_ALARM	MINOR	MAJOR
TC8100	4.58E-4 torr	5.00E-4 torr	5.00E-4 torr	5.00E2 torr	1.00E3 torr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
CG8100TB	1.13E-4 torr	1.00E-10 torr	1.00E-10 torr	3.00E-5 torr	2.00E-4 torr	INVALID	NO_ALARM	NO_ALARM	NO_ALARM
TC8104RP	6.97E-2 torr	5.00E-4 torr	5.00E-4 torr	5.00E2 torr	1.00E3 torr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
TB8100	101.31 %	80.00 %	90.00 %	0.00 %	0.00 %	MAJOR	MINOR	NO_ALARM	NO_ALARM
Roots Vacuum									
DESC	VALUE	LOLO	LOW	HIGH	HIHI	LLSV	LSV	HSV	HHSV
TC8105	1.58E-2 torr	5.00E-4 torr	5.00E-4 torr	5.00E2 torr	1.00E3 torr	NO_ALARM	NO_ALARM	NO_ALARM	NO_ALARM
Valves									
DESC	VALUE	ZNAM	ZSV	OSV	ONAM				
PV8100	Open	Closed	MAJOR	NO_ALARM	Open				
PV8101	Open	Closed	NO_ALARM	NO_ALARM	Open				
PV8105RB	Closed	Closed	NO_ALARM	MAJOR	Open				
Misc.									
DESC	VALUE	ZNAM	ZSV	OSV	ONAM				
UPS On Battery	False	False	NO_ALARM	MAJOR	True				
ESR	Ok	Down	MAJOR	NO_ALARM	Ok				



EPICS VACUUM SCREEN								
ID numbers correspond to circled ID numbers on .pdf of the same name.								
ID	PLC Tag	Current EPICS PV	Datatype	UNITS	Description	EPICS EXPERT	EPICS OPERATOR	NOTES
1	CG8103	TORUS\VAC\CG8103	REAL	Torr	Upper Torus Vacuum Cold Cathode	Y	Y	
2	TCB103	TORUS\VACT\TCB103	REAL	Torr	Upper Torus Vacuum Pirani	Y	Y	
3	CG8100	TORUS\VAC\CG8100	REAL	Torr	Main Vacuum Cold Cathode	Y	Y	
4	TCB100	TORUS\VACT\TCB100	REAL	Torr	Main Vacuum Pirani	Y	Y	
5	CG8100TB	TORUS\VAC\CG8100TB	REAL	Torr	Main Turbo Vacuum	Y	Y	
6	TC8104RP	TORUS\VACT\TC8104RP	REAL	Torr	Main Backing Pump Vacuum	Y	Y	
7	TCB105	TORUS\VACT\TCB105	REAL	Torr	Roots Vacuum	Y	Y	
8	CG8102	TORUS\VAC\CG8102	REAL	Torr	Lower Torus Vacuum Cold Cathode	Y	Y	
9	TCB102	TORUS\VACT\TCB102	REAL	Torr	Lower Torus Vacuum Pirani	Y	Y	
10	PV8100	TORUS\VAC\PV8100	BOOL	%	Main Turbo Pump Speed	Y	Y	
11	PV8101	TORUS\VAC\PV8101	BOOL	-	Main Gate Valve	Y	Y	OPEN IF TRUE
12	PV8101	TORUS\VAC\PV8101	BOOL	-	Secondary Gate Valve	Y	Y	OPEN IF TRUE
13	PV8105RB	TORUS\VAC\PV8105RB	BOOL	-	Roots Gate Valve	Y	Y	OPEN IF TRUE
14	VacChassis_OnBatt	TORUS\VAC\OnBatt	BOOL	-	UPS on battery power	Y	Y	FALSE IF UPS switches to batte

Torus Vacuum Controls - PLC

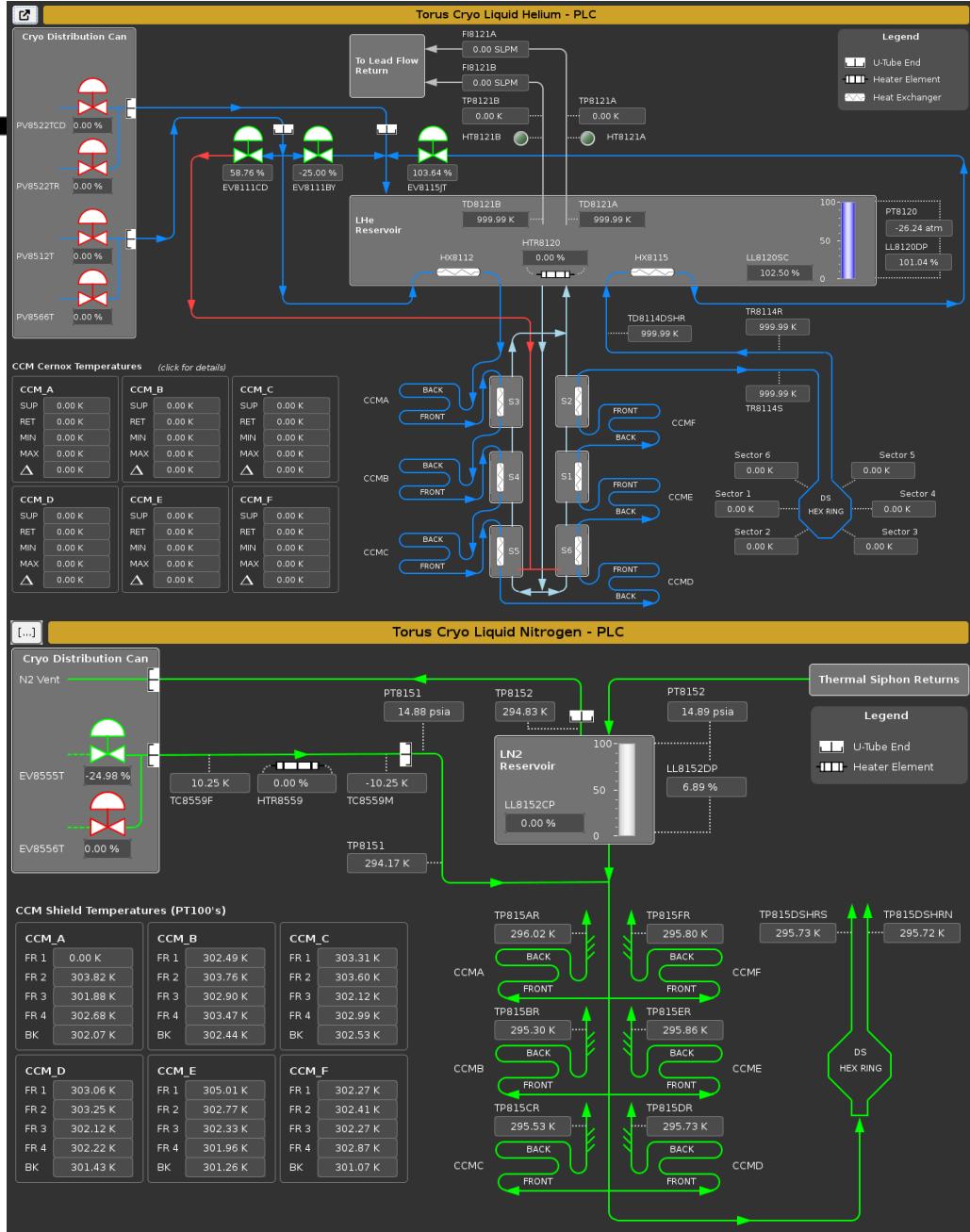
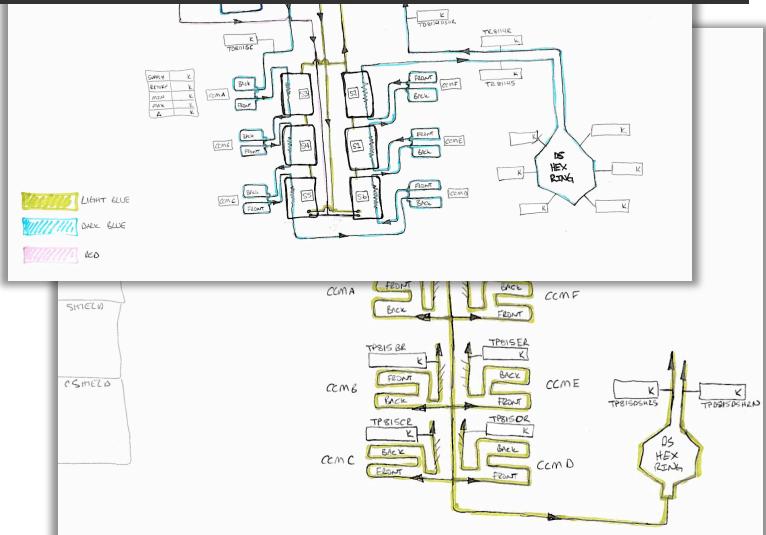
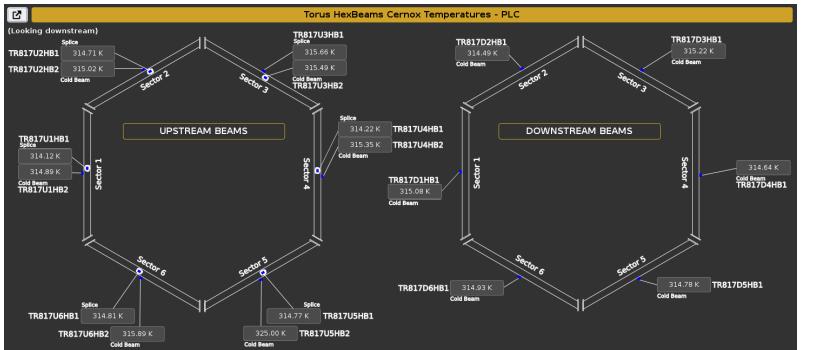


Main Vacuum		
4.71E-5 torr	CG8100 (CC)	CG8100TB (CC)
4.49E-4 torr	TC8100 (Pirani)	TC8102 (Pirani)
1.41E-4 torr	Turbo Pump	7.11E-2 torr
101.32 %	Backing Pump	
101.32 %	Main Gate Valve	TB8100 (Turbo)
Roots Vacuum		
2.54E-2 torr	TC8105 (Pirani)	
Closed	PV8105RB	Roots Gate Valve
ESR	Override	
Ok	OFF	
Transfer Switch	Override	
Utility PWR	ON	
UPS on battery?	False	

Lower Torus Vacuum			
2.67E-4 torr	Open	PV8101	
2.23E-3 torr	Secondary Gate Valve		
Pumping Rates			
Rate	1hr Avg	10hr Avg	
CG8103 (CC)	0.00E0 torr/hr	-5.40E-11 torr/hr	-1.41E-6 torr/hr
TC8103 (Pirani)	7.27E-4 torr/hr	-2.79E-10 torr/hr	-3.04E-6 torr/hr

Torus Cryo

Allen-Bradley → EPICS and GUI support implemented, according to expert specs.
Alarms implemented & running.

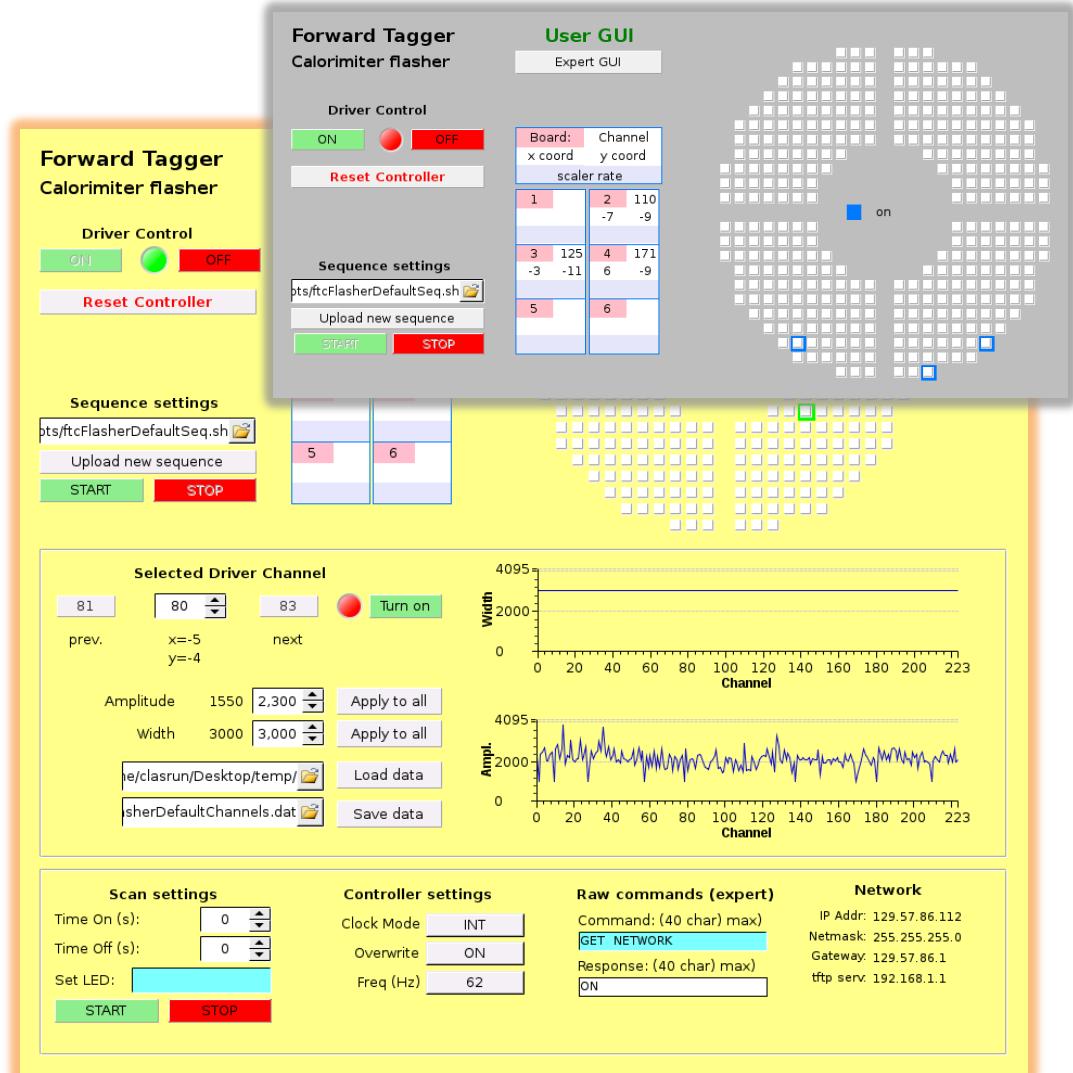


Flashers

- EPICS Support Complete
 - JLab Flasher VME board
 - HTCC, CTOF
 - INFN standalone Flasher
 - FTC

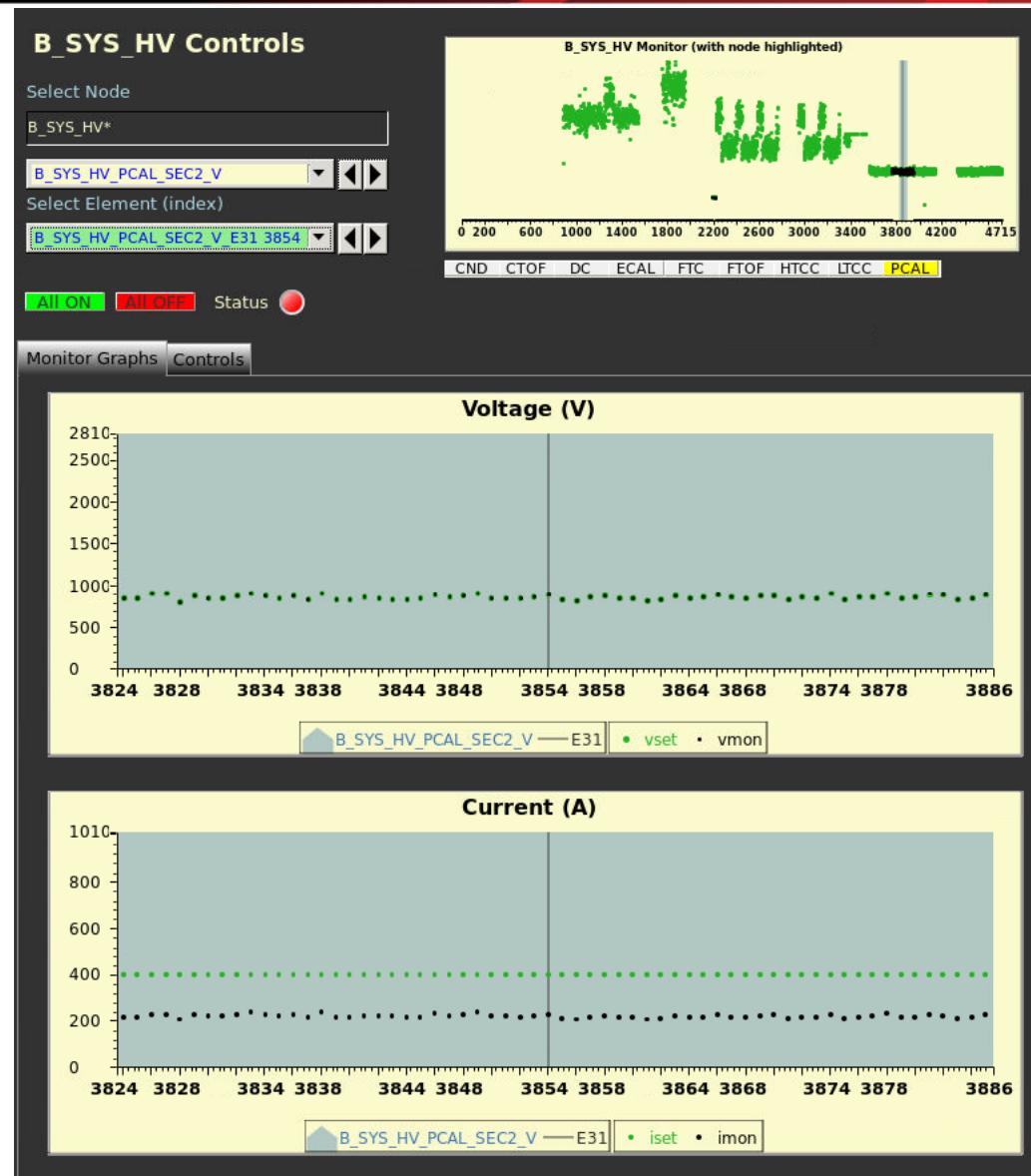
B_DET_HTCC_FLASHER

Pulser 1		Pulser 2			
Voltages OFF Set (V) Rbk (V)		Voltages OFF Set (V) Rbk (V)			
V1	3.126	0.000	V1	3.126	3.738
V2	3.126	3.738	V2	3.126	3.760
VLED	3.126	4.688	VLED	3.126	4.438
Trigger ON Trig mode INT		Trigger OFF Trig mode INT			
0 Freq Hz 0		0 Freq Hz 0			
Module / IOC Config					
<input type="button" value="Load settings"/>		<input type="button" value="Expert GUI"/>			
<input type="button" value="Save settings"/>		<input type="button" value="IOC SysReset"/>			



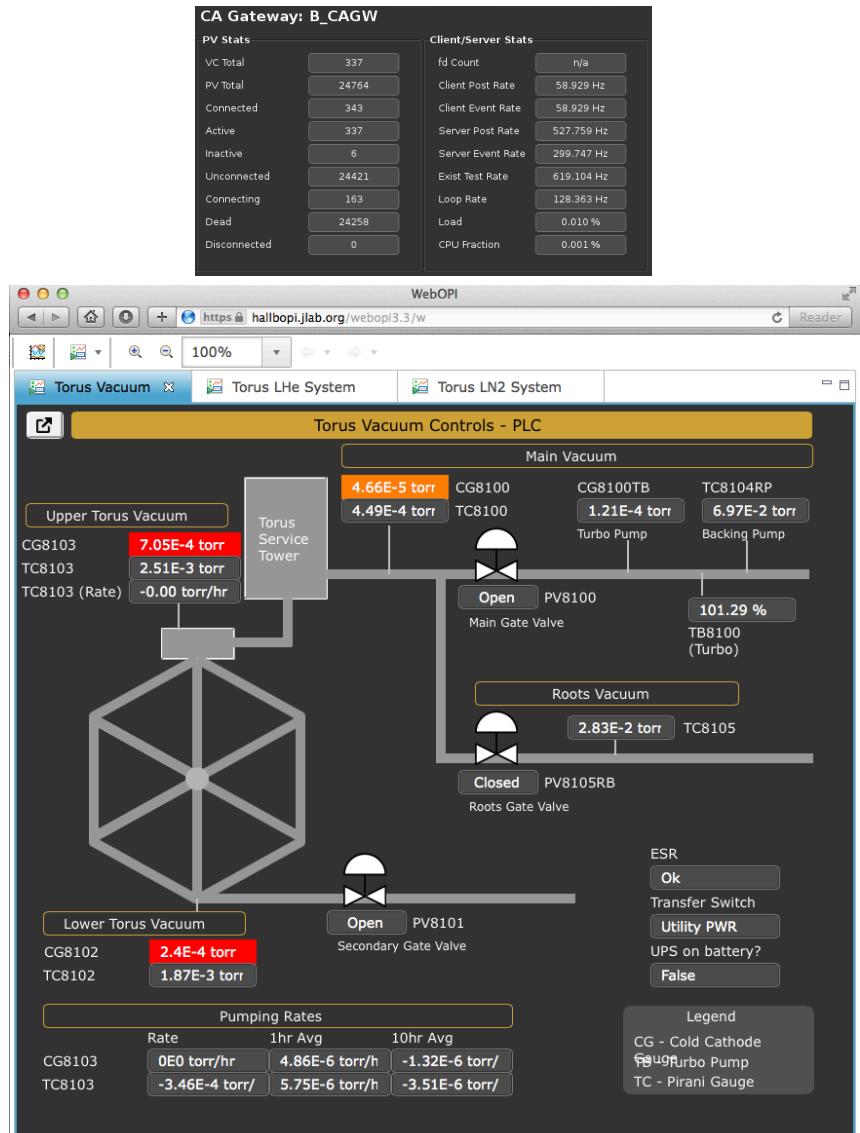
Tree/Search View

- Navigate through entire system
 - by detector/sector hierarchy
 - *with wildcard search*
- Automatic graph generation
 - currently focus on HV Current/Voltage
 - JLab scalers to be added soon
 - supplied by
 - python softIOC to generate EPICS waveform
 - CS-Studio Data Browser



Remote Monitoring

- Experimental operations must be read-only unless 2-factor authentication
 - Hall-B read-only EPICS channel access gateway up and running on clondb3
- Exploring web browser access
 - Without a terminal, ssh, X-forwarding
 - WebOPI will be useful for basic read-only monitoring
 - e.g. system overviews
 - Runs same GUI screens written for CS-Studio
 - <https://hallbopi.jlab.org>
 - 8 cores and 8 GB RAM, part of JLab's VM pool
 - Scalability concerns (cpu, but memory footprint seems stable)
 - And VDI, which can provide full software tools, and write-access with 2-factor authentication
- Lack of Mya archive access from CS-Studio
 - MyaViewer and associated command line tools are currently the only option
 - not “easy” from offsite
 - Considering
 - running Hall-B archiver with ~week lookback time (easy)
 - implementing Mya access from CS-Studio (not easy)



Summary

- Much progress over past months and year
- En Route to KPP by summer's end
- TODO items include:



- Møller Polarimeter: refurbish hardware/software
- Saclay Cryotarget → EPICS+CS-Studio
- HV/LV tolerance monitoring in EPICS
- MM/FTH/CND's HV/LV/etc → EPICS

- Adding all alarms (ongoing)
- Adding to MYA archive (ongoing)
- Exercise & choose “easy” offsite options (WebOPI, VDI, ...)
- Torus Slow Controls → Solenoid
- Install cameras (delivered) and weather sensors (ordered)
- Improve CLAS12 DAQ integration

- Logbook Entries in CS-Studio
- UI Layout / Design
- SVT → CS-Studio
- ...

Motor Controls

Harp controls/sequencers excersized and updated with HPS.

HARP SCANS

2C21	Tagger	2H02
harp_tagger	Speed to start point: <input type="text" value="5.0000"/>	
Start Scan at: <input type="text" value="10.0000"/>	Speed during scan: <input type="text" value="1.0000"/>	
End Scan at: <input type="text" value="61.0000"/>	Time between scaler reads: <input type="text" value="0.0700"/>	
Filename: harp_tagger	04-16-16_01:41:51	
<input type="button" value="SCAN"/> <input type="text" value="0.000"/> <input type="button" value="Done"/>	<input type="button" value="Analyze"/>	<input type="button" value="ABORT SCAN"/> <input type="button" value="ROOT Analyze"/>

MOTORS

Hall-B Colli	HPS Colli	HPS Target	Viewer
<input type="button" value="Retract"/>	<input type="button" value="OTR"/>	<input type="button" value="YAG"/>	<input type="button" value="Chromax"/>
0. (253)	0.124 (158)	0.243 (68)	0.389 (338)
Motor is at: <input type="text" value="0.389"/>	<input type="button" value="EXPERT"/>	90 degree turn is 0.1273	

HARP EXPERTS

2C21	Tagger	2H02
harp_2c21 (epics: harp_2c21)		
Drive	User	Dial
Hi limit	<input type="text" value="150.000"/>	<input type="text" value="150.000"/>
Readback	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>
MoveAbs	<input type="text" value="0.000"/>	<input type="text" value="0.000"/>
Lo limit	<input type="text" value="-150.000"/>	<input type="text" value="-150.000"/>
MoveRel	<input type="text" value="0.000"/>	JogR <input type="button" value="JogF"/>
Tweak	< <input type="text" value="0.000"/> >	HomR <input type="button" value="HomF"/>
Dynamics	Normal	Backlash
Speed	<input type="text" value="5.000"/>	<input type="text" value="0.010"/>
Base Speed	<input type="text" value="0.010"/>	
Accel.	<input type="text" value="0.100"/>	<input type="text" value="0.500"/>
Backlash distance	<input type="text" value="0.000"/>	
Move Fraction	<input type="text" value="1.000"/>	
Setup	Status	
Motor res.	<input type="text" value="0.001"/>	State Ox <input type="text" value="0x107"/>
Encoder res.	<input type="text" value="0.001"/>	CurrDir <input type="text" value="1"/>
Readback res.	<input type="text" value="0.000"/>	Moving <input type="text" value="0"/>
Retry deadband	<input type="text" value="0.001"/>	At Home <input type="text" value="0"/>
Retries	<input type="text" value="0"/> max: <input type="text" value="10"/>	MotorPos <input type="text" value="0"/>
Use Encoder	<input type="checkbox"/> No <input type="checkbox"/> Yes	Encoder MIP Ox <input type="text" value="0x0"/>
Use Readback	<input type="checkbox"/> No <input type="checkbox"/> Yes	Err <input type="text" value="0.000"/>
Mode	<input type="text" value="Disconnected"/>	Version <input type="text" value="6.90"/>
	<input type="text" value="supervisory"/>	VME Card# <input type="text" value="0"/>
	<input type="text" value="closed loop"/>	Precision <input type="text" value="3"/>

DAQ Crates

snmp communications with all DAQ VXS crates integrated into EPICS and CS-Studio.

Crate Name	Main	Sys	Main Switch	VME Reset	Fan Speed Set	
	Read	Write				
adcecal1	ON	ON	On	Off	Reset	6000 6000
adcecal2	ON	ON	On	Off	Reset	6000 6000
adcecal3	ON	ON	On	Off	Reset	6000 6000
adcecal4	ON	ON	On	Off	Reset	5000 5000
adcecal5	ON	ON	On	Off	Reset	6000 6000
adcecal6	ON	ON	On	Off	Reset	6000 6000
tdcecal1	ON	ON	On	Off	Reset	3600 3600
tdcecal2	ON	ON	On	Off	Reset	3600 3600
tdcecal3	ON	ON	On	Off	Reset	3600 3600
tdcecal4	ON	ON	On	Off	Reset	3600 3600
tdcecal5	ON	ON	On	Off	Reset	3600 3600
tdcecal6	ON	ON	On	Off	Reset	3600 3600
adcpcal1	ON	ON	On	Off	Reset	6000 6000
adcpcal2	ON	ON	On	Off	Reset	6000 6000
adcpcal3	ON	ON	On	Off	Reset	6000 6000
adcpcal4	ON	ON	On	Off	Reset	5000 5000
adcpcal5	ON	ON	On	Off	Reset	6000 6000
adcpcal6	ON	ON	On	Off	Reset	6000 6000
tdcpcal1	ON	ON	On	Off	Reset	3600 3600
tdcpcal2	ON	ON	On	Off	Reset	3600 3600
tdcpcal3	ON	ON	On	Off	Reset	3600 3600

Crate Name	Stat	Voltages				Temps		Fan Speed			
		1	2	3	4	Int	Ext	1	2	3	Set
adcecal1	80	5.00	11.94	3.30	12.01	34.2	32	6011	5835	6018	6000
adcecal2	80	5.00	12.00	3.31	11.98	30.6	29	5872	5936	6026	6000
adcecal3	80	5.00	11.98	3.31	11.96	29.8	22	5925	5955	5996	6000
adcecal4	80	4.98	11.97	3.29	12.00	30.2	24	4946	4968	4931	5000
adcecal5	80	4.98	11.95	3.31	11.98	37.0	34	6037	5872	5936	6000
adcecal6	80	4.98	12.01	3.31	11.98	37.4	35	6011	5940	5921	6000
tdcecal1	80	5.00	12.01	3.31	12.00	31.6	30	3337	3375	3487	3600
tdcecal2	80	5.00	11.98	3.30	11.99	34.0	34	3397	3405	3495	3600
tdcecal3	80	5.01	11.99	3.31	12.02	31.0	30	3442	3397	3528	3600
tdcecal4	80	5.00	12.03	3.30	11.98	30.0	26	3270	3198	3251	3600
tdcecal5	80	4.99	11.98	3.31	12.00	34.4	30	3243	3311	3416	3600
tdcecal6	80	5.01	11.99	3.31	12.02	38.0	36	3307	3431	3483	3600
adcpcal1	80	4.99	12.00	3.29	11.99	33.6	29	5981	5917	5966	6000
adcpcal2	80	5.00	11.99	3.29	11.94	28.8	20	5928	5940	5988	6000
adcpcal3	80	4.99	12.00	3.29	11.98	29.2	19	5958	5966	5966	6000
adcpcal4	80	5.01	12.02	3.31	11.95	29.2	28	4953	5013	4931	5000
adcpcal5	80	5.00	12.00	3.31	11.99	38.0	34	6007	5898	5955	6000
adcpcal6	80	5.01	12.02	3.32	11.98	34.8	30	6048	5928	5898	6000
tdcpcal1	80	5.02	11.98	3.30	12.01	32.6	30	3303	3345	3393	3600
tdcpcal2	80	5.01	12.00	3.30	12.01	31.8	29	3255	3217	3311	3600
tdcpcal3	80	5.01	11.96	3.28	11.99	32.6	25	3300	3108	3138	3600

IOC Health

VME IOCs						
IOC Name	Hostname	Up Time	Heartbeat	Expert	Reboot	Last Reboot
iocclassc1	classc1	10 days, 15:51:53	921113	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	04/07/2016 15:16:25
iocclassc4	classc4	10 days, 18:57:36	932256	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	04/07/2016 12:10:42
iocclassc6	classc6	4 days, 11:58:30	388711	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	04/13/2016 19:09:47
iocclassc8	classc8	10 days, 21:30:48	941448	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	04/07/2016 09:37:30

IOC Name	Hostname	Up Time	Heartbeat	Expert	Reboot	Last Reboot
ioccaenhv_HVECAL1	clonioc2.jlab.org	6 days, 21:05:07	594307	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/06/2016 12:33:12
ioccaenhv_HVECAL2	clonioc2.jlab.org	12 days, 03:46:24	1050384	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:55
ioccaenhv_HVECAL3	clonioc2.jlab.org	12 days, 03:44:37	1050277	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:53:42
ioccaenhv_HVECAL4	clonioc2.jlab.org	12 days, 03:46:19	1050379	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:52:00
ioccaenhv_HVECAL5	clonioc2.jlab.org	12 days, 03:46:25	1050385	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:55
ioccaenhv_HVECAL6	clonioc2.jlab.org	12 days, 03:46:15	1050375	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:52:04
ioccaenhv_HVFTOF1	clonioc2.jlab.org	12 days, 03:46:23	1050383	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:56
ioccaenhv_HVFTOF2	clonioc2.jlab.org	12 days, 03:46:23	1050383	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:56
ioccaenhv_HVFTOF3	clonioc2.jlab.org	12 days, 03:46:23	1050383	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:56
ioccaenhv_HVFTOF4	clonioc2.jlab.org	12 days, 03:46:18	1050378	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:52:01
ioccaenhv_HVFTOF5	clonioc2.jlab.org	12 days, 03:46:23	1050383	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:56
ioccaenhv_HVFTOF6	clonioc2.jlab.org	12 days, 03:46:23	1050383	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:56
ioccaenhv_HVFTAG	clonioc2.jlab.org	3 days, 18:29:16	325754	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/09/2016 15:09:05
ioccaenhv_HVCTOF0	clonioc2.jlab.org	12 days, 03:14:10	1048449	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 06:24:10
ioccaenhv_HVLTCO0	clonioc2.jlab.org	4 days, 21:39:18	423558	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/08/2016 11:59:01

IOC Name	Hostname	Up Time	Heartbeat	Expert	Reboot	Last Reboot	Autosave			
							Status	Message	Recently	Expert
ioctcdv	Disconnected	Disconnected	Disconnected	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	Disconnected	Disconnect	Disconnected	Disconnected	<input checked="" type="checkbox"/>
ioccas	clonioc1.jlab.org	11 days, 14:39:16	1003156	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/03/2016 17:29:26	Ok	Ok	Wrote 'cas_settings.sav2'	<input checked="" type="checkbox"/>
ioctcdv	Disconnected	Disconnected	Disconnected	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	Disconnected	Disconnect	Disconnected	Disconnected	<input checked="" type="checkbox"/>
iochtccvl	clonioc2.jlab.org	14 days, 02:16:49	1217809	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 05:51:53	-	-	-	<input checked="" type="checkbox"/>
ioctcofv	Disconnected	Disconnected	Disconnected	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	Disconnected	Disconnect	Disconnected	Disconnected	<input checked="" type="checkbox"/>
iocttaglv	Disconnected	Disconnected	Disconnected	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	Disconnected	Disconnect	Disconnected	Disconnected	<input checked="" type="checkbox"/>
ioctctTemp	clonioc1.jlab.org	13 days, 23:45:26	1200951	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 10:32:51	Ok	Ok	Wrote 'info_positions.sav1'	<input checked="" type="checkbox"/>
ioctfcChiller	clonioc1.jlab.org	13 days, 23:45:27	1208727	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 08:23:15	Ok	Ok	Wrote 'info_positions.sav1'	<input checked="" type="checkbox"/>
ioctfcFlasher	clonioc1.jlab.org	13 days, 16:10:25	1181425	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 15:58:17	-	-	-	<input checked="" type="checkbox"/>
ioctorusCryo	clonioc1.jlab.org	5 days, 16:51:19	492679	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/09/2016 15:17:23	Ok	Ok	Wrote 'info_positions.sav2'	<input checked="" type="checkbox"/>
ioctorusDq	clonioc1.jlab.org	13 days, 23:45:26	1208726	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 08:23:16	Ok	Ok	Wrote 'info_positions.sav2'	<input checked="" type="checkbox"/>
ioctorusForce	clonioc1.jlab.org	13 days, 23:45:27	1208719	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 08:23:15	Ok	Ok	Wrote 'torus_force_settings.sav2'	<input checked="" type="checkbox"/>
ioctorusMps	clonioc1.jlab.org	13 days, 23:45:28	1208728	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 08:23:15	Ok	Ok	Wrote 'info_positions.sav2'	<input checked="" type="checkbox"/>
ioctorusQD	clonioc1.jlab.org	13 days, 23:45:27	1208727	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 08:23:15	Ok	Ok	Wrote 'info_positions.sav2'	<input checked="" type="checkbox"/>
ioctorusVac	clonioc1.jlab.org	13 days, 23:45:27	1208727	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 08:23:15	Ok	Ok	Wrote 'info_positions.sav1'	<input checked="" type="checkbox"/>
iocgasSystem	clonioc1.jlab.org	13 days, 23:45:28	1208728	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/01/2016 08:23:14	Ok	Ok	Wrote 'info_positions.sav1'	<input checked="" type="checkbox"/>
iocgasSystem86	svtystem1.jlab.org	27 days, 23:32:16	2417536	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	05/18/2016 08:36:26	Ok	Ok	Wrote 'info_positions.sav0'	<input checked="" type="checkbox"/>
ioccagw	clonioc1.jlab.org	11 days, 13:58:35	1000715	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	06/03/2016 18:10:08	Ok	Ok	Wrote 'info_positions.sav2'	<input checked="" type="checkbox"/>
ioctgenFlasher	Disconnected	Disconnected	Disconnected	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	Disconnected	-	-	-	<input checked="" type="checkbox"/>
iocvmeCrates	Disconnected	Disconnected	Disconnected	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Reboot	Disconnected	-	-	-	<input checked="" type="checkbox"/>

