



EPICS Progress and Plans

IOCs, Alarm Handler, & Target DAQ

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Outline

- Purpose
- Alarm Handler
- Target Controller (James)
- High Voltage Monitoring
- Gateway
- Summary



Purpose within MICE

- What we do NOT do
 - PPS will be in place to protect people
 - We do not interface with PPS
 - No shared hardware
 - PPS is the highest priority, monitoring must *not* interfere
 - Properly designed control systems trip (hardware and/or software) to protect the device



Purpose within MICE

- What we DO do with alarm handling

- Monitoring protects equipment

- * Detect changes in hardware/environment which may affect equipment
- * Warn shifters when significant changes occur
- * Shifters must act before hardware fails

- Monitoring protects data quality

- * MICE is a precision experiment necessitating control/understanding of systematic errors
- * Must monitor changes in detector performance
- * Warn shifters when significant changes occur
- * Shifters must act before data quality is affected

- NOTE: shifter intervention is required!!!



Purpose within MICE

● Examples:

- Monitoring protects equipment
 - * Unstable AC units in MICE hall
 - * Longer periods when MICE hall is interlocked
 - * Linde Compressor might fail when hall is too hot
 - * Now imagine the MICE hall packed with equipment
- Monitoring protects data quality
 - * HV sags - ToF calibration changes
 - * AC unit fails - ToF calibration changes
 - * Magnet currents change - different beam than expected



Alarm Handler

- Two levels of alarms:

- Minor - announces to shifters that values are changing out of tolerance
- Major - announce to shifters that if problem is not addressed, damage may occur to equipment and/or data quality may be compromised

- “Significant” Alarms

- Generally do not know appropriate alarm limits apriori
- Must be sensitive to real alarm states
- Must not cry wolf
- Iterative process to set limits
- Requires feedback from MOM/shifters to optimize values

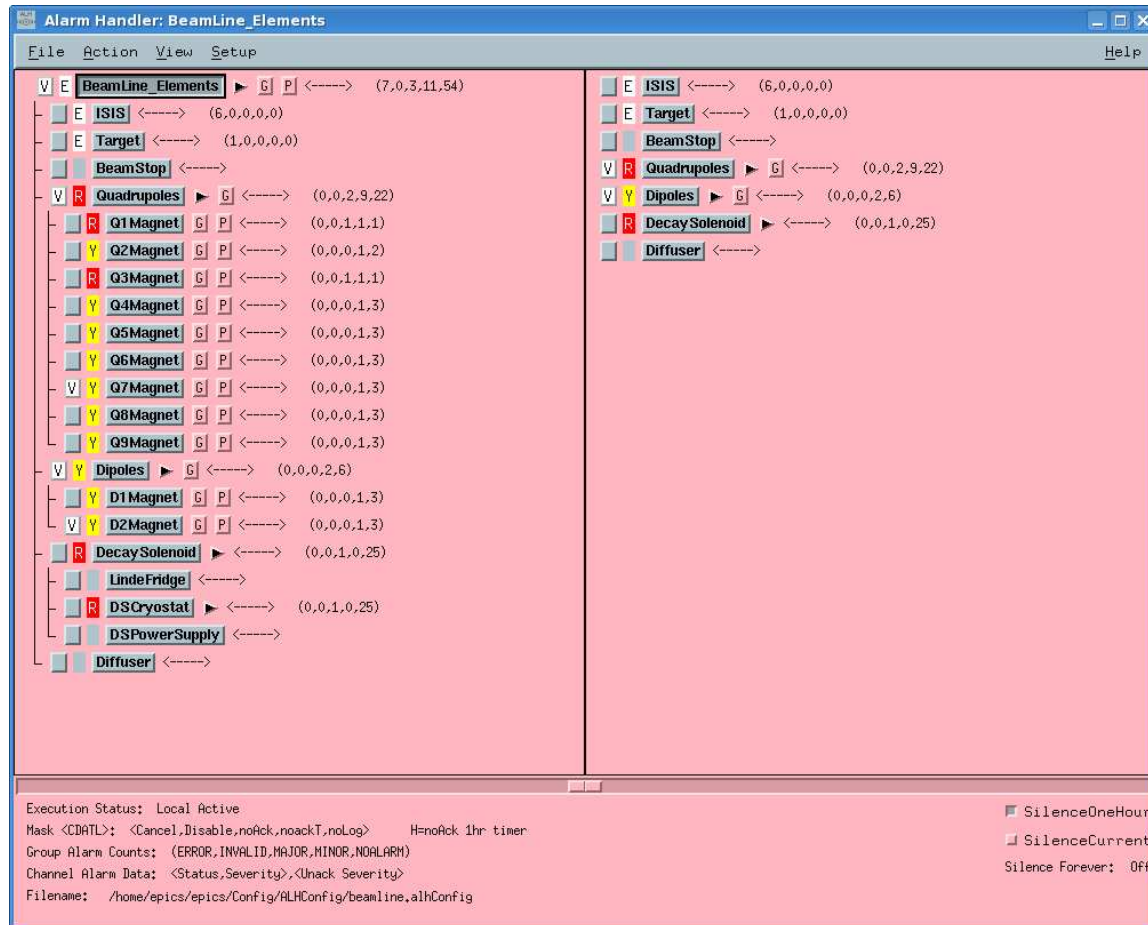


Alarm Handler

- Existing alarm handlers:
 - BeamLine
 - PID
 - Environment
 - DAQ/Electronics
- Future alarm handlers:
 - Tracker
 - Tracker Magnets
 - Absorber
 - RF
- Modify configuration files to add new devices
- Added aliases for better descriptions



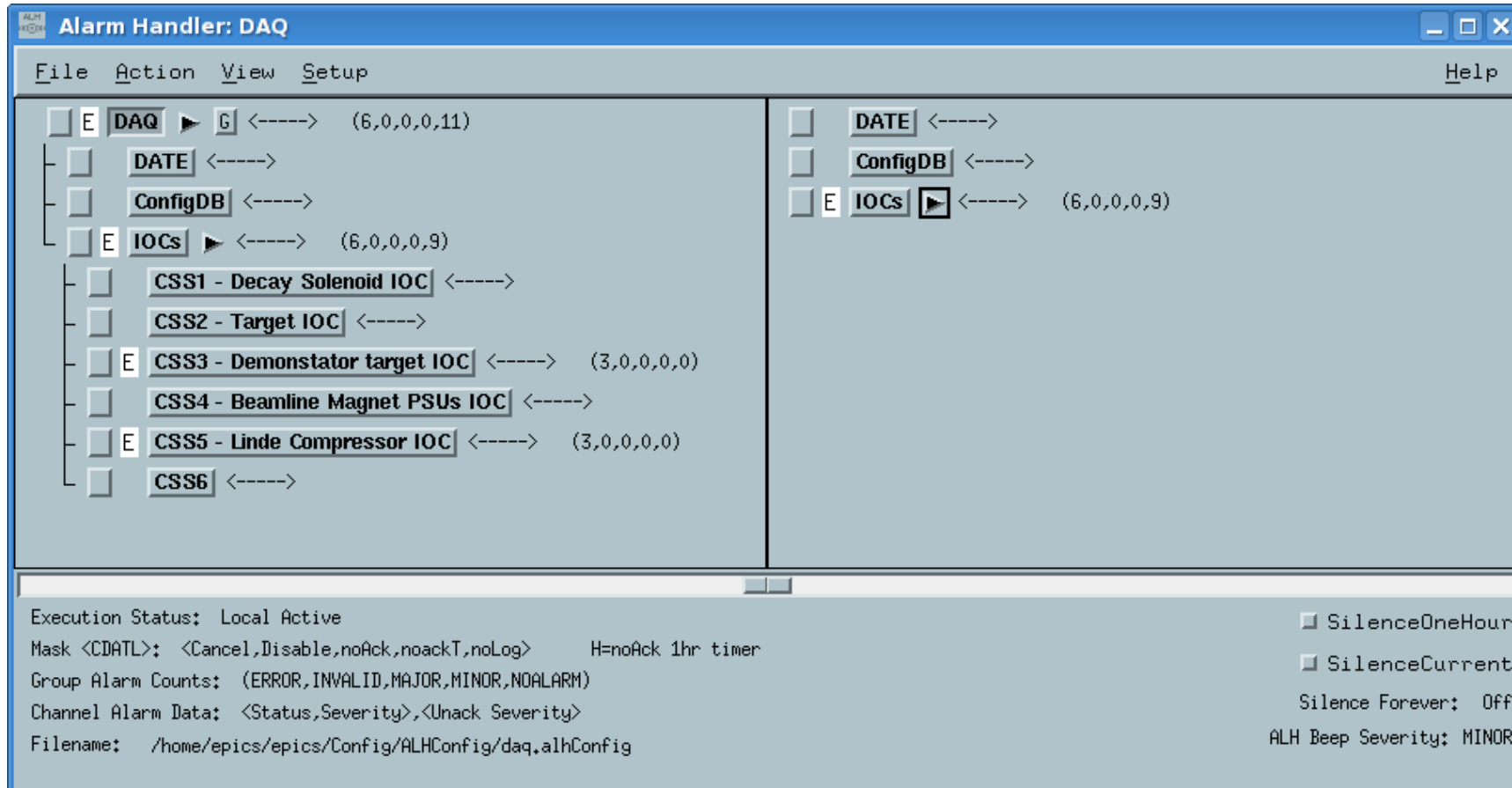
Alarm Handler



- complete decay solenoid
- add beamstop
- proton absorber and target coming soon

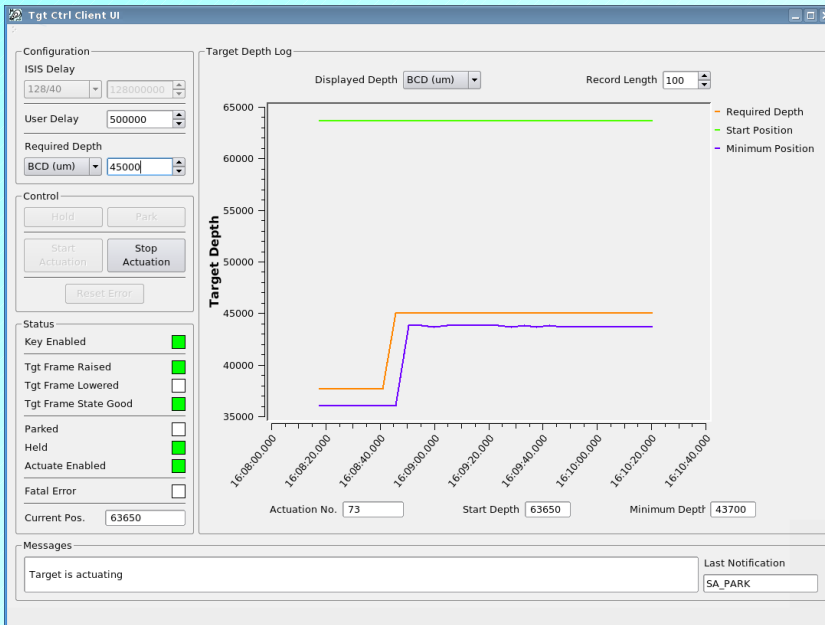


Alarm Handler



- new IOC converting DATE and CDB logic to alarm levels

Target Controller



- Target Controller Stage 1 upgrade complete

- Will perform soak test when Target 2.4 installed in R78 (provisionally during August)

- Have purchased 2 replacement Target Controller PCs

Stage 1 upgrade – EPICS Control functionality includes:

- Set delays
- Set / monitor Target depth
- Park / hold, start / stop actuation
- Monitor hardware status

- Original machines incompatible with USB interface of new hardware

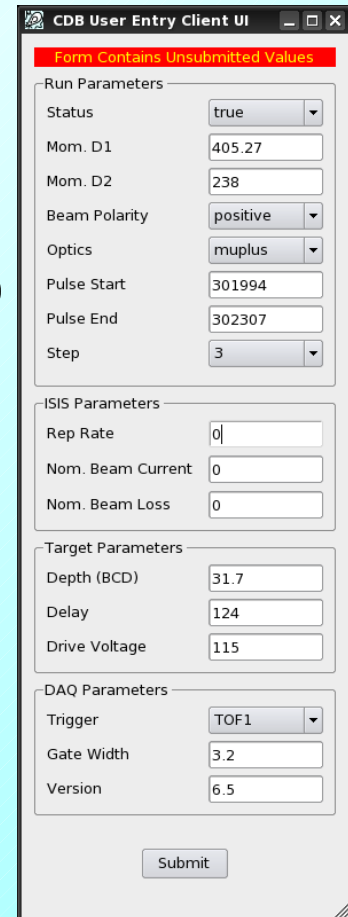
Configuration Database



The screenshot shows the 'Ctrl CDB Interface UI' window. It has two main sections: 'Manual PV Backup' and 'Manual PV Restore'. The 'Manual PV Backup' section has a 'Tag' text input field and a 'Backup' button. The 'Manual PV Restore' section has a 'Data ID Type' dropdown menu set to 'Run Number', a 'Run Number' text input field with the value '0', and a 'Restore' button.

- EPICS CDB Interface now operational
- Successfully integrated with DATE for automated backup of run set point values

- User entry form enables submission of parameters not available as PVs
 - No. of manual entry items will decrease as further systems are integrated with EPICS
- First routine database submissions made during shift last Wednesday
 - Will implement automatic entry of target actuation numbers next week for increased user friendliness



The screenshot shows the 'CDB User Entry Client UI' window. At the top, a red banner reads 'Form Contains Unsubmitted Values'. The form is divided into several sections: 'Run Parameters' (Status: true, Mom. D1: 405.27, Mom. D2: 238, Beam Polarity: positive, Optics: muplus, Pulse Start: 301994, Pulse End: 302307, Step: 3), 'ISIS Parameters' (Rep Rate: 0, Nom. Beam Current: 0, Nom. Beam Loss: 0), 'Target Parameters' (Depth (BCD): 31.7, Delay: 124, Drive Voltage: 115), and 'DAQ Parameters' (Trigger: TOF1, Gate Width: 3.2, Version: 6.5). A 'Submit' button is at the bottom right.



High Voltage CAM

- Two High Voltage Systems:
 - 2 daisy chained CAEN SY127 crates:
 - * Crate 1: CKOV (8 channels) and GVA1
 - * Crate 2: BPM (4 channels)
 - 1 CAEN SY527 crate
 - * ToF 0: (40 channels)
 - * ToF 1: (40 channels)
 - * ToF 2: (40 channels)
 - * KL: (46 channels)
- CAEN 127 system controlled via RS232 (1980's technology)
- CAEN 527 system controlled via pci interface (1990's technology)



High Voltage CAM

- CAEN SY127 system ready:
 - IOC working
 - switches between 2 crates and reads every minute
 - most important control features implemented (needs final test)
 - alarm handler ready (needs final test)
 - channel archiver (almost complete)
- CAEN 527 system read (almost ready)
 - no monitoring and occasionally loosing set voltages!!!
 - IOC working
 - reads crate every minute
 - channel archiver (almost complete)



High Voltage CAM

/home/epics/epics/Config/opi/edl/HVSY127.edl <@miceiocpc1>

C.A.E.N. SY127 V6.9

HV ON

CRATE

1

CHANNEL

0

Select Crate

NAME

GVA1

VALUE REQUEST

1

STATUS

ON

OFF

OVC

OVP

UNV

TRIP

RAMP UP

RAMP DW

CONTROL

Update Display

Select Crate

Select Channel

Set Parameters

Select Group

HV Module Map

Error Table

READ: OK

WRITE: OK

RWFlag: 0

INPUT VALUE

Reset

Exit



High Voltage CAM

/home/epics/epics/Config/opi/edl/HVSY127.edl <@miceiocpc1>

C.A.E.N. SY127 V6.9

HV ON

2

0

CRATE

CHANNEL

BPM-UY

NAME

VALUE REQUEST

C
H
A
N
N
E
L

S
T
A
T
U
S

ON

OFF

OVC

OVV

UNV

TRIP

RAMP UP

RAMP DW

CONTROL

Update Display

Select Crate

Select Channel

Set Parameters

Select Group

HV Module Map

Error Table

READ: OK

WRITE: OK

RWFlag: 0

I

Reset

Exit

INPUT VALUE

High Voltage Display

Group: ALL

CH	Name	On/Off	V	I	VSet	ILim	RmpUp	RmpDn	Trip
			(V)	(uA)	(V)	(uA)	(V/s)	(V/s)	(0.1s)
00	BPM-UY	1	2296.0	196.0	2300	300	50	100	0
01	BPM-UX	1	2323.0	215.0	2325	300	50	100	0
02	BPM-DX	1	2322.0	219.0	2325	300	50	100	0
03	BPM-DY	1	2297.0	203.0	2300	300	50	100	0



- We now have a bastion machine!!!
- May have to have fixed IP addresses for remote machines



Summary and Conclusions

- new controllers being developed
- new controllers will be implemented after run
- alarm handler operational for beamline elements, daq, and environment
- stage 1 target controller upgrade complete
- more to do, but awaiting shutdown