

**DØ SMT  
Shift Instructions**

Version 1.4

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# General Instructions

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# Shift Guidelines

1. If you haven't done so, **read the instructions!**
2. Login into the logbook at the beginning of your shift.
3. Log everything you do, and try to be thorough in the description of problems you may run into. Fill in the checklists relevant to what is going on. Start filling in the « Begin of Shift » checklist as soon as you start your shift.
4. Most of the GUIs you need can be started from the « GUI starter » GUI (in a terminal window type: `cd; setup d0online; ./startguis.py`)
5. If one of the VRB crates is 100% FEB try the following, in order, until the busy is cleared:
  1. Ask the DAQ expert for a SCL init.
  2. Can you find HDIs responsible for it? One or many HDIs in a row showing high DVDD current (look in the SMT DVDD CURRENTS GUI) can stall the readout. Ask for a run pause and redownload the problematic HDIs from the corresponding SEQ in the download GUI (SMT Download GUI). Note!: If the problem HDI is tripped, remember to ramp down and turn off the HV first.
  3. Ask for a run pause and do a "Reinit VME" for that crate in the SMT Download GUI.
  4. Ask for a run pause and reinit the sequencer controller for that crate in the SMT Download GUI (left click on the SEQC \*\*\*\* box near the top of the crate's details window, then click on "reset" and "init")
  5. Ask for a run pause and do a "download" for the whole crate (SMT Download GUI)
  6. If all of the above fails: Ask for a run pause, power cycle the corresponding VME crate, do a "reinit VME », once the Power PC has rebooted, and continue the run. How to powercycle a VME (=VRB) crate? go to 2nd floor Movable Counting house; in the upper part of each rack, there are two 3 pull switches labeled with the crate numbers present in that rack. Flip the corresponding switch down to turn the crate off, wait a few seconds and flip the switch back up. It takes 30 seconds to a minute for the crate to reboot.
  7. Page the SMT expert (218-8764)

# Shift Guidelines

5. HV trips when ramping up :  
See the « Troubleshooting HV pod Trips » section of the « High Voltage » chapter of the SMT Shift Instructions.
6. Check for major and minor HV alarms:
  1. If they are related to currents which are getting close to the trip limit, increase the limit by 10uA using the HV current limit GUI  
(GUI starter - page B - Button 4).  
If you need to do it more than 3 times in your shift for the same pod, page the expert (218-8764).
  2. If they are related to voltages, check that you ramped the voltages up to 100%.
    - if not, fix it.
    - if so, page the SMT expert (218-8764)
7. Check for major « Occupancy » or « Dead » alarms.  
The ONLY monitoring alarms that you can disregard are the « Occupancy » alarms, ONLY when the SMT HV is OFF. In ALL other cases, IF the monitoring is running, you should take the « Dead » and « Occupancy » alarms seriously.  
Try to fix the alarms by redownloading the corresponding HDIs. You may need to wait 5 to 10 minutes to see the effect of your download (check the « SES UPDATE TIME » for the corresponding crate - see the « Monitoring » part of these Guidelines for more details).  
If the problem persists, page the expert (218-8764)
8. Check `smt_examine` histograms and compare them with the references. Write in the logbook any discrepancy you can see.
9. At the end of your shift, fill in the « Shift Summary » check list and logout from the logbook.

## Types of HDIs present in D0SMT

- **Barrels: 1 HDI = 1 Ladder**
  - 3 chips:  
Bi-j-k  $\forall k$  (i=1,6; j=1,2,5,6)  
2 Single Sided sensors
  - 6 chips [3 p-side + 3 n-side]:  
Bi-j-k  $\forall k$ , (i=2,3,4,5; j=1,2,5,6)  
1 Double Sided 90° stereo sensor
  - 9 chips [5 p-side + 4 n-side]:  
Bi-j-k  $\forall i, \forall k$ , (j=3,4,7,8)  
2 Double Sided 2° stereo sensors

where Bi-j-k means Barrel i, Layer j, Position k
- **F-Disks: 1 wedge = 1 Double Sided sensor  
1 HDI = 1 side of a wedge**
  - p-side: 8 chips  
Fi-1-k  $\forall i, \forall k$
  - n-side: 6 chips  
Fi-2-k  $\forall i, \forall k$

where Fi-j-k means Disk i, Side j, Position k
- **H-Disks: 1 HDI = 1 side of a wedge**
  - p-side: 6 chips  
Hi-1-k  $\forall i, \forall k$   
2 Single Sided sensors
  - n-side: 6 chips  
Hi-2-k  $\forall i, \forall k$   
2 Single Sided sensors  
(it is actually a second p-side)

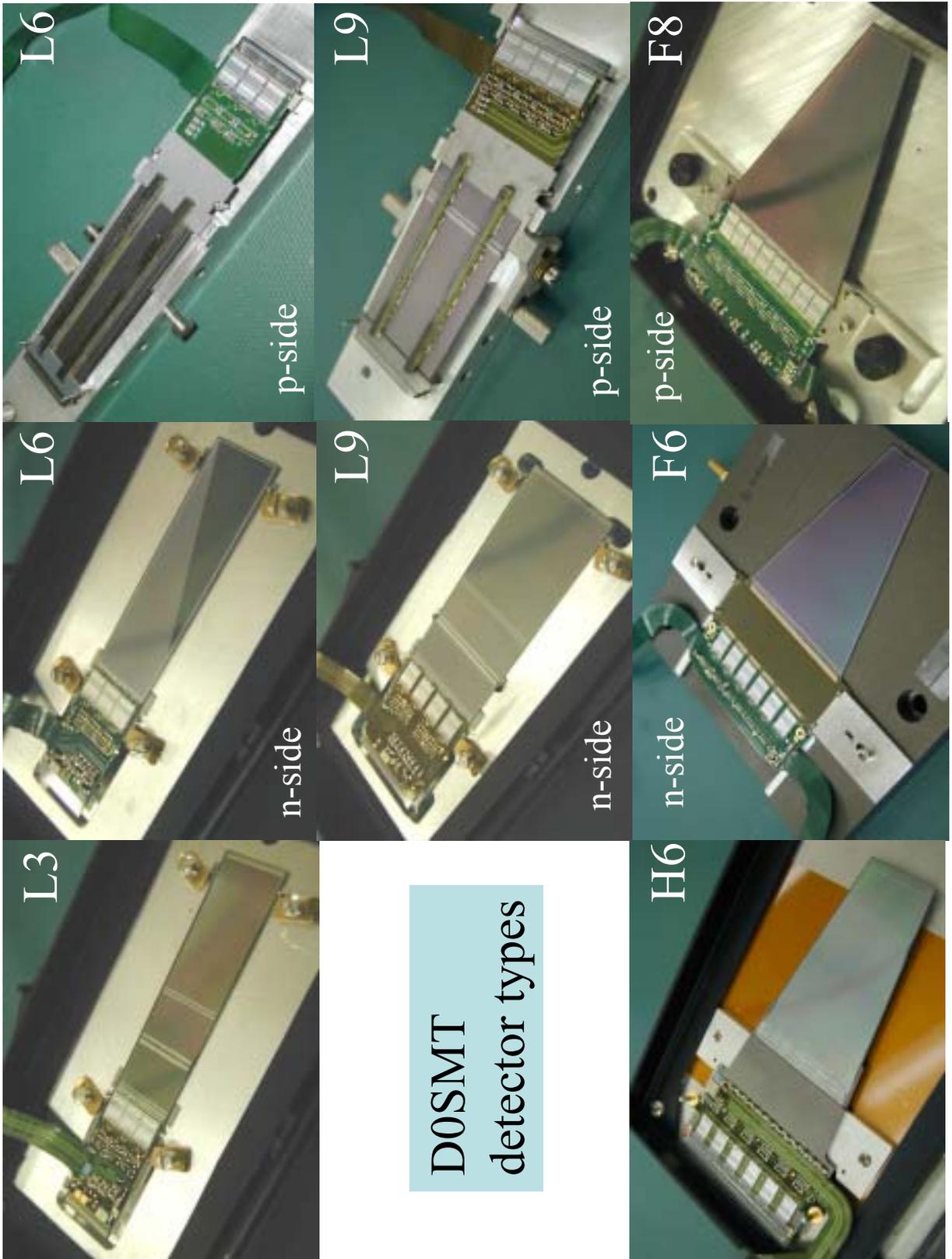
where Hi-j-k means Disk i, Side j, Position k

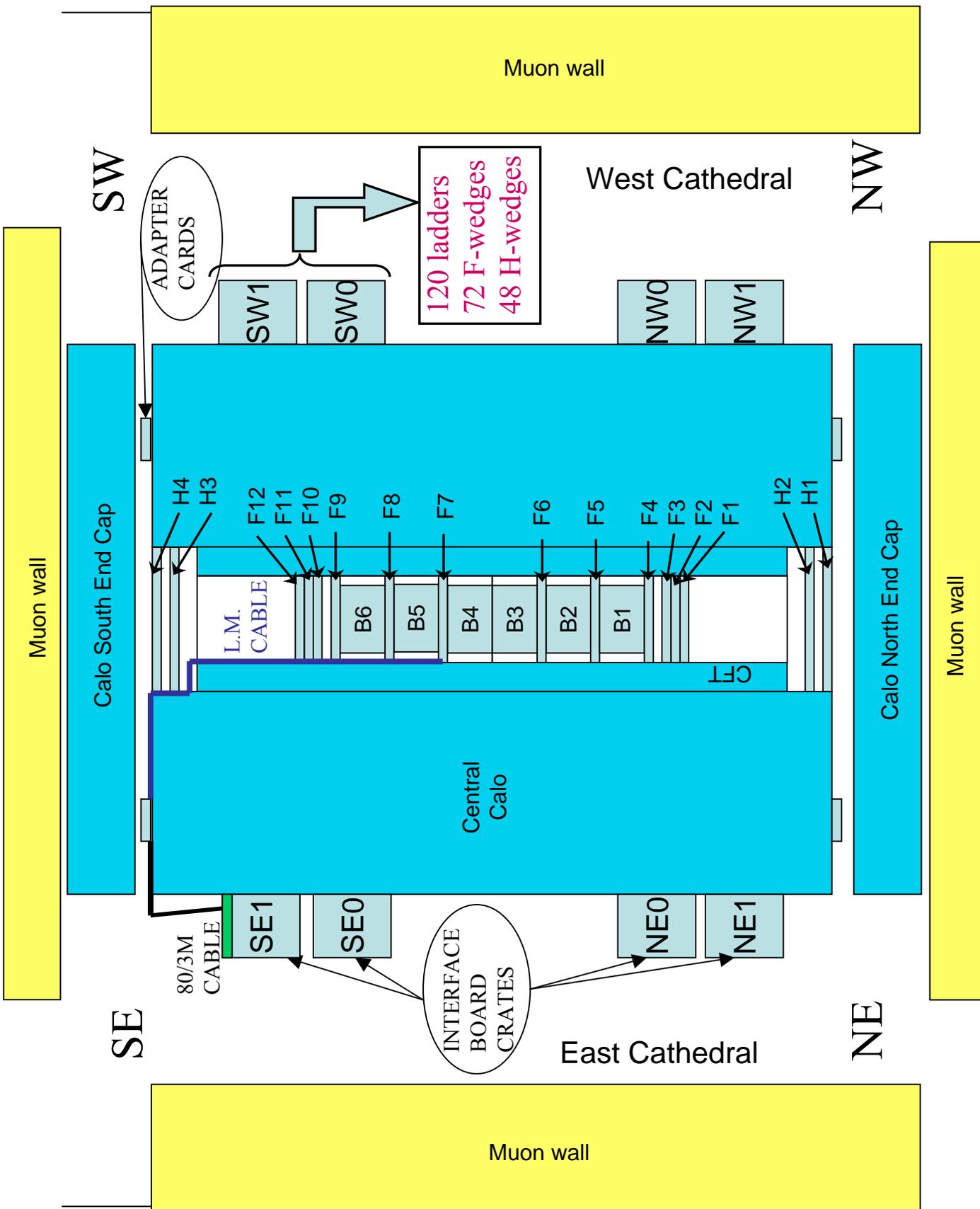
## Correspondence between different mappings

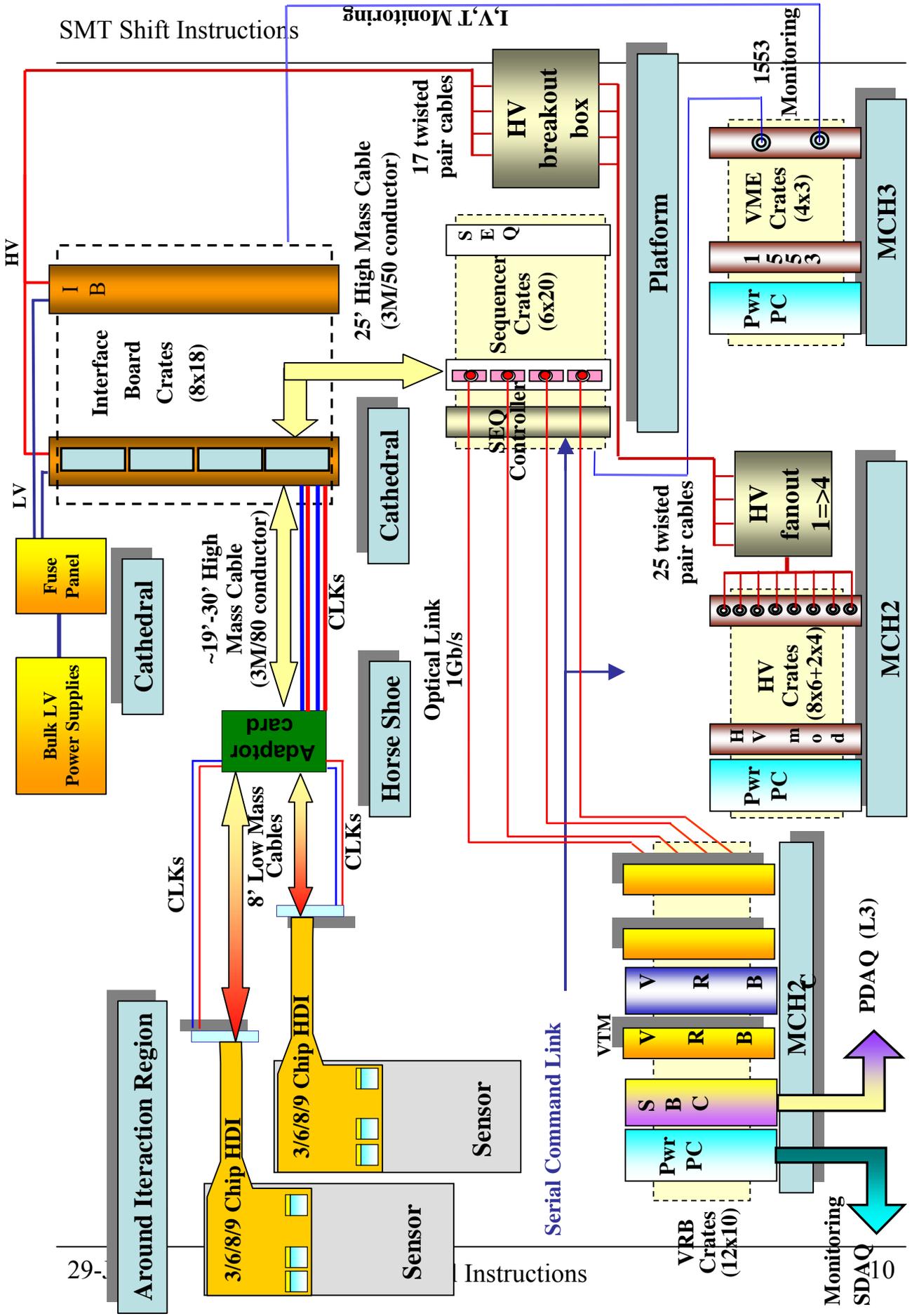
SMT Download GUI	Smt_Examine	Online Monitoring and Offline
B2-L5-HDI09-(N)	B2-5-09-p	B2-5-9
	B2-5-09-n	
H4-L1-HDI03-(N)	HD 4 03-p	H4-1-3
H4-L2-HDI03-(N)	HD 4 03-n	H4-2-3
F3-L1-HDI05-type8-(N)	FD 3 05-p	F3-1-5
F3-L2-HDI05-type6-(N)	FD 3 05-n	F3-2-5

« L » identifies:

- the layer (1,...,8) in a barrel
- the side (1,2) of a disk







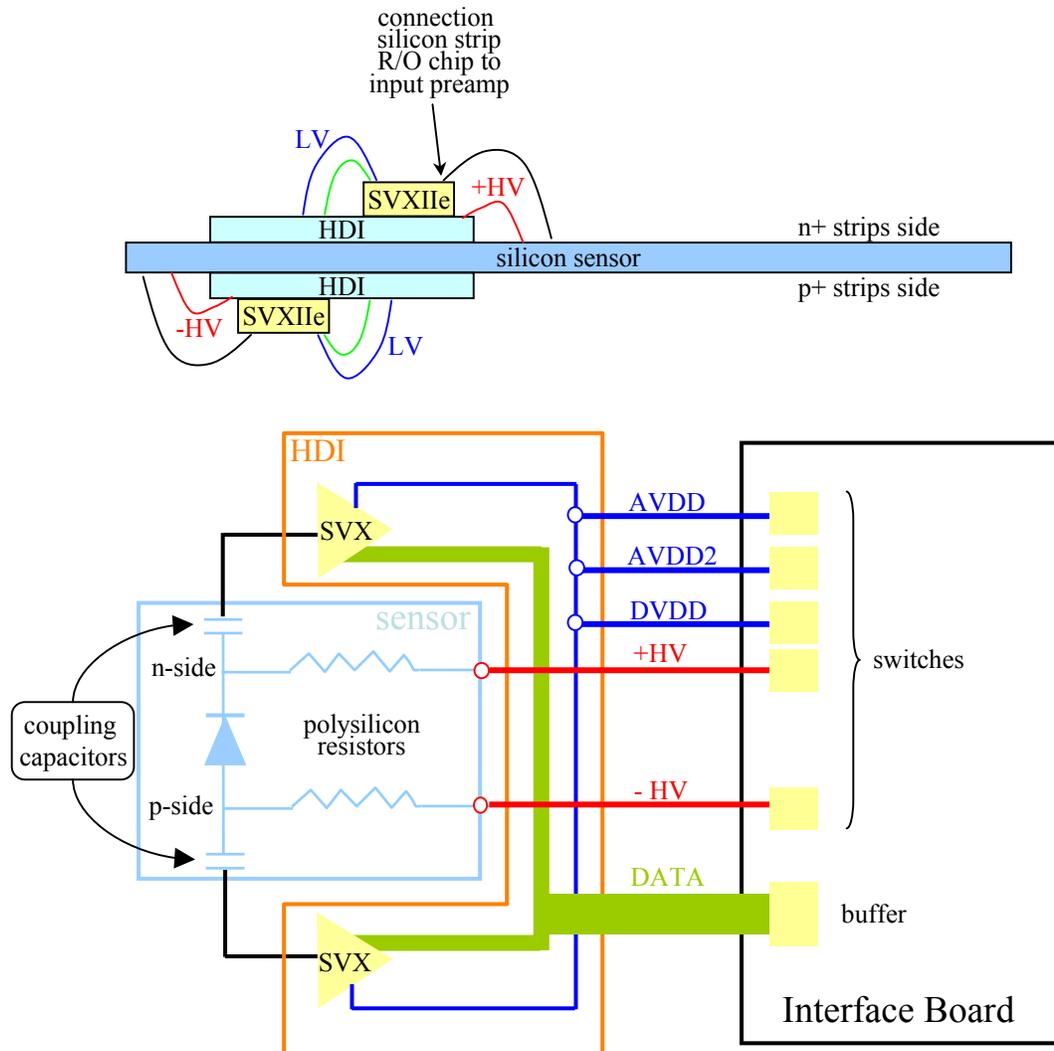
PowerPCs and Single Board Computers are accessed thru Ethernet

## About LV and HV (1)

Our silicon detectors are made of 1 or 2 silicon sensor(s) glued to an HDI which carries SVXIIe chips. These chips allow to read out information about the charge collected on the sensor strips, when charged particles went through the sensor(s). For the detector to function properly:

- the silicon sensors must be depleted. This requires 1 (single sided sensors) or 2 (double-sided sensors) HV power supplies.
- the SVXIIe read out chips must be powered. This requires 3 different LV power supplies: AVDD, AVDD2, and DVDD.

HV and LV are provided by the IB to the HDI which, in turn, provides it to the sensor(s) and to the SVXIIe chips, respectively.



## About LV and HV (2)

In the SMT download GUI, **when you click « download »**, e.g. in the Left-click menu of a Sequencer or a Sequencer Fiber, what happens for the corresponding HDIs is the following:

1. The Sequencer asserts the HDI enable line for the corresponding IB channel:
  - a) if the SVX chips on the HDI are already powered, nothing new happens.
  - b) if the SVX chips on the HDI are not powered:
    - a) if there is a trip condition, i.e. HDI AVDD, AVDD2 or DVDD current greater than 700mA, or HDI temperature greater than 40°C, the IB channel will be kept OFF and a corresponding Trip Bit(s) will be asserted, making the corresponding IB channel turn red in the SMT download GUI and blink red/black on the DVDD current GUI. Resetting the trip condition requires to do, in the SMT download GUI, a « HDI off » in the Left-click menu of the tripped HDI. This will, of course, work only if the cause of the trip has disappeared before you try to reset the trip condition.
    - b) if there is no trip condition, the firmware in the FPGA of the IB will try to turn, in sequence, the IB switches for AVDD, AVDD2 and DVDD:
      - a) if none of the currents for these 3 HDI supplies is greater than 700mA and the HDI temperature is not greater than 40°C, the IB buffer for the HDI data lines will be enabled and the IB HV switches will be turned on.
      - b) if not, all switches will be turned off, and the corresponding Trip Bit(s) will be asserted, making the corresponding IB channel turn red in the SMT download GUI and blink red/black on the DVDD current GUI (see above).
2. Download the chips of the corresponding HDI with the initialization parameters as defined in the « SVX parameter » item of the « Global Parameter » button Left-click menu in the SMT Download GUI

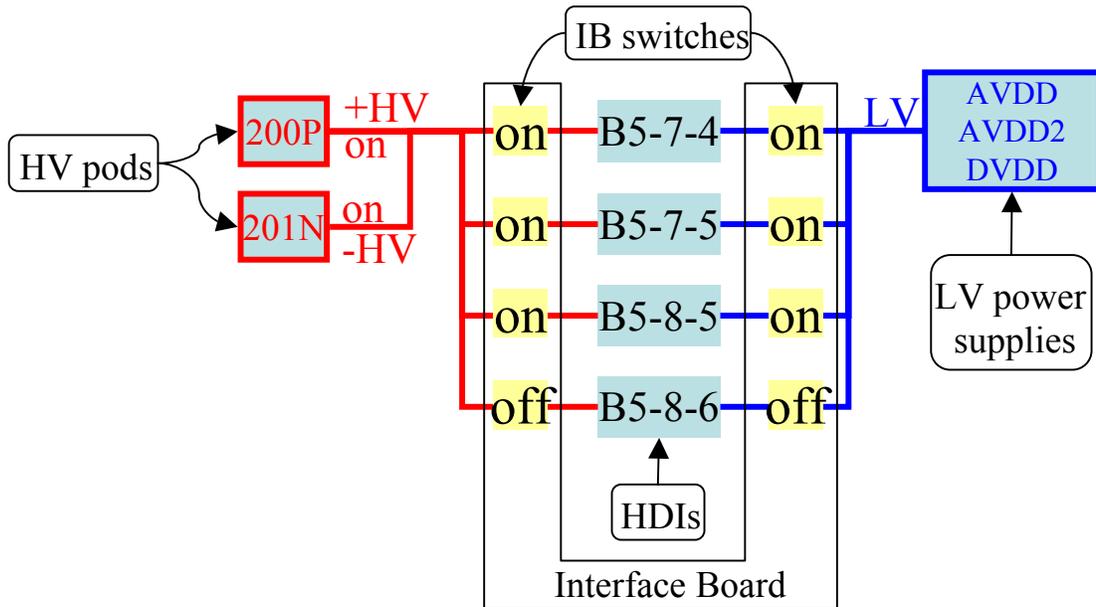
**When you click on « HDI off »**, e.g. in the Left-click menu of a Sequencer, a Sequencer Fiber or an HDI, the Sequencer de-asserts the corresponding HDI enable line(s), which makes the FPGA in the corresponding IB channel(s) disable the data buffer and turn off the switches for DVDD, AVDD2, AVDD, +HV and -HV. **This will not turn off the HV pods, it will only turn off the IB switches connected to the HV HDI lines.**

**General rule for HDI(s):            Turn ON LV first, then HV.  
   Turn OFF HV first, then LV.**



## About LV and HV (4)

Now, up to 4 HDIs can share the same HV pod (single-sided detector) or the same pair of HV pods (double-sided detectors). For instance, the 9-chip ladders (double-sided) B5-7-4, B5-7-5, B5-8-5, B5-8-6 share positive pod 200P and negative pod 201N:



If the Download GUI would let you download B5-8-6 with pods 200P and 201N on, it would make the corresponding Sequencer assert the HDI enable line for B5-8-6, making the LV and HV switches turn ON on the corresponding IB channel. The problem here is that as soon as the switches are on, since the input of the SVX chips are at a virtual ground when powered, the coupling capacitors on the n-side (resp. p-side) of the silicon sensors of B5-8-6 will see a voltage step of +HV (resp. -HV). These capacitors are very delicate, to avoid stressing them and breaking them prematurely, it's better to slowly ramp the HV on them.

So, to make a long story short, to make things safe, each time you need to turn ON or OFF the LV on an HDI, first, you ABSOLUTELY need to ramp down and turn OFF the HV on that HDI and on all the HDIs which share the sequencer with the HDI you want to deal with (how to do it is described on page 22). The download GUI will not execute your command (and print an error message on the terminal window) if you do not comply.

If you want to re-download HDIs which already have their LV ON, you can do it without touching the HV. The LV will not be touched, but the SVX chips of the corresponding HDIs will be re-initialized with the current download parameters.

## SVXIIe read out chips download parameters

The screenshot shows the SMT Download GUI with a table of chip parameters. A blue arrow points from the 'SVX Parameter' button in the table to a detailed dialog box for the SVX Parameter.

	turn HDIs off	Turn pulses on	turn debug on	global	oscillators	quit
				SVX Parameter		
				SEQ Parameter		
				SDAQ Parameter		
VRBCR_60	download	HDI off	cal inject	re VRB Parameter	ration	print problem details
VRBCR_61	download	HDI off	cal inject	re	ration	print problem details
VRBCR_62	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_63	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_64	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_65	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_66	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_67	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_68	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_69	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_6A	download	HDI off	cal inject	reinit VME	calibration	print problem details
VRBCR_6B	download	HDI off	cal inject	reinit VME	calibration	print problem details
Teststand_79	download	HDI off	cal inject	reinit VME	calibration	print problem details

The SVX Parameter dialog box shows the following parameters:

- cal\_voltage: 0x0
- adc\_pedestal: 0x7
- ramp\_trim: 0x700
- adc\_max: 0xff
- cal\_pattern: 0x4
- preamp\_band: 0x24
- pipeline: 0xd
- chip\_current: 0x4
- threshold: 0x23

Checkboxes:

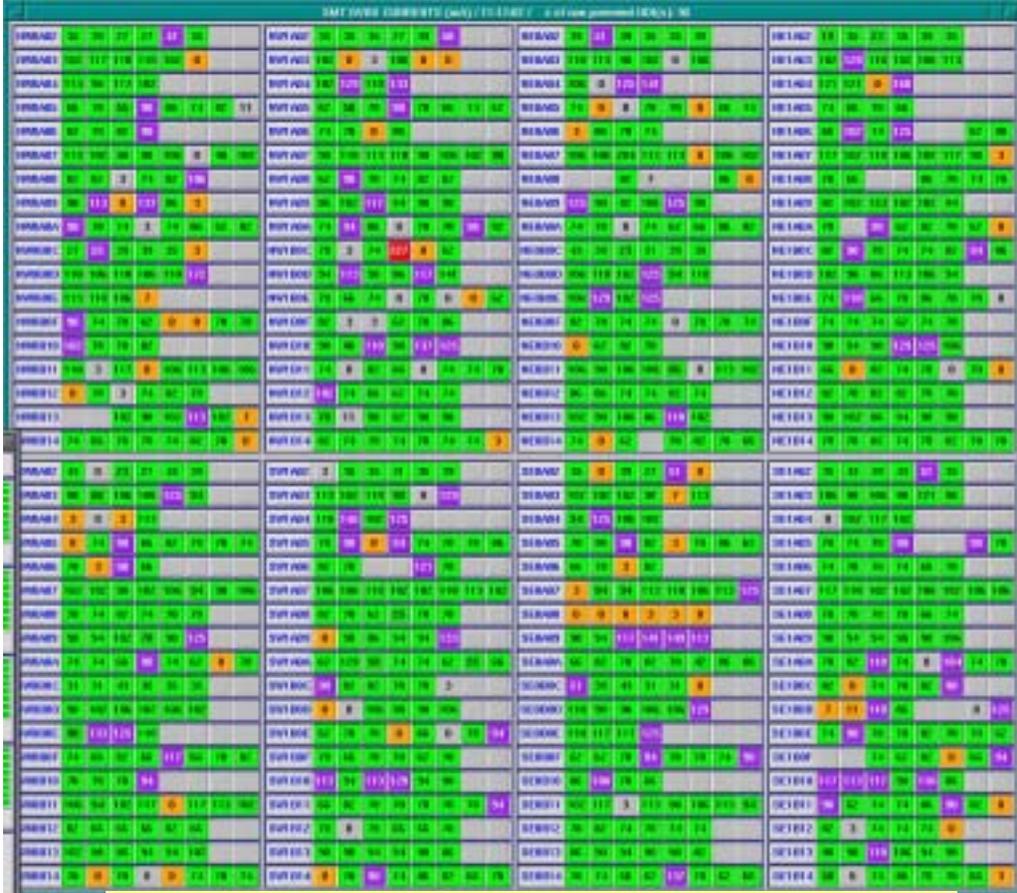
- Read\_All
- Read\_Neighbor
- Use Global Threshold
- Last Channel Last Chip
- Last Channel All Chips

Buttons: Modify database, Quit

you should redownload all the crates with these default parameters at the beginning of each shot setup, to make sure the SVX chips are properly initialized for Physics!

## High DVDD currents and HDI LV Trips (1)

If a lot of HDIs show high currents in the DVDD Current GUI, that usually means that the SVX chips are not read out. This happens when the crates are not in a global run, or when the global run is pause or stalled for some reason. **You should not let the system in that state for too long.**



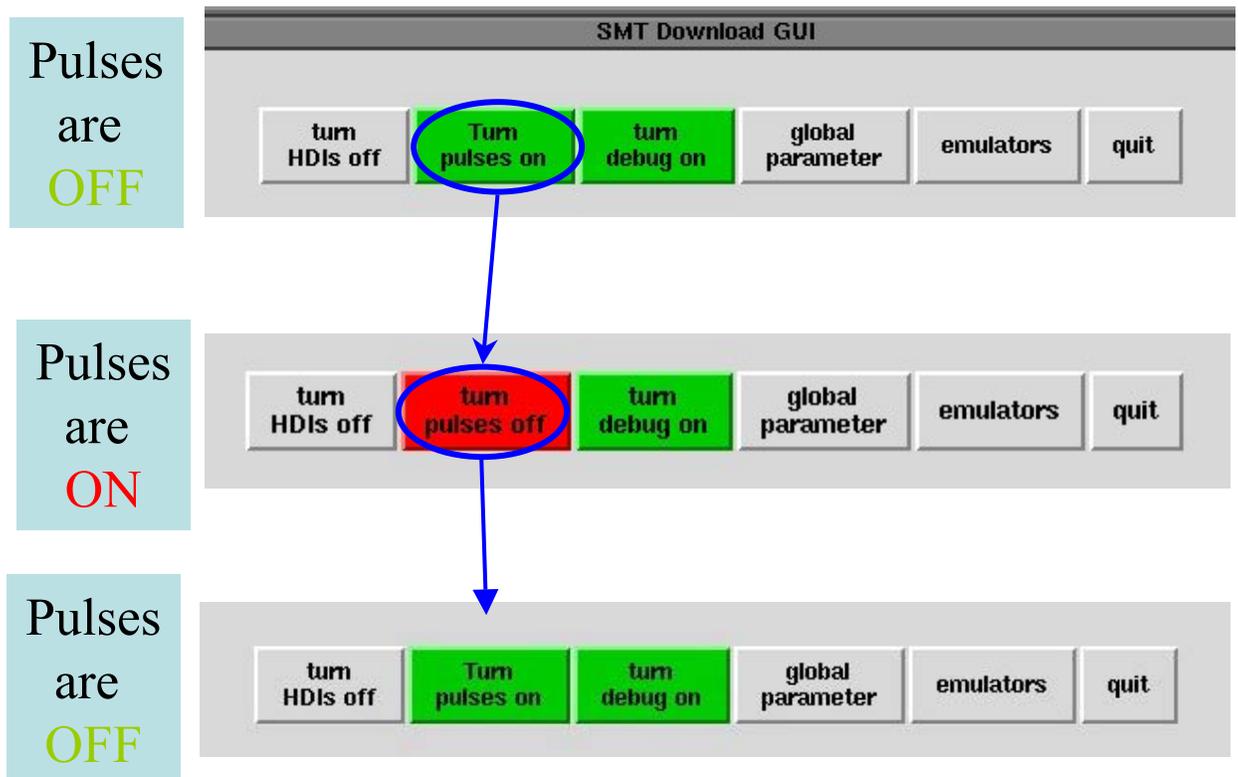
DVDD Currents GUI color coding:

- orange: LV is OFF
- green: LV is ON and I\_DVDD OK
- purple: LV is ON and I\_DVDD slightly high
- red: LV is ON and I\_DVDD high
- red/black: Abnormal state (Trip or Buffer Disabled)
- light blue: Channel is a disabled 6-chip F-wedge used only to provide bias to the 8-chip partner
- pink: Channel permanently disabled
- grey: Channel not used

## High DVDD currents and HDI LV Trips (2)

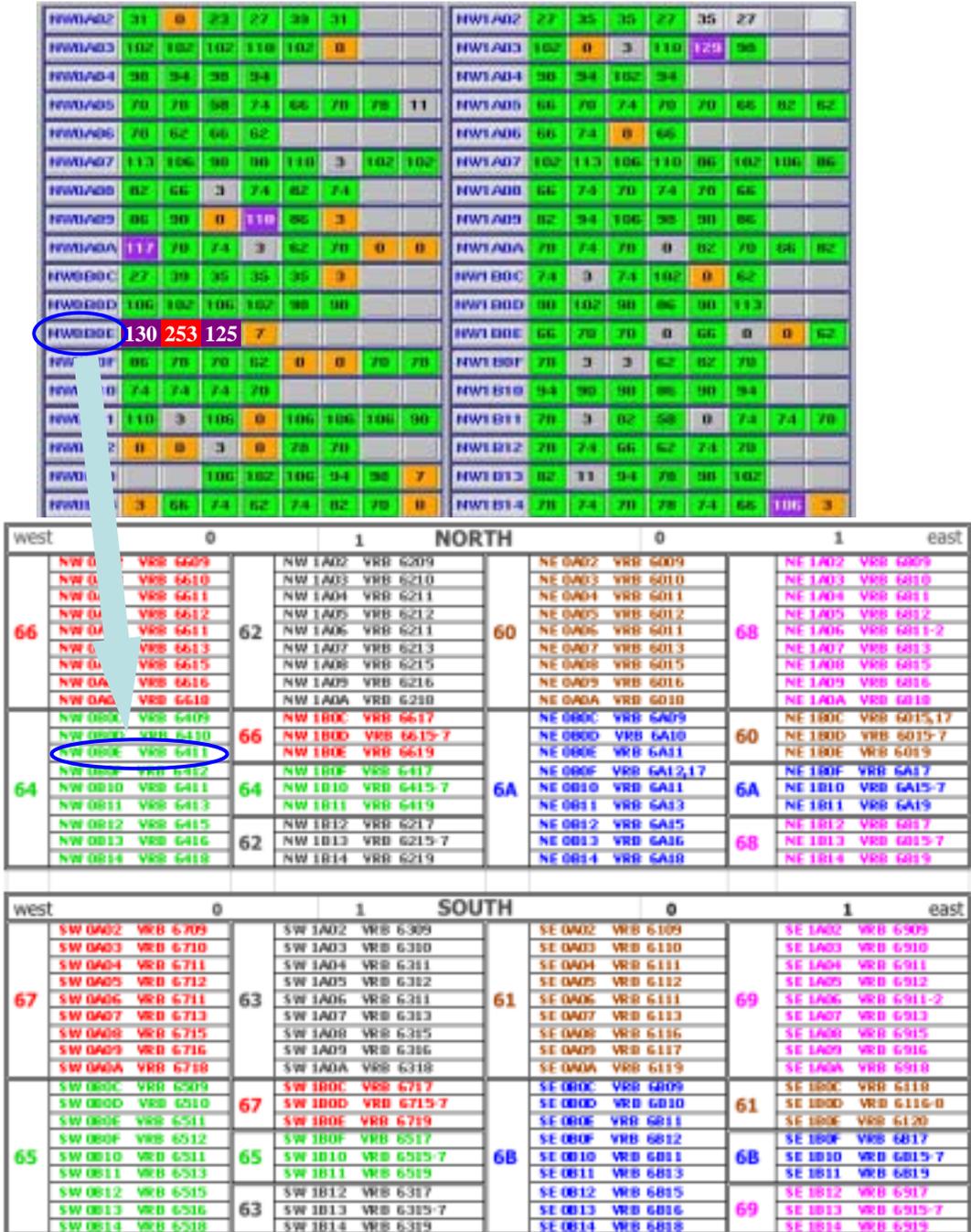
A way to lower the DVDD current drawn by the SVX chip, is to send trigger to the Sequencer Controllers so as to make the chips work. This can be achieved in several ways, by:

- having the crates in a working Global Run,
- having the crates out of the Global Run and making use of a special run which just sends triggers to the sequencer crates (the VRB crates are not read out). This is described in the « SMT Crater » section,
- sending triggers to the Sequencer Controllers via the 1553, by pressing the « turn pulses ON » button in the SMT Download GUI main page. **Do not forget to « turn the pulses OFF » before the Global Run starts or resumes readout of the SMT crates.** If you try to read out the crates while pulses are ON, this will result in 100% L1 FEB, because you are sending more triggers to the sequencer crates than to the VRB crates.



# High DVDD currents and HDI LV Trips (3)

If some HDIs consistently draw too much current (red or purple on the DVDD Currents GUI) you need to REDOWNLOAD them. The first step is to find what VRB they are connected to. This can be done looking at the IB mapping chart:



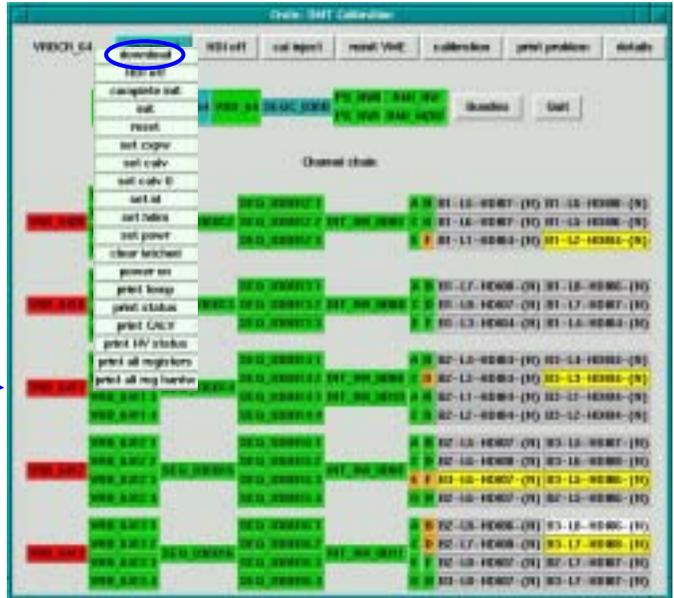
# High DVDD currents and HDI LV Trips (4)

Then, go to the corresponding VRB in the SMT Download GUI, and click download on the Left-click menu of the corresponding sequencer.

Most buttons have a Right- and Left-click menus.

A Left-click on an item of a menu executes that item

A Right-click on a menu closes it.



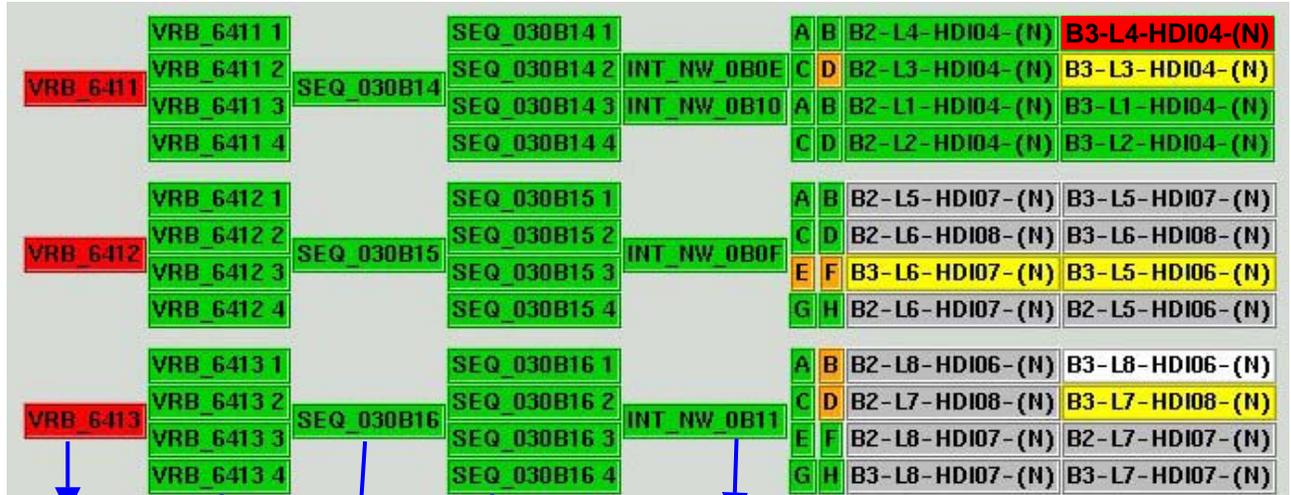
If the download was successful, the HDIs should appear green, both in the Download GUI and on the DVDD Currents GUI:

HWDV02	31	0	23	27	35	31	
HWDV03	102	102	102	110	102	0	
HWDV04	90	94	90	94			
HWDV05	70	70	58	74	68	70	11
HWDV06	70	62	66	62			
HWDV07	113	106	90	96	110	3	102
HWDV08	82	66	3	74	82	74	
HWDV09	96	90	0	110	86	3	
HWDV0A	117	70	74	3	62	70	0
HWDV0C	27	29	35	35	35	3	
HWDV0D	106	102	106	102	80	90	
HWDV0E	102	102	94	7			
HWDV0F	66	70	70	62	0	0	70
HWDV0H	74	74	74	70			
HWDV0I	110	3	106	0	106	106	90
HWDV0J	0	0	3	0	70	70	
HWDV0K		106	102	106	94	90	7
HWDV0L	3	66	74	62	74	82	70



# High DVDD currents and HDI LV Trips (5)

If one or more HDIs appear red in the Download GUI, the download was not successful.

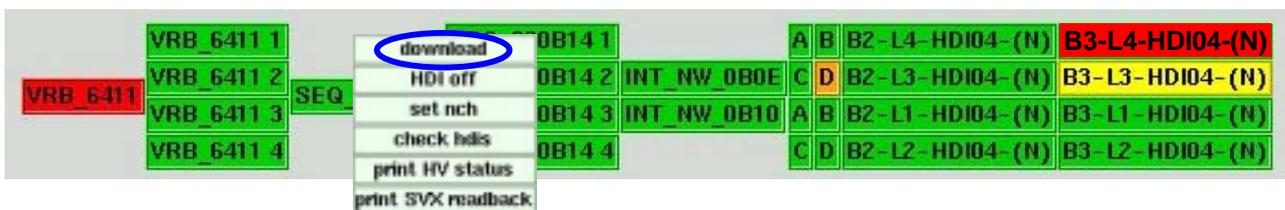


- HDI Status Color Coding:**
- white: permanently disabled
  - yellow: disabled
  - grey: enabled and either OFF or unknown
  - green: enabled, ON and downloaded OK
  - red: enabled, (ON and failed download) or tripped

- IB Channel Status Color Coding:**
- green: OK
  - red: tripped

1 Fiber = 2 HDI s

Try to download a few more times at the Sequencer level. If it still does not work, try to download at the corresponding Sequencer Fiber level.



## High DVDD currents and HDI LV Trips (6)

1. If this still does not work, it sometimes helps, when an **HDI is reluctant in downloading properly**, to turn it OFF and ON again.
2. In the same way, if an **HDI has tripped**, to recover it, you need to clear the trip by turning the HDI OFF and then turn it back ON again, by downloading it.

The screenshot shows a control interface with two main sections:

**Top Section: Sequencer Commands**

VRB_6411	VRB_6411 1	SEQ_030B14	SEQ_030B14 1	B	B2-L4-HDI04-(N)	B3-L4-HDI04-(N)
	VRB_6411 2		SEQ_030B14 2	C	B2-L3-HDI04-(N)	B3-L3-HDI04-(N)
	VRB_6411 3		SEQ_030B14 3	A	B2-L1-HDI04-(N)	B3-L1-HDI04-(N)
	VRB_6411 4		SEQ_030B14 4	C	B2-L2-HDI04-(N)	B3-L2-HDI04-(N)

**Bottom Section: Data Table**

NWDA02	31	0	23	27	39	31		
NWDA03	102	102	102	110	102	0		
NWDA04	90	94	90	94				
NWDA05	70	70	50	74	66	70	70	11
NWDA06	70	62	66	62				
NWDA07	113	106	90	96	110	3	02	102
NWDA08	02	66	3	74	02	74		
NWDA09	06	90	0	110	06	3		
NWDA0A	117	70	74	3	62	70	0	0
NWDB0C	27	30	35	35	35			
NWDB0D	106	102	106	102	90	90		
NWDBDE	13		25	7				
NWDBDF	06	70	70	62	0	0	70	70
NWDBD0	74	74	74	70				
NWDBD1	110	3	106	0	106	106	106	90
NWDBD2	0	0	3	0	70	70		
NWDBD3			106	102	106	94	90	7
NWDBD4	3	66	74	62	74	02	70	0

**In both cases, if the High Voltage is ON, you will need first, to RAMP DOWN and TURN OFF the HV on ALL HDIs connected to the SAME SEQUENCER as the HDI you want to turn ON or OFF. Otherwise, the Download GUI will not execute your commands.**



# High DVDD currents and HDI LV Trips (8)

Turn OFF the tripped HDI:

VRB_6411	VRB_6411 1	SEQ_030B14	SEQ_030B14 1	INT_NW_0B0E	A B	B2-L4	HDI04-(N)	HDI04-(N)
	VRB_6411 2		SEQ_030B14 2		C D	B2-L3	DIO4-(N)	DIO4-(N)
	VRB_6411 3		SEQ_030B14 3		A B	B2-L1	DIO4-(N)	DIO4-(N)
	VRB_6411 4		SEQ_030B14 4		C D	B2-L2	DIO4-(N)	DIO4-(N)

HDI off
power cycle
calc new threshold
calc noisy chan
calc dead and occ
print HV pods
print HV status
print cal statistics
HV pods GUI
SVX GUI
SVX Thresholds



VRB_6411	VRB_6411 1	SEQ_030B14	SEQ_030B14 1	INT_NW_0B0E	A B	B2-L4-HDI04-(N)	B3-L4-HDI04-(N)
	VRB_6411 2		SEQ_030B14 2		C D	B2-L3-HDI04-(N)	B3-L3-HDI04-(N)
	VRB_6411 3		SEQ_030B14 3		A B	B2-L1-HDI04-(N)	B3-L1-HDI04-(N)
	VRB_6411 4		SEQ_030B14 4		C D	B2-L2-HDI04-(N)	B3-L2-HDI04-(N)

NWDA02	31	0	23	27	39	31		
NWDA03	102	102	102	110	102	0		
NWDA04	98	94	90	94				
NWDA05	70	70	58	74	66	70	70	11
NWDA06	70	62	66	62				
NWDA07	113	106	90	96	110	3	102	102
NWDA08	02	06	3	74	02	74		
NWDA09	06	90	0	110	06	3		
NWDA0A	117	70	74	3	62	70	0	0
NWDB0C	27	39	35	35	35	7		
NWDB0D	106	102	106	102	98	90		
NWDB0E	130	3	25	7				
NWDB0F	06	70	70	62	0	0	70	70
NWDB10	74	74	74	70				
NWDB11	110	3	106	0	106	106	106	90
NWDB12	0	0	3	0	70	70		
NWDB13			106	102	106	94	90	7
NWDB14	3	66	74	62	74	02	70	0

OFF

As explained earlier, try to download the HDI at the sequencer level or at the Sequencer Fiber level.

If the download worked, in the HV GUIs shown in the previous page, turn the HV ON, « Set HV->100% », « Ramp ». Once the target voltages are reached, « Lock », « File->Quit », and you are done!

If not, you need to turn the HDI off, disable it as explained in the next page ...

## **High DVDD currents and HDI LV Trips (8)**

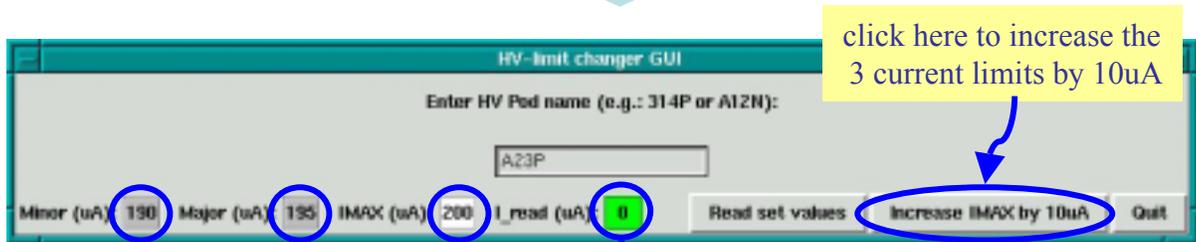
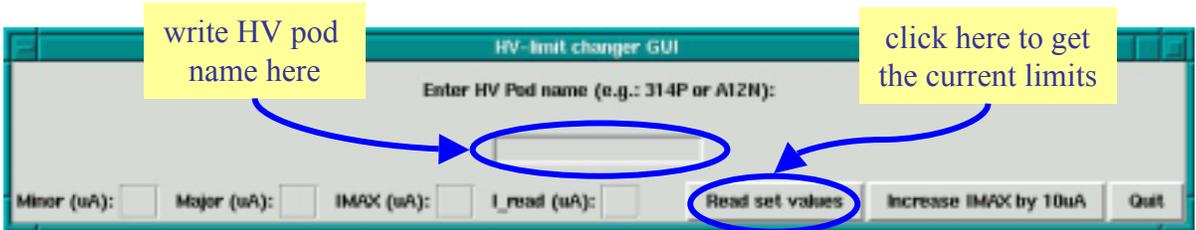
### **Disabling Instructions**

## High DVDD currents and HDI LV Trips (9)

HDI off		A B	B2-L4-HDI04-(N)	B3-L4-HDI04-(N)
power cycle				
calc new threshold	HDI power off	C D	B2-L3-HDI04-(N)	B3-L3-HDI04-(N)
calc noisy chan	print problem	A B	B2-L1-HDI04-(N)	B3-L1-HDI04-(N)
calc dead and occ	start monitoring	C D	B2-L2-HDI04-(N)	B3-L2-HDI04-(N)
print HV pods	start monit run...			
print HV status	stop monitoring			start HV GUI
print cal statistics	SEQ set CALV			start IB GUI
HV pods GUI	SEQ CALV 0			download
SVX GUI	SEQ set CXPW			HDI off
SVX Thresholds	SEQ clear latched			set nch
	VRB reset			check hdis
	VRB init			print HV status
	VRB enable			print SVX readback
	VRB disable			
disable hdi_status	VRB j3 disable			
hdi_status	VRB j3 enable			
cal_id	VRB j3 default			HDI off
adc_pedestal	VRB pattern			power cycle
hdi_type	VRB no pattern			calc new threshold
subset	VRB print reg			calc noisy chan
sector	VRB print VTM			calc dead and occ
barrel\$di	VRB print problem			print HV pods
layer	scan HV			print HV status
ladder\$we	start HV GUI			print cal statistics
bundle	print hdi list			HV pods GUI
number_of_s	write sdaq file			SVX GUI
hdi_view	write mon cal file			SVX Thresholds
prim_hv_pod_s	write off cal file			
sec_hv_pod_s	write pickle file			
	write transl map			
				download
				HDI off
				complete init
				init
				reset
				set cxpw
				set calv
				set calv 0
				set id
				set hdim
				set powr
				clear latched
				power on
				print temp
				print status
				print CALV
				print HV status
				print all registers
				print all reg hardw

# HV current limit GUI

Start the HV current limit GUI using the « GUI starter » GUI, Page B, button 4 (to start the GUI starter, type in a terminal window: cd; setup d0online; ./startguis.py)

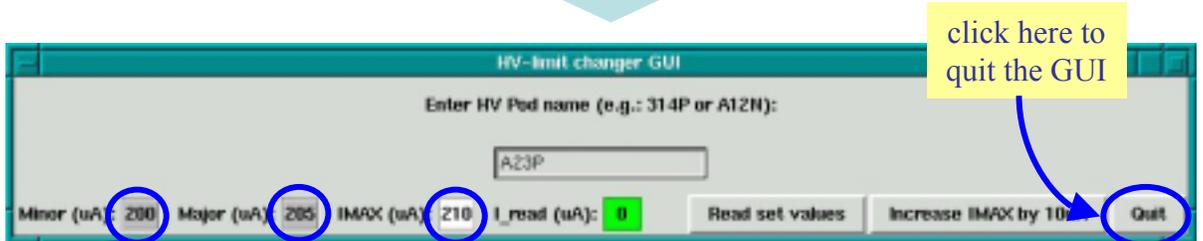


Minor Alarm Current Limit

Major Alarm Current Limit

Current Trip Limit

Actual Pod Read Back Current



current limits are updated and a mail is sent to Breese and Eric

## Monitoring (1)

Monitoring of the data quality is done at the strip level in processes which run in the VRB crates Power PCs (IOCs). The status of these IOCs can be looked at from the « Readout IOC Monitor » (from GUI starter, page C, button 6).

Power PCs (IOCs)  
in the 12 VRB crates

CPU consumption varies  
between 50 and 75% when  
monitoring is running

IOC Node	CPU %	Mem %	FD %	Action
crate 0x60 port 8				
d0olmt11	58	36	38	Reboot
crate 0x61 port 30				
d0olmt08	52	20	40	Reboot
crate 0x62 port 21				
d0olmt13	61	20	38	Reboot
crate 0x63 port 7				
d0olmt07	61	20	38	Reboot
crate 0x64 port 28				
d0olmt00	53	36	38	Reboot
crate 0x65 port 27				
d0olmt06	57	41	40	Reboot
crate 0x66 port 26				
d0olmt09	51	20	56	Reboot
crate 0x67 port 5				
d0olmt05	56	38	38	Reboot
crate 0x68 port 10				
d0olmt02	56	37	38	Reboot
crate 0x69 port 23				
d0olmt03	63	20	36	Reboot
crate 0x6a port 31				
d0olmt14	59	38	38	Reboot
crate 0x6b port 24				
d0olmt04	63	42	36	Reboot

Status: GUI initialization complete

Buttons: Reconnect, Reboot

For each VRB crate, the monitoring process captures events from the SBC and makes histograms out of them. A Linux box queries the IOCs one after the other to get their histograms out, so as to allow their browsing through a WEB interface. When an IOC is queried, if the number of events accumulated by the IOC lies between 8,000 and 10,000, an update will be sent for the corresponding crate to the Significant Event System (the result of which is shown in the Alarm Display) for major alarms related to the « Occupancy » and « Dead » categories. An « Occupancy » alarm is set whenever the occupancy of an HDI is greater than 25%. A « Dead » alarm is set if (a) chip(s) of an HDI never appear in the read out stream. Note that disabled HDIs do not generate a « Dead » alarm. **You have to take Occupancy and Dead alarms seriously!**

## Monitoring (2)

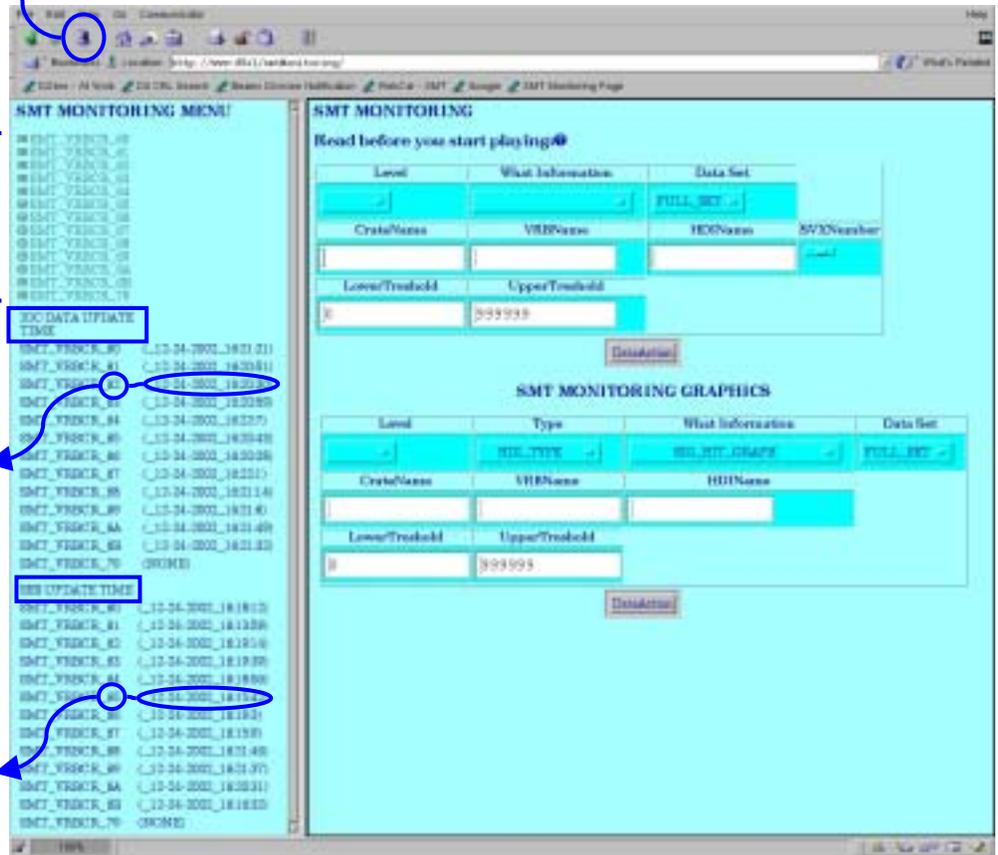
You can connect with Netscape (or you favorite Browser) to the Monitoring Server page (<http://www-d0ol/smtMonitoring/>). It also appears labeled as « SMT Monitoring Page » in the Netscape Toolbar and in the Bookmarks menu.

click on this to update the page

VRB crates

Last time data were received from IOC in VRB crate 62

Last time update was sent to SES (Alarm system) for crate 65



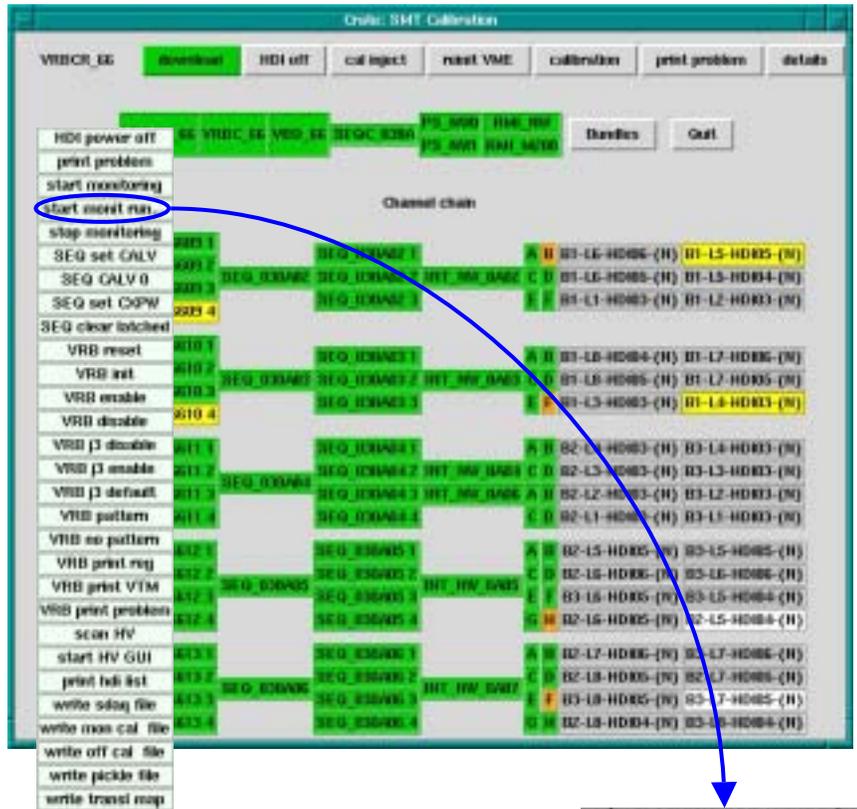
As a general rule, the monitoring should always be turned on during Global Runs (zero\_bias or physics). Check this by looking at the IOC CPU consumption, on the Readout IOC Monitor GUI, at the « IOC DATA UPDATE TIME » and « SES UPDATE TIME » on the Monitoring WEB page. The monitoring is started at the beginning of a run and stopped at the end of a run. If monitoring does not seem to be on, during a Global Run, check with the DAQ shifter that the trigger file has SMT monitoring enabled. If not, the DAQ shifter should enable the monitoring and start a new run. You can also start the monitoring « by hand », VRB crate by VRB crate, using the crate « details » page in the SMT download GUI, as follows:

# Monitoring (3)

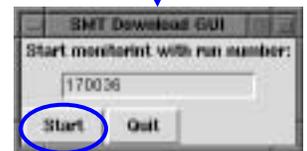
Imagine that for some reason, you need to power cycle crate 66 during a global run. After pausing the run, you cycle the power on crate 66, you wait for the Power PC to reboot, you « Reinit VME » and you resume the run. Now, what you see on the IOC monitoring is that the monitoring process in crate 66 is probably not processing anything:



open the details page for crate 66 in the SMT download GUI and click on the « Start monit run » item in Left-clickmenu of the VRBCR\_66 button. In the resulting pop up window, write the current run number and click « Start »



You can open a terminal window on the IOC by connecting to it through the MCH2 terminal server. The login name is: ioc the passwd: Onlined0



# Monitoring (4)

If everything goes as expected, this is what you should then see:

The image shows a terminal window on the left and a graphical SMT Monitor display on the right. The terminal window displays the output of a telnet session to t-d0-mch2, showing the connection process, login, and the start of the monitoring process. The SMT Monitor display shows a table of IOC names, CPU%, Mem%, and FD% for various components, with a 'Refresh' button at the bottom.

```

[00smt@d0o128 ~]$ telnet t-d0-mch2
Trying 131.225.231.47...
Connected to t-d0-mch2.fnal.gov (131.225.231.47).
Escape character is '^'.

login: ioc
password:
digi> conn 26

-> 0x3dcff80 (CA_client): ** Command Parsed: I
0x3dcff80 (CA_client): ** Command Parsed: N
0x3dcff80 (CA_client): ** Command Parsed: I
0x3dcff80 (CA_client): ** Command Parsed: T
process: CTL_SDAQ_6S/RPLY
ssdaqInit - waiting (forever) for semaphore stateMutex
ssdaqEnd called -----
ssdaqEnd completed
ssdaqInit - got stateMutex
whatToDo parameter is: MONITOR
host: d0o1c port: 52221 run: 170036 runTypeSuper parameter: MONITOR whatToDo par
meter: MONITOR

ssdaqInit - reading configuration information...
buildRunConfig.c - BEGIN ...
buildRunConfig.c - before return ...
ssdaqInit - replacing host name and port number...
ssdaqInit - creating distributions...
ssdaqCreateDist; NumberOfSvx: 419 NumberOfHdi: 61
MONITOR .....
ssdaqInit - detectinging VRBC...
ssdaqInit - detecting VRB...
ssdaqInit - creating raw data buffer...
pBuf calculated based on HDIs and Chips: 214528
pBuf data buffer size: 400000
usingTFW(): 1
SBCIntConnect(handler:SBCIntHandler)
SSDAQ initialization finished successfully
**** clearDistributions ****
ssdaqInit - end of init
0x3dcff80 (CA_client): ** Command Parsed: S
0x3dcff80 (CA_client): ** Command Parsed: T
0x3dcff80 (CA_client): ** Command Parsed: A
0x3dcff80 (CA_client): ** Command Parsed: R
0x3dcff80 (CA_client): ** Command Parsed: T
process: CTL_SDAQ_6S/RPLY
ssdaqProc - waiting (forever) for semaphore stateMutex
ssdaqEnd called -----
ssdaqEnd completed
ssdaqProc - got stateMutex
***** Begin of monitoring stuff *****
***** one loop, *****: 0
***** one loop, *****: 1000
    
```

IOC Name	CPU%	Mem%	FD%	Refresh
s0Inlet01	80	21	36	Refresh
s0Inlet02	80	20	36	Refresh
s0Inlet03	84	20	36	Refresh
s0Inlet07	89	20	36	Refresh
s0Inlet00	51	21	36	Refresh
s0Inlet08	84	41	36	Refresh
s0Inlet09	54	16	36	Refresh
s0Inlet05	53	16	36	Refresh
s0Inlet02	81	17	36	Refresh
s0Inlet03	85	20	36	Refresh
s0Inlet14	82	16	36	Refresh
s0Inlet04	89	42	36	Refresh

After 5 to 10 minutes, you can also check that the « IOC DATA UPDATE TIME » and « SES UPDATE TIME » are current on the Monitoring WEB interface.

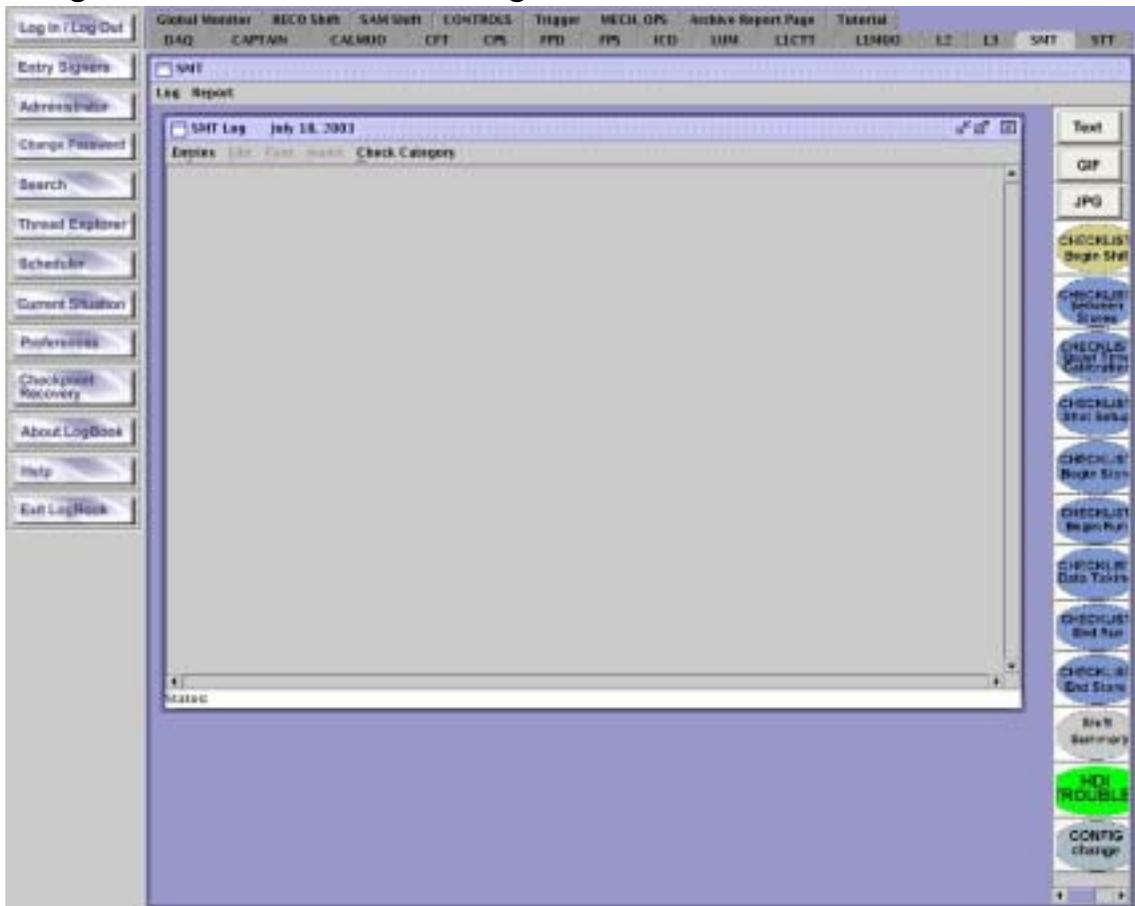
# Logbook

## Starting

The very first thing that a shifter should do is log into the online electronic logbook. Normally it is already running on one of the SMT monitors. If it is not, then start the logbook:

- > setup d0online
- > start\_daq logbook &
- Or from the "startgui" gui D.1.
- Click on the **SMT** tab.
- Select **SMT Log** from the **Log** menu.

An SMT Log window should now appear in the central field, with pre-configured checklist icons to the right:



# Logbook Use

**General Guidelines:** *Everything* that is done to any part of the SMT system by the shifter or anyone else must be recorded in the logbook. Some guidelines to follow are:

- **Use Checklists:** The pre-configured checklists are there to provide a thorough framework and guide for conducting a shift. They are required, but not sufficient; i.e. a starting point for logbook entries.
- **Keep it short:** Each entry should be concise and focussed on a single task/observation/event. Practice a “log-as-you-go” habit instead of saving up a lot of information for a big summary entry.
- **Archive promptly:** Archive entries immediately upon *timely* completion. Do not keep entries open for extended periods. For example, do not wait for a Shot Setup to complete before archiving the Shot Setup checklist. Archive promptly, and annotate later, if necessary. Also, do not make logs within entries (e.g. 8:00 – started shift. 8:30 – ramped up HV. 9:00 – recovered all dead HDI’s).

**Log In/Log Out:** To log into the logbook, click on the **Log In/Log Out** button at the top left. Enter your account name and password in the window that pops up (to obtain an account, contact Harald Fox or Eric Kajfasz). Remember to log out of the logbook at the end of your shift.

**Checklists:** There are twelve pre-configured checklist icons to the right. To use one of the checklists, select an icon and drag it into the SMT Log window. Then proceed to complete the checklist by filling in all of the fields.

The checklists are:

- **Begin Shift:** complete at the beginning of a shift
- **Between Stores:** fill out (and update once per hour) during the time between the last store and the next shot setup. This includes during beam studies.
- **Quiet Time Calibration:** complete any time a calibration run is taken.
- **Shot Setup:** complete when MCR is preparing for shot setup.
- **Begin Store:** complete after a new store has been verified with the Shift Captain.
- **Begin Run:** fill out any time a new data run is started.
- **Data Taking:** complete a new Data Taking checklist once every hour during an ongoing data run.
- **End Run:** complete at the end of every data run.

# Logbook Use

- **End Store:** complete before a store is dumped (or after a store is lost unexpectedly).
- **Shift Summary:** complete at the end of a shift (this summary will be automatically e-mailed to the d0smt mailing list).
- **HDI TROUBLE:** fill out any time an individual HDI requires special attention (i.e. redownload due to FEB or high currents, disable, re-enable, etc.).
- **CONFIG Change:** fill out any time the SMT run configuration has changed (i.e. any time an HDI has been disabled/re-enabled or there has been a change in the voltage setting of any of the HV pods).

**Text Entry:** To add a text entry to the logbook, select the **Text** icon from the right and drag it into the SMT Log window. Then compose in the generated entry.

**Creating Images:** Many times it is required or desired to make an image of a plot or gui window on one of the monitors. This can be done with the **import** command:

- Open a shell on the screen in which the desired image (plot, gui, etc.) appears.
- **cd** to the appropriate SHIFT directory which may need to be created (e.g. ~d0smt/SHIFTS/2002/oct/16/day).
- `>import <filename>`
- Place the '+' cursor on the desired window to be imaged, and left-click. The image will be created as <filename> in the current directory.

**Inserting Images:** There are two ways to insert images into the logbook:

- **GIF/JPG Entry:** Select either the **GIF** or **JPG** icon from the right and drag it into the SMT Log window. A **Get File** pop-up window will appear from which you can browse for the desired image.

# Logbook Use

- **Insert into an existing entry:** with the cursor positioned within an existing logbook entry, select **Image > From a File** from the **Insert** menu on the SMT Log toolbar. A **Get File** pop-up window will appear from which you can browse for the desired image.

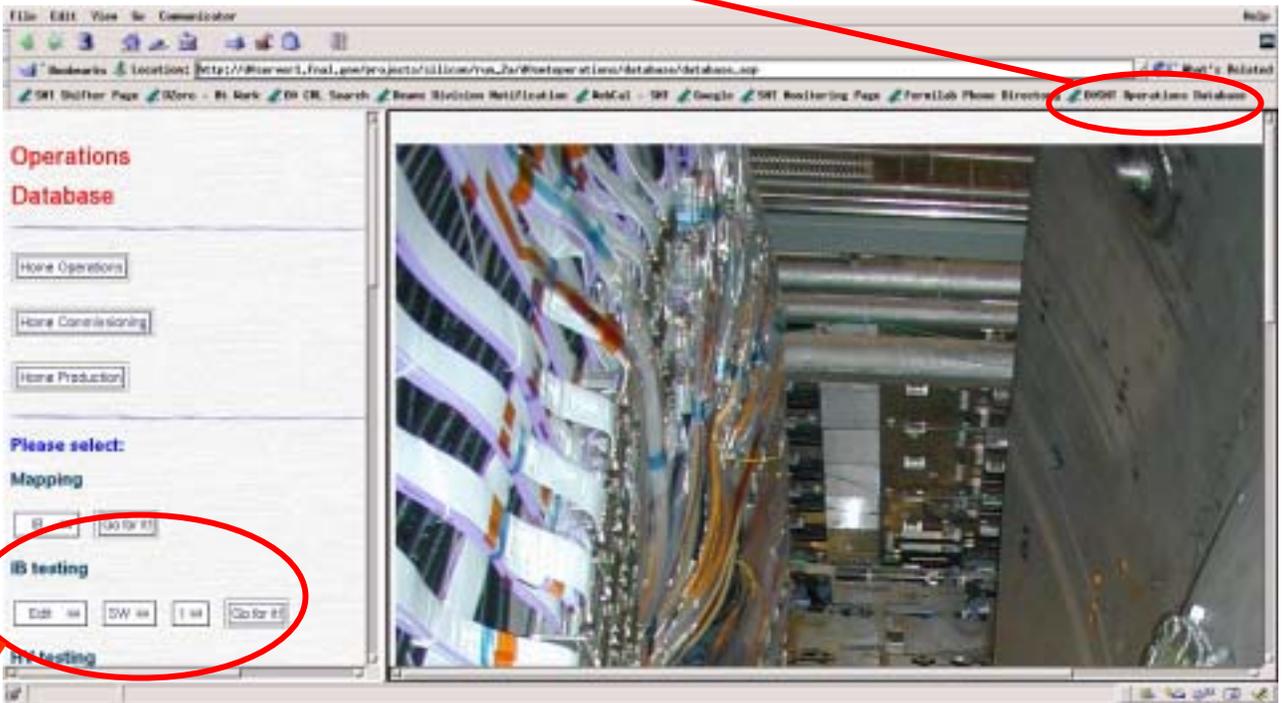
**Archiving Entries:** Any entry to the logbook should be archived immediately upon completion. To do this, left-click on the entry header, then right-click and select **Archive Selected Entries**.

**Annotating Entries:** An annotation can be added to any archived entry by clicking on the **ANNOTATE** button in the archived entry.

# DØSMT Operations Database

The Operations Database is a web-based database that we use to keep track of the performance history of the SMT. By far, the most-used section of the Operations Database is the one in which we keep track of individual HDI histories. In particular, it is a shifter's responsibility to make a database entry each time that an HDI is disabled or re-enabled.

The Operations Database can easily be located from a netscape window started from the d0smt account. A link to "DØSMT Operations Database" can be found at the far right of the quick link bar.



If you need to make an entry into the database for a particular HDI (e.g. when an HDI has been disabled or re-enabled), go to the "IB Testing" section in the left-hand frame. Let's assume you have disabled SW1B11-B:

- From the pull-down menus in the "IB Testing" area, select: "Edit" "SW" "1". Then click "Go for it!".

# DØSMT Operations Database

- You will be prompted for a user name (d0smt) and password (dab). Enter those at the appropriate spaces and click “Submit”.
- A graphic map of the SW interface board crates will appear. Click on the colored box corresponding to the IB channel for the HDI that you want to make an entry for.

**NOTE!:** In the download GUI and elsewhere, when HDIs are referred to by their Interface Board channel, the numbering is in hexadecimal (e.g. the '11' in SW1B11-B). In the Operations Database, two designation are given: the top 'IB #' row is in hexadecimal, the bottom 'GUI #' row is in decimal. Be careful that you are selecting the correct HDI!

The screenshot shows the 'Operations Database' web interface. On the left, there are navigation buttons for 'Home Operations', 'Home Commissioning', and 'Home Production'. Below these are sections for 'Please select:', 'Mapping', 'IB testing', and 'HV testing'. The main area is a grid of colored boxes representing different SW interface board crates. The grid is organized into three main columns: SW1, SW1A, and SW1B. Each column has rows for different Interface Board (IB) channels and GUI numbers. A red circle highlights a cell in the SW1B column, specifically at the intersection of IB 11 and GUI 17. A red arrow points from the text above to this highlighted cell.

	IB#	GUI#	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14					
H	1B	B																								
G	1A	A																								
F	2B	D																								
E	2A	C																								
D	3B	F																								
C	3A	E																								
B	4B	H																								
A	4A	G																								
	Dev type		L3	L3	L3	L3	L3	L3	L3	F3	F3	F3	F3	F3	H3	F3	H3	F3	H3	F3	H3					
	VPRISEU data		6320-1B						6713-0A						6519-0B						6320-1B					

# DØSMT Operations Database

- A list of all entries made for that particular HDI will appear. To make a new entry, click on the “New Rec” button near the upper left.

The screenshot shows a web browser window displaying the 'Operations Database' for 'IB channel SW1B/17-B'. The page title is '7 Record(s) found ...'. A red circle highlights the 'New Rec' button in the top left corner of the record list. The record list contains the following data:

	Date	Time	Initials	Iavdd	Iavdd2	Ivdd1	Iop+	Iop-	Status	Comments
<a href="#">4670</a>	6/9/2003	11:19:19 AM	MC(RG)						DVDD trip	first it tripped, then it caused 100%FEB also after many downloads, we are in shot setup.
<a href="#">3986</a>	1/14/2002	9:05:31 PM	MW						OK	HDI is up and running at the moment..
<a href="#">3938</a>	11/6/2001	10:41:05 PM	TD						No download	buffer is always in a disabled state, causing other dvdd currents associated with I1 SW1B11 to trip.
<a href="#">3675</a>	11/2/2001	2:22:45 PM	AJ						OK	I haven't seen any Calject problem with chip 3.
<a href="#">3345</a>	10/25/2001	12:59:45 AM	MW						Cal Inj problem	chip no. 3 no calinj from time to time
<a href="#">2480</a>	5/31/2001	1:37:08 AM	JS	358	173	86	2.8		OK	
<a href="#">542</a>	5/11/2001	1:02:40 AM	AN						OK	

- A new record template will appear. Fill in your initials, choose a “Status” representing the current state of the HDI, and enter some thorough comments describing the problems observed, what actions were taken and why. The fields for individual currents do not, in general, need to be filled in.

# DØSMT Operations Database

The screenshot shows a web browser window with the URL [http://f0erwer1.fnal.gov/projects/ellison/run\\_2a/@topoperations/database/database.asp](http://f0erwer1.fnal.gov/projects/ellison/run_2a/@topoperations/database/database.asp). The page title is "New record for SW1B/17-B". The form contains the following fields:

- Date: 7/10/2003
- Time: 2:55:11 PM
- Initials: BQ
- leidd: [ ]
- leidd2: [ ]
- leidd: [ ]
- lcp+: [ ]
- lcp-: [ ]
- Status: DVDD trip
- Comments: I would write some incredibly insightful comments about this intractable HDI in this generous space.

At the bottom of the form, the "Update" and "Update/Top" buttons are circled in red. A red arrow points from the "Update" button to the bullet point below.

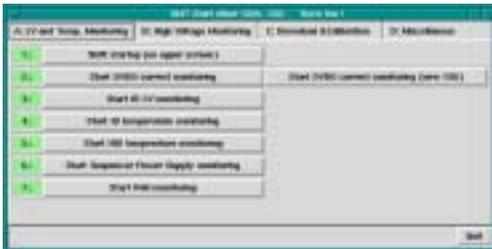
- When the entry has been completed, either click “Update”, which will return you to the HDI’s history (where your new entry will appear), or click “Update/Top”, which will return you to the interface crate map.

# All-GUIs-starter

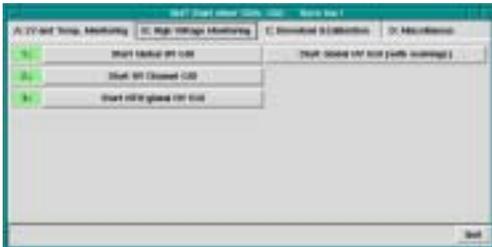
This GUI has been written to make your life, as a shifter, easier. It will allow you to start most of the other GUIs you will need to perform your work.

To start this GUI:

- open a d0smt shell window
- type:
  - > setup d0online
  - > cd ~
  - or
  - > cd ~/monitoring (it doesn't matter, as you wish...)
  - > ./startguis.py &



Page A: monitoring GUIs related to Low Voltages and temperatures



Page B: monitoring GUIs related to High Voltage



Page C: monitoring GUIs related to download, calibration and data taking



Page D: miscellaneous GUIs

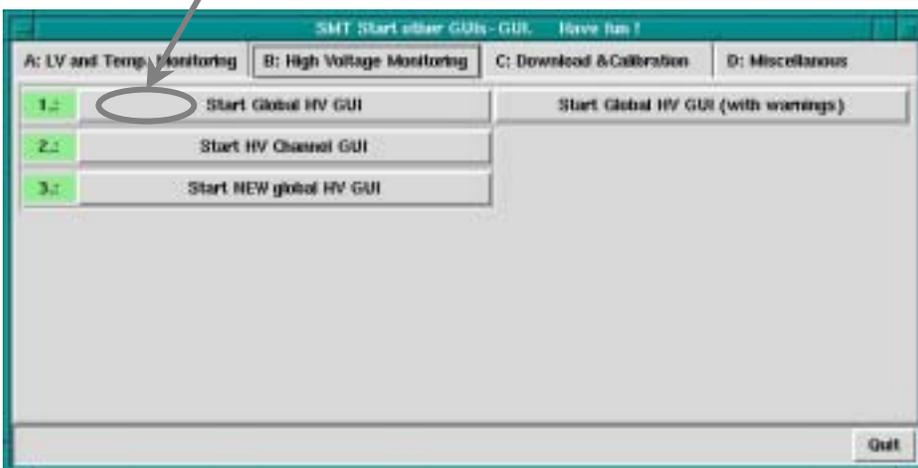
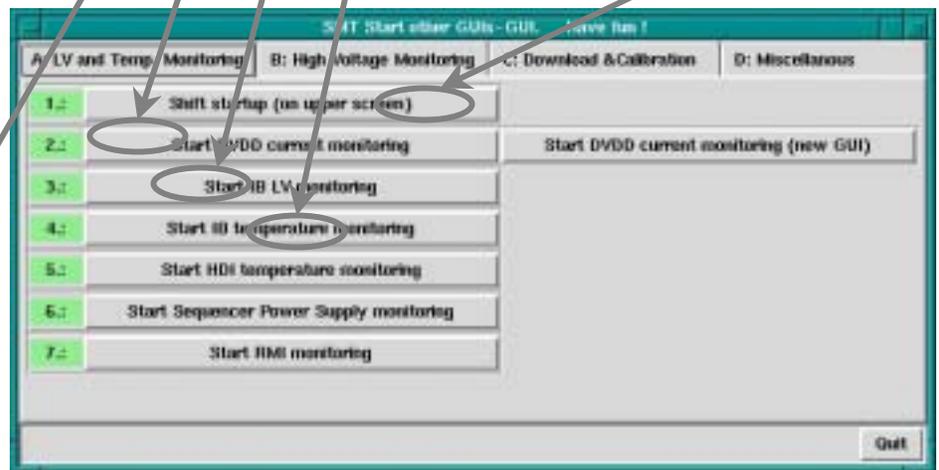
# All-GUIs-starter

## General Monitoring GUIs

The General Monitoring GUIs are the ones which allow you to monitor the behavior of the detector as far as:

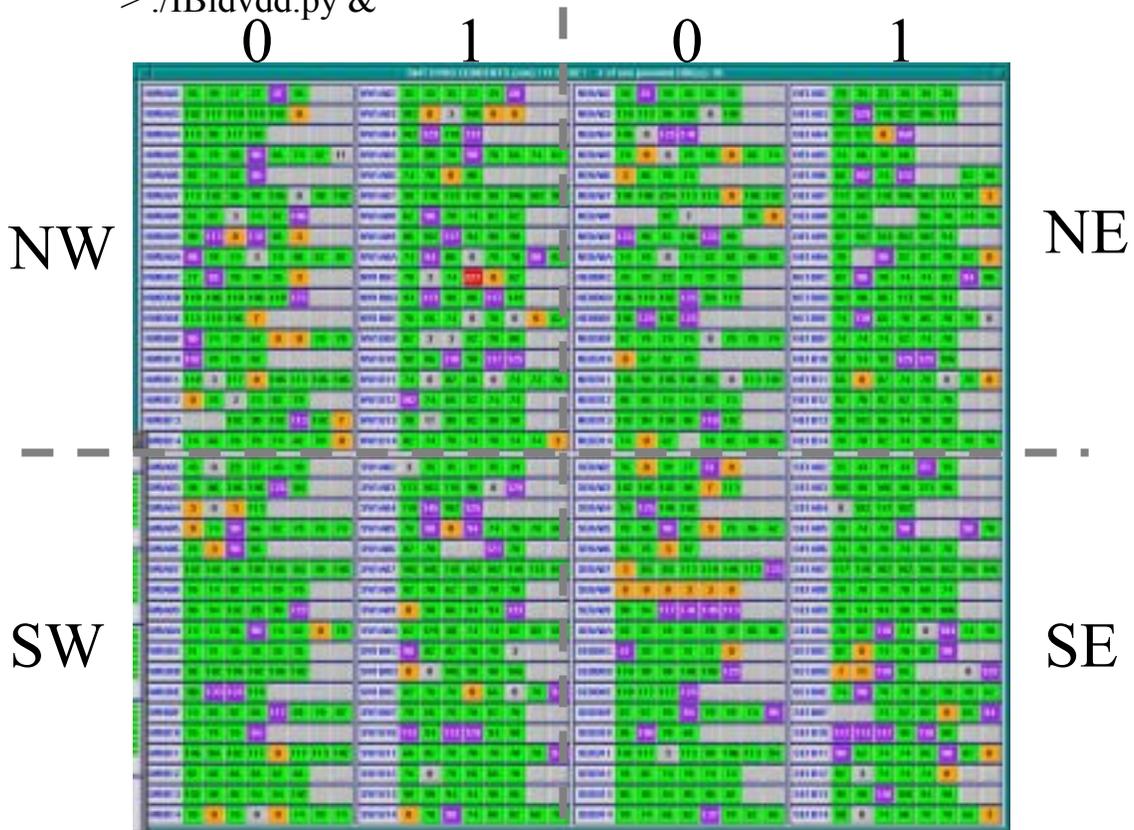
- HDIs DVDD currents
- Interface Board Low Voltage
- Interface Board Temperature
- High Voltage.

They need to be active at ALL TIMES. Using the all-GUIs-starter, they can be started individually (buttons B.1, A.2, A.3, A.4.) or all at once (button A.1.)



# HDI DVDD current GUI

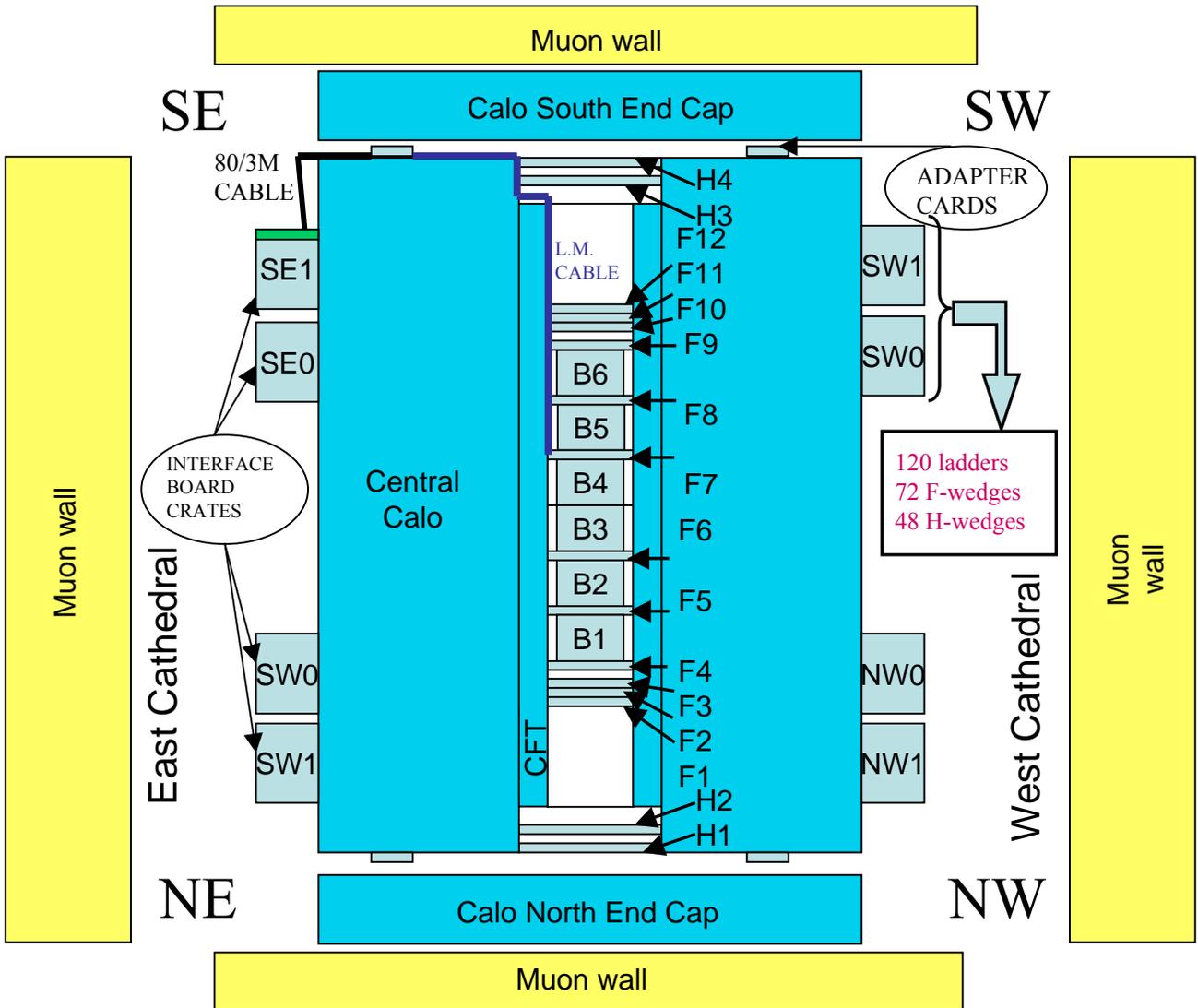
1. this GUI displays the DVDD currents of each Interface Board Channel ( i.e. each HDI)
2. It can be started from the all-GUIs-starter (A.2.) or by typing in a d0smt shell window:
  - > setup d0online
  - > cd ~/monitoring
  - > ./IBdvdd.py &



DVDD Currents GUI color coding:

- orange: LV is OFF
- green: LV is ON and I\_DVDD OK
- purple: LV is ON and I\_DVDD slightly high
- red: LV is ON and I\_DVDD high
- red/black: Abnormal state (Trip or Buffer Disabled)
- light blue: Channel is a disabled 6-chip F-wedge used only to provide bias to the 8-chip partner
- pink: Channel permanently disabled
- grey: Channel not used

# HDI's DVDD current GUI

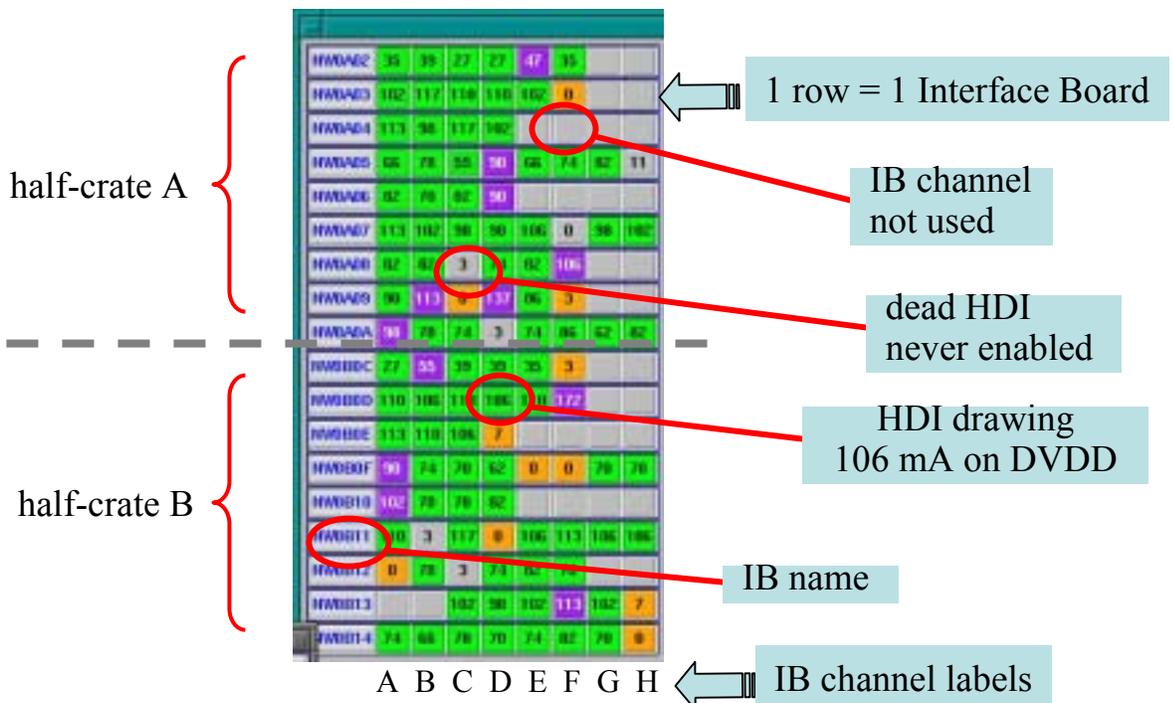


Location of the Interface Board Crates in the Cathedral

# HDI DVDD current GUI

The IB crates are subdivided into 2 halves (A and B), each half corresponds to 9 IB boards. In the IB crate GUI each IB is represented by a row:

- The first cell of the row contains the name of the interface board. The name is constructed as follows:
  - quadrant (NE, NW, SE, SW)
  - crate number (0, 1)
  - crate half (A, B)
  - IB slot number (in hex: 02-0A and 0C-14)
- It is followed by 8 cells corresponding to the 8 IB channels (labeled A thru H). Each IB channel can be connected to an HDI. The numbers written in the cells give the DVDD current in mA drawn by the corresponding HDIs
  - if a cell is gray and has a number, it means the HDI is really dead and thus never enabled.
  - if a cell is gray without number, it means that the IB channel is not used (no HDI connected to it)



# HDI DVDD current GUI

HDI (offline) name corresponding to that cell

IB channel name corresponding to that cell

if you click here

if you click here

SMT IB Status Display

IB Name	AVDD (A)	AVDD2 (A)	DVDD (A)	AVDD (V)	AVDD2 (V)	DVDD (V)	Temp (C)	Status
SMT_IB_SWDAB0-A	0.405	0.153	0.075	5.850	4.160	5.460	101.604	DVDD No
SMT_IB_SWDAB0-B	0.381	0.161	0.075	5.817	4.128	5.428	101.604	AVDD2 No
SMT_IB_SWDAB0-C	0.385	0.157	0.106	5.850	4.160	5.428	101.604	AVDD No
SMT_IB_SWDAB0-D	0.393	0.165	0.075	5.850	4.160	5.460	101.604	HDI Enab
SMT_IB_SWDAB0-E	0.381	0.157	0.071	5.850	4.128	5.428	101.604	Temp No
SMT_IB_SWDAB0-F	0.365	0.181	0.079	5.883	4.160	5.428	101.604	Buff Enab
SMT_IB_SWDAB0-G	0.000	0.000	0.000	0.130	0.130	0.130	101.604	ERROR
SMT_IB_SWDAB0-H	0.000	0.000	0.004	0.098	0.098	0.098	101.604	ERROR

IB Channels

HDI currents

HDI voltages

HDI temperatures

IB Channel status

IB Channel detailed status

click

# HDIs DVDD current GUI

- Check that the GUI is updating (e.g. from the GUI title bar date/time) if NOT kill it and restart it
- You should only see a small number of HDIs with a purple or red color. Some of the causes for this to happen can be:
  - if only 2 to 4 HDIs become purple or red in a row (i.e. Interface Board), this usually means the corresponding HDIs need to be redownloaded. To figure out what VRB they correspond to, you can either click on the corresponding cell in the DVDD current GUI or look at the IB/VRB map posted close to the SMT monitors
  - if HDIs are purple and red everywhere, it may mean that the HDIs are not read out:
    - check with the DAQ shifter that all the SMT readout crates are in a global run
    - if they are not, ask him/her to include them
    - if for some reason the global DAQ has to run without the SMT crates:
      - if the DAQ shifters allows it, start a SEQ only run with your own **taker**, after having prepared the SEQ only trigger file with the **crater** GUI
      - if the DAQ is down or the DAQ shifter does not want you to start your own taker, **turn on the pulsers** from the main page of the download GUI. DO NOT FORGET to turn OFF the pulser whenever the SMT crates are put back in a global run.

# IB Power Supplies GUI

There are 8 sets of IB Power Supplies. One set for each IB crate. Each set of power supplies is comprised of: 1 15V PS for IB 1553 circuitry, 3 VCC PS to power the IB ICs (1 for the 1st 7 boards, 1 for the next 6 boards, and 1 for the last 5 boards), and 6 PS to supply power to the SVX chips (1 AVDD2 PS, 2 DVDD PS [1 for 3 chippers and 1 for 6,8 and 9-chippers], 3 AVDD PS [1 for 3 chippers, 1 for 6 chippers and 1 for 8 and 9 chippers])

To start the IB Power supply GUIs, open a d0smt shell window:

```
> setup d0online
> cd ~/monitoring
> ./IBLVsmall.py &
```

or

in the all-GUIs-starter click button 3 on page A

detailed  
digital status

The External Interlock can be activated by the:

- Cryo permit (HDI cooling)
- IB Rack Monitors (Flow, Leak, Smoke)
- MCH3 Switches to AC power of the IB PS

# SEQ Power Supplies GUI

To start the Sequencer Power supply GUI, open a d0smt shell window:

- > setup d0online
- > cd ~/monitoring
- > ./seq\_gui.py &

or

in the all-GUIs-starter click button 6 on page A

The screenshot displays the SEQ LV Power Supply GUI with three main panels. The left and right panels show detailed status for North and South crates, while the center panel provides a summary and control options.

**Left Panel: North Crates**

Crates	(5.2V) Volt	(5.2V) Curr	(5V) Volt	(5V) Curr
North 1	5.2	128.42	5.16	151.86
North 2	5.17	112.79	5.16	128.42
North 3	5.19	120.12	5.07	143.07
North CFT	5.2	46.39	5.16	83.5

**Right Panel: South Crates**

Crates	(5.2V) Volt	(5.2V) Curr	(5V) Volt	(5V) Curr
South 1	5.2	152.83	5.4	122.56
South 2	5.19	118.65	5.43	124.51
South 3	5.18	142.58	5.14	139.18
South CFT	5.14	46.39	5.16	78.61

**Center Panel: Summary and Control**

Crates	5.2V	5V	Status
North 1	5.2V	5V	OK
North 2	5.2V	5V	OK
North 3	5.2V	5V	OK
North CFT	5.2V	5V	OK
South 1	5.2V	5V	OK
South 2	5.2V	5V	OK
South 3	5.2V	5V	OK
South CFT	5.2V	5V	OK

Supply Output: Enabled  
Operating Mode: Remote

Buttons: Details North, Details South, Power Control

Status: GUI Initialization complete

**Bottom Panel: Power Control for the North Side**

Buttons: On, Off, Reset

Annotations: Red ovals highlight the North and South crate data tables. Arrows point from the 'Details North' and 'Details South' buttons to their respective data tables. An arrow points from the 'Power Control' button in the left panel to the 'Power Control for the North Side' panel.

power supplies for the 3 North sequencer crates

power supplies for the 3 South sequencer crates

powers off ALL North crates (3 SMT and 1 CFT)

# IB Temperature GUI

All IB crates have a set of 3 pairs of temperature sensors inserted between some of their IBs. The sensors are read out through IB channels which are not used for HDIs.

If 3 or more temperatures out of 6 in a crate are over 35 degC, we consider that there is probably a cooling problem on that crate. In that case the GUI will automatically switch off the LV power supplies of that crate. So it is really IMPERATIVE to check from time to time that this gui is updating.

To start the IB Temperature GUI, open a d0smt shell window:

- > setup d0online
- > cd ~/monitoring
- > ./IBdegC.py &

or

in the all-GUIs-starter click button 4 on page A

The GUI displays a grid of temperature readings for various IB crates. The top bar shows the title 'IB CRATE TEMPERATURES - 11:13:31'. The grid is organized into three main sections, each with four rows and four columns of data. The first section (NW) shows temperatures ranging from 17 to 25. The second section (SW) shows temperatures ranging from 17 to 30. The third section (SE) shows temperatures ranging from 18 to 30. A red circle highlights the temperature reading '34.27' in the bottom-right cell of the SE section. An arrow points from this cell to a detailed data table below. Callout boxes provide instructions: 'check that time changes' points to the top bar, '3 pairs of temp sensors per crate' points to a 2x2 grid of cells, and 'click for details' points to the highlighted cell.

IB Name	AVDD (A)	AVDD2 (A)	AVDD3 (A)	AVDD (V)	AVDD2 (V)	AVDD3 (V)	Temp (C)	Status
SMT_IB_SE1B13-A	0.475	0.228	0.228	1.173	4.295	5.428	48.8	TEMPER
SMT_IB_SE1B13-B	0.472	0.212	0.209	1.143	4.296	5.428	49.4	TEMPER
SMT_IB_SE1B13-C	0.464	0.215	0.205	1.113	4.325	5.428	49.4	TEMPER
SMT_IB_SE1B13-D	0.468	0.228	0.204	1.113	4.325	5.428	48.7	TEMPER
SMT_IB_SE1B13-E	0.468	0.224	0.204	1.113	4.325	5.428	48.8	TEMPER
SMT_IB_SE1B13-F	0.448	0.215	0.204	1.173	4.324	5.428	48.8	TEMPER
SMT_IB_SE1B13-G	0.468	0.208	0.205	1.173	4.325	5.428	48.8	TEMPER
SMT_IB_SE1B13-H	0.468	0.208	0.205	1.173	4.325	5.428	48.8	TEMPER

# Utility Scripts and GUIs

To prepare to run the utility GUIs:, open a d0smt shell window:

```
> setup d0online  
> cd ~/monitoring
```

Since some of these utility GUIs can be launched from the all-GUIs-starter, you may want to start it too:

```
> ./startguis.py &
```

Some of the most useful utility GUIs are:

- information about what VRB, IB, SEQ, HV pod(s) a specific HDI (e.g. B2-3-5) is connected to:

```
> ./show_det_info.py B2-3-5 &
```

- information about what is connected to a specific HV pod (e.g. 100P):

```
> ./show_hv_info.py 100 &
```

(rem: you must drop the P or N from the end of the pod name)

- information about a specific IB channel (e.g. SW0A02-C)

```
> ./show_IB_info.py SW0A02-C &
```

- information about specific fiber input (e.g. fiber 2 [possible choices: 1, 2, 3 or 4]) of a specific VRB (e.g. VRB 13 in crate 6B)

```
> ./show_VRB_info.py VRB_6B13
```

- information about a specific VRB channel (e.g. channel 2 [possible choices: 0 thru 7]) of a specific VRB (e.g. VRB 13 in crate 6B):

```
> ./show_VRBchan_info VRB_6B13 2
```

# Utility Scripts and GUIs

- script to check **fast** and **slow** archivers:

```
> cd ~
> archiverchecks.sh &
```

or

in the all-GUIs-starter click button 7 on page D

```
> executing: /home/d0smt/archiverchecks.sh &
-----
FAST ARCHIVER CHECKS
-----
  Archiver processes on d0o128 (there should be three):
/usr/bin/X11/xauth: creating new authority file /tmp/Xauth3152_3842
d0smt  9484    1  0 Oct18 ?    00:45:28 /d0usr/products/chan_archiver/v1
d0smt  9485  9484  0 Oct18 ?    00:00:06 /d0usr/products/chan_archiver/v1
d0smt  9486  9485  1 Oct18 ?    01:23:47 /d0usr/products/chan_archiver/v1
} there should be 3 processes

  Archive file on d0o128 (should have a current time stamp):
/usr/bin/X11/xauth: creating new authority file /tmp/Xauth3152_3935
-rw-r--r--  1 d0smt  D0smt  30450331 Oct 23 11:04 0021023-000000
} date and time should be current

-----
SLOW ARCHIVER CHECKS
-----
  Archiver processes on d0o103 (there should be three):
/usr/bin/X11/xauth: creating new authority file /tmp/Xauth3152_16008
d0smt  11756    1  0 Oct21 ?    00:16:50 /d0usr/products/chan_archiver/v1
d0smt  11757 11756  0 Oct21 ?    00:00:02 /d0usr/products/chan_archiver/v1
d0smt  11758 11757  0 Oct21 ?    00:07:24 /d0usr/products/chan_archiver/v1
} there should be 3 processes

  Archive file on d0o103 (should have a current time stamp):
/usr/bin/X11/xauth: creating new authority file /tmp/Xauth3152_16103
-rw-r--r--  1 d0smt  D0smt  68762011 Oct 23 11:04 0021023-000000
} date and time should be current

-----
Archive checks complete - if different from expected, look
in the 'channel archiver' section of the SMT Shift Instructions
for information on how to proceed
-----
> █
```

If this is not the cas, follow the instructions in the « Archiver » section to stop and restart the problematic archiver(s)

# Listing Scripts and GUIs

- list of HDIs which are turned off

> ./listDisabledHDIs.py &

← script style

or

> ./show\_disabled\_hdis.py &

← GUI style

or

in the all-GUIs-starter click button 4 on page D

IB channel name	Device name	Status	DBstat	Comment
SMT_IB_SE0A02-F	B6-2-6	0x20	0	known
SMT_IB_SE0A03-E	B6-3-6	0x20	0	known
SMT_IB_SE0A05-E	B5-5-12	0x20	0	known
SMT_IB_SE0A06-C	B5-2-6	0x20	1	known
SMT_IB_SE0A07-A	B4-7-10	0x20	0	known
SMT_IB_SE0B0C-F	B6-2-1	0x20	0	known
SMT_IB_SE0B11-C	B5-8-2	0x20	2	known
SMT_IB_SE1A04-A	B5-3-2	0x20	2	known
SMT_IB_SE1A0A-E	H3-2-4	0x20	2	known
SMT_IB_SE1B0C-B	F8-2-1	0x20	0	known
SMT_IB_SE1B0D-G	F8-1-3	0x20	2	known
SMT_IB_SE1B0F-F	F10-2-2	0x20	0	known
SMT_IB_SE1B11-H	H4-2-3	0x20	8	known
SMT_IB_SE1B12-F	F12-2-4	0x20	0	known
SMT_IB_SE1B14-B	H4-2-6	0x20	2	known
SMT_IB_SE1B14-H	H4-2-7	0x20	0	known
SMT_IB_SW0A02-B	B6-6-5	0x20	2	known
SMT_IB_SW0A04-A	B5-3-3	0x20	0	***NEW***
SMT_IB_SW0A04-B	B4-3-3	0x20	2	known
SMT_IB_SW0A04-C	B5-4-3	0x20	0	known

Status:

# Listing Scripts and GUIs

- list information about HV

> ./list\_underdepleted\_hdi.py &

← script style

or

> ./show\_underdepleted\_hdis.py &

← GUI style

or

in the all-GUIs-starter click button 5 on page D

List of underdepleted HV pods as of Wed Oct 23 11:03:17 2002  
(listed are only sensors that are underdepleted by 5V or more)

HDI	planned deltaV(V)	current deltaV(V)	depleted to	Comment
B6-5-1	50	0	0% / 1%	**NEW!**
B6-5-2	50	0	0% / 1%	**NEW!**
B6-5-3	50	0	0% / 1%	**NEW!**
B6-5-4	50	0	0% / 1%	**NEW!**
B6-5-11	45	0	0% / 0%	**NEW!**
B6-5-12	45	0	0% / 0%	**NEW!**
B6-6-1	45	0	0% / 0%	**NEW!**
B6-6-2	45	0	0% / 0%	**NEW!**
B6-1-1	50	0	0% / 0%	**NEW!**
B6-1-6	50	0	0% / 0%	**NEW!**
B6-2-1	50	0	0% / 0%	**NEW!**
B6-2-6	50	0	0% / 0%	**NEW!**
B6-5-10	60	0	0% / 0%	**NEW!**
B6-6-10	60	0	0% / 0%	**NEW!**
B6-6-11	60	0	0% / 0%	**NEW!**

Status:

# Rack Monitor Interface GUI

To start the Rack Monitor Interface GUI, open a d0smt shell window:

- > setup d0online
- > cd /online/config/ctl
- > ./pfm.rmi &

or in the all-GUIs-starter click button 7 on page A

SEQs North

SEQs South

Central Platform RMs  
Sequencer Crates

Cathedral RMs  
Interface Board Crates

# Read Out Crates IOCs

To run the Read Out Crate IOC GUI, open a d0smt shell window:

```
> setup d0online
> cd ~/onl_smtnew/util
> ./smtreadout.ioc &
```

or

in the all-GUIs-starter click button 6 on page C

The screenshot shows the SMT Readout GUI with a table of IOC nodes. The table has columns for IOC Node, CPU %, Mem %, and FD %, and a Reboot button for each row. A red circle highlights the 'port 8' in the first row's header. A blue arrow points to the 'Reboot' button for 'd0olsmt13'. Another blue arrow points to the 'Reboot' button at the bottom of the GUI. The status bar at the bottom shows 'Reconnect all finished'.

IOC Node	CPU %	Mem %	FD %	Reboot
crate 0x60 port 8				
d0olsmt11	0	7	32	Reboot
crate 0x61 port 30				
d0olsmt08	1	7	32	Reboot
crate 0x62 port 21				
d0olsmt13	1	7	32	Reboot
crate 0x63 port 7				
d0olsmt07	0	7	32	Reboot
crate 0x64 port 28				
d0olsmt00	0	7	30	Reboot
crate 0x65 port 27				
d0olsmt06	0	7	32	Reboot
crate 0x66 port 26				
d0olsmt09	0	7	32	Reboot
crate 0x67 port 6				
d0olsmt05	0	7	32	Reboot
crate 0x68 port 10				
d0olsmt02	0	7	30	Reboot
crate 0x69 port 25				
d0olsmt03	0	7	30	Reboot
crate 0x6a port 31				
d0olsmt14	1	7	32	Reboot
crate 0x6b port 24				
d0olsmt04	0	7	30	Reboot

Status: Reconnect all finished

Buttons: Reconnect, Reboot

terminal server port  
to which the IOC  
is connected

click to reboot  
a particular IOC

when trying to reboot  
you will be asked for  
a password. It is:  
Onlined0

click to reboot  
all IOCs

# Read Out Crates IOCs

To connect to a particular IOC (e.g. IOC of crate 65 i.e. port 17):

```
[d0smt@d0o128 ~]$ telnet t-d0-mch2
Trying 131.225.231.47...
Connected to t-d0-mch2.fnal.gov (131.225.231.47).
Escape character is '^'.

login: ioc
password:
digi> connect 27

-> i
```

Onlined0

bad state for a process to be in

list process in the IOC

NAME	ENTRY	TID	PRI	STATUS	PC	SP	ERRNO	DELAY
tExcTask	excTask	3dff098	0	PEND	190c64	3dfefc0	3006b	0
tLogTask	logTask	3dfc720	0	PEND	190c64	3dfc658	0	0
tShell	shell	3a2c7e0	1	READY	173b7c	3a2c468	30065	0
tRlogind	rlogind	3ddb3e8	2	PEND	1701b8	3ddb3e8	0	0
tTelnetd	telnetd	3dd9f10	2	PEND	1701b8	3dd9db0	0	0
tRdbTask	rdbTask	3dd73f0	20	PEND	1701b8	3dd7290	d0003	0
tAioIoTask1	aioIoTask	3df09d0	50	PEND	17062c	3df0928	0	0
tAioIoTask0	aioIoTask	3de97c8	50	PEND	17062c	3de9720	0	0
tNetTask	netTask	3ddf638	50	PEND	1701b8	3ddf588	0	0
tAioWait	aioWaitTask	3df7bd8	51	PEND	1701b8	3df7a80	0	0
ts_Casync	3c52e34	3da81d0	70	DELAY	173130	3da7e70	3d0004	856
scan1	3c56324	3a9c608	70	DELAY	173130	3a9c578	0	1
cbHigh	callbackTask	3b84430	71	PEND	1701b8	3b84368	0	0
scan2	3c56324	3aa1e20	71	DELAY	173130	3aa1d90	0	2
scan6	3c56324	3aa7638	72	DELAY	173130	3aa75a8	0	2
scan12	3c56324	3aaace50	73	DELAY	173130	3aaacdc0	0	3
scan30	3c56324	3ab2668	74	DELAY	173130	3ab25d8	0	16
cbMedium	callbackTask	3dad9c8	75	PEND	1701b8	3dad900	0	0
scan60	3c56324	3ab7e80	75	DELAY	173130	3ab7df0	0	36
scan120	3c56324	3abd698	76	DELAY	173130	3abd608	0	31
scan300	3c56324	3ac2eb0	77	DELAY	173130	3ac2e20	0	146
scan600	3c56324	3ac86c8	78	DELAY	173130	3ac8638	0	141
cbLow	callbackTask	3cfd2e0	85	SUSPEND	3d2b20c	3cfd168	0	0
scanOnce	3c56048	3ace318	85	PEND	1701b8	3ace250	0	0
EV_dbCaLinkevent_task	3b67850	3b67850	87	PEND	1701b8	3b677a8	3006b	0
dbCaLink	dbCaTask	3b7ec38	88	PEND	1701b8	3b7eb80	3006b	0
tPortmapd	portmapd	3dd8980	100	PEND	1701b8	3dd8810	16	0
synchServers	synchServer	3a34af8	101	PEND	15b5e4	3a34870	1c0001	0

# 1553 Controller Crates IOC mapping (MCH3)

Quadrant	IOC name	1553 channel	devices connected	cable info
SW	d0o1ct157	0	10 SEQ PC19-0A - Sequencers	black #1
		1	10 SEQ PC19-0B - Sequencers	black #2
		2	10 SEQ PC20-1B -Sequencers	black #8
*		3	3 South SEQC – Seq. Controllers (South)	black #9
		4	18 IB SW-0	black #17 (G)
		5	18 IB SW-1	black #18 (H)
SE	d0o1ct156	0	10 SEQ PC20-0A - Sequencers	black #5
		1	10 SEQ PC20-0B -Sequencers	black #6
		2	10 SEQ PC20-1A – Sequencers	black #7
*		3	4 East RMI (IB power supplies/East)	black #19 (A)
		4	18 IB SE-0	black #20 (C)
		5	18 IB SE-1	black #21 (D)
NW	d0o1ct160	0	10 SEQ PC03-0A - Sequencers	black #10
		1	10 SEQ PC03-0B - Sequencers	black #11
		2	10 SEQ PC03-1A -Sequencers	black #12
*		3	4 West RMI (IB power supplies /West)	black (green H)
		4	18 IB NW-0	black #22 (I)
		5	18 IB NW-1	black #23 (J)
NE	d0o1ct159	0	10 SEQ PC03-1B - Sequencers	black #14
		1	10 SEQ PC04-0A - Sequencers	black #15
		2	10 SEQ PC04-0B - Sequencers	black #16
*		3	3 North SEQC – Seq. Controllers (North)	black #13
		4	18 IB NE-0	black #24 (E)
		5	18 IB NE-1	black #25 (F)
* South	d0o1ct158	0	SEQ/SEQC Power Supplies South	
* North	d0o1ct155	4	SEQ/SEQC Power Supplies North	

\* This entries are NOT quadrant specific , i.e. they span two quadrants

## Read Out Crates IOC mapping (MCH2)

VRB crate name	IOC name	IOC port
60	d0olsmt11	8
61	d0olsmt08	30
62	d0olsmt13	21
63	d0olsmt07	7
64	d0olsmt00	28
65	d0olsmt06	27
66	d0olsmt09	26
67	d0olsmt05	6
68	d0olsmt02	10
69	d0olsmt03	25
6A	d0olsmt14	31
6B	d0olsmt04	24

## HV Crates IOC mapping (MCH2)

<b>HV crate name</b>	<b>IOC name</b>	<b>IOC port</b>
smts1	d0octl08	
smts2	d0octl48	
smts3	d0octl49	
smts4	d0octl25	
smts9	d0octl36	
smtn5	d0octl23	
smtn6	d0octl52	
smtn7	d0octl51	
smtn8	d0octl53	
smtnA	d0octl35	

# Download GUI

1. Contact Harald Fox for any questions about the Download GUI:
  - 847-414-4044
  - x5222

# SDAQ / Calibrations

**Page Section**

61. Instructions

71. Troubleshooting

72. Expert Guide

# SDAQ / Calibrations

## Quick Guide

1. Take SMT out of the Global run.
2. Start a SEQ only run.
3. Make sure the HV is off.
4. Set the SVX parameters for read all mode, check the SEQ and SDAQ parameters and download the SMT.
5. Power cycle the readout crates and reinit them.
6. Bring the HV up.
7. Take an SDAQ run and follow the progress on the SDAQ GUI and the Calibration Manager GUI.
8. When data taking is finished switch pulses on. Do not free the trigger!
9. Bring the HV down and turn it off.
10. Set the SVX parameters to read neighbor.
11. Download the detector in sparse readout mode.
12. Wait until the data of all crates is committed to the database.
13. Free the trigger, turn pulses off and hand SMT over.
14. Make an entry in the log book and in the file `~d0smt/Calibration/CalibrationRuns.txt`
15. Make a root tuple out of the calibration data.

### **For experts only:**

13. Process the data to make new thresholds.
14. Download the new thresholds.
15. Install the new thresholds for examine.
16. Transfer the pedestal information to the offline database.

# SDAQ / Calibration

1. **Take SMT out of the Global run.** The Calibration run is an SDAQ run. It does not involve or need the L3. It can go on in parallel while experts work on the L3 and it is out of the system. It needs however the L1 system and the COOR / Calibration manager / SDAQ supervisor infrastructure.
2. **Start a SEQ only run.** The preparation for the SDAQ run will take a while. The best way to ensure that HDI currents stay low is to have a SEQ only run going. While this is strictly speaking not an SDAQ run also this run does not need the L3. See the Section on PDAQ / Taker / Crater for instruction on how to start a SEQ only run.
3. **Make sure the HV is off.** We need to download the detector. This is only possible when the HV is off.
4. **Set the SVX parameters for read all mode, check the SEQ and SDAQ parameters and download the SMT:**

Download crates 60-6B

SVX Parameter

SEQ Parameter

SDAQ Parameter

	turn HDIs off	Turn pulses on	turn debug on	global parameter	emulation	qu		
VRBCR_60	download	HDI off	cal inject	reinit	SVX Parameter	in	print problem	details
VRBCR_61	download	HDI off	cal inject	reinit	SEQ Parameter	in	print problem	details
VRBCR_62	download	HDI off	cal inject	reinit	SDAQ Parameter	in	print problem	details
VRBCR_63	download	HDI off	cal inject	reinit vme	Offline Cal File	in	print problem	details
VRBCR_64	download	HDI off	cal inject	reinit vme	Translation Map	in	print problem	details
VRBCR_65	download	HDI off	cal inject	reinit VME	calibration		print problem	details
VRBCR_66	download	HDI off	cal inject	reinit VME	calibration		print problem	details
VRBCR_67	download	HDI off	cal inject	reinit VME	calibration		print problem	details
VRBCR_68	download	HDI off	cal inject	reinit VME	calibration		print problem	details
VRBCR_6A	download	HDI off	cal inject	reinit VME	calibration		print problem	details
VRBCR_6B	download	HDI off	cal inject	reinit VME	calibration		print problem	details
Teststand_79	download	HDI off	cal inject	reinit VME	calibration		print problem	details

# SDAQ / Calibration

This is the button configuration for SDAQ runs. Set this configuration before you download the detector.

SVX Parameter	
cal_voltage	0x0
adc_pedestal	0x7
ramp_trim	0x700
adc_max	0xff
cal_pattern	0x4
preamp_band	0x24
pipeline	0xd
chip_current	0x4
threshold	0x23
<input checked="" type="checkbox"/>	Read_All
<input type="checkbox"/>	Read_Neighbor
<input type="checkbox"/>	Use Global Threshold
<input type="checkbox"/>	Last Channel Last Chip
<input type="checkbox"/>	Last Channel All Chips
<input type="button" value="Modify database"/> <input type="button" value="Quit"/>	

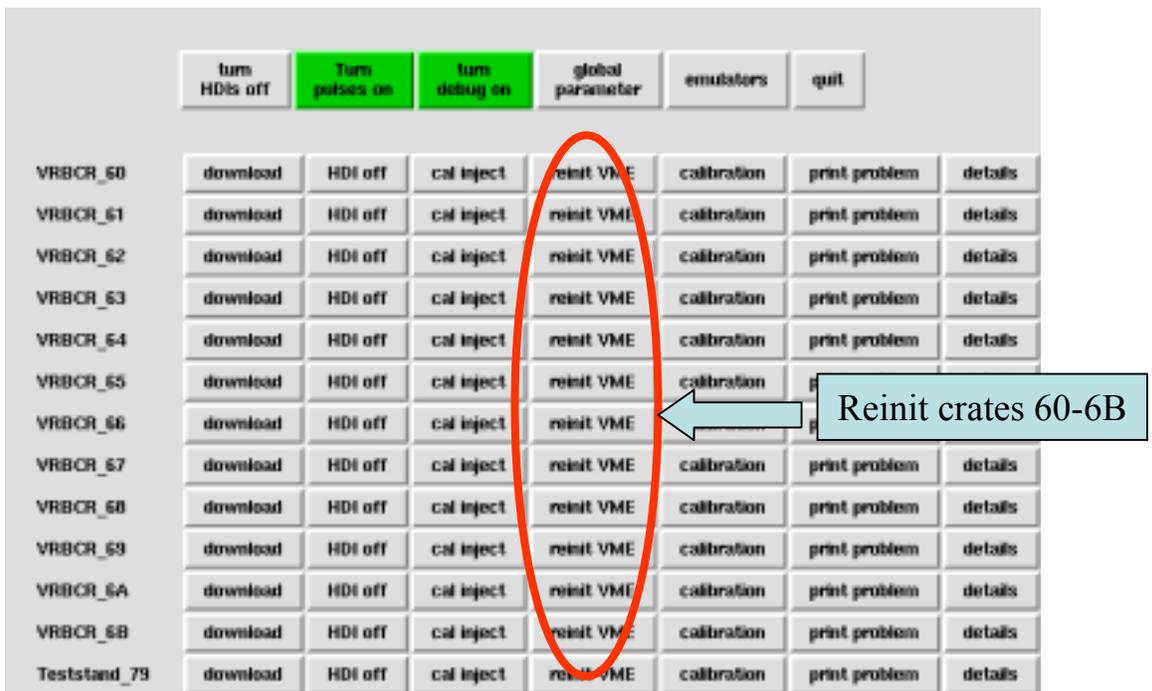
SEQ Parameter	
seq_default_calv	0x50
ncalv	0x0
CalV for polarity 0:	
calv1	0x10
calv2	0x18
calv3	0x20
calv4	0x28
calv5	0x30
CalV for polarity 1:	
calv6	0xe0
calv7	0xe6
calv8	0xec
calv9	0xf2
calv10	0xff
<input type="button" value="Modify database"/> <input type="button" value="Quit"/>	

These are the standard configurations. Normally no modification is needed. Just check.

SDAQ Parameter	
n_cal_events	0x320
sdaq_cal_pattern	0x1
<input checked="" type="checkbox"/>	Calibration
<input checked="" type="checkbox"/>	UseTFW
<input checked="" type="checkbox"/>	UseSEQC
<input type="checkbox"/>	HwInit
<input type="checkbox"/>	HwRecover
<input type="checkbox"/>	CheckSync
<input type="checkbox"/>	DetermineCalV
<input checked="" type="checkbox"/>	Itc
<input type="checkbox"/>	LogLevel
<input type="button" value="Modify database"/> <input type="button" value="Quit"/>	

# SDAQ / Calibration

5. **Power cycle the readout crates and reinit them.** The VME crates are located in MCH2 and are labeled 0x60 (SMT0\_0) through 0x6B (SMT5\_1). The power switches are located above the crates. Switch the power off, wait a few seconds and switch it on again. Back in the control room you may have to wait a minute before all crates are back on. Then reinit the crates from the download GUI:

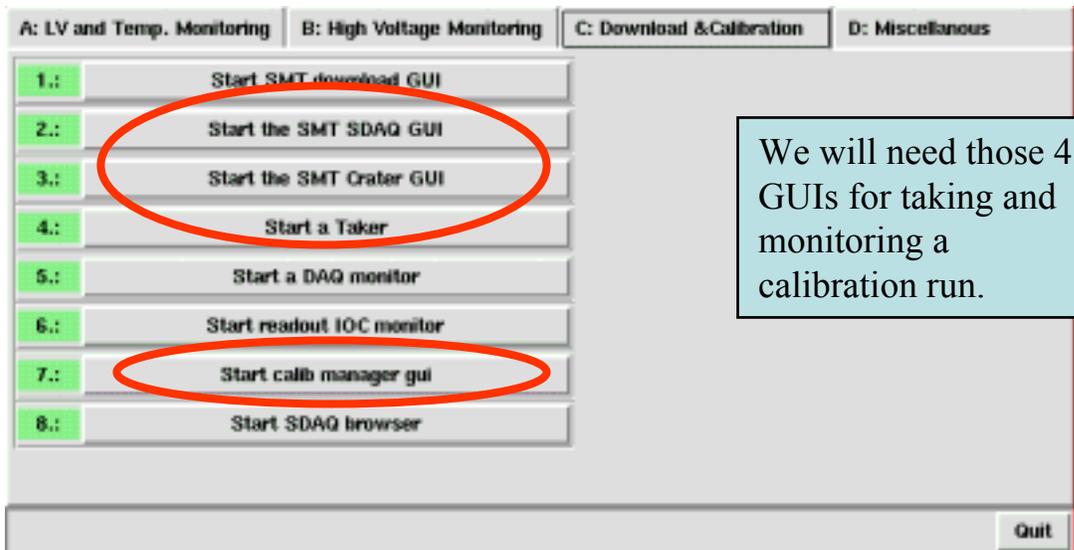


6. **Bring the HV up.** Check the HV section on how to turn the HV on and on how to ramp it up.

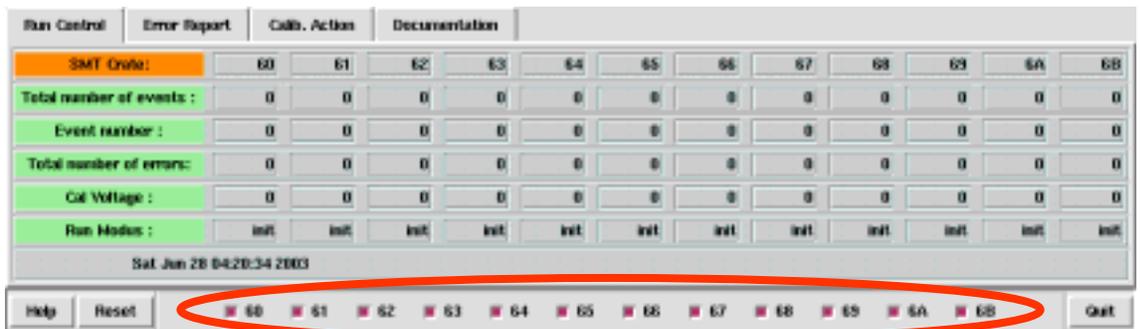
# SDAQ / Calibration

## 7. Take an SDAQ run and follow the progress on the SDAQ and calibration manager GUI.

1. Start all necessary GUIs from the All-GUIs-starter:



2. Select all the crates in the SDAQ GUI:



Select all crates for monitoring.

# SDAQ / Calibration

3. Create a run configuration using the SMT crater GUI:

The screenshot shows the SMT Crater GUI with the following sections and options:

- L1 Trigger:**
  - zero bias
  - min bias
  - tick 10 - BX 2
- Run Parameters:**
  - 50000 Default Prescale
  - 12 Default L3 Nodes
- Run Mode:**
  - PDAQ
  - SDAQ
  - SEQ only
- Crate Selection:**
  - 0x60,  0x61,  0x62,  0x63,  0x64,  0x65,  0x66,  0x67,  0x68,  0x6A,  0x6B,  0x79
  - SEQ 0,  SEQ 1,  SEQ 2,  SEQ 4,  SEQ 6,  SEQ 7,  SEQ F
  - monitoring,  exclusive,  auto disable
- Buttons:**
  - select north, deselect north, select south, deselect south, select seq, deselect seq, deselect all
  - Save Configuration, QUIT
- Status Bar:** Sat Jun 28 04:21:54 2003: written file commissioning/smt/auto-generated-1.0

1. Select an SDAQ run

2. Make sure that 0x79 and SEQ F are off and all the rest is on.

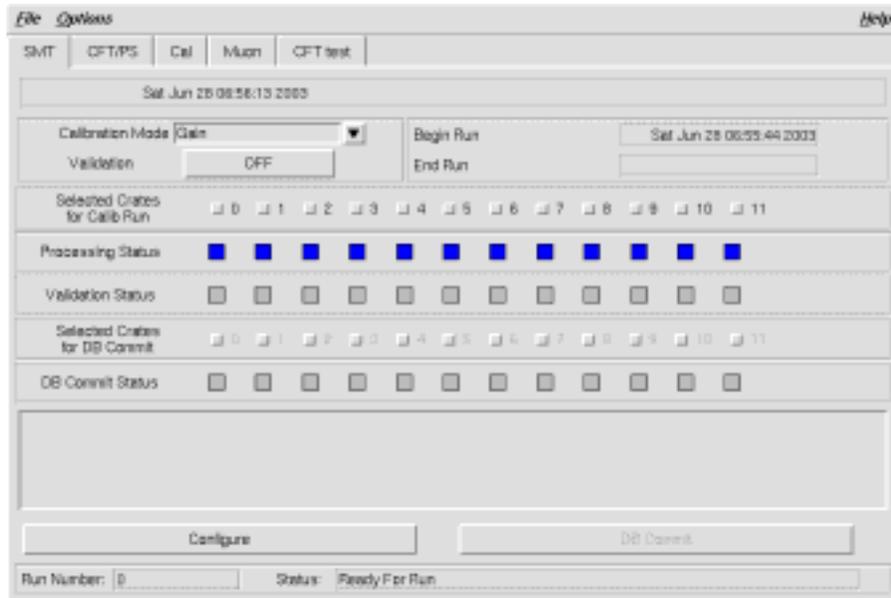
3. Save this configuration

4. The file is saved in this location.

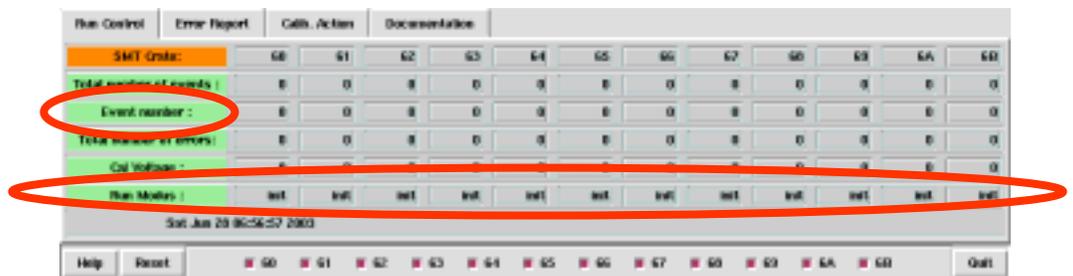
4. End the SEQ all run and choose the new configuration in the Taker window (see the Section PDAQ/Taker/Crater for details).

# SDAQ / Calibration

5. After the SDAQ run is configured the Calibration Manager GUI should look like this:



6. Start the Calibration run on the Taker. Follow the progress on the SDAQ GUI. The line “Run Modus” should change from “off” to “init”:

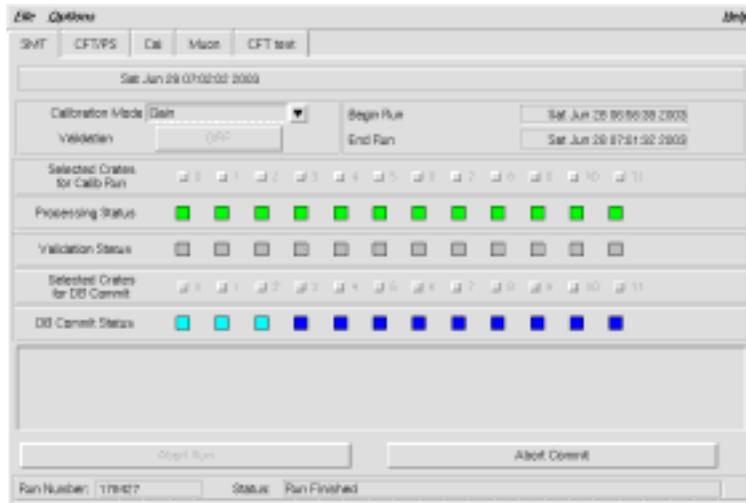


7. The “Run Modus” should then change to “ped”, “Total number of events” should read 800 and ”Event number” should steadily increase to 800. Once this is achieved the “Run Modus” should go from “db commit” to “success”. The final result should look like this:

# SDAQ / Calibration

Run Control	Error Report	Calib. Action	Documentation												
SMT Crates:	60	61	62	63	64	65	66	67	68	69	6A	6B			
Total number of events :	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
Event number :	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
Total number of errors:	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Cal Voltage :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Run Modes :	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
Sat Jun 28 07:01:35 2003															
Help	Reset	60	61	62	63	64	65	66	67	68	69	6A	6B	Quit	

- The Calibration Manager now receives data from the crate. The GUI looks like this:



- At this point the data taking part is finished. The run has been automatically stopped by the Calibration Manager. However, it is important that the trigger is not “freed” in the Taker as long as the commit is not yet finished.

**8. Start the SMT pulsar from the download GUI.**



# SDAQ / Calibration

9. Bring the HV down and turn it off.
10. Set the SVX parameters back to data taking mode:

This is the configuration for physics data taking.

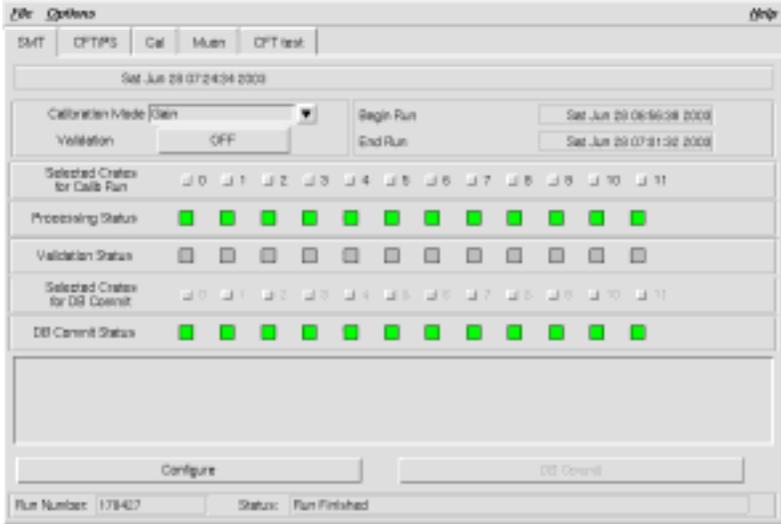


SVX Parameter

col_voltage	0x0
adc_pedestal	0x7
ramp_trim	0x700
adc_max	0xff
col_pattern	0x4
preamp_band	0x24
pipeline	0x0
chip_current	0x4
threshold	0x23

Read\_All  
 Read\_Neighbor  
 Use Global Threshold  
 Last Channel Last Chip  
 Last Channel All Chips

11. Download the SMT with the new configuration.
12. Wait until all data is committed to the database:



The screenshot shows the 'SMT Options' window with the following details:

- Buttons: SMT, CPTPS, Cal, Menu, CFT test
- Date: Sat Jun 29 07:24:34 2009
- Calibration Mode: Gain (dropdown menu)
- Validation: OFF (checkbox)
- Buttons: Begin Run, End Run
- Timestamps: Sat Jun 29 06:56:08 2009 (Begin Run), Sat Jun 29 07:21:32 2009 (End Run)
- Selected Chans for Calib Run: 0-11 (checkboxes)
- Processing Status: 12 green squares
- Validation Status: 12 gray squares
- Selected Chans for DB Commit: 0-11 (checkboxes)
- DB Commit Status: 12 green squares
- Buttons: Configure, DB Commit
- Run Number: 178407
- Status: Run Finished

13. Free the trigger in the Taker window and hand SMT back to the DAQ shifter for the global run. Congratulations! We now have a new calibration run bagged.

# SDAQ / Calibration

14. **Make an entry in the logbook and in file**  
`~d0smt/Calibration/CalibrationRuns.txt`
15. **Make a root tuple out of the calibration data.** Go to the directory:
  1. `cd /home/d0smt/smt_ped_tools_new/runs`
  2. `../smt_ped_tools/scripts/rootFromRun`  
`#runnumber`
  3. As summary you will see the number of strips extracted from the database when the process finishes. Sometimes it happens that the process doesn't exit gracefully. It then consumes loads of memory and CPU time. In this case try to kill the process with an interrupt (^C) or an explicit kill command.

## SDAQ / Calibration Troubleshooting

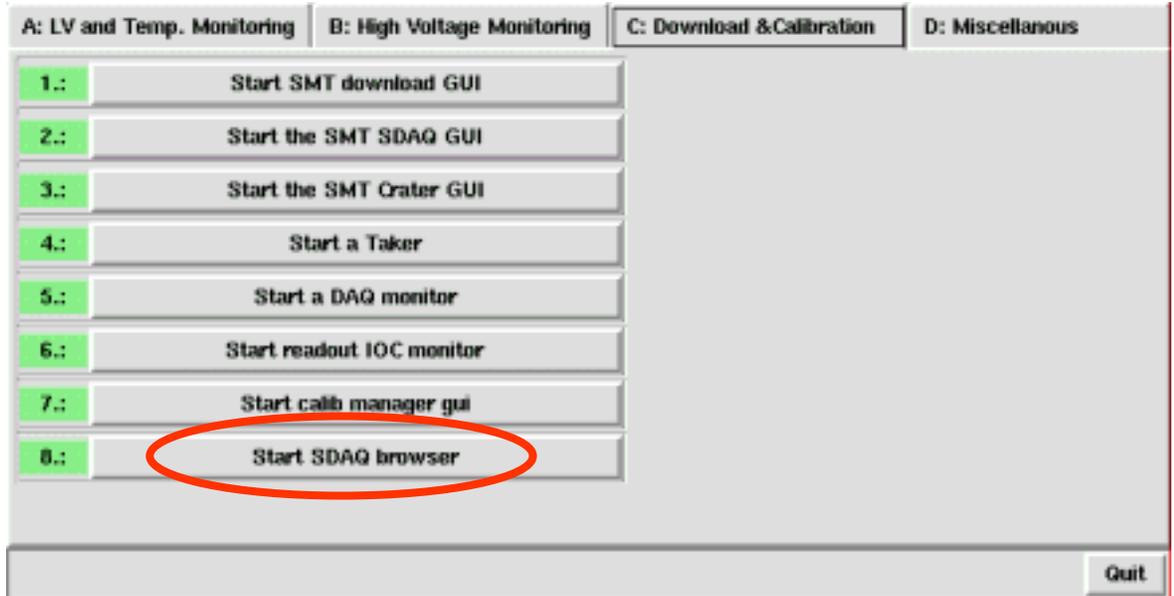
1. The typical problem is the status “error” in the status line of the SDAQ GUI. Stop the run from the Calibration Manager GUI. **Do not stop the run from the Taker.** Free the trigger (Taker), reboot or power cycle the corresponding crate and try again.
2. We had 2 occurrences where above error message would show up permanently for a random crates. The problem was fixed power cycling the 1553 controller crates in MCH3. **Caution: After power cycling those crates a download from scratch is necessary.** The 1553 controllers lose the memory of the power bits. Those need to be written again with a download. For that the HV must be off!
3. Sometimes crates are Front End Busy at the beginning of the “ped” stage. In that case a (few) sclinit may help (ask the DAQ shifter). It is advantageous when no other run is started/stopped during the calibration run.

# SDAQ / Calibration Expert Guide

**For Experts only:**

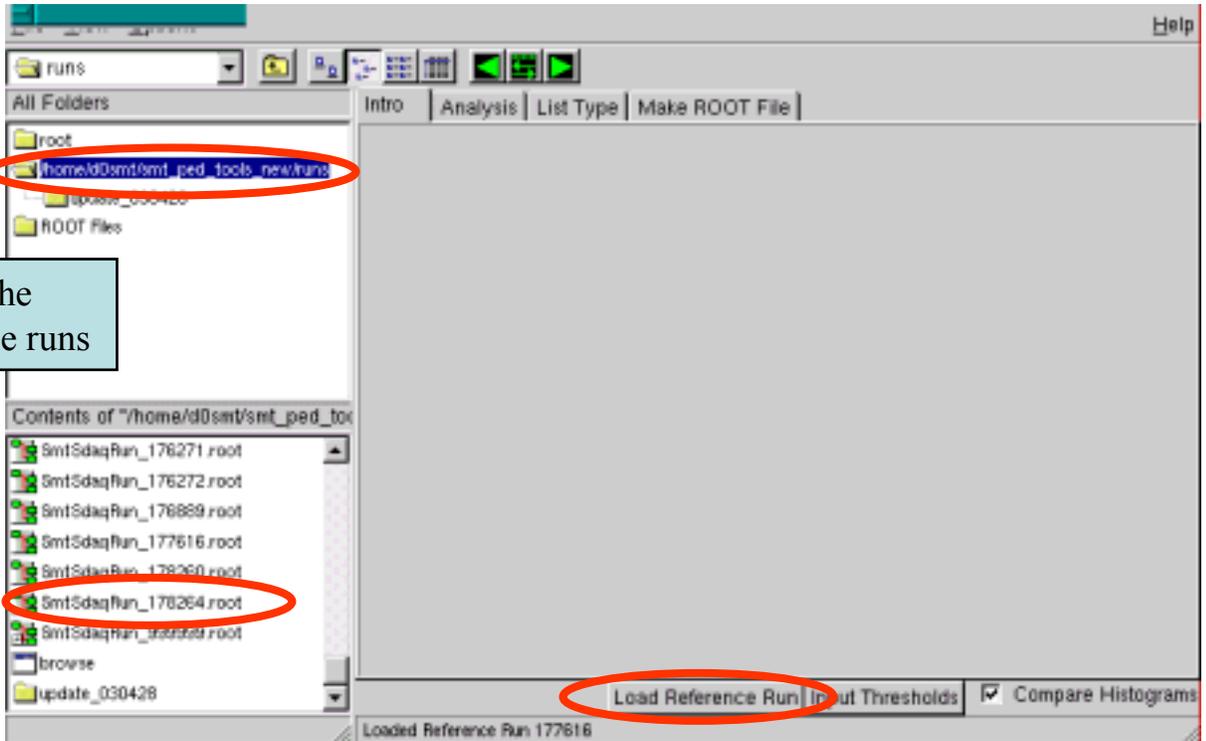
**16. Process the data to make new thresholds.**

1. Start the SDAQ browser from the All-GUIs-starter.



# SDAQ / Calibration Expert Guide

2. Load the SDAQ run you want to investigate. This is usually the most recent run. Watch the text window for error messages. Try again in case of problems.



1. List the available runs

2. Double click on the run you want to work on

3. Load a reference run for comparison

3. Load the reference run. This is usually the last SDAQ run that was used for producing new thresholds. The SDAQ Browser has the ability to compare pedestal and noise for 2 different SDAQ runs.

# SDAQ / Calibration Expert Guide

4. List the problematic HDIs. The program calculates new thresholds from the pedestal and noise data. The SDAQ browser automatically identifies HDIs with different problems and groups them accordingly. One can either look at individual HDIs and decide what to do or implement the new thresholds for a whole group.

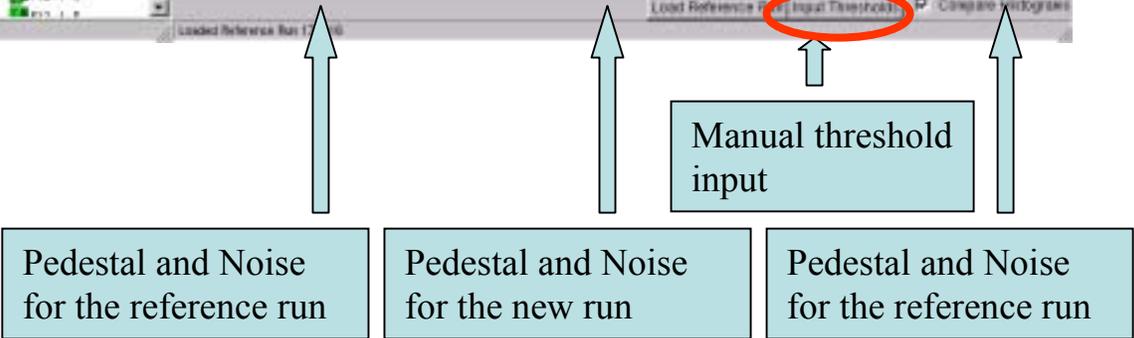
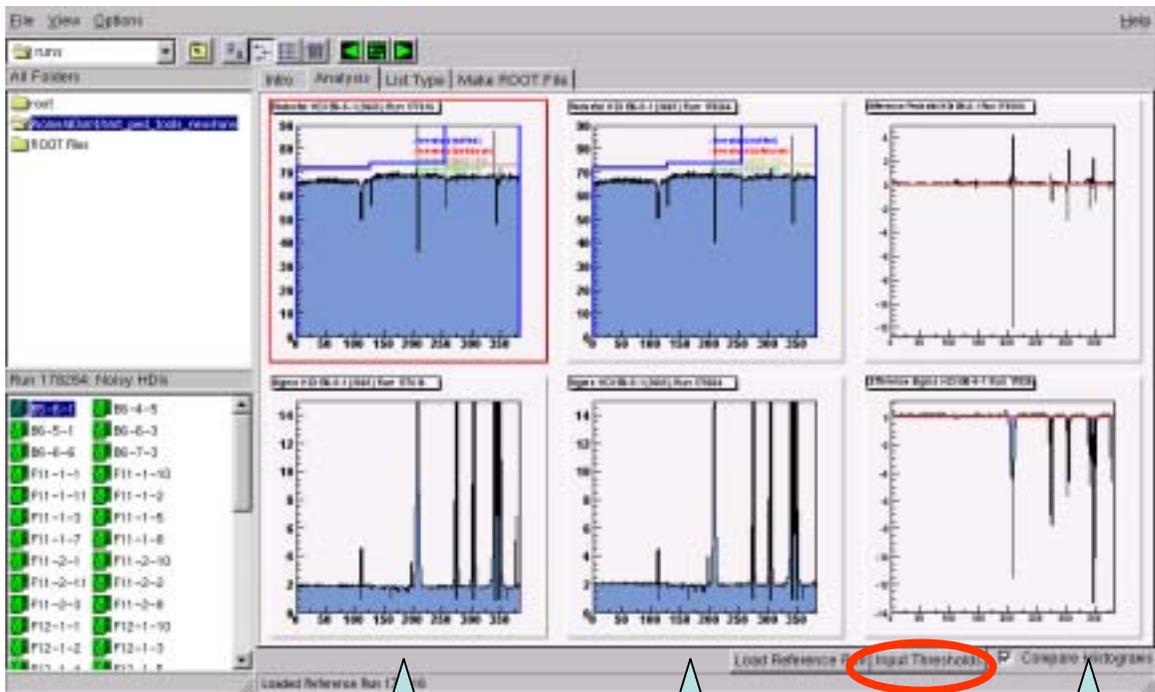
Control buttons for scrolling through a list.  
Start by selecting the middle button.

The screenshot shows the SDAQ software interface with several annotated components:

- Page for HDI listings:** Points to the top navigation area of the software window.
- Control buttons for scrolling through a list:** Points to three green arrow buttons (left, center, right) used for navigating through lists.
- Selection button for a specific list:** Points to the "List HDIs With Big Threshold Shift" button, which is circled in red.
- Button to commit new thresholds without further ado to the database:** Points to a "Commit" button located to the right of the list of functions.
- Manual input of thresholds:** Points to the "Input Thresholds" checkbox at the bottom of the interface.
- Selection button to compare pedestal and noise to the loaded reference run:** Points to the "Compare Histograms" button at the bottom right.
- HDIs in a specific list:** Points to a list of HDIs in the "Problematic HDIs" section, which is circled in red.

# SDAQ / Calibration Expert Guide

- Go through the list of HDIs with big threshold shift and add new thresholds to the database. Select “List HDIs With Big Threshold Shift”, start viewing by pressing the middle control button, and manipulate thresholds by selecting “Input Thresholds”.



# SDAQ / Calibration Expert Guide

SVX chips

Chip number	1	2	3	Plot	Edit
Ped + 3 sigma (reference)	71	74	73	<input type="checkbox"/>	<input type="radio"/>
Ped + 6 (reference)	71	74	254	<input type="checkbox"/>	<input type="radio"/>
Ped + 3 sigma (new)	71	74	73	<input type="checkbox"/>	<input type="radio"/>
Ped + 6 (new)	72	74	254	<input type="checkbox"/>	<input type="radio"/>
Threshold (database)	72	74	254	<input type="checkbox"/>	<input type="radio"/>

Manual input

Commit + Need

Commit this threshold and go to next HDI

6. Go through the list of HDIs with many strips below threshold and add new thresholds to the database.
  7. Commit new thresholds with big threshold difference to the database. There are 2 algorithms implemented to calculate the new threshold: average Pedestal + 6 ADC counts and average pedestal + 3 x average noise. We see a large difference between the methods for noisy HDIs. The automatic calculation for noisy HDIs is fairly good. We can therefore do a global commit for this group.
  8. Commit new thresholds for noisy HDIs to the database.
  9. Commit new thresholds for non-problematic HDIs to the database.
- 15. Download the new thresholds.** It is probably best (but not necessary) to restart the download GUI for this.

# SDAQ / Calibration Expert Guide

- 16. Install the new thresholds for examine.** Select “Global Parameter” and “Offline Cal File” from a download GUI that you don’t need for other purposes. This process takes a lot of time. For each of the crates a output file is written to  
`/online/data/smt/outcal_0x*.txt` These files need to be linked to `/online/data/smt/cal_0x*.txt` Edit the file `SmtConfiguration.rcp` in  
`/online/examines/pxx.xx.xx/smt_examine/smt_config/rcp/` accordingly.

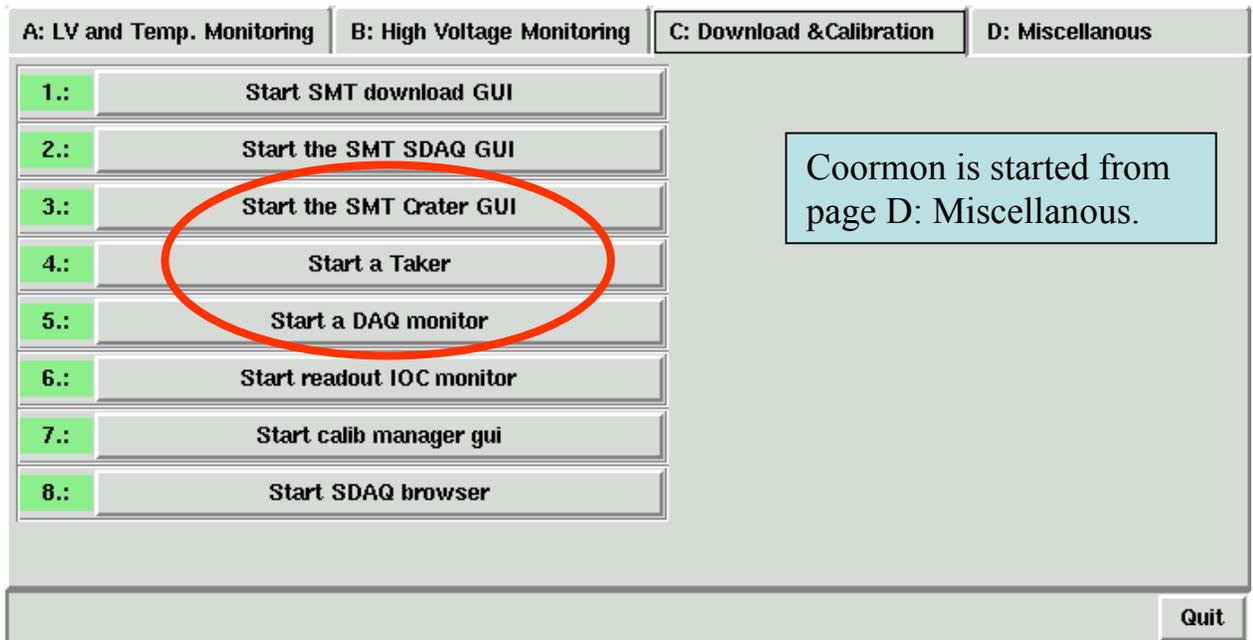


- 17. Transfer the pedestal information to the offline database.** Follow the instructions in [http://www-d0.fnal.gov/~yasuda/smt\\_transfer.html](http://www-d0.fnal.gov/~yasuda/smt_transfer.html)

# PDAQ / Crater / Taker

There are only few occasions where a SMT shifter needs to take a PDAQ run. Those are mostly special runs for investigating an SMT specific problem. With some justification you may also count a SEQ only run as PDAQ run. This kind of run does not need the L3 infrastructure. Data is not shipped to the front-end crates. Those runs are useful when SMT cannot be part of the global run or when there is a L3 problem and the SMT needs to be read out to keep the HDI currents stable.

The tools used to start and control a run are SMT Crater, Taker, Coormon and the DAQ Monitor. They are all started from the All-GUIs-starter:



# SMT Crater

**SMT Crater.** This GUI is used to configure any of the runs that SMT needs.

The screenshot shows the SMT Crater GUI with several components highlighted by callout boxes:

- Trigger Selection:** A box pointing to the L1 Trigger section, which includes radio buttons for  zero bias,  min bias, and  tick 10 - BX 2.
- Run Parameters:** A box pointing to the Run Parameters section, which includes input fields for Default Prescale (50000) and Default L3 Nodes (12).
- Run Mode:** A box pointing to the Run Mode section, which includes radio buttons for  PDAQ,  SDAQ, and  SEQ only.
- Crate Selection:** A box pointing to the Crate Selection section, which includes a grid of checkboxes for crates (0x60 to 0x6A, 0x61 to 0x6B, 0x79) and sequences (SEQ 0 to SEQ F).
- Run Attributes:** A box pointing to the Run Attributes section, which includes checkboxes for  monitoring,  exclusive, and  auto disable.
- Crate Selection Shortcuts:** A box pointing to a grid of buttons for selecting and deselecting north, south, seq, and all crates.
- Save Button:** A box pointing to the Save Configuration button, which is circled in red.
- Status Line:** A box pointing to the status bar at the bottom, which displays the text: Sat Jun 28 04:21:54 2003: written file commissioning/smt/auto-generated-1.0

# SMT Crater

- **Run Mode:** The most important selection.
  1. **PDAQ:** For special runs where the data should go through L3 to tape. Prescale and number of L3 nodes should be adjusted to the needs of the run.
  2. **SDAQ:** This is the run type used for calibration.
  3. **SEQ only:** This run is mainly used to keep the HDI current when there is no global run or SMT does not participate in the global run. This run is especially useful during downloads, when preparing a calibration run. None of the VME readout crates should participate in the run. L3 is not used. This run is close to an SDAQ run.
- **Trigger Selection:** One can chose between 3 different L1 triggers:
  1. **Zero bias:** This is the default. The trigger is quasi randomly distributed (depends on the prescale factor) over any possible bunch crossing.
  2. **Min bias:** Any bunch crossing with interaction is triggered on.
  3. **Tick 10 – BX2:** This is the ticksel2 and triggers only on one specific tick, at the moment tick 10 corresponding to bunch crossing 2. Dan Edmunds can change the tick number easily.
- **Run Parameters:**
  1. The **prescale** should be adjusted according to the desired output rate. The zero bias L1 has a rate of 1.7MHz. The default prescale of 50000 gives an output rate of just above 30Hz. The prescale must not be a multiple of 3 or 59, otherwise the selected tick numbers are not quasi random. The prescale can be adjusted later from the Taker.
  2. The number of **L3 nodes** should be increased depending on how many crates are read out and whether SMT is zero suppressed or not. Talk to the DAQ shifter. If the load on the L3 is too high the readout can get stuck. The number of L3 nodes can be adjusted later from the Taker. The number of L3 nodes has no effect for SEQ only and SDAQ runs.

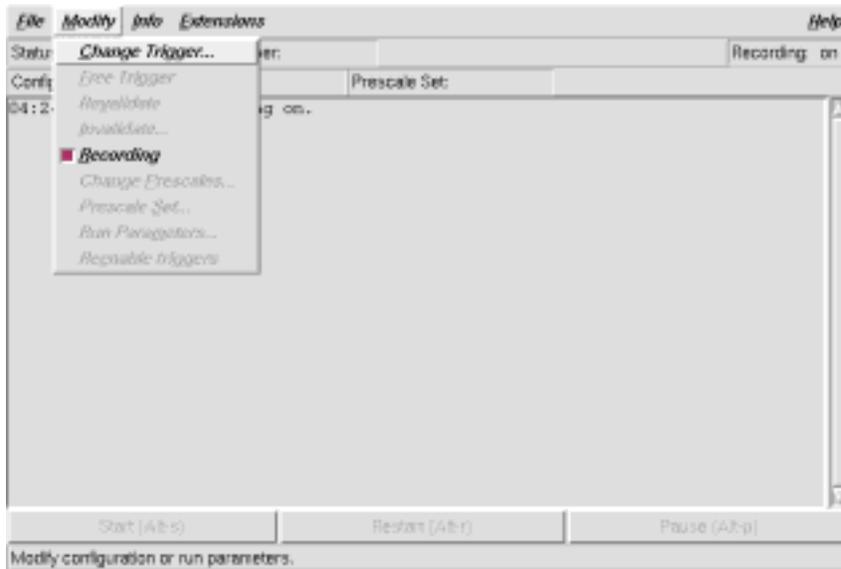
# SMT Crater

- **Crate Selection:** Select here which crates should participate in the special run. Note that 1 SEQ crates corresponds to 2 VRB crates. When a VRB crate is selected the corresponding SEQ crate is selected automatically. If a SEQ only run is chosen the selection is done automatically. Note that crate 0x79 and the corresponding crate SEQ F are located in the test stand in MCH3. Don't use these crates under normal conditions.
- **Crate Selection Shortcuts:** Some buttons to make the crate selection quicker.
- **Run Attributes:**
  1. **Monitoring:** Adds a monitoring flag to PDAQ runs. The online monitoring is run in parallel on the readout crates.
  2. **Exclusive:** The selected crates are requested exclusively for this run. No other run using these crates can be configured. If a run is already configured with one of the selected crates then configuring the new run will fail. This flag should be set in most cases.
  3. **Auto disable:** This flag may be used to issue single triggers. The run is automatically disabled after a trigger fired. The run can be enabled for a single trigger from the Taker. Currently this function has no use.
- **Save Button:** Writes the configuration file.
- **Status Line:** Gives the date, time and location of the last configuration file written out. The location is used again for the Taker.

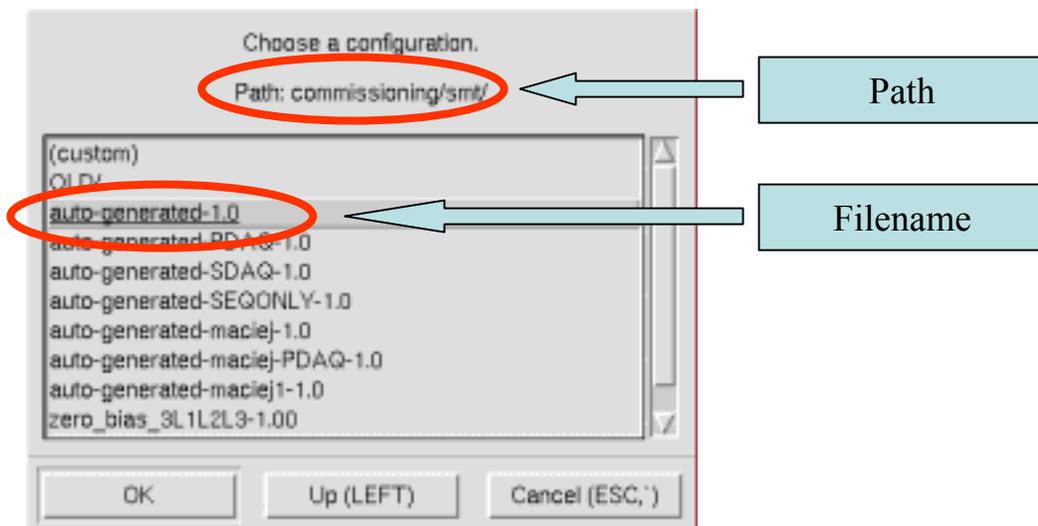
# Taker

Runs are started and controlled from the Taker GUI:

1. Load the configuration file created with SMT Crater. Select <Modify>→<Change Trigger...>



2. Select the path and filename that was stated in the SMT Crater Status Line. The current values are below. Select <OK>. Check the Taker window for error messages.



# Taker

3. Make sure that recording is switched on/off according to your needs (Menu <Modify>). Without recording on (default) the data will not be written to tape.
4. You may change the prescales or the number of L3 nodes (<Modify> → <Run Parameters>).
5. Start the run with the <Start> button at the bottom of the Taker window.
6. Make sure that the number of events written into the status line at the bottom of the Taker window is increasing.
7. Stop the run when the desired number of events is reached.
8. Free the trigger from the <Modify> Menu.

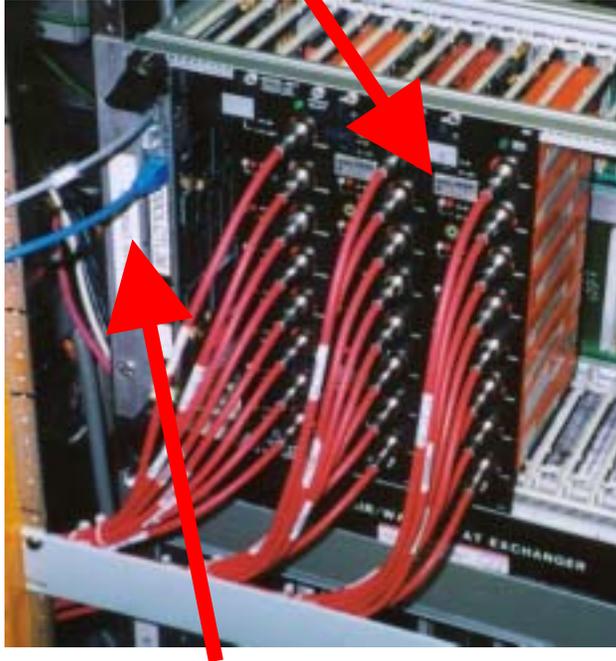
# High Voltage

Page Section

- 85. Description
- 86. Tasks
- 87. Ramping HV up/down
- 88. Global HV Control
- 93. Channel HV Control
- 96. Underdepletion
- 98. HV Alarms
- 101. Troubleshooting
  - 101.HV Pod Trips
  - 104.HV Crate Trips
  - 105.Minor HV Alarm
  - 106.Major HV Alarm
  - 108.StripTool
- 109.HV Information

# Description of the HV System

The high voltage (HV) system is used to deplete/bias the sensors used in the SMT. The power supplies used for this can be found in MCH2. There are a total of 440 HV pods of the BiRa 4877 type in three different racks and 10 crates.



A HV crate consists of a power PC (PPC) for monitoring and control and up to 6 HV modules, each with 8 HV pods. The HV is distributed via a system of fanout and breakout boxes and the interface boards

SMT sensors are grouped together in HV groups, which can consist of up to four sensors. In the case of double-sided sensors, a positive and a negative HV pod are serving the HV group.

The HV pods can be monitored and controlled by a number of GUI's in the control room. It is normally not necessary to take any action in MCH2.

# Shifter Tasks

The SMT shifter is responsible for the stable operation of the SMT HV system. This encompasses:

1. Ramp-up and ramp-down of high-voltage at appropriate times.
2. Monitoring of high voltage parameters.
3. Monitoring of and reactions on HV alarm conditions.
4. Reset of HV trips.
5. Documentation of the current HV configuration.
6. Documentation of any HV related problems.

Most of these tasks can be done by using a set of GUI's and scripts that are described later.

## When to Ramp HV Up

HV can be turned **ON** if the detectors are powered under two conditions:

1. No Beam: If there is no beam of any kind in the Tevatron, then it is safe to bias powered detectors. Verify with the shift captain that there will be no beam for at least 10 minutes, and that MCR will call before injecting beam. Biasing is typically done at such times for commissioning or calibration studies like SDAQ runs.
2. Clean, Stable Beam: This is the case *after* shot setup, injection and scraping have been *successfully* completed. Check with the shift captain to confirm the status of the beam. Normally the shift captain will give the command to start ramping up the HV.

## When to Ramp HV Down

The time needed to ramp down the high voltage should be a little more than 3 minutes.

HV must be turned **OFF** *before*:

- 1 Shot Injection: The detectors cannot be biased when beam is first put into the Tevatron. During shot setup, check with the shift captain to ascertain the accelerator schedule, and start turning off the HV at least 4 minutes before injection.
- 2 End of Store: HV must be turned off before the beam is dumped. Again, check the schedule with the shift captain, and start turning the HV off several minutes before the end of store. Normally the shift captain will give the command to ramp down the high voltage.
- 3 Turning on the detector: Whenever a HDI has to be switched on (e.g. after a LV trip), the high voltage corresponding to this HDI has to be ramped down and switched off.
- 4 Beam Studies: No HV during any accelerator studies.
- 5 Beam manipulation during stores that might result in higher losses (e.g. rescraping).
- 6 Work on HV system: obvious...

# Global HV Monitoring & Control

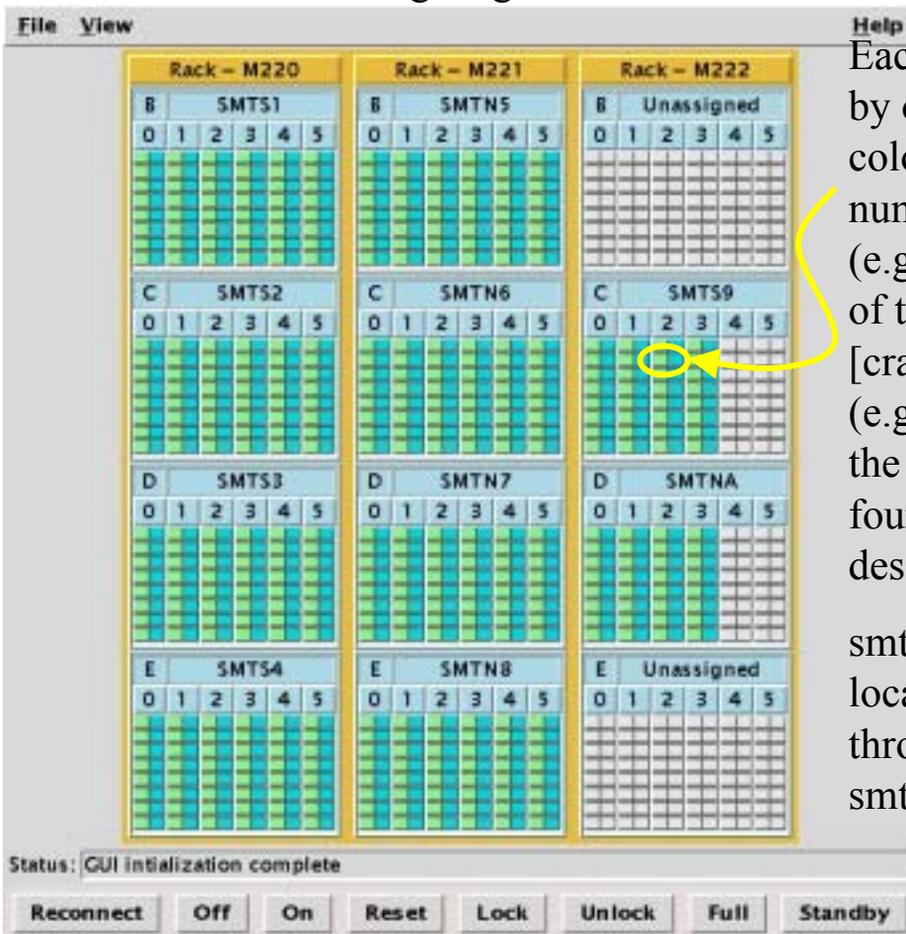
To run the global HV GUI:

Open a terminal window on the upper SMT monitor, and then

```
> setup d0online
> cd /online/config/smt/hv
> ./smt.hvg &
```

Or from the "startgui" gui B.3.

This is a representation of all the HV crates in MCH2.

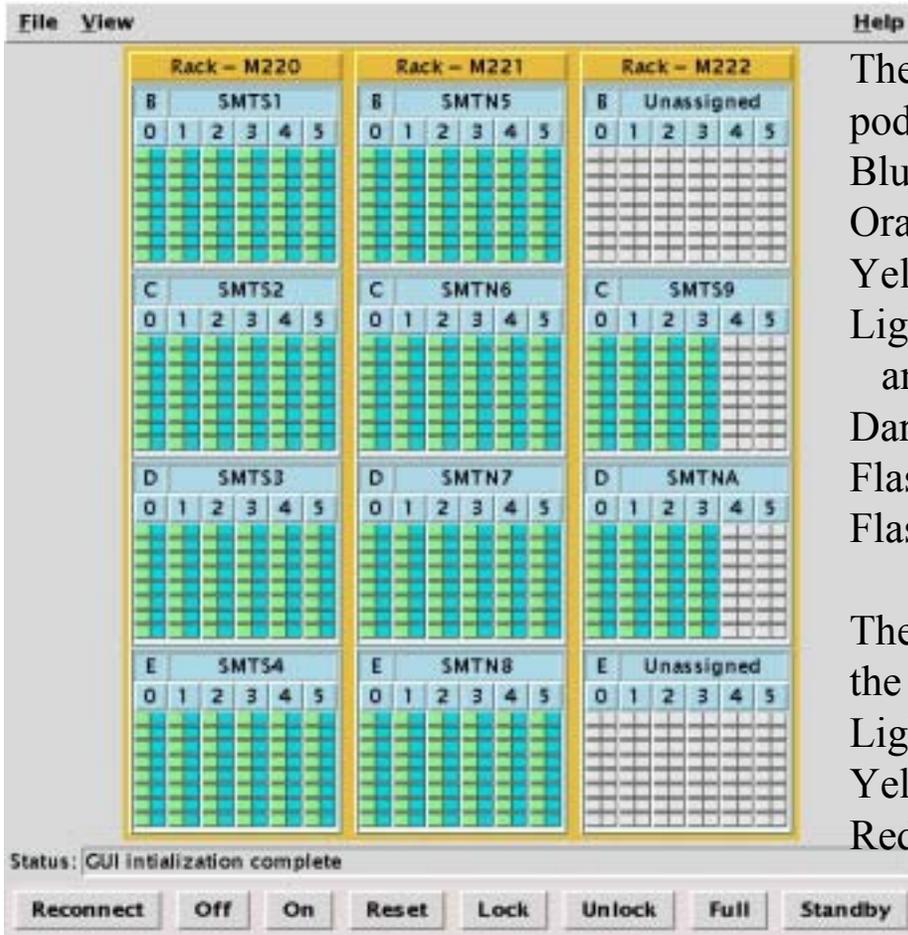


Each HV pod is represented by one of eight pairs of colored boxes under a module number (e.g. "2") in a crate (e.g. smts9). A pod's name is of the form [crate][module][pod][polarity] (e.g. the circled pod is 926P, the polarity (P/N) can be found in the Channel HV gui described later).

smts1 through smts4 are located in rack M220, smtn5 through smtn8 in M221 and smts9 & smtnA in M222.

**Remark:** There is no crate B in M222, although there is a power supply for it that is not used. It might be possible that the DAQ shifter complains about this power supply, since it is in his checklist. It does not affect any SMT operations if this power supply is switched off.

# Global HV Monitoring & Control



The right colored box for each pod indicates the pod status:  
 Blue: turned OFF  
 Orange: turned ON  
 Yellow: ramping  
 Light Green: OK, ramped up and holding at set voltage  
 Dark Green: locked  
 Flashing Red: tripped  
 Flashing Black: disabled

The left colored box indicates the pod's alarm status:  
 Light Green: OK  
 Yellow: Minor Alarm  
 Red: Major Alarm

- Reconnect: reconnect to the monitoring process
- Off: turn off pods
- On: turn on pods
- Reset: reset tripped pods
- Lock: lock pods at current settings
- Unlock: unlock locked pods
- Full: set and ramp all pods to 100%
- Standby: set and ramp all pods to 0 V

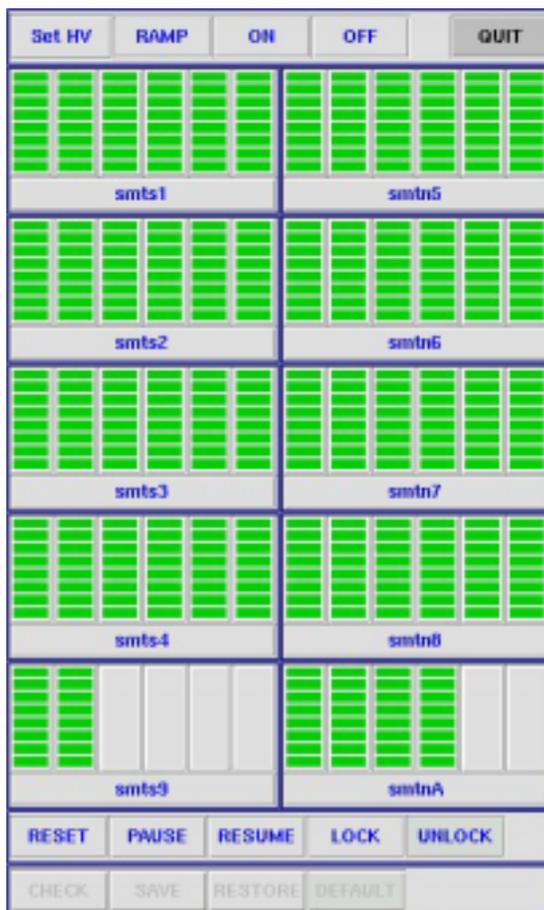
# Old Global HV Monitoring & Control

To run the old global HV GUI:

Open a terminal window on the upper SMT monitor, and then

```
> setup d0online
> cd /online/config/smt/hv/OLD
> ./hv_det_mod.py smtAll.hvd &
```

Or from the "startgui" gui B.1.



This is a representation of all the HV crates in MCH2.

Each colored rectangle represents one HV pod, and each crate is designated by its name (e.g. smts1).

smts1 through smts4 are located in rack M220, smtn5 through smtn8 in M221 and smts9 & smtnA in M222.

**Note:** Global HV operations are preferably carried out using the new Global HV GUI (previous section). The reason that the old Global HV GUI must be running is to provide SMT HV status signals to the Control Room LED status board.

# Old Global HV Monitoring & Control

**Set HV:** pull-down menu to define set voltages

**RAMP:** start ramping pods to set voltages

**ON:** turn on pods

**OFF:** turn off pods

Pod states are indicated by color:

- Blue: turned OFF
- Orange: turned ON
- Yellow: ramping
- White: paused
- Light Green: OK, ramped up and holding at set voltage
- Dark Green: locked
- Flashing Red: tripped
- Flashing Black: disabled

**RESET:** reset tripped pods

**PAUSE:** pause ramping

**RESUME:** resume paused ramping

**LOCK:** lock pods at current settings

**UNLOCK:** unlock locked pods

The interface shows a grid of pod status indicators (smts1 to smtnA) with various colored bars representing their current state. Control buttons are located at the top and bottom of the grid.

# Global HV Ramping Procedure

## 1. Start the Global HV crate GUI

```
> setup d0online  
> cd /online/config/smt/hv  
> ./smt.hvg &
```

Or from the "startgui" gui B.3.

## 2. Ramp-Up:

- a) Turn on all pods: click the **On** button
- b) Check whether all pods go into the ON-state, or if any are tripped. If any pods are tripped, reset the trips by clicking the **Reset** button.
- c) Start ramping to full voltage: click the **Full** button
- d) If any pods trip (i.e. start flashing red), click the **Reset** button immediately, and then click **Full** again.
- e) When all pods are fully ramped and holding (i.e. light green), lock the pods: click the **Lock** button.

## 3. Ramp-Down:

- a) Unlock all pods: click the **Unlock** button
- b) Start ramping to 0 V: click the **Standby** button
- c) When all pods have ramped down to less than 5 V, turn off the pods: click the **Off** button.

# Channel HV Monitoring & Control

The Channel GUI is particularly useful for working with individual pods and troubleshooting (resetting trips, tracking currents, etc.).

A page for each HV crate

Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State	Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State
110P	51	100	58	50.0	49.0	8.8	Locked	101P	55	55	45	45.0	45.1	0.0	locked
112P	60	58	58	50.0	50.2	1.1	locked	103P	78	58	60	68.0	68.2	1.7	locked
114P	50	50	0	8.0	8.8	8.2	locked	105P	77	58	60	68.0	68.2	2.8	locked
116P	52	50	58	50.0	50.0	2.2	locked	107P	62	58	50	58.0	58.2	0.7	locked
118P	51	50	58	50.0	49.2	3.1	locked	111P	54	58	45	45.0	45.8	2.9	locked
120P	60	100	55	58.0	59.0	21.8	locked	113N	-28	180	-5	-5.0	-5.4	18.0	locked
122P	35	100	38	30.0	30.0	5.3	locked	115N	-28	180	-10	-10.0	-9.8	5.7	locked
124P	50	100	48	40.0	41.0	40.2	locked	117N	-34	180	-10	-10.0	-14.6	32.0	locked
126P	45	100	36	35.0	35.0	6.8	locked	121N	-16	180	-5	-5.0	-4.8	21.0	locked
128P	45	100	48	40.0	39.8	41.0	locked	123N	-34	180	-20	-20.0	-19.5	45.0	locked
130P	30	80	38	30.0	29.0	9.4	locked	125N	-32	88	-15	-15.0	-15.1	7.4	locked
132P	25	50	38	30.0	29.0	10.2	locked	127N	-32	88	-15	-15.0	-15.1	9.4	locked
134P	41	80	35	35.0	35.0	21.8	locked	131N	-32	88	-20	-20.0	-19.6	23.2	locked
136P	47	58	48	40.0	40.0	8.8	locked	133N	-28	88	-10	-10.0	-10.1	6.5	locked
138P	44	80	35	35.0	35.1	4.6	locked	135N	-32	88	-20	-20.0	-20.6	4.9	locked
140P	51	50	48	40.0	39.0	19.7	locked	137N	-26	88	-10	-10.0	-10.1	3.7	locked
142P	45	58	48	40.0	39.8	7.8	locked	141N	-28	88	-5	-5.0	-5.1	8.0	locked
144P	35	80	58	50.0	50.0	8.8	locked	143N	-28	88	-15	-15.0	-14.8	18.7	locked
146P	40	50	48	40.0	40.0	7.4	locked	145N	-25	88	-10	-10.0	-9.7	9.1	locked
148P	55	50	45	45.0	44.9	8.8	locked	147N	-27	88	-5	-5.0	-5.1	9.1	locked
150P	45	150	48	40.0	39.8	3.8	locked	151N	-32	150	-10	-10.0	-10.2	2.8	locked
152P	35	100	38	30.0	29.2	7.8	locked	153N	-28	88	-15	-15.0	-14.4	6.5	locked
154P	34	100	38	30.0	30.0	1.1	locked	155N	-24	180	-10	-10.0	-14.8	4.2	locked
156P	40	50	48	40.0	40.1	5.2	locked	157N	-28	88	-15	-15.0	-14.6	5.8	locked

To run this GUI:    > setup d0online  
                          > cd /online/config/smt/hv  
                          > ./smt.hvc

Or from the "startgui" gui B.2.

# Channel HV Monitoring & Control

Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State
180P	81	100	88	50.0	45.5	8.8	Locked
182P	60	50	58	50.0	50.2	2.5	Locked
184P	60	50	0	8.0	6.8	8.2	Locked
186P	62	50	58	50.0	50.0	2.8	Locked

- ▶ **Channel:** HV pod name, last character gives polarity (P/N)
- ▶ **V\_Trip:** bias voltage hardware trip point
- ▶ **I\_Max:** bias current trip point
- ▶ **V\_Max:** bias voltage maximum (i.e. bias voltage for full depletion)
- ▶ **V\_Set:** bias voltage set point
- ▶ **V\_Read:** bias voltage reading
- ▶ **I\_Read:** bias current reading
- ▶ **State:** shows current state of the HV pod



- Off:** turn off pods
- On:** turn on pods
- Ramp:** start ramping
- Pause:** pause ramping
- Resume:** resume paused ramping
- Lock:** lock pods at current setting
- Unlock:** unlock locked pods
- Reset:** reset tripped pods

# Channel HV Monitoring & Control States & Actions

Channel	V_Trip	L_Max	V_Max	V_Set	V_Read	L_Read	State
106F	82	100	88	88.8	49.3	2.3	Locked
106P	88	100	88	88.8	88.1	2.1	Locked
104F	88	50	0	0.0	0.1	8.5	Locked
108F	82	100	88	88.8	88.8	2.4	Locked
116F	88	50	88	88.8	49.8	2.1	Locked
112F	88	100	85	85.8	84.8	22.4	Locked
114F	85	100	88	88.8	29.2	8.4	Locked
116P	88	100	45	45.8	44.7	42.1	Locked
126F	46	100	35	35.8	35.2	6.2	Locked
122F	46	130	48	48.8	39.4	48.2	Locked
124F	36	80	38	38.8	29.3	9.8	Locked
126P	35	50	38	0.0	11.4	8.5	Paused
138F	41	80	38	38.8	21.8	22.2	Ramp
122P	47	50	48	48.8	38.8	6.1	Locked
134F	44	80	35	35.8	34.2	6.2	Locked
181F	55	50	45	45.8	45.8	-0.3	Locked
182F	78	80	88	88.8	88.8	1.8	Locked
185F	71	50	88	88.8	88.1	2.5	Locked
187F	82	50	88	88.8	49.7	8.8	Locked
111F	84	50	45	45.8	45.8	3.8	Locked
113N	-28	100	-5	-5.8	-4.2	33.0	Locked
116N	-28	100	-18	-18.8	-9.4	8.2	Locked
117N	-34	100	-15	-15.8	-14.2	31.7	Locked
121N	-16	100	-8	-8.8	-4.8	20.8	Locked
123N	-34	130	-29	-28.8	-19.2	50.2	Locked
128N	-82	80	-16	0.0	0.3	-0.8	Off
127N	-32	50	-15	0.0	12.8	8.1	CX OC
131N	-88	80	-88	0.0	1.8	8.8	On
133N	-26	50	-18	0.0	1.2	2.5	Holding
135N	-38	80	-28	-28.8	-19.8	4.8	Locked

**Off:** turned off, options from this state are:

- **On:** turn on the pod
- **Disable:** disable the pod

**On:** turned on but not ramped, options from this state are:

- **Off:** turn off the pod
- **Ramp:** ramp the pod to **V\_Set**

**Ramp:** ramping to **V\_Set**, options from this state are:

- **Off:** turn off the pod
- **Pause:** pause the ramping

**Paused:** ramping has paused, options from this state are:

- **Off:** turn off the pod
- **Resume:** resume ramping to **V\_Set**

**Holding:** ramping to **V\_Set** completed, options from this state are:

- **Off:** turn off the pod
- **Ramp:** ramp to **V\_Set**
- **Lock:** lock the pod at its current setting

**Locked:** locked at current setting, options from this state are:

- **Unlock:** unlock the pod

**CX OC/CX OV/CX:** tripped (overcurrent/overvoltage/group-trip), options from this state are:

- **Reset:** reset the pod to **On**

**Disabled:** disabled, options from this state are:

- **Enable:** enable the pod

Pod states can be changed globally using the buttons at the bottom of the GUI, or individually by clicking on a pod's **State** box.

# Underdepletion Script

Some of the SMT sensors can't hold the full bias voltage they were originally designed for. These devices can be biased only to a smaller fraction of the original  $V_{\text{max}}$ . These fractions have already been taken into account when setting the current  $V_{\text{max}}$ -values. To keep track of underdepleted devices, there is a script that prints out a list of these.

This script is automatically run every time a Begin Run checklist or a Configuration Change checklist are entered into the logbook.

The script can be run manually by typing:

```
> setup d0online  
> cd ~/monitoring  
> ./list_underdepleted_hdi.py
```

A typical output of the underdepletion script is shown on the next page.

Warning: The underdepletion script does not check whether a F6-HDI is enabled or not. In case of a switched off F6-HDI, the corresponding F8-HDI is without bias as well, since only the F6'ers receive the bias for a F-wedge.

# Underdepletion List

List of underdepleted HV pods as of Sun Apr 21 16:08:43 2002  
(listed are only sensors that are underdepleted by 5V or more)

HDI	planned deltaV(V)	current deltaV(V)	depleted to	Comment
+++++				
H3-1-21	60	0	0% / 0%	known
H3-2-21	60	0	0% / 0%	known
H4-1-22	80	71	89% / 110%	known
H4-2-22	80	71	89% / 110%	known
F12-2-8	80	63	79% / 98%	known
H3-2-11	60	23	39% / 52%	known
F6-2-5	50	42	85% / 122%	known
F6-2-7	50	42	85% / 122%	known
H1-1-6	80	72	90% / 111%	known
H1-2-6	80	72	90% / 111%	known
H2-1-22	75	66	88% / 110%	known
H2-2-22	75	66	88% / 110%	known
H1-1-18	60	52	87% / 116%	known
H1-2-18	60	52	87% / 116%	known
F4-2-4	80	71	89% / 110%	known
H2-1-24	60	47	79% / 105%	known
H2-2-24	60	47	79% / 105%	known
H1-1-23	85	67	78% / 95%	known
H1-2-23	85	67	78% / 95%	known
H1-1-17	80	68	85% / 105%	known
H1-2-17	80	68	85% / 105%	known
H1-1-13	60	22	38% / 51%	known
B3-4-1	70	46	67% / 85%	known
B6-7-10	46	34	75% / 112%	known
B5-3-1	66	33	51% / 66%	known
B5-8-11	46	33	73% / 109%	known
H3-1-19	80	55	69% / 85%	known
H3-2-24	80	70	88% / 108%	known
H3-1-24	80	23	29% / 36%	known
H3-2-12	60	30	50% / 67%	known
F9-2-8	80	73	92% / 113%	known
H3-2-19	80	56	71% / 87%	known
H3-1-12	60	22	37% / 50%	known
H3-2-18	60	22	38% / 51%	known
F6-2-3	50	39	78% / 112%	known
F6-2-6	50	23	46% / 66%	known
B3-5-3	50	21	42% / 61%	known
H2-2-20	60	17	29% / 39%	known

number of slightly underdepleted sensors (between 5V and 10V below originally planned deltaV)

ladders: 0  
F-wedges: 4  
H-wedges: 9

number of significantly underdepleted sensors (more than 10V below originally planned deltaV)

ladders: 5  
F-wedges: 3  
H-wedges: 17

WARNING: This list doesn't include switched off F6-HDI's.. In this case the corresponding F8 is not biased as well...

# HV Alarms & Alarm Display

The SMT HV system is connected to the Significant Event System, which means that alarms are being sent if the voltages or currents are exceeding normal bounds.

These alarms can be monitored using the alarm-display. You can start the SMT alarm display by typing:

```
> setup d0online
```

```
> start_alarm_display -c /home/d0smt/smt.ses &
```

Or from the "startgui" gui D.3.

Group Name	MAJOR	MINOR	INVALID	DISABLED	GOOD
HV	397	899	0	0	0
LV	0	2	2	0	596
IB	0	0	0	0	0
Occupancy	0	0	0	0	0
Dead	0	0	0	0	0
all	397	901	41	0	817

Status: Connection to server opened

Each of the buttons in this GUI contains the number of alarms at the different severity levels for the corresponding row. The different alarm-levels are the following (alarms other than those in row 'HV' are not described here):

## Major alarms:

There is a problem that has to be fixed. For the high voltage, this could mean one of the following things:

- HV off: There are ~400 major HV alarms when the HV is turned off. They are voltage alarms for pods for which  $V_{max}$  is greater than  $\pm 5V$ .
- HV trip: A HV pod has tripped of for some reason. In this case you will see in total 4 alarms per tripped pod in the alarm column because of linked alarms.
- Bias-current is very close to the trip-point (less than 5uA).
- Voltage is larger than  $V_{max}+5V$
- Voltage is smaller than  $V_{max}-5V$

A major alarm from a HV trip will also pause a run. A message will come via the speakers at the DAQ-shifters console indicating that the run is being paused.

# HV Alarms & Alarm Display

## **Minor alarms:**

This is a warning that something might be wrong and the corresponding channel should be monitored closely. For the HV, this can mean one of the following things:

- HV off: There are ~900 minor HV alarms when the HV is turned off. 864 are related to the *state* of being **OFF** (two alarms for each of the 432 pods). The rest are minor voltage alarms for pods for which  $V_{\max}$  is within  $\pm 5V$ .
- Slightly too high bias-current (within 10uA of trip-point).
- Voltage is larger than  $V_{\max} + 3V$
- Voltage is smaller than  $V_{\max} - 3V$

## **Invalid alarms:**

A read or a write has failed. (Not yet seen for HV alarms !)

## **Disabled Alarms:**

It is possible to disable a alarm. It will then not show up again anywhere else than in the 'Disabled' column, unless it is re-enabled. Do not disable an alarm without a reason.

## **Good Alarms:**

If an alarm condition has been resolved, the alarm will go into the GOOD-column where it will disappear after 5 minutes. Seeing an increase in the number of good alarms without having done something (like ramping the HV up) is an indication that there is a alarm-condition that goes away after a short time-period. This might be the case if the bias-current is not yet fully at the alarm-limit but oscillating around it.

In the example alarm display on the previous page, all HV pods were off.

# HV Alarms & Alarm Display

By clicking on the alarm-button, a detailed listing of the alarms will appear.

Group Name	MAJOR	MINOR	INVALID	DISABLED	GOOD
HV	397	899	0	0	0
LV	0	2	2	0	596
IB	0	0	0	0	0
Occupancy	0	0	0	0	0
Dead	0	0	0	0	0
all	397	901	41	0	817

Status: Connection to server opened

SMT\_HVC\_100P/VOLT  
 SMT\_HVC\_101P/VOLT  
 SMT\_HVC\_102P/VOLT  
 SMT\_HVC\_103P/VOLT  
 SMT\_HVC\_105P/VOLT  
 SMT\_HVC\_106P/VOLT  
 SMT\_HVC\_107P/VOLT  
 SMT\_HVC\_110P/VOLT  
 SMT\_HVC\_111P/VOLT  
 SMT\_HVC\_112P/VOLT  
 SMT\_HVC\_113N/VOLT  
 SMT\_HVC\_114P/VOLT  
 SMT\_HVC\_115N/VOLT  
 SMT\_HVC\_116P/VOLT  
 SMT\_HVC\_117N/VOLT

SHOW  
 DISABLE  
 DISABLE ALL  
 CLOSE

Mark an alarm by clicking on it.  
 Click on **SHOW** to get detailed information about the marked alarm.  
 Click on **DISABLE** to disable the marked alarm.  
 Click on **DISABLE ALL** to disable all alarms listed here.  
 Click on **CLOSE** to get rid of the window again.

In the details window:

Click on **CLOSE** to get rid of the window.

Click on **DISABLE** to disable the alarm.

Click on **GUIDANCE** to get a message that explains the alarm and proposed actions (*not yet implemented*).

Click on **COMMAND** to execute a predefined command (*not yet implemented*).

```

***** SMT_HVC_100P/VOLT *****
Alarm cause:      LoLo alarm
Alarm value:     -0.305175
HiHi limit:     55.000000
High limit:     53.000000
Low limit:      47.000000
LoLo limit:     45.000000

Message contents:
version:        v4
utility:        aff(5,0)
timestamp:      Thu Oct 3 11:14:48 2002
message type:   alarm
name:          SMT_HVC_100P/VOLT
priority:       0
host:          d0oictf08
db entry:      0
parent:        none
children:      none
transition:    bad
severity:      major
alarm type:    analog
parameters:    ai 5 -0.305175 55.000000 53.000000 47.000000 45.000000

CLOSE  DISABLE  CONTROL  GUIDANCE  COMMAND
  
```

# Troubleshooting

## HV Pod Trips

### Symptoms:

Blinking red field in global HV GUI

Pod in tripped state in the channel HV GUI

Major run-pausing alarm in the significant event system.

### Types of trips:

Overcurrent trip (CXOC): current exceeded the bias current trip point.

Overvoltage trip (CXOV): voltage exceeded the bias voltage hardware trip point

### Fix:

For most trips, all that is required is:

- Start monitoring the currents and voltages of the affected pod(s) with StripTool (left-click on the pod name in the channel HV gui).
- Reset the tripped pods: click the **Reset** button
- Ramp the reset pods: click the **Ramp** button.
- Lock the pods when they go into 'holding': click the **Lock** button.
- Note the trip in the logbook together with information about the circumstances of the trip (e.g. tripped while downloading HDI's, trip-indications (CX ??) ...).

### Risers:

Some pods exhibit a behavior of slowly rising currents. Eventually, the currents for such pods will rise to alarm and trip levels. They can be identified in StripTool by a current trace that is generally steady and high with a slightly increasing slope. If one of these risers trips, it will usually be necessary to increase the alarm and trip limits for the tripped pod (and its partner for double-sided devices) before returning to long-term stable operation:

- `>cd ~/onl_smtnew/util`  
`>./increaseHVlim.py &`
  - Or from the "startgui" gui B.4.

# Troubleshooting

## HV Pod Trips

- Enter the pod name and new limits
- Click **Increase IMAX by 10  $\mu$ A**
  - Do not raise a pod by more than 30  $\mu$ A total without checking with the On-call Expert.
  - Click **Read set values** if you just want to read back the current value and IMAX
- Click **Quit**
- Note the limit increase in the logbook.

### Unstable pods:

Some HV trips are caused by unstable channels in the fanout boxes. These are identified by the presence of non-oscillating instabilities of the current as seen in the StripTool plot. These will most likely trip again soon after recovering from the first trip. If a pod trips after it has been identified as unstable:

- Disable the tripped pod (and its partner for double-sided detectors)
- Disable the HDI's biased by the disabled pods
  - Find the associated HDI's
    - >cd ~/ monitoring
    - >show\_hvinfo.py <pod name>
  - Disable the HDI's in the download gui
- Have the DAQ shifter start a new run

### Ramp-up trips:

If a pod trips during ramp-up before it reaches its full voltage,

- Start monitoring the currents and voltages of the affected pod(s) with StripTool (left-click on the pod name in the channel HV gui).
- Try the following solutions *in order* until one or none is successful:
  1. Ramp in small steps of 10% each to reach 100%.
  2. If the trip is on overcurrent (CXOC), increase the current trip limit
    - >cd ~/onl\_smtnew/util
    - >./increaseHVlim.py &
      - Or from the "startgui" gui B.4.
    - Enter the pod name and new limits

# Troubleshooting

## HV Pod Trips

- Click **Increase IMAX by 10  $\mu$ A**
    - Do not raise a pod by more than 30  $\mu$ A total without checking with the On-call Expert.
    - Click **Read set values** if you just want to read back the current value and IMAX
  - Click **Quit**
  - Note the limit increase in the logbook.
3. Contact the On-call Expert
- Note the trip in the logbook together with information about the circumstances of the trip (e.g. tripped while downloading HDI's, trip-indications (CX ??)...).

### Turn-on Trips:

Sometimes a lot of HV pods immediately trip without ramping then when turning a crate **On**. Resets from the global GUI or crate GUI will not reset these trips. To reset pods tripped in this manner:

- Click on the crate name in the global HV GUI. A detail window will pop up showing all the HV pods in this crate.
- Click on the **Reset** button in this detail GUI.
- Try multiple times if this should not help immediately.
- Note the occurrence in the logbook.

### IMPORTANT

**If the high voltage configuration has to be changed for any reason (e.g. underdepletion or disabling of a pod), a new run must be started to have a known situation on a run-by-run basis.**

# Troubleshooting HV Crate Trips

**Symptoms:** flashing red crate name in the global HV GUI

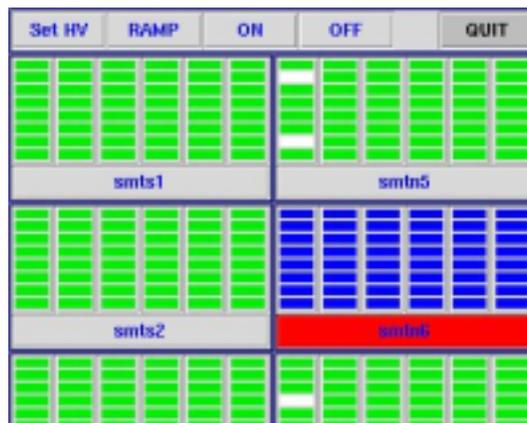
**Fix:** Before taking any other action, do the following:

1. Check the appropriate crate in the crate HV GUI
2. If all HV-pods can be seen (try a reconnect first), restart the global HV GUI, since this is a glitch in the GUI.
3. Note the occurrence in the logbook

If this does not help, the HV crate is most likely really tripped. In all likelihood the trip is due to a Rack Monitor trip in the HV rack (M220, M221, or M222).

To reset a crate:

1. Identify and correct the cause of the crate trip
  - Go to MCH2 and check if the RM has tripped. If so, press the **Reset Alarms** button to reset the RM.
2. Click on the flashing crate name in the global HV GUI



3. Click **Reset** in the window that pops up.
4. Ramp the HV up again if necessary (it is possible that all HV-pods in this crate are off now).
5. Note the occurrence in the logbook.

# Troubleshooting

## Minor HV Alarm

### Minor HV alarm

**Symptoms:** entry in the minor alarm column of the alarm display

**Fix:** It is normal to have ~900 minor HV alarms if the HV is off. If the minor alarms do not correspond to this case, do the following:

1. Find out the alarm-condition, by clicking on the alarm in the alarm-display
2. If the alarm is on the bias-current:
  - a) Check in the crate GUI, if this is a real alarm condition (see section on alarm-limits).
  - b) If yes, start monitoring the bias current with StripTool.
3. If the alarm is on the bias-voltage:
  - a) Check in the crate GUI, if this is really the case (see section on alarm-limits).
  - b) If yes, start monitoring the voltage with StripTool.
4. Make a note in the logbook.

# Troubleshooting

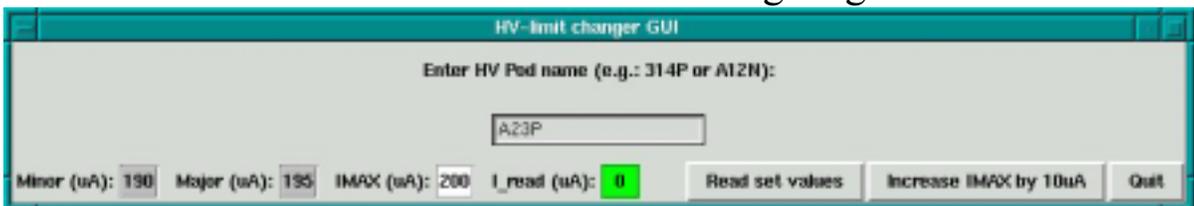
## Major HV Alarm

### Major HV alarm

**Symptoms:** entry in the major alarm column of the alarm display

**Fix:** Do the following:

1. First check for tripped HV pods in the global HV GUI.
2. Find out the alarm-condition, by clicking on the alarm in the alarm-display
3. If the alarm is on the bias-current:
  - a) Check in the crate GUI, if this is really the case (see section on alarm-limits).
  - b) If this HV-pod was already being monitored, and this monitoring indicates that the bias-current will reach the trip-point, the current alarm and trip limits should be increased. Do this as follows:
    - `>cd ~/onl_smtnew/util`
    - `>./increaseHVlim.py &`
    - Or from the "startgui" gui B.4.



- Enter the pod name and new limits
- Click **Increase IMAX by 10  $\mu$ A**
  - Do not raise a pod by more than 30  $\mu$ A total without checking with the On-call Expert.
  - Click **Read set values** if you just want to read back the current value and IMAX
- Click **Quit**
- Note the limit increase in the logbook.

# Troubleshooting

## Major HV Alarm

- c) If this HV-pod was not being monitored before, start a StripTool on it. If this indicates that the pod will reach the trip-point soon, take the same action as above.
4. If the alarm is on the voltage:
  - a) Check in the crate GUI, if this is really the case (see section on alarm-limits).
  - b) If the correspond HV-pod is OFF, turn it on and try to ramp it to 100%. Turn on the partner pod as well in case of a HV pair.
  - c) If this does not help, call an expert and/or Ben Abraham (*pod malfunction*).
5. Note everything in the logbook and run the 'underdepletion' script.

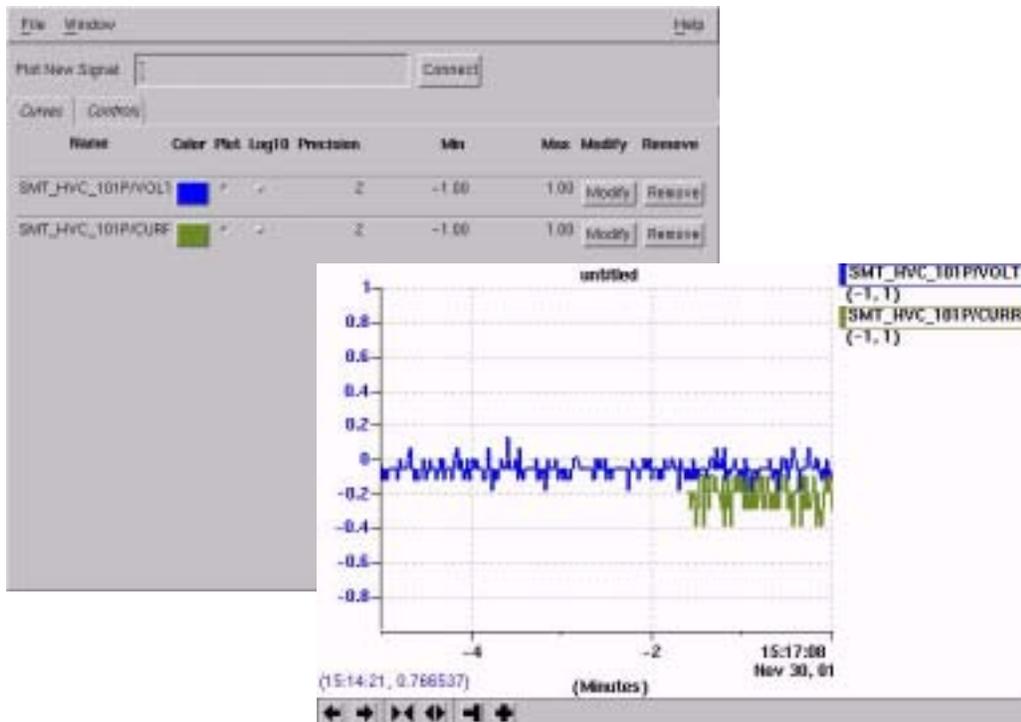
# Troubleshooting StripTool

The StripTool utility allows tracking of bias voltages and currents. This is very useful for debugging problem HV channels. A StripTool chart can be launched from the command line by:

- > setup d0online
- > StripTool &

In the Control window, enter a signal name (e.g. SMT\_HVC\_101P/VOLT, SMT\_HVC\_101P/CURR) and click **Connect** to start the graph. Plotting parameters can be modified in the Control GUI.

StripTool charts for HV pods can also be launched automatically from the Crate HV GUI by left-clicking on a HV pod's name in the **Channel** field. The Control window can be opened again by right-clicking inside the plot-range and choosing "Controls Dialog". It is also advisable to set the ringbuffer size to 64000 samples.



# HV Information

## Finding HV Info for a Particular Device

There are a couple of ways to obtain HV information for a particular channel. Either of the following may be more useful depending on what you are doing.

**Download GUI:** If you are working with the download GUI, then you can conveniently find HV information for a complete interface board.

Click this, select **HV GUI**...

...and get this...

Channel	V_Trip	I_Max	V_Max	V_Set	V_Read	I_Read	State
101P	55	50	45	0.0	-0.2	-0.2	OFF
103P	70	50	60	0.0	-0.1	0.3	OFF
102P	60	50	50	0.0	0.1	0.7	OFF

status: GUI initialization complete

Reconnect Offline Online Off On Ramp Pause Resume Lock Unlock Reset

...giving HV information and control for each channel on that interface board.

A HV GUI for the entire VRB crate can be obtained by left-clicking on the VRBCR\_# button and selecting **HV GUI**. **Note:** 8-chippers don't receive bias, so the HV GUI will empty for these.

**Command line:** HV information for a particular detector or IB channel (e.g. B2-4-6 or SMT\_IB\_NE0A04-C) can be obtained by:

```
>cd ~d0smt/monitoring
>show_IB_info.py SMT_IB_NE0A04-C
```

or

```
>show_det_info.py B2-4-6
```

which will produce a window, which shows the HV pods connected to that detector/channel, and the other detectors/channels connected to those pods.

```
GUI_SERIAL_NO: B2-4-6
GUI IB channel: NE_0A04-C
PRIMARY_BIAS_POD: 847
SECONDARY_BIAS_POD: 847
Device connected to these HV pods:
B2-5-2: CU IB channel: NE_1A04-A
B2-6-6: CU IB channel: NE_0A04-C
B2-7-6: CU IB channel: NE_1A07-A
B2-8-3: CU IB channel: NE_1A07-C
SEQUENCES: SEQ_040A04 Fiber: 2
VRB: VRB_8011 Fiber: 2
```

# HV Information

## Finding Device Info for a Particular Pod

**Command line:** A window showing the devices connected to a particular HV pod (e.g. 133N) can be obtained by:

```
>cd ~d0smt/monitoring  
>show_hv_info.py 133
```



```
File View                               Help  
HV pod ID: 133  
HV pod EPICS name: SMT_HVC_133N  
Secondary bias pod connected to:  
HDI_SERIAL_NO: 85-7-7  
  CA 16 channel: SW_0813-E      EPICS 16 channel: SW0800-E  
  SEQUENCER:      SEQ_190613    Fiber:      1  
  VRS:            VRS_0510     Fiber:      1  
HDI_SERIAL_NO: 85-8-8  
  CA 16 channel: SW_0813-C      EPICS 16 channel: SW0800-C  
  SEQUENCER:      SEQ_190613    Fiber:      2  
  VRS:            VRS_0510     Fiber:      2  
HDI_SERIAL_NO: 85-8-9  
  CA 16 channel: SW_1A03-D      EPICS 16 channel: SW1A00-D  
  SEQUENCER:      SEQ_201613    Fiber:      2  
  VRS:            VRS_0510     Fiber:      2  
HDI_SERIAL_NO: 85-9-10  
  CA 16 channel: SW_1A03-C      EPICS 16 channel: SW1A00-C  
  SEQUENCER:      SEQ_201613    Fiber:      2  
  VRS:            VRS_0510     Fiber:      2  
Status:
```

# Alarm Display

Several portions of the SMT system are connected to the Significant Event System. This means that for those sub-systems, alarms are sent if various operating parameters exceed normal bounds.

These alarms can be monitored using the alarm-display. You can start the SMT alarm display by typing:

```
> setup d0online
```

```
> start_alarm_display -c /home/d0smt/smt.ses &
```

Or from the "startgui" gui D.3.

Group Name	MAJOR	MINOR	INVALID	DISABLED	GOOD
HV	397	899	0	0	0
LV	0	2	2	0	596
IB	0	0	0	0	0
Occupancy	0	0	0	0	0
Dead	0	0	0	0	0
all	397	901	41	0	817

Status: Connection to server opened

Each of the buttons in this GUI contains the number of alarms at the different severity levels for the corresponding row. The different alarm-levels are the following:

## **Major alarms:**

There is a problem that has to be fixed. Many (but not all) major alarms will pause a run. A message will come via the speakers at the DAQ-shifters console indicating that the run is being paused.

## **Minor alarms:**

This is a warning that something might be wrong and the corresponding system should be monitored closely. The source of the alarm should be identified and understood.

## **Invalid alarms:**

A read or a write has failed.

# Alarm Display

## **Disabled Alarms:**

It is possible to disable an alarm. It will then not show up again anywhere else than in the 'Disabled' column, unless it is re-enabled. Consequently, a disabled alarm loses the ability to pause a run. Do not disable an alarm without first contacting the Expert On-Call.

## **Good Alarms:**

If an alarm condition has been resolved, the alarm will go into the GOOD-column where it will disappear after 5 minutes. Seeing an increase in the number of good alarms without having done something (like ramping the HV up) is an indication that there is a alarm-condition that goes away after a short time-period. For example, this might be the case if a bias-current is not yet fully at the alarm-limit but oscillating around it.

Details about diagnosis and treatment for various alarms can be found in the SMT Shift Instruction sections for the corresponding sub-systems:

<u>Alarm Group Name</u>	<u>Shift Instruction Section</u>
HV	High Voltage
LV	Low Voltage Supplies
IB	Download gui, IB Temperature gui
Occupancy	Monitoring
Dead	Monitoring

# Alarm Display

By clicking on the alarm-button, a detailed listing of the alarms will appear.

Group Name	MAJOR	MINOR	INVALID	DISABLED	GOOD
HV	397	899	0	0	0
LV	0	2	2	0	596
IB	0	0	0	0	0
Occupancy	0	0	0	0	0
Dead	0	0	0	0	0
all	397	901	41	0	817

Status: Connection to server opened

SMT\_HVC\_100P/VOLT  
 SMT\_HVC\_101P/VOLT  
 SMT\_HVC\_102P/VOLT  
 SMT\_HVC\_103P/VOLT  
 SMT\_HVC\_105P/VOLT  
 SMT\_HVC\_106P/VOLT  
 SMT\_HVC\_107P/VOLT  
 SMT\_HVC\_110P/VOLT  
 SMT\_HVC\_111P/VOLT  
 SMT\_HVC\_112P/VOLT  
 SMT\_HVC\_113N/VOLT  
 SMT\_HVC\_114P/VOLT  
 SMT\_HVC\_115N/VOLT  
 SMT\_HVC\_116P/VOLT  
 SMT\_HVC\_117N/VOLT

SHOW  
 DISABLE  
 DISABLE ALL  
 CLOSE

Mark an alarm by clicking on it.  
 Click on **SHOW** to get detailed information about the marked alarm.  
 Click on **DISABLE** to disable the marked alarm.  
 Click on **DISABLE ALL** to disable all alarms listed here.  
 Click on **CLOSE** to get rid of the window again.

In the details window:

Click on **CLOSE** to get rid of the window.

Click on **DISABLE** to disable the alarm.

Click on **GUIDANCE** to get a message that explains the alarm and proposed actions.

Click on **COMMAND** to execute a predefined command.

```

***** SMT_HVC_100P/VOLT *****
Alarm cause:      LoLo alarm
Alarm value:     -0.305175
HiHi limit:     55.000000
High limit:     53.000000
Low limit:      47.000000
LoLo limit:     45.000000

Message contents:
version:        v4
utility:        aff(5,0)
timestamp:      Thu Oct 3 11:14:48 2002
message type:   alarm
name:          SMT_HVC_100P/VOLT
priority:       0
host:          d0oictf08
db entry:      0
parent:        none
children:       none
transition:     bad
severity:       major
alarm type:     analog
parameters:    ai 5 -0.305175 55.000000 53.000000 47.000000 45.000000

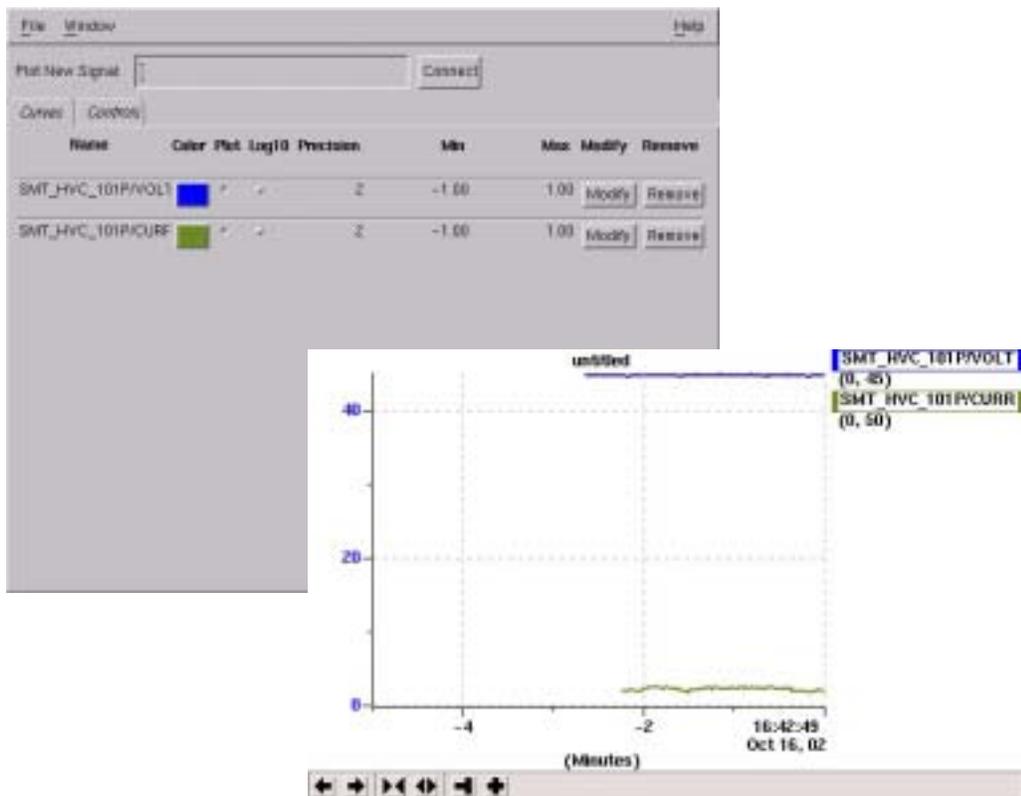
CLOSE  DISABLE  CONTROL  GUIDANCE  COMMAND
  
```

# StripTool

The StripTool utility allows tracking of SMT voltages, currents, temperatures and other miscellaneous parameters that are saved as EPICS variables. This is very useful for debugging various problems. A StripTool chart can be launched from the command line by:

- > setup d0online
- > StripTool &

On the **Curves** page of the Control window, enter a signal name (e.g. SMT\_HVC\_101P/VOLT, see next page) and click **Connect** to start the graph. Plotting parameters can be modified in the **Controls** page of the Control window. It is advisable to set the **Ring Buffer** size to 64000 samples. If the Control window is dismissed, it can be opened again by right-clicking inside the plot-range and choosing **Controls Dialog**.



# StripTool

## EPICS Variable Names

An incomplete list of EPICS variables of the SMT system available for StripTool use is given below.

EPICS Variable Name	Wild Card Completions	Variable Meaning
SMT_HVC_****/CURR	**** = HV pod name, e.g. 102P, 347N	HV pod bias current
SMT_HVC_****/VOLT	**** = HV pod name, e.g. 102P, 347N	HV pod bias voltage
SMT_IB_******/I_AVDD	***** = IB-channel, e.g. SW1B14-A	IB channel AVDD current
SMT_IB_******/I_AVDD2	***** = IB-channel, e.g. SW1B14-A	IB channel AVDD2 current
SMT_IB_******/I_DVDD	***** = IB-channel, e.g. SW1B14-A	IB channel DVDD current
SMT_IB_*****-A/TEMP	***** = IB, e.g. SW1B14	IB channel A temperature
SMT_IB_*****-B/TEMP	***** = IB-channel, e.g. SW1B14-B	IB channel B-H temperature
SMT_IB_******/V_AVDD	***** = IB-channel, e.g. SW1B14-A	IB channel AVDD voltage
SMT_IB_******/V_AVDD2	***** = IB-channel, e.g. SW1B14-A	IB channel AVDD2 voltage
SMT_IB_******/V_DVDD	***** = IB-channel, e.g. SW1B14-A	IB channel DVDD voltage
SMT_LVSEQ_*/*+52V-STAT	*/ = side/supply number, e.g. N/2	sequencer LV power supply +52V status
SMT_LVSEQ_*/*+52VI	*/ = side/supply number, e.g. N/2	sequencer LV power supply +52V current
SMT_LVSEQ_*/*+52VV	*/ = side/supply number, e.g. N/2	sequencer LV power supply +52V voltage
SMT_LVSEQ_*/*+5V-STAT	*/ = side/supply number, e.g. N/2	sequencer LV power supply +5V status
SMT_LVSEQ_*/*+5VI	*/ = side/supply number, e.g. N/2	sequencer LV power supply +5V current
SMT_LVSEQ_*/*+5VV	*/ = side/supply number, e.g. N/2	sequencer LV power supply +5V voltage
SMT_LV_***/IAVDD-3	*** = IB crate power supply, e.g. NE0	IB LV power supply 3-chip AVDD current
SMT_LV_***/IAVDD-6	*** = IB crate power supply, e.g. NE0	IB LV power supply 6-chip AVDD current
SMT_LV_***/IAVDD-89	*** = IB crate power supply, e.g. NE0	IB LV power supply 8/9-chip AVDD current
SMT_LV_***/IAVDD2	*** = IB crate power supply, e.g. NE0	IB LV power supply AVDD2 current
SMT_LV_***/IDVDD2-3	*** = IB crate power supply, e.g. NE0	IB LV power supply 3-chip DVDD current
SMT_LV_***/IDVDD2-689	*** = IB crate power supply, e.g. NE0	IB LV power supply 6/8/9-chip DVDD current
SMT_LV_***/IV15	*** = IB crate power supply, e.g. NE0	IB LV power supply 15V current
SMT_LV_***/IVCC1	*** = IB crate power supply, e.g. NE0	IB LV power supply VCC1 current
SMT_LV_***/IVCC2	*** = IB crate power supply, e.g. NE0	IB LV power supply VCC2 current
SMT_LV_***/IVCC3	*** = IB crate power supply, e.g. NE0	IB LV power supply VCC3 current

# StripTool

## EPICS Variable Names

An incomplete list of EPICS variables of the SMT system available for StripTool use is given below.

EPICS Variable Name	Wild Card Completions	Variable Meaning
SMT_LV_***/MF	*** = IB crate power supply, e.g. NE0	IB LV power supply magnetic field
SMT_LV_***/SPT	*** = IB crate power supply, e.g. NE0	IB LV power supply shunt plate temperature
SMT_LV_***/STAT	*** = IB crate power supply, e.g. NE0	IB LV power supply status
SMT_LV_***/UAVDD-3	*** = IB crate power supply, e.g. NE0	IB LV power supply 3-chip AVDD voltage
SMT_LV_***/UAVDD-6	*** = IB crate power supply, e.g. NE0	IB LV power supply 6-chip AVDD voltage
SMT_LV_***/UAVDD-89	*** = IB crate power supply, e.g. NE0	IB LV power supply 8/9-chip AVDD voltage
SMT_LV_***/UAVDD2	*** = IB crate power supply, e.g. NE0	IB LV power supply AVDD2 voltage
SMT_LV_***/UDVDD2-3	*** = IB crate power supply, e.g. NE0	IB LV power supply 3-chip DVDD voltage
SMT_LV_***/UDVDD-689	*** = IB crate power supply, e.g. NE0	IB LV power supply 6/8/9-chip DVDD voltage
SMT_LV_***/UV15	*** = IB crate power supply, e.g. NE0	IB LV power supply 15V voltage
SMT_LV_***/UVCC1	*** = IB crate power supply, e.g. NE0	IB LV power supply VCC1 voltage
SMT_LV_***/UVCC2	*** = IB crate power supply, e.g. NE0	IB LV power supply VCC2 voltage
SMT_LV_***/UVCC3	*** = IB crate power supply, e.g. NE0	IB LV power supply VCC3 voltage
SMT_LV_***/VT	*** = IB crate power supply, e.g. NE0	IB LV power supply Vicor temperature

# SMT Event Display

## CONTENTS

How To Run The Program  
The Display  
Modes Of Operation  
Printing Options

## HOW TO RUN THE PROGRAM

The online SMT Event Display is run with a different command according to the current run type. To run it during normal data-taking, open a new terminal window and type

```
> setup d0online  
> start_daq smt_event_display all
```

If there is a zero-bias run then use the option 'zb' instead of 'all', ie...

```
> start_daq smt_event_display zb
```

When the DAQ shifter is taking a special run then you should give 'special' as the argument but if you are unsure of what to use then you can try 'anything'. This last option receives any data from the first ten runs being taken by the DAQ shifter, regardless of the run type.

After launching the program, the following windows should be displayed (see next page):

# SMT Event Display



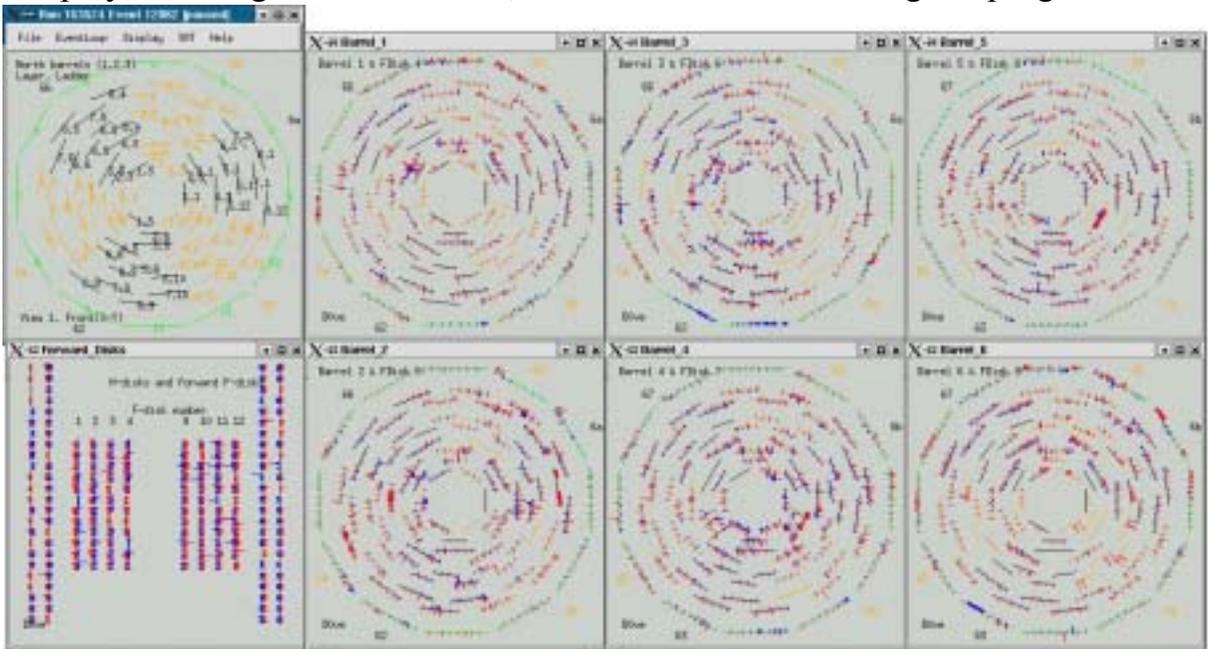
There are two ways to process events in the SMT Event Display. Selecting 'Start/Resume' from the EventLoop menu (or pressing return in any of the event display windows) will start a continuous event loop. Doing this a second time will pause the event loop. The default time between events is 5 seconds but this can be changed by selecting 'set pause interval' from the EventLoop menu and entering the desired interval, in seconds.

Selecting 'pause/step' from the EventLoop menu (or pressing space in any of the event display windows) will request the next available event. This allows the user to look at events one at a time.

# SMT Event Display

## THE DISPLAY

During operation, the SMT Event Display uses eight graphical windows to display data within the silicon detector (as shown below). Six of these are used to display the six barrels and the associated f-disks. One displays the forward f-disks and h-disks. The remaining window contains a key to the barrel display, showing ladder numbers, and a menu for controlling the program.



Each barrel is displayed in the r-phi plane with the ladders drawn in groups of black or orange, depending on which VRB crate they are connected to. Crate numbers are written on the outside of the barrel. The corresponding f-disk is also drawn on the outside of the barrel with each wedge coloured green. All ladders are pictured as being axially aligned, even though some stereo ladders are offset from the axial plane by 2 degrees or 90 degrees in the real detector. This representation should still be useful for diagnostic purposes.

The forward disks display window lays all wedges out in a straight line with 12 wedges per f-disk and 24 wedges per h-disk. Again, this representation is geometrically incorrect but diagnostically convenient.

All detector signals are shown in red for p-side chips and in blue for n-side chips. The length of the line is proportional to the amplitude of the signal recorded, up to a maximum of 256 ADC counts.

# SMT Event Display

The main window containing the barrel key can be reconfigured by making selections in the 'SMT' menu. The South and North barrel keys and the six barrel readouts can be added / overlaid and removed from the window which allows the user to see 'tracks' which cross more than one barrel.

## MODES OF OPERATION

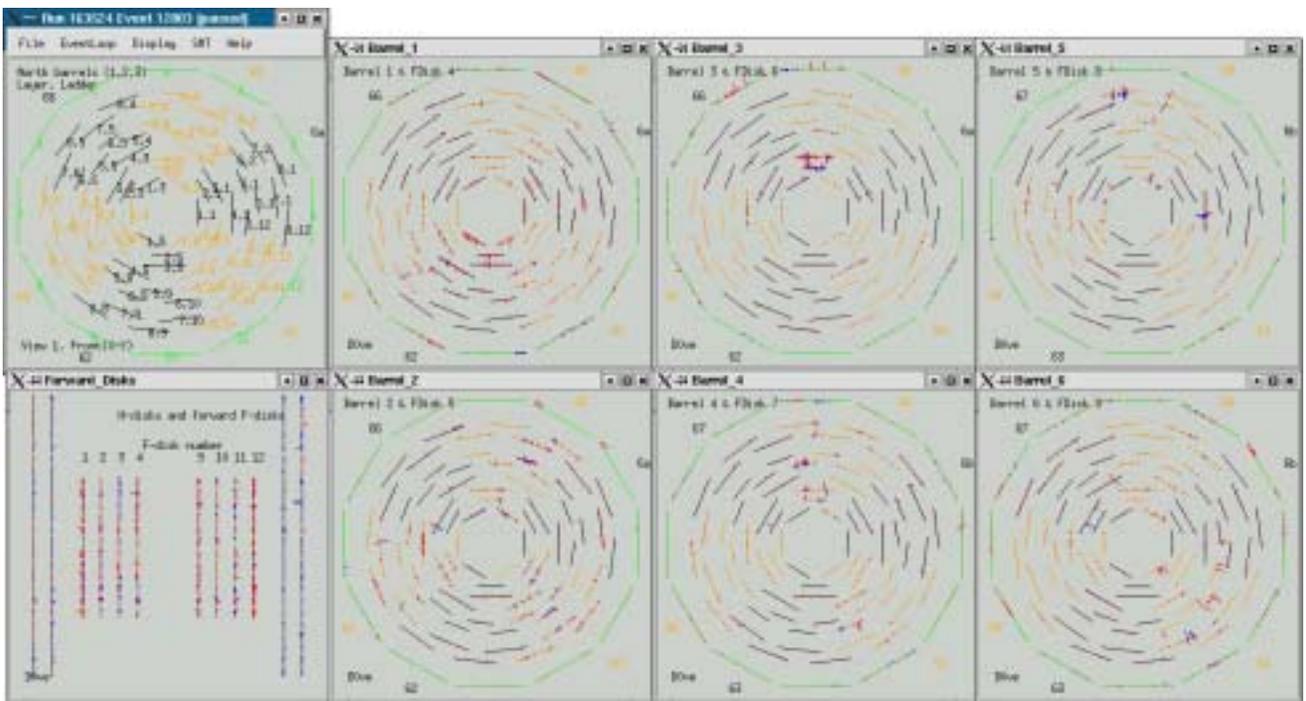
The event display runs in one of a number of calibration modes (default is STATIC, explained below) which determine how the data is processed before being displayed. The user can select the desired calibration mode from the 'SMT -> Configurator Mode' menu. These modes are listed below.

### STATIC

The signal as measured by the detector is displayed. A global pedestal is also subtracted but this is currently set to zero (example shown on previous page.)

### GENERIC

SDAQ chip pedestals from the database are subtracted before the data are displayed (example below.)



# SMT Event Display

GENERIC_MIXED	GENERIC mode is applied to those VRB crates operating in sparse readout mode while DYNAMIC mode is applied to those crates operating in all readout mode.
DYNAMIC	Pedestals are calculated on a chip-by-chip basis and then subtracted.
ONLINE_DB	Pedestals are imported from the database on a strip-by-strip basis and subtracted.
ONLINE_FILE	Pedestals are imported from a file on a strip-by-strip basis and subtracted.
MIXED	ONLINE_FILE mode is applied to those VRB crates operating in sparse readout mode while DYNAMIC mode is applied to those crates operating in all readout mode.

## PRINTING OPTIONS

The event display output can be printed to a postscript file by selecting one of the options in the 'File -> PS print' menu. Individual displays can be saved to file or the option exists to save all displays at once, to either a single file or separate files.

# SMT Examine

**Page Section**

123. Running SMT Examine

124. How to Use Histoscope

130. Monitoring Data Quality

132. SMT Examine Histograms

# SMT Examine

## Running SMT Examine

To run SMT Examine in the Control Room, you should be on d0o122 and logged in as *d0smt*. (for login do: *d0ssh <node name>* or *ssh -l <user name> <node name>* )

Type commands:

**setup d0online**

**start\_daq smt\_examine runtype**

*runtype = all for physics data taking examine*

*runtype = zb for zero bias run*

*runtype = special for a special SMT run*

*runtype = anything in the unknown situation*

In case of any problems, look in the *error.log* file and refer to [errors and warnings section](#) to understand what kind of error caused the problem.

To run **occupancy monitor** type **start\_daq smt\_occupancy**

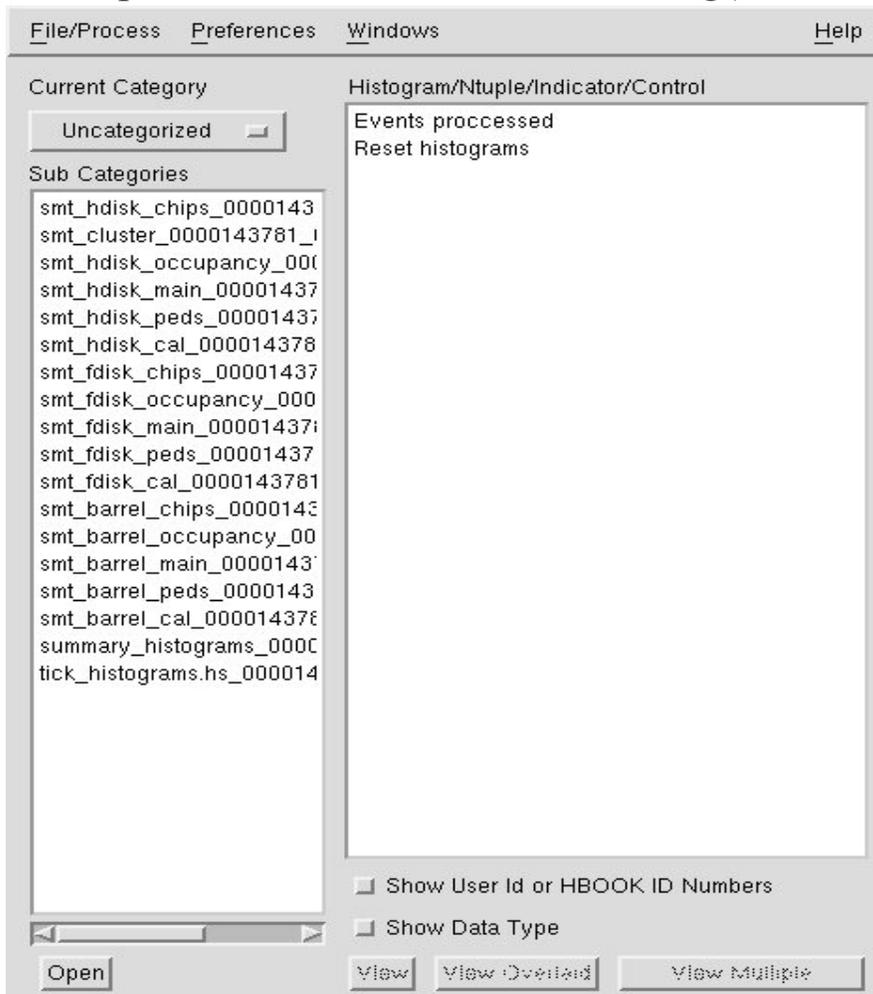
Note: occupancy monitor runs only together with smt\_examine because it uses smt\_examine output.

# SMT Examine

## How to Use Histoscope

(While reading this section keep referring to Sections 3 and 4)

- A histoscope window looks like the following(Window1):



- If histoscope is running already, such a window should be present.
- You can see a list of histoscope files on the left part of the window. Each file name has the run number in it. An idea of the content of these files can be had by reading Section 3. Barrel, Fdisk, Hdisk files have similar names like

smt\_barrel\_occupancy.hs

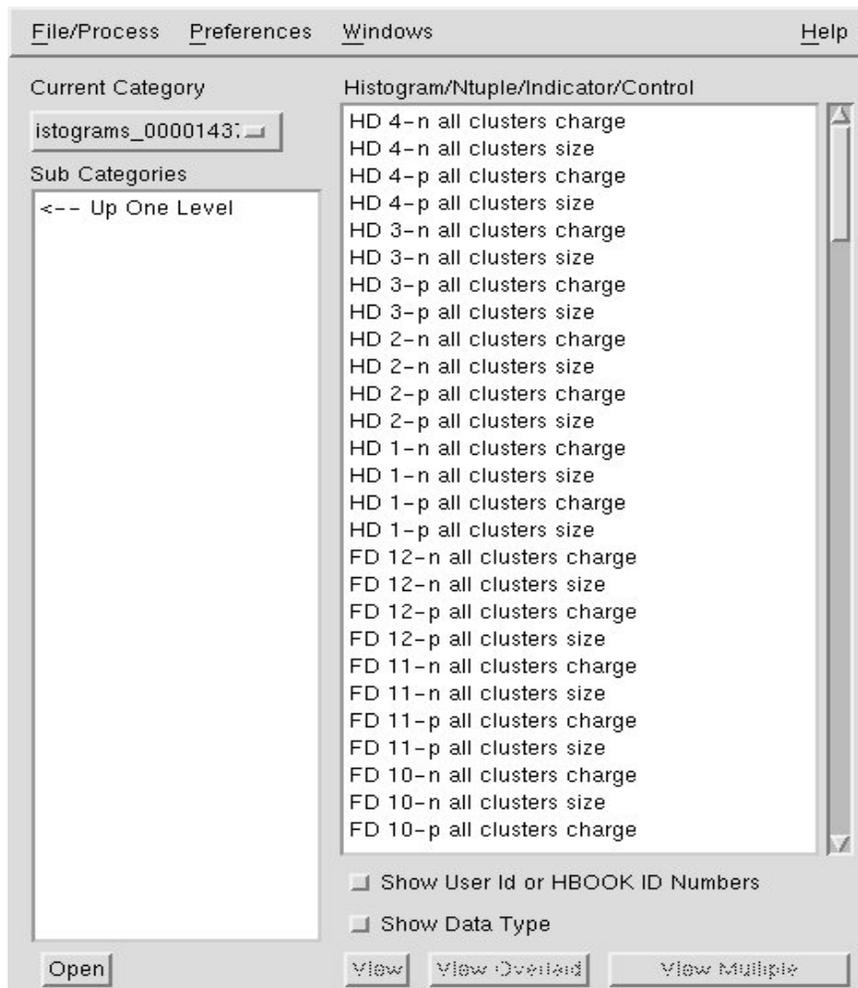
smt\_fdisk\_occupancy.hs

# SMT Examine

## How to Use Histoscope

smt\_hdisk\_occupancy.hs

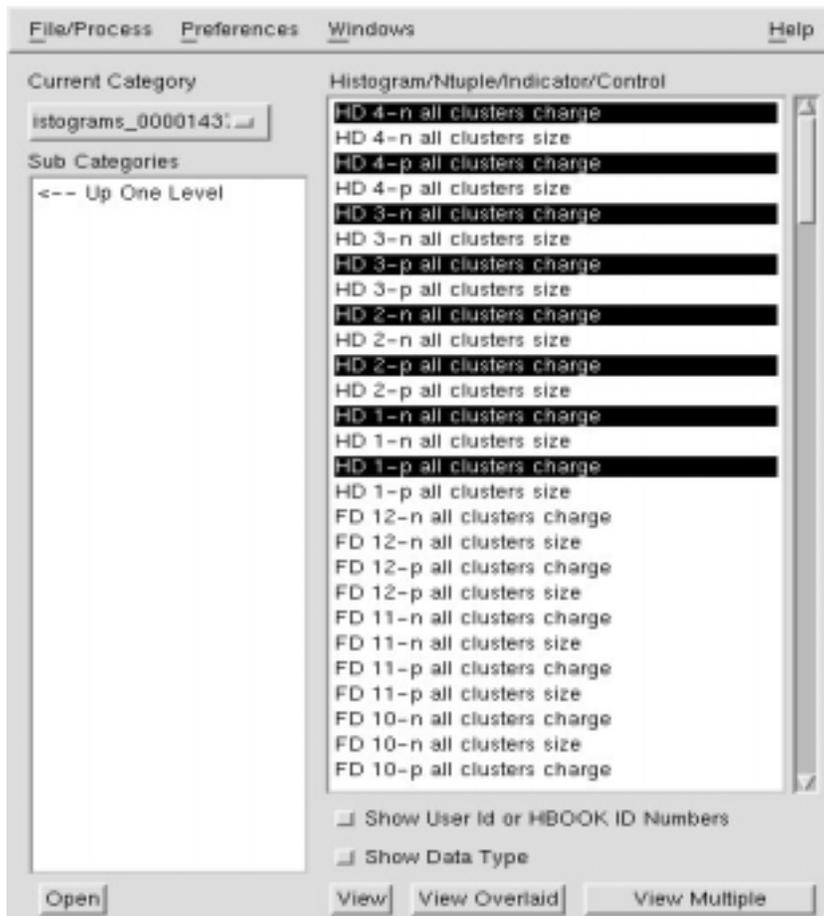
- Examine uses first 200 events to identify noisy strips and remove them further from cluster reconstruction. During this calibration cluster histograms are not filled. Usually they become available after 15 minutes of running. A shifter should first look at summary\_histograms.hs file. These are the only plots that we are interested in saving besides the plots of the devices that you may find causing anomalous “spikes” in these cluster distributions.
- Double click on its name. After this action the histoscope window would like the following(Window 2):



# SMT Examine

## How to Use Histoscope

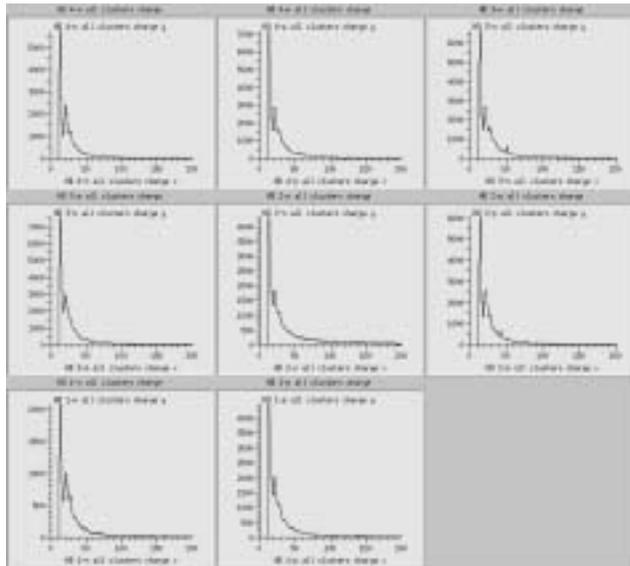
- By clicking on the “← up one level”, you can go back to Window 1.
- Scroll down the window. It has plots of cluster size and cluster charge distributions for ladders/wedges of barrel, fdisk and hdisk. You can double click on the plot names to see them. A histoscope window will pop up showing the clicked plot.
- You can make a multiple selection also i.e. seeing more than one plot in a single window. Press “Ctrl” button and select for example hdisk cluster distributions the cluster charge distributions. After making selection, release the “Ctrl” button and click on “View Multiple” button in the histoscope window. At this instant you do this the histoscope window would look like the following(Window3):



# SMT Examine

## How to Use Histoscope

- The result of above step would be a window(Window 4) like( for Hdisk). The contents of the plot this Window 4 are not important. This is just to show how the window looks like.



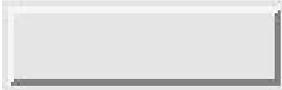
- You should also make such multiple selection for fdisk and barrel separately. Simply select all the plot in which you find “cluster charge” and hit “view multiple” button.
- You should store plots of in the directory :  
*/home/d0smt/SHIFTS/year/month/date/shift*  
 For e.g. */home/d0smt/SHIFTS/2002/mar/01/owl*
- HOW TO SAVE THE PLOT WINDOW (Window 4) in a file
  - Go to the directory  
*/home/d0smt/SHIFTS/year/month/date/shift*
  - At the command prompt type(hdisk.jpg is just a file name)  
`import hdisk.jpg`
  - Go to the “Window 4” and click on the top with middle button of the mouse. You will see that prompt returns in the the window where you typed “ import hdisk.jpg”. See if the file is there.

# SMT Examine

## How to Use Histoscope

- HOW TO RESET HISTOSCOPE

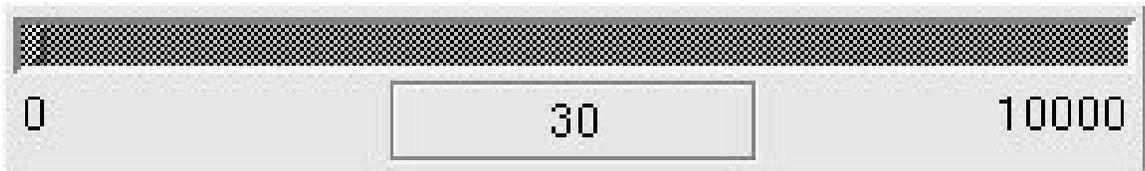
Double click on “Reset histograms” in Window 1. A very small window like the following pops up.



Left-mouse-hit on it. All histoscope plots would be reset.

- HOW TO LOOK AT THE NUMBER OF EVENTS PROCESSED

Double click on “Events processed” in Window 1. A small window pops up like

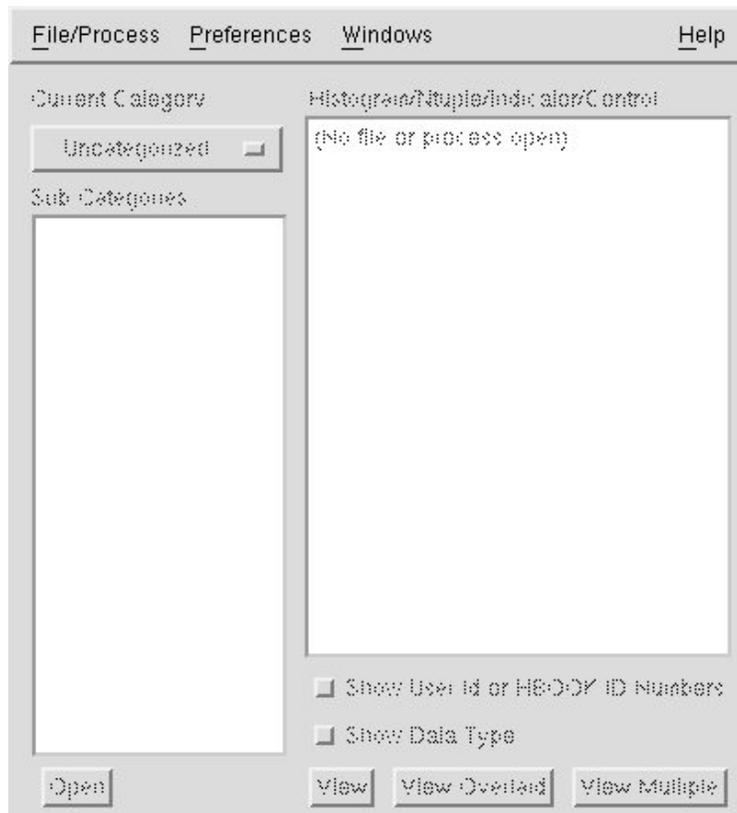


Here 30 are the number of events processed.

# SMT Examine

## How to Use Histoscope

- If you close this window by mistake you can open an x-window and start histoscope by typing
  - setup histo
  - *histo&*
- After typing *histo&* , histoscope will open like the following window. From “File/Process” connect to the process running examine. Wait for a while till this window looks like Window 1.



# SMT Examine

## Monitoring Data Quality

### 1. Summary cluster distributions

- Open *summary\_histograms.hs* and look at *Summary cluster charge distributions* (see SMT Examine Histograms section). Compare histograms with the reference plots. If you do not see significant deviations in shape from the reference plots go to 2.
- If you observe an unusual shape or additional peaks in Landau distributions open *smt\_cluster.hs* file and look at the individual ladder/wedge cluster charge distributions for a barrel/disk that shows the problem. Find the device responsible for it and make a log book entry. Look at the corresponding histogram for the position of the first strip in cluster. Are there any significant peaks?
- Open *smt\_barrel\_occupancy.hs* (or the corresponding disk data file) and look at the occupancy vs event dependence for the ladder/wedge under consideration. Does the device have consistent high occupancy? Make an entry in the log book.
- Open *smt\_barrel\_main.hs* (or the corresponding disk data file) and look at the number of fired strips distribution and the number of entries in each strip for the ladder/wedge under consideration. Does the device have many fired strips in each event? Does the entry histogram show high peaks in some channels? Make an entry in the log book.
- Open *smt\_barrel\_peds.hs* (or the corresponding disk data file) and look at the pedestal vs channel snapshot histograms for the ladder/wedge under consideration. Compare p- and n-side response. Are there correlations between the charge detected on two sides? If no clusters observed check the list of underdepleted ladders:
  - `cd ~/monitoring`  
`setup d0online`  
`list_underdepleted_hv.py`
  - Make an entry in the log book.
- Open *smt\_barrel\_chips.hs* (or the corresponding disk data file) and look at the pedestal distributions for each chip of the ladder/wedge under consideration. If you are running in GENERIC mode (default for *smt\_examine* in the Control Romm) the distributions have to have a peak at zero from neighbour readout and a tail towards higher pulses from the real clusters. Are the chip pedestals consistent with this shape? Is the problem (if any) observed in one chip? Make an entry in the log book.

# SMT Examine

## Monitoring Data Quality

### 2. Summary entries histograms

- Open *summary\_histograms.hs* and look at Summary entries and average pulse histograms (see SMT Examine Histograms section). Compare histograms with the reference plots and with the list of disabled HDIs. Make an entry in the log book.
- To make the list:
  - as d0smt,  
    cd ~/monitoring  
    ./listDisabledHDIs.py

# SMT Examine

## SMT Examine Histograms

During usual operation, SMTExamine produces 6 histogram files for each SMT subsystem (barrel, F-disks, H-disks), one summary file and two files containing cluster level plots. This document briefly describes the histograms that can be found in each file.

### Summary Plots

File *summary\_histograms.hs* contains

- summary cluster charge distributions
- summary cluster size distributions
- histograms for number of entries per ladder/wedge
- histograms for average pulse height per ladder/wedge

### Summary cluster charge distributions

Cluster charge distributions are presented for each barrel.

Histograms are split by detector type and side (3-chip ladders, 6-chip ladders p/n side and 9-chip ladders p/n side).

Summary charge distributions are expected to have Landau shape.

Any deviations from this shape like extra peaks can be usually traced down using detailed cluster plots from *smt\_cluster\_XXXXX.hs* file (see below Cluster plots section)

#### ***Barrel cluster histogram names:***

"Bar nb-side ladtype cluster charge"

"Bar nb-side ladtype cluster size"

where nb - barrel # (1,...,6)

side - p or n

ladtype - L3,L9 (for nb = 1,6); L6,L9 (for nb = 2,3,4,5)

#### ***F-disk cluster histogram names:***

"FD nd-side cluster charge"

"FD nb-side cluster size"

where nd - F-disk # (1,...,12)

side - p or n

# SMT Examine

## SMT Examine Histograms

### ***H-disk cluster histogram names:***

"HD nd-side cluster charge"

"HD nb-side cluster size"

where nd - H-disk # (1,...,4)

side - p or n

### **Summary entries and average pulse histograms**

For each barrel/disk side if at least one channel of a ladder/wedge is read out in an event the entry histogram is filled with 1 for this ladder/wedge. If the entry histogram shows zero or very small number of entries for some ladder/wedge the device is either not read out (disabled) or has some problems with calibration or thresholds.

For each barrel/disk side for each event average pulse height per ladder/wedge enters the average pulse histogram.

Histograms are arranged in the following way: entries for ladder *lad* from layer *lyr* go into channel number  $20*(lyr-1)+lad+1$  of the histogram containing all ladders of a particular barrel side. For example, number of entries for ladders 1 through 12 belonging to layer 5 barrel 4 p-side can be found in "Bar 4 p-side ladders entries" histogram in channels 81 through 92.

Average pulse height histograms for barrels are arranged similarly. Each F-disk(H-disk) histogram contains entries for wedges 1 through 12 (1 through 24) in channels 1 through 12 (1 through 24).

### ***Barrel entries and average pulse histogram names:***

"Bar nb-side ladders entries"

"Bar nb-side ladders average pulse"

where nb - barrel # (1,...,6)

side - p or n

### ***F-disk entries and average pulse histogram names:***

"FD nd all wedges entries"

"FD nb all wedges average pulses"

where nd - F-disk # (1,...,12)

# SMT Examine

## SMT Examine Histograms

***H-disk entries and average pulse histogram names:***

"HD nd all wedges entries"

"HD nb all wedges average pulses"

where nd - H-disk # (1,...,4)

side - p or n

**Summary cluster charge distributions and summary entries histograms are the main histograms that characterize SMT performance, efficiency and data quality. These histograms have to be looked at by a shifter and compared to the reference plots.**

### Cluster Plots

File *smt\_cluster.hs* contains cluster charge distribution and the position of the first strip of the reconstructed cluster for each barrel ladder and each F- and H- disk wedge (p- and n-side separately).

***Barrel cluster histogram names:***

"Bar nb-lyr-lad-side cluster charge"

"Bar nb-lyr-lad-side first strip of cluster"

where nb - barrel # (1,...,6)

lyr - layer # (1,..., 8)

lad - ladder # (1,...,12)

side - p or n

***F-disk clusters histogram names:***

"FD nd-nw-side cluster charge"

"FD nd-nw-side first strip of cluster"

where nd - disk # (1,...,12)

nw - wedge # (1,..., 12)

side - p or n

***H-disk clusters histogram names:***

"HD nd-nw-side cluster charge"

"HD nd-nw-side first strip of cluster"

where nd - disk # (1,...,4)

nw - wedge # (1,..., 24)

side - p or n

# SMT Examine

## SMT Examine Histograms

Cluster charge distribution shapes have to represent Landau distribution. For most of the ladders/wedges you'll see the peak at small cluster charge indicating the average noise contribution. Any other deviations from the Landau distribution is a signal of the problem.

Histograms containing the cluster first strip position are filled to ultimately show the noisy strips. If the ladder/wedge does not have any noisy strips the distribution has to be uniform. The peaks in certain channels indicate that this channel initiates fake (noisy) clusters at a rate higher than the real ones.

### **Tick plots**

File *tick\_histograms.hs* contains cluster charge distribution split by barrel/disk, ladder/wedge type (see above) and side filled for each bunch crossing (tick) separately. These histograms appeared to be useful to make sure that the number of clusters and cluster charge for all bunch crossings are similar.

#### ***Barrel tick histogram names:***

"Bar nb-side-XX-YY ladtype clusters charge"

where nb - barrel # (1,...,6)

side - p or n

ladtype - L3,L9 (for nb = 1,6); L6,L9 (for nb = 2,3,4,5)

XX - superbunch number (X0,X1,X2)

YY - bunch number (01,...,12)

#### ***F-disk tick histogram names:***

"FD nd-side-XX-YY clusters charge"

where nd - disk # (1,...,12)

side - p or n

#### ***H-disk tick histogram names:***

"HD nd-side-XX-YY clusters charge"

where nd - disk # (1,...,4)

side - p or n

# SMT Examine

## SMT Examine Histograms

### Occupancy plots

Files

*smt\_barrel\_occupancy.hs*

*smt\_fdisk\_occupancy.hs*

*smt\_hdisk\_occupancy.hs*

contain occupancy vs event distributions for each ladder/wedge.

Occupancy is defined as a percentage of the channels which were read out per ladder/wedge. The expected average occupancy is about 5%. Occupancy fluctuations above 30% indicate high common mode noise or many noisy channels on the ladder/wedge. Persistent high occupancy can be a result of the wrong threshold downloaded into the chip.

#### ***Barrel occupancy histogram names:***

"Bar nb-lyr-lad-side occupancy vs event"

where nb - barrel # (1,...,6)

lyr - layer # (1,..., 8)

lad - ladder # (1,...,12)

side - p or n

#### ***F-disk occupancy histogram names:***

"FD nd-nw-side occupancy vs event"

where nd - disk # (1,...,12)

nw - wedge # (1,..., 12)

side - p or n

#### ***H-disk occupancy histogram names:***

"HD nd-nw-side occupancy vs event"

where nd - disk # (1,...,4)

nw - wedge # (1,..., 24)

side - p or n

### Main plots

Files

*smt\_barrel\_main.hs*

*smt\_fdisk\_main.hs*

*smt\_hdisk\_main.hs*

# SMT Examine

## SMT Examine Histograms

for each ladder/wedge contain number of entries vs channel number histograms and the distributions of the number of fired strips. First set of histograms allows to track down the channels that are readout more often than the others (noisy channels) while running in srapse mode of the SVX chip. The second set is another way to represent the occupancy.

### ***Barrel channel entries histogram names:***

"Bar nb-lyr-lad-side entries"

"Bar nb-lyr-lad-side fired channels"

where nb - barrel # (1,...,6)

lyr - layer # (1,..., 8)

lad - ladder # (1,...,12)

side - p or n

### ***F-disk channel entries histogram names:***

"FD nd-nw-side entries"

"FD nd-nw-side fired channels"

where nd - disk # (1,...,12)

nw - wedge # (1,..., 12)

side - p or n

### ***H-disk channel entries histogram names:***

"HD nd-nw-side entries"

"HD nd-nw-side fired channels"

where nd - disk # (1,...,4)

nw - wedge # (1,..., 24)

side - p or n

### **Pedestal plots**

Files

*smt\_barrel\_peds.hs*

*smt\_fdisk\_peds.hs*

*smt\_hdisk\_peds.hs*

contain average pedestal vs channel number histograms for each ladder/wedge. They also contain pedestal vs channel histograms updated for each event, in other words, the detector response snapshot. The last set of histogram is useful to observe charge

# SMT Examine

## SMT Examine Histograms

correlations between p- and n-side of the same detector when a real particle goes through it.

### ***Barrel pedestal histogram names:***

"Bar nb-lyr-lad-side average pulse"

"Bar nb-lyr-lad-side event pulse"

where nb - barrel # (1,...,6)

lyr - layer # (1,..., 8)

lad - ladder # (1,...,12)

side - p or n

### ***F-disk pedestal histogram names:***

"FD nd-nw-side average pulse"

"FD nd-nw-side event pulse"

where nd - disk # (1,...,12)

nw - wedge # (1,..., 12)

side - p or n

### ***H-disk pedestal histogram names:***

"HD nd-nw-side average pulse"

"HD nd-nw-side event pulse"

where nd - disk # (1,...,4)

nw - wedge # (1,..., 24)

side - p or n

## **Standard deviation plots**

Files

*smt\_barrel\_sigma.hs*

*smt\_fdisk\_sigma.hs*

*smt\_hdisk\_sigma.hs*

contain sigma of pedestal vs channel number histograms for each ladder/wedge. These histograms are useful to identify the noisy channels (channels with large sigma) of each ladder/wedge. They make sense if data was taken in the readall mode of SVX chip and was processed in STATIC mode (see SmtRawUnp2Data.rcp) .

### ***Barrel sigma histogram names:***

"Bar nb-lyr-lad-side std dev"

where nb - barrel # (1,...,6)

# SMT Examine

## SMT Examine Histograms

lyr - layer # (1,..., 8)  
 lad - ladder # (1,...,12)  
 side - p or n

### ***F-disk sigma histogram names:***

"FD nd-nw-side std dev"  
 where nd - disk # (1,...,12)  
 nw - wedge # (1,..., 12)  
 side - p or n

### ***H-disk sigma histogram names:***

"HD nd-nw-side std dev"  
 where nd - disk # (1,...,4)  
 nw - wedge # (1,..., 24)  
 side - p or n

## **Chip pedestal distributions**

Files

*smt\_barrel\_chips.hs*

*smt\_fdisk\_chips.hs*

*smt\_hdisk\_chips.hs*

contain chip pedestal distributions and average chip pedestal vs event for each chip of ladder/wedge. The first set of histograms is used to study total noise. The second set allows to extract common mode noise if data is taken in readall mode of SVX chip and processed in STATIC mode (see SmtRawUnp2Data.rcp) .

### ***Barrel chip pedestal histogram names:***

"Bar nb-lyr-lad-side-chip nc pedestal"  
 "Bar nb-lyr-lad-side-chip nc average pulse vs event"  
 where nb - barrel # (1,...,6)  
 lyr - layer # (1,..., 8)  
 lad - ladder # (1,...,12)  
 side - p or n  
 nc - chip #

### ***F-disk chip pedestal histogram names:***

"FD nd-nw-side-chip nc pedestal"  
 "FD nd-nw-side-chip nc average pulse vs event"

# SMT Examine

## SMT Examine Histograms

where nd - disk # (1,...,12)  
nw - wedge # (1,..., 12)  
side - p or n  
nc - chip #

### ***H-disk chip pedestal histogram names:***

"HD nd-nw-side-chip nc pedestal"

"HD nd-nw-side-chip nc average pulse vs event"

where nd - disk # (1,...,4)  
nw - wedge # (1,..., 24)  
side - p or n  
nc - chip #

### **Calibration histograms**

Files

*smt\_barrel\_cal.hs*

*smt\_fdisk\_cal.hs*

*smt\_hdisk\_cal.hs*

contain histograms used to make the list of the noisy channels when smt\_examine starts.

# Occupancy GUI

1. Contact Harald Fox for any questions about the Occupancy GUI:
  - 847-414-4044
  - x5222

# Monitoring Shifter Instructions

Silicon detector monitoring is a multi-host system. It's purpose is to collect data describing current status of hardware generate and send alarm messages to Significant Event System.

Monitoring system consists of the following applications:

- Linux box multit-threaded application
- frontend processor VxWorks server
- Java servlets

## What to do when

### **If you need to stop monitoring:**

- login to 'd0ol28' as 'd0run'
- cd '/home/d0run/onlineMonitoring'
- source 'STOP\_MONITORING.tesh'
- check if there are not processes: 'ps -aux | grep SMTDataStore'
- if you see any 'SMTDataStore' kill them: kill -9 'process\_number'

### **If you need to start monitoring:**

- login to 'd0ol28' as 'd0run',
- cd '/home/d0run/onlineMonitoring'
- setup d0online
- check if there are not processes: 'ps -aux | grep SMTDataStore'

# Monitoring Shifter Instructions

- if you see any 'SMTDataStore' kill them: kill -9 'process\_number'
- restart monitoring: source START\_MONITORING.tesh
- check if you can access 'http://www-d0ol.fnal.gov/smtMonitoring/'

## **If a new message has been sent to Significant Event System:**

- confirm that examine reports the same problem
- get more information about problematic HDI/CHIP:
  - using GUI on the left hand side interesting part of the detector(crate/VBR/HDI) select interesting part of the detector (crate/VRB/HDI)
  - using GUI on the right hand side of the 'http://www-d0ol.fnal.gov/smtMonitoring/' select information you need (signal/hit number/ occupancy)
  - look for problems: no events, signal 'zero', high occupancy

## **If you think that monitoring does not send information about faulty system to Significant Event System:**

- on the page <http://www-d0ol.fnal.gov/smtMonitoring/> check 'IOC DATA UPDATE TIME' and 'SES UPDATE TIME' . Both times should be close to current time. The first one informs when that last data transfer has been done from IOC whereas the second one displays date when the last message has been sent to Significant Event System.
  - if data is not collected from an IOC and you are not an expert: PAUSE the run, reboot PowerPC, start monitoring for the IOC from SMT GUI

# Monitoring

## Shifter Instructions

- If data is not collected from an IOC and you are an EXPERT: login to the that IOC, look for suspended processes (VxWork command 'i'), look into log file /home/d0run/onlineMonitoring/IOC\_d0olsmtXX\_ConnectionLog.txt
- If messages are not sent to Significant Event System and you are not an expert check if SES runs whith no problems, eg. if other application can send data to SES. If only monitoring cannot talk to SES restart monitoring.
- If messages are not sent to Significant Event System and you are an EXPERT check log files /home/d0run/onlineMonitoring/SESLog.txt and /home/d0run/onlineMonitoring/IOC\_d0olsmtXX\_ConnectionLog.txt. Information is sent to SES only if there is new data comming from IOC. If IOC connections are broken SES messages are suspended.

# Monitoring

## What experts should know

### **Linux box application consists of the following threads:**

- IOCCConnection thread that collects data from frontend processor servers (actually, that is a set of threads. One thread collects data from a one IOC)
- shmServer thread that serves data to Java servlet queries
- SESConnection thread that sends alarms to Significant Event System

When application starts it creates data structure to store SMT hardware data. Data structure is created based on the current online database content. OCI Oracle functions are used to get information about all the SMT crates, VRBs, HDIs and chips from online Oracle database. Each HDI and chip have tables to describe signals, hit count and occupancy. The 'OCICConnection' thread waits for incoming connection requests from frontend processors. As soon as these connection requests appear they are accepted and every 1 minute (currently set) data request is sent to frontend processors by OCICConnection thread. Received data is stored in previously created data structure. Connections are socket based.

The 'shmServer' thread serves data to Java servlet requests. Connection is socket based. A new socket connection is opened for a new data request. Connection is closed as soon as requested data is served. There are two files written to a disk for each data request. An

# Monitoring

## What experts should know

html file and php file. An html file contains information about how many separated images are in the php file. php file contains real data and on a base of that file histograms are created on fly in the WWW browser. After a data request has been successfully completed names of existing html files including a new created one are sent to java servlet client. Java servlet displays them in the browser.

The two threads 'shmServer' and 'OCIConnection' share the same data structures. They are synchronized using set of semaphores. There is one semaphore created to synchronize access to each SMT crate data.

The 'SESConnection' thread checks hardware data every 10,000 events (currently set) and generates alarms if occupancy exceeds 25% (currently set) or if an HDI or a chip are dead (signal from all the strips is zero). Messages are generated based on the content of the same data structure that is used by 'OCIConnection' thread as well. There is an semaphore used to ensure that the data structure is not overwritten while check is being done.

# Monitoring

## What experts should know

**Java servlets** ([www-d00l/smtMonitoring](http://www-d00l/smtMonitoring)) are served by WWW server and are used to display the data histograms (signal, hit count, occupancy).

Using the GUI, shown on the left hand side of the WWW page, you can select interesting parts of the detector. Information can be obtained only for those HDIs that are NOT marked as 'disabled'. Below the tree like menu of existing SMT hardware there is a list of 'IOC DATA UPDATE TIME' which tells you when the last data was collected from a particular IOC. Based on that time one can easily figure out if data base contains updated data for a current run.

There is 'SES UPDATETIME' list for all IOCs below already mentioned 'IOC DATA UPDATE TIME' list. Dates and times in that list inform when the last hardware check was done and when the last message was sent to Significant Event System.

The GUI on right hand side of WWW page allows to obtain information about SMT hardware in text and graphical formats.

# Monitoring

## What experts should know

Meaning of selection criteria for text like output:

- Level -- what level hardware should be selected on
- WhatInformation
  - DEAD\_HARDWARE -- hardware is considered dead if there is no signal from any of SVX channels
  - FAULTY\_HARDWARE -- hardware is considered faulty if there is at least one SVX channel with no signal
  - SIGNAL\_DATA -- signal mean values
  - HITCOUNT\_DATA -- hit number
  - OCCUPANCY\_DATA -- occupancy numbers
- DataSet
  - FULL\_SET -- output based on all the collected data from the beginning of the run
  - TMP\_SET -- output based on tmp data
- CrateName
- VRBName
- HDIName
- SVXNumber

Before you push the 'DataAction', you must make your selections.

The easiest way to fill in the CrateName, VRBName and HDIName is to click on a crate, then VRB and then HDI in the left hand WWW window. If you want something at the SVX level you use the pull down menu under SVXNumber. After 'DataAction' is pushed

# Monitoring

## What experts should know

selected data will appear in a scrollable widget that is going to be drawn below that button.

To display data in a form of histograms one needs to select/fill table below 'SMT MONITORING GRAPHICS'.

Meaning of selection criteria for graphics type output.

- Level -- what level hardware should be selected on
- Type
  - HDI\_SVX\_TYPE -- data for SVXes and for HDIs (adds all SVX's belonging to the HDI)
  - HDI\_TYPE -- only data for HDI's
  - SVX\_TYPE -- only data for SVX's
  - VRB\_TYPE -- some data are available for VRB's
- WhatInformation
  - SIG\_HIT\_GRAPH -- signal and hit distributions
  - SIGNAL\_GRAPH -- only signal distributions
  - HITCOUNT\_GRAPH -- onlt hit distributions
  - OCCUPANCY\_GRAPH -- occupancy plots
  - ERROR\_GRAPH
  - BITPATTERN\_GRAPH
  - MISSING\_BITS\_GRAPG
  - EVENT\_SIZE\_GRAPG
  - EVENT\_BUFF\_GRAPG

# Monitoring

## What experts should know

- BUNCH\_SIG\_HIT\_GRAPH
- BUNCH\_SIG\_GRAPH
- BUNCH\_HIT\_GRAPH
- DataSet
  - FULL\_SET -- output based on all the collected data from the beginning of the run
  - TMP\_SET -- output based on tmp data
- CrateName
- VRBName
- HDIName

After button 'DataAction' is pushed selected data will appear in new browser widget.

**Frontend processor server:** is a part of SMT frontend processor code. As soon as 'SMT Monitoring' is turned ON in CREATOR window SDAQ Supervisor passes all the run commands from COOR to frontend processors. At the begin of each run commands INIT and START are sent to SMT frontend processor. When INIT command comes initialization procedure is called. When START commands comes data collection starts. As soon as initialization is completed monitoring server tries to connect to Linux box application (IOCCConnection thread) . At that point IOCCConnection process

# Monitoring

## What experts should know

takes over and asks server for data every 1min (currently set). Connection is socket based. As soon as run is stopped command STOP is passed via SDAQ Supervisor to frontend and monitoring server breaks connection.

Hardware data for monitoring purposes can be collected from:

- VRB spy memory (A24/D16 transfer). At a time on a request only data from one HDI is stored in VRB spy memory. Handshake is described in VRB documentation. That procedure is very slow and it is not currently used.
- onl\_smtcalib/ssdaq/smtStore/monitoringbuffer and an interrupt is generated. That interrupt is caught by PowerPc and data is copied via VME backplane. That procedure is very efficient and is currently used.

Collected hardware data is unpacked and stored in to histograms for each HDI and each chip. On a request from IOCCConnection thread that data is copied to a buffer and sent back to IOCCConnection thread.

### Current setup.

The whole software is stored in cvs repository in the following directories:

- onl\_smtcalib/ssdaq/smtStore/monitoring -- Linux box C++ code
- onl\_smtcalib/ssdaq/smtStore/servlet -- Linux box Java servlets
- onl\_smtcalib/ssdaq/smtStore/frontend -- frontend C code for VXWorks

# Monitoring

## What experts should know

SMT online monitoring application runs on 'd0ol28.fnal.gov' D0 online host from 'd0run' account. Application is located in directory '~d0run/onlineMonitoring'.

Since graphs are created using PHP software PHP library needs to be supported by WWW server. Current version installed is 'php-4.1.2'.

For graphs creation an additional packed 'jpgraph-1.6.1' (written in PHP) was used. It is installed on a disc accessible from online cluster in directory '/d0usr/products/jpgraph'. There are links created in the application to the above mentioned location.

SMT online monitoring application should be started/ stopped using official d0 script start\_daq/stop\_daq Usage of that script ensures that only one instance of application runs at a time.

There are several log files created in dir '~d0run/onlineMonitoring/'

- IOC\_d0olsmtXX\_ConnectionLog.txt -- stores information about data collection from SMT IOCs
- DataServerLog.txt -- stores information about requests from Java servlets
- SESLog.txt -- stores information about hardware checks and messages sent to Significant Event System

Every time application is stopped log files are copied to '/projects/smtMonitoring/log/' directory with current date and time. All 'html' and 'php' files that contain created graphs are in directory '/projects/smtMonitoring/jpgraph\_cache'.

# Monitoring

## What experts should know

Files older than 1 month are purged from both directories  
'/projects/smtMonitoring/log/' and  
'/projects/smtMonitoring/jpgraph\_cache' by an automatic cron job.

### **Compilation and Linking.**

In order to compile C++ code  
(`'onl_smtcalib/ssdaq/smtStore/monitoring'`) one needs to `'setup  
D0RunII p13.10.00'` or later if backward compatible.

In order to compile Java servlets

(`'onl_smtcalib/ssdaq/smtStore/servlet'`) one needs to:

`'setup tomcat'` and `'setup java v1_3_1_02'`. Compilation is done automatically by `'makefile'`. Copiled files `'class'` are copied to `'www/WEB-INF/classes/'` and library `'jar'` is copied to `'www/WEB-INF/lib/'`. After successful compilation one needs to copy `'class'` and `'jar'` files to a well known location of `'tomcat'` server. Currently that are:

`'/projects/elog/jakarta-tomcat-3.2.1/webapps/smtMonitoring/WEB-INF/classes/'` and

`'/projects/elog/jakarta-tomcat-3.2.1/webapps/smtMonitoring/WEB-INF/lib/'`

In order to compile frontend part change directory to

`'onl_smtcalib/ssdaq/smtStore/frontend'` and use existing `'makefile'` that will make the whole job for you.

# The Archivers

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# The Archivers

## Introduction

The procedures outlined here are to be carried out either every shift (**checking and restarting the Archivers, if required**), or once a week, during the Friday day and/or evening shifts (**saving the Archiver data and restarting the Archivers**)

Written June 5, 2003 P. Rapidis

### 1. Philosophy

#### 1. What gets saved and why :

We have three processes of the Archiver running, they record periodically data gathered by the control system (via the 1553 link).

The fast Archiver records data at 1 Hz rate and this data is primarily used to diagnose transients that may cause us problems. This system has proven invaluable in diagnosing power supply glitches that have plagued us in the past. This data is of no long term importance and thus only a week's worth of stored data is saved on a scratch disk. Every week we stop the process, clean up the stored data and restart it.

The slow Archiver records parameters at a much slower rate (from a few times a minute to once an hour) that may be of some importance in monitoring the long term performance of the detector – these are primarily the bias voltages (HV) of the HDI's, their power consumption,

# The Archivers

## Introduction

and environmental variables (temperatures, water flows, magnetic fields ...). These pieces of data get saved for long term perusal; they get transferred onto tapes via the SAM system. The transfer onto the SAM data tapes, the erasing of the old data, and the restarting of the process is also done once a week. If for some reason the slow Archiver gets stopped (e.g. it terminates abnormally) earlier in a the week, then the recovery procedure should be a transfer of the older data to SAM followed by a restarting of the process (I.e. follow the procedure for the weekly saving of data for this process).

The Radmon Archiver records parameters related to the radiation loss detectors (the fingers) and to the BLM's at the end of the D0 detector, both at a low rate (once a minute for temperatures and integrated doses) and at a fast rate (1 Hz, for instatneous loss rates) If for some reason the Radmon Archiver gets stopped (e.g. it terminates abnormally) earlier in a the week, then the recovery procedure should be a transfer of the older data to SAM followed by a restarting of the process (I.e. follow the procedure for the weekly saving of data for this process).

# The Archivers

## Introduction

A detailed list of variables being saved:

Fast Archiver:

<http://d0server1.fnal.gov/projects/silicon/www/Archiver/fastlist.htm>

Slow Archiver:

<http://d0server1.fnal.gov/projects/silicon/www/Archiver/slowlist.htm>

Radmon Archiver

(ask the radiation loss experts)

A general note – at some steps you will be asked to see if a file has a current date. Please be cognizant of the fact that the Archiver (esp. the slow Archiver) may be up to a few minutes late in updating the output files. So be somewhat generous when interpreting the date stamp information

# The Archivers

## To be done once a shift

### 1. Make sure the fast Archiver is running

It is assumed that you are signed on as **d0smt on an online machine** and you have done a **>setup d0online**

1. **Either** you can issue the command

```
>d0ssh d0ol28 'ps -ef | grep d0smt | grep archi | grep -v grep'
```

and check that you see three jobs running;

also check if the archive file is updating by

```
>d0ssh d0ol28 'ls -l /scratch/smt/psarchive | grep  
`date +%Y%m%d`'
```

and check if the file with a name like

200ymmdd-000000 (where ymmdd are today's year, month, and date) has a current time stamp.

**Easier step**

**or** execute the script:

```
>/home/d0smt/archiverchecks.sh
```

which does the above (and more) for you

2. If things look OK go on to checking the slow Archiver.

# The Archivers

## To be done once a shift

3. If the fast Archiver is dead you should kill any malfunctioning jobs, clean up the lock file, and restart it. This is done by doing :

Sign on d0ol28 as d0smt by doing :

```
>d0ssh d0ol28 ← if needed
```

```
>setup d0online ← if needed
```

```
>setup chan_archiver
```

```
>stop chan_archiver -p 4820
```

```
>cd /scratch/smt/psarchive
```

```
>rm archive_active.lck ← done if this file exists
```

kill any leftover jobs found in step 1 via

```
>kill -9 <pid> ← get the process id number from step 1
```

restart the fast Archiver by doing

```
>start_chan_archiver -p 4820 -w . -c ps_config
```

You must be in the /psarchive directory,

and just for your information 4820 is the port number

check (after a couple of minutes) if the fast Archiver is running by repeating the tests of step 1.

# The Archivers

## To be done once a shift

### 2. Make sure the slow Archiver is running

1. **Either** you can issue the command

```
>d0ssh d0ol03 'ps -ef | grep d0smt | grep archi | grep -v grep'
```

and check that you see three jobs running;  
also check if the archive file is updating by

```
>d0ssh d0ol03 'ls -l /projects/archive/smt/current | grep  
`date +%Y%m%d`'
```

and check if the file with a name like  
200ymmdd-000000 (where ymmdd are today's  
year, month, and date) has a current time  
stamp.

**Easier step**

**or** execute the script:

```
>/home/d0smt/archiverchecks.sh
```

which does the above (and more) for you.

2. If things look OK then you are done, go do something else now !
3. If the slow Archiver is dead, then follow the procedure used to back up the slow Archiver data (which should be done once a week, **or** in an exceptional circumstance, such as the one you are facing now).

# The Archivers

## To be done once a shift

### 3. Make sure the Radmon Archiver is running

**Either** you can issue the command

>d0ssh d0ol23 'ps -ef | grep d0rad | grep archi | grep -v grep'  
and check that you see three jobs running;  
also check if the archive file is updating by

>d0ssh d0ol23 'ls -l /projects/archive/radmon/current | grep  
'date +%Y%m%d''

and check if the file with a name like  
200ymmdd-000000 (where ymmdd are today's  
year, month, and date) has a current time stamp.

**Easier step**

**or** execute the script:

```
>/home/d0smt/archiverchecks.sh
```

which does the above (and more) for you.

If things look OK then you are done, go do  
something else now !

If the Radmon Archiver is dead, then follow the  
procedure used to back up the Radmon  
Archiver data (which should be done once a  
week, **or** in an exceptional circumstance, such  
as the one you are facing now).

# The Archivers

## To be done once a week

These procedures are to be done once a week (Friday day and/or evening shift ).

Steps I and II will also be needed in the situation of a malfunctioning slow/Radmon Archiver.

There are five distinct operations here.

Ia and Ib) We save the data of the slow/Radmon Archiver by copying the data to a temporary location, *tar*ing it and *gzip*ing it. The original directory is cleared and the slow/Radmon Archiver is restarted.

Iia and Iib) The *tar/gzip*ed file is transferred to SAM, and upon a successful SAM transfer the *tar/gzip*ed file is deleted. (These two operations are to be done once a week and in the case of a malfunctioning slow/Radmon Archiver).

III) In addition, for the fast Archiver, we delete the older data of the fast archiver from a backup directory, copy its current data to the backup directory, clean up the current data directory and restart the fast Archiver.

# The Archivers

## To be done once a week

### 1. Save the data from the slow Archiver

#### 1. Login and setup :

Login as d0smt on d0ol03, this can be done only from d0ol00 and d0ol05 by doing

```
>setup d0online ← if needed
>d0ssh d0ol03 ← if needed, from d0ol00/d0ol05 only
>setup d0online ← if needed
>setup chan_archiver
>cd /projects/archive/smt
```

#### 2. Copy and compress the older data

```
>chan_arch_copy smt
```

This copies the data from the previous week (from *./previous*) to a temporary location (*/d0olcluster/scratch*) and then *tars* and *gzi*ps it. This can easily take ~1hour for a week's worth of data. If you are compulsive you can check the progress of this step by doing the following on another x-terminal :

```
>ls -l /d0olcluster/scratch/archive/smt/dir*
>ls -l /projects/archive/smt/previous
```

**Please wait for this compressing to end before proceeding**

# The Archivers

## To be done once a week

### 3. Stop the slow Archiver process

```
>stop_chan_archiver -p 4815 ← if needed,  
if you are here because the slow Archiver malfunctioned you  
may not need this, but  
it does no harm to do it.
```

Check if the three jobs running have stopped. Sometimes two of the three jobs take 5 to 10 minutes to die. If they take too long you may want to kill them. Check on the jobs by doing

```
>ps -ef | grep d0smt
```

and, if needed, kill them by :

```
>kill -9 <pid> ← where you use the process id  
from the previous command
```

If you kill the jobs, or if things have ended abnormally you will have to remove the lock file by doing:

```
>rm ./current/archive_active.lck
```

### 4. Copy the current data

Copy the current data (from ./current) to the backup location (to ./previous)

```
>rm -Rf ./previous/*
```

```
>chan_arch_move smt ← for this to work there should be no  
./current/archive_active.lck file
```

# The Archivers

## To be done once a week

5. Start the slow Archiver once again

```
>cd ./current ← (i.e. go to /projects/archive/smt/current)
```

```
>start_chan_archiver -c config_file -w . -p 4815
```

make sure the slow Archiver is running, this can take a few minutes to complete. You can check this by **either** issuing the command

```
>ps -ef | grep d0smt
```

and check that you see three jobs running; also check if the archive file is updating by

```
>ls -l /projects/archive/smt/current | grep 'date +%Y%m%d'
```

and check if the file with a name like 200ymmdd-000000 (where yymmdd are today's year, month, and date) has a current time stamp.

**Easier Step**

**Or** you can do it by executing the script:

```
>/home/d0smt/archiverchecks.sh
```

which does the above (and more) for you.

You may log out of d0o103 now.

# The Archivers

## To be done once a week

### 6. Transfer the compressed data to SAM

(More details can be found in the file */projects/archive/HOWTO\_SAM*)

Log on to d0olb as d0smt, this can be done if you are d0smt on one of the following three machines d0ol44, d0ol28, and d0ol05

>setup d0online ← if needed

>d0ssh d0olb ← from d0ol44, d0ol28, and d0ol05 only !

go to the directory where the compressed data is (from step 2) I.e. :

>cd /scratch/archive/smt/dir<tab> ← this is another name for the directory */d0olcluster/scratch/archive/...* of step 2

Create and edit the metafile that controls the transfer to SAM

>setup nedit

>./sammfile

An edit window (nedit) will pop up in which you should edit the five lines with the *data\_file*, *parameter\_file*, *start\_date*, *end\_date*, and *file\_size*. Please note that (a) you should change the filenames on some of these five lines (including the date part, *\_ctl\_* to *\_smt\_*, etc.- paste the names from the x-terminal) and (b) the size of the *tar.gz* file as they were shown on your x-terminal.

# The Archivers

## To be done once a week

Exit the editor and save the file :

online\_epics\_to\_sam.py

Setup SAM by doing :

```
>source /projects/archive/SAM_SETUP.sh
```

Check that things are setup properly :

```
>which sam ← should be V3_1_9a or greater
```

```
>echo $SAM_STATION ← should be datalogger-d00lb
```

Submit the job to SAM:

```
>sam store --descrip=online_epics_to_sam.py --source=.
```

or if you encounter an error you can resubmit it via:

```
>sam store --descrip=online_epics_to_sam.py --source=.  
--resubmit
```

(note that there is no space between the two dashes in these commands)

Now wait for the completion of the data transfer (usually less than 15 minutes).

If the transfer is successful remove the old data.

First check the file transfer

```
>setup netscape
```

```
>netscape & and go to
```

```
http://d0db.fnal.gov/sam\_data\_browsing/data\_file\_query.html
```

which is also bookmarked as "SAM data browser"

use datatier = *epics* , datafile = *dir\_smt%*

application family = *online\_archive* , and

application\_name= *online\_epics*

# The Archivers

## To be done once a week

and see if the file from step 2 was stored properly. If this does not work out, try a resubmit as outlined above, and if this even fails notify an expert (P. Rapidis or V. Sirotenko) and do not do the cleanup of the next step.

7. Delete the old files (to be done if all is well from the previous step)

```
>cd /scratch/archive/smt/dir<tab><carriage return>
>rm *
>cd ..
>rmdir dir<tab><carriage return>
>ls ← you should see only one file named "sammfile"
```

At this point log off d00lb.

If you are doing the above as a result of a malfunction of the slow Archiver, then please skip the next steps – you are done with the Archiver tasks. If this is part of the weekly task then continue.

# The Archivers

## To be done once a week

### 2. Save the data from the Radmon Archiver

#### 1. Login and setup :

Login as **d0rad** on d0ol23, this can be done by doing

```
>setup d0online ← if needed
>d0ssh -l d0rad d0ol23
>setup d0online
>setup chan_archiver
>cd /projects/archive/radmon
```

#### 2. Copy and compress the older data

```
>chan_arch_copy radmon
```

This copies the data from the previous week (from *./previous*) to a temporary location (*/d0olcluster/scratch*) and then *tars* and *gzi*ps it. This can easily take ~1hour for a week's worth of data. If you are compulsive you can check the progress of this step by doing the following on another x-terminal :

```
>ls -l /d0olcluster/scratch/archive/radmon/dir*
>ls -l /projects/archive/radmon/previous
```

**Please wait for this compressing to end before proceeding**

# The Archivers

## To be done once a week

### 3. Stop the radmon Archiver process

```
>stop_chan_archiver -p 4813 ← if needed,
```

if you are here because the Radmon Archiver malfunctioned you may not need this, but

it does no harm to do it.

Check if the three jobs running have stopped.

Sometimes two of the three jobs take 5 to 10

minutes to die. If they take too long you may

want to kill them. Check on the jobs by doing

```
>ps -ef | grep d0rad
```

and, if needed, kill them by :

```
>kill -9 <pid> ← where you use the process id
```

from the previous command

If you kill the jobs, or if things have ended abnormally you will have to remove the lock file by doing:

```
>rm ./current/archive_active.lck
```

### 4. Copy the current data

Copy the current data (from ./current) to the

backup location (to ./previous)

```
>rm -Rf ./previous/*
```

```
>chan_arch_move radmon ← for this to work there should be no  
./current/archive_active.lck file
```

# The Archivers

## To be done once a week

5. Start the radmon Archiver once again

```
>cd ./current ← (i.e. go to /projects/archive/radmon/current)
```

```
>start_chan_archiver -c config_file -w . -p 4813
```

make sure the radmon Archiver is running, this can take a few minutes to complete. You can check this by **either** issuing the command

```
>ps -ef | grep d0rad
```

and check that you see three jobs running; also check if the archive file is updating by

```
>ls -l /projects/archive/radmon/current | grep 'date +%Y%m%d'
```

and check if the file with a name like 200ymmdd-000000 (where ymmdd are today's year, month, and date) has a current time stamp.

**Or** you can do it by executing the script:

```
>/home/d0smt/archiverchecks.sh
```

which does the above (and more) for you.

**Easier step**

You may log out of d0ol23 now.

# The Archivers

## To be done once a week

### 6. Transfer the compressed data to SAM

(More details can be found in the file */projects/archive/HOWTO\_SAM*)

Log on to d0olb as d0rad, this can be done if you are d0smt on one of the following three machines d0ol44, d0ol28, and d0ol05

```
>setup d0online ← if needed
```

```
>d0ssh -l d0rad d0olb ← from d0ol44, d0ol28, and d0ol05 only !
```

go to the directory where the compressed data is (from step 2) I.e. :

```
>cd /scratch/archive/radmon/dir<tab> ← this is another name for the directory /d0olcluster/scratch/archive/... of step 2
```

Create and edit the metafile that controls the transfer to SAM

```
>setup nedit
```

```
>./sammfile
```

An edit window (nedit) will pop up in which you should edit the five lines with the *data\_file*, *parameter\_file*, *start\_date*, *end\_date*, and *file\_size*. Please note that (a) you should change the filenames on some of these five lines (including the date part, *\_ctl\_* to *\_radmon\_*, etc.- paste the names from the x-terminal) and (b) the size of the *tar.gz* file as they were shown on your x-terminal.

# The Archivers

## To be done once a week

Exit the editor and save the file :

online\_epics\_to\_sam.py

Setup SAM by doing :

```
>source /projects/archive/SAM_SETUP.sh
```

Check that things are setup properly :

```
>which sam ← should be V3_1_9a or greater
```

```
>echo $SAM_STATION ← should be datalogger-d00lb
```

Submit the job to SAM:

```
>sam store --descrip=online_epics_to_sam.py --source=.
```

or if you encounter an error you can resubmit it via:

```
>sam store --descrip=online_epics_to_sam.py --source=.  
--resubmit
```

(note that there is no space between the two dashes in these commands)

Now wait for the completion of the data transfer (usually less than 15 minutes).

If the transfer is successful remove the old data.

First check the file transfer

```
>setup netscape
```

```
>netscape & and go to
```

```
http://d0db.fnal.gov/sam\_data\_browsing/data\_file\_query.html
```

which is also bookmarked as "SAM data browser"

use `datatier = epics` , `datafile = dir_radmon%`

`application family = online_archive` , and

`application_name= online_epics`

# The Archivers

## To be done once a week

and see if the file from step 2 was stored properly. If this does not work out, try a resubmit as outlined above, and if this even fails notify an expert (P. Rapidis or V. Sirotenko) and do not do the cleanup of the next step.

7. Delete the old files (to be done if all is well from the previous step)

```
>cd /scratch/archive/radmon/dir<tab><carriage return>  
>rm *  
>cd ..  
>rmdir dir<tab><carriage return>  
>ls ← you should see only one file named "sammfile"
```

At this point log off d00lb.

If you are doing the above as a result of a malfunction of the radmon Archiver, then please skip the next steps – you are done with the Archiver tasks. If this is part of the weekly task then continue.

# The Archivers

## To be done once a week

### 3. Cleanup and restart of the fast Archiver

#### 1. Login and setup :

Login as d0smt on d0ol28, this can be done only from d0ol00, d0ol03, and d0ol05 by doing

```
>setup d0online ← if needed
>d0ssh d0ol28 ← if needed, from d0ol00/d0ol05 only
>setup d0online ← if needed
>setup chan_archiver
>cd /scratch/smt/
```

#### 2. Delete the older files

```
>rm -Rf ./old/*
```

#### 3. Stop the fast Archiver process

```
>stop_chan_archiver -p 4820
```

Check if the three jobs running have stopped. Sometimes two of the three jobs take 5 to 10 minutes to die. If they take too long you may want to kill them. Check on the jobs by doing

```
>ps-ef | grep d0smt | grep arch
```

and, if needed, kill them by :

```
>kill -9 <pid> ← where you use the process id from the previous command
```

# The Archivers

## To be done once a week

If you kill the jobs, or if things have ended abnormally you will have to remove the lock file by doing:

```
>rm ./psarchive/archive_active.lck
```

4. Move the current files (from *./psarchive*) to the older file directory (to *./old*) by:

```
>mover ← moves the files and creates new directories in ./old
```

5. Restart the fast Archiver

```
>cd ./psarchive
```

```
>start_chan_archiver -p 4820 -w . -c ps_config
```

6. Check that the fast Archiver is running  
this can take a few minutes to complete.  
You can check this by **either** issuing the command

```
>ps -ef | grep d0smt | grep archi
```

and check that you see three jobs running;  
also check if the archive file is updating by

```
>ls -l /scratch/smt/psarchive | grep 'date +%Y%m%d'
```

and check if the file with a name like  
200ymmdd-000000 (where ymmdd are today's  
year, month, and date) has a current time  
stamp.

Or you can do it via the script:

```
>/home/d0smt/archiverchecks.sh
```

which does the above (and more) for you.

**THE END**

**Easier Step** →

# The Archivers

## Plotting archiver data

For devices being archived by the **slow** archiver use any of the online machines and do :

- > setup d0online
- > setup chan\_archiver
- > Xarr.py /projects/archive/smt/xxxxxx/dir.200ymmdd-hhmmss &  
( xxxxxx can be either 'current' or 'previous', and y,mm,dd,hh,mm,ss stand for the year, month, day, hour, minute, and second when this archive file started)

For devices being archived by the **fast** archiver use **ONLY** the d0ol28 machine :

- > setup d0online ← on d0ol28 !!!
- > setup chan\_archiver
- > Xarr.py /scratch/smt/psarchive/xxxxxx/dir.200ymmdd-hhmmss &  
( xxxxxx can be either 'psarchive' or 'old', and y,mm,dd,hh,mm,ss stand for the year, month, day, hour, minute, and second when this archive file started)

-----  
The control of the display program is quite obvious, but you may need to know the name of the device you wish to plot, such lists can be found in this book or

on the web at

<http://d0server1.fnal.gov/projects/Silicon/www/Archiver/fastlist.htm>  
<http://d0server1.fnal.gov/projects/Silicon/www/Archiver/slowlist.htm>

for the fast and the slow archiver respectively.

# MCH Walkthrough

1. Contact Aurelio Juste for any questions about MCH Walkthroughs:
  - 722-0033
  - x6565

# D0 Radiation Monitoring

## Shift Procedure for SMT Radiation Monitoring

SMT radiation dose is monitored through two systems: BLMs (Beam Loss Monitors) and Fingers (silicon diode detectors residing inside the SMT). The BLM system is the primary protection system. It generates alarm and abort signals according to preset thresholds. Both the instantaneous and integrated doses are recorded and can be monitored through ACNET interface of the system (E35). One of the integrating devices (D0BRUT) is monitored by MCR for making manual trip decisions for integrated doses. The SMT Finger system provides detailed dose monitoring through EPICS and can be used to analyze losses in more detail than the BLM system.

## Startup

- Start E35 ACNET page for BLM monitoring (if it's already not running) on the ACNET console.
- Start StripChart for BLM HV:
  - from /projects/D0rad/shift
  - Linux: onl-> setup d0online
  - Linux: onl-> ./blm\_bias.sh &;

## Monitoring

- On E35 page, make sure that all the devices are enabled: green EN should show for each device. A LAM state indicates an alarm condition. If this occurs call the experts.
- At the start of shot setup or store, note down the integrated dose values from the E35 page in the logbook. Monitor the change in these values and inform the shift captain if any of the values reaches the manual abort threshold (shot setup: 2krad, store: 3krad). Shift captain would then request MCR to abort the beam. [D0-OP\\_SMT-010](#) (D0 Silicon Detector Radiation Protection) gives instructions on beam alarm and aborts.
- If BLM HV goes out of bound (<1200V or >2200V) call the expert.

## Experts

Syed Naeem Ahmed  
x4250  
(630)898-7936 (home)  
(630)788-6940 (work)  
naeema@fnal.gov

Ronald Lipton  
x4132  
(630)266-8242 (pager)  
lipton@fnal.gov

# Paging

When you have trouble with the detector and don't know what to do, the first thing you should do is page the SMT On-call Expert.

To page the SMT On-call Expert you have to:

- Dial: 9 218 8764
- Wait for a signal
- Enter: 8800#
- You will hear another signal - that is it! Hang up and wait for the On-call expert to call you back.

Other Pager numbers:

Breese Quinn: 266-0565

Michael Weber: 266-0561

Eric Kajfasz: 218-9774

Harald Fox: 847-414-4044

Petros Rapidis: 905-4069

RADMON On-call expert: 218-9437