

BigBite Timing Hodoscope: Manual for JLab Hall A Shifter Workers

A condensed set of instructions for operation and maintenance of the BigBite Timing Hodoscope detector. For questions, please contact an expert, either Ralph Marinaro r.marinaro.1@research.gla.ac.uk, Rachel Montgomery at rachel.montgomery@glasgow.ac.uk, or send an email to David Hamilton david.j.hamilton@glasgow.ac.uk, or contact by sending an email to Gary Penman g.penman.1@research.gla.ac.uk.

Created by Ralph Marinaro and Rachel Montgomery.

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Updates will be made in accordance with changes made to the detector and data acquisition system as the SBS experiment run groups progress.

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A.1 How to Troubleshoot the Detector:

If one or a few channels appear to go missing, or become noisy, and the proposed solution requires a controlled access, then simply make a log entry on halog, and we will wait until the next planned access from the RC. If a whole NINO card worth of channels go missing, or are noisy, or the whole

side of one side of the detector, or the whole detector itself, then first check the LV, HV, DAQ, and if necessary, contact an expert, and leave it up to their discretion for how to proceed.

Problem	Cause	Solution
No Hits	Low Voltage	Turn On the Low Voltage**
	OFF High	Turn On the High Voltage*
	Voltage OFF	Contact Expert (by phone)
	DAQ Errors	

Missing/Noisy Channel(s)	One Channel (Bad Connection)	Contact Expert (by email)
	16 Channels (Bad NINO)	Contact Expert (by email)
	All Channels (Bad Repeater)	Contact Expert (by phone)
High/Low Rate	High Voltages set too High/Low	Check settings of High Voltage
	NINO thresholds set too High/Low	Contact Expert (by email)

** Requires controlled access, no remote control through

EPICS * Check on EPICs first, then consider controlled access

B.1 How to Check the High Voltage

Values: a. Using EPICS to the check the high voltage

values:

- Link for table of hodoscope HV values for left and right side:

<https://docs.google.com/spreadsheets/d/1zLP-EcmTfvqp03FQmC8ZNb2EocsTjxnE2qipitqOwSw/edit?usp=sharing>

- Below is a table of the HV values from the link provided.

HV_BBhodo_0 1300.0 V 12.00 mA 1301.2 V 8.90 mA On 1350 00.0000		
hodo_R0 749.0 V -- 749.6 V -- On -- 00.0001		
hodo_R1 897.0 V -- 898.0 V -- On -- 00.0002		
hodo_R2 500.0 V -- 500.6 V -- On -- 00.0003		
hodo_R3 849.0 V -- 849.6 V -- On -- 00.0004		
hodo_R4 1016.0 V -- 1017.0 V -- On -- 00.0005		
hodo_R5 950.0 V -- 951.0 V -- On -- 00.0006		
hodo_R6 500.0 V -- 500.2 V -- On -- 00.0007		
hodo_R7 787.0 V -- 787.8 V -- On -- 00.0008		
hodo_R8 873.0 V -- 873.8 V -- On -- 00.0009		
hodo_R9 812.0 V -- 812.6 V -- On -- 00.0010		
hodo_R10 883.0 V -- 883.8 V -- On -- 00.0011		

hodo_R11 736.0 V -- 736.8 V -- On -- 00.0012		
hodo_R12 876.0 V -- 877.0 V -- On -- 00.0013		
hodo_R13 891.0 V -- 892.4 V -- On -- 00.0014		
hodo_R14 921.0 V -- 922.4 V -- On -- 00.0015		
hodo_R15 883.0 V -- 883.8 V -- On -- 00.0016		

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hodo_R16 853.0 V -- 853.6 V -- On -- 00.0017		
hodo_R17 844.0 V -- 844.8 V -- On -- 00.0018		
hodo_R18 856.0 V -- 857.0 V -- On -- 00.0019		
hodo_R19 867.0 V -- 867.8 V -- On -- 00.0020		
hodo_R20 852.0 V -- 852.8 V -- On -- 00.0021		
hodo_R21 791.0 V -- 792.0 V -- On -- 00.0022		
hodo_R22 910.0 V -- 911.0 V -- On -- 00.0023		
hodo_R23 909.0 V -- 909.8 V -- On -- 00.0024		
hodo_R24 943.0 V -- 944.0 V -- On -- 00.0025		
hodo_R25 918.0 V -- 919.0 V -- On -- 00.0026		
hodo_R26 840.0 V -- 840.8 V -- On -- 00.0027		
hodo_R27 886.0 V -- 886.8 V -- On -- 00.0028		
hodo_R28 926.0 V -- 926.8 V -- On -- 00.0029		
hodo_R29 897.0 V -- 898.2 V -- On -- 00.0030		
hodo_R30 0.0 V -- 468.8 V -- On Ovr -- 00.0031		

hodo_R31 932.0 V -- 932.8 V -- On -- 00.0032		
hodo_R32 954.0 V -- 954.8 V -- On -- 00.0033		
hodo_R33 824.0 V -- 825.0 V -- On -- 00.0034		
hodo_R34 794.0 V -- 794.8 V -- On -- 00.0035		
hodo_R35 828.0 V -- 828.8 V -- On -- 00.0036		
hodo_R36 804.0 V -- 804.6 V -- On -- 00.0037		
odo_R37 897.0 V -- 898.0 V -- On -- 00.0038		
hodo_R38 807.0 V -- 807.8 V -- On -- 00.0039		
hodo_R39 875.0 V -- 875.6 V -- On -- 00.0040		
hodo_R40 884.0 V -- 884.6 V -- On -- 00.0041		
hodo_R41 976.0 V -- 977.2 V -- On -- 00.0042		
hodo_R42 873.0 V -- 873.8 V -- On -- 00.0043		
hodo_R43 941.0 V -- 942.2 V -- On -- 00.0044		
hodo_R44 837.0 V -- 837.6 V -- On -- 00.0045		
hodo_R45 950.0 V -- 951.2 V -- On -- 00.0046		
hodo_R46 929.0 V -- 930.4 V -- On -- 00.0047		
hodo_R47 957.0 V -- 958.2 V -- On -- 00.0048		

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HV_BBhodo_1 1300.0 V 12.00 mA 1302.2 V 9.14 mA On 1350 02.0000		
hodo_L0 500.0 V -- 537.2 V -- On -- 02.0001		
hodo_L1 964.0 V -- 965.0 V -- On -- 02.0002		

hodo_L2 737.0 V -- 737.6 V -- On -- 02.0003		
hodo_L3 837.0 V -- 837.4 V -- On -- 02.0004		
hodo_L4 812.0 V -- 812.8 V -- On -- 02.0005		
hodo_L5 825.0 V -- 825.6 V -- On -- 02.0006		
hodo_L6 1087.0 V -- 1087.8 V -- On -- 02.0007		
odo_L7 1003.0 V -- 1003.6 V -- On -- 02.0008		
hodo_L8 929.0 V -- 930.0 V -- On -- 02.0009		
hodo_L9 904.0 V -- 904.8 V -- On -- 02.0010		
hodo_L10 777.0 V -- 777.2 V -- On -- 02.0011		
hodo_L11 0.0 V -- 628.2 V -- On Ovw -- 02.0012		
hodo_L12 853.0 V -- 853.6 V -- On -- 02.0013		
hodo_L13 973.0 V -- 973.8 V -- On -- 02.0014		
hodo_L14 910.0 V -- 910.6 V -- On -- 02.0015		
hodo_L15 973.0 V -- 973.6 V -- On -- 02.0016		
hodo_L16 973.0 V -- 973.6 V -- On -- 02.0017		
hodo_L17 828.0 V -- 828.6 V -- On -- 02.0018		
hodo_L18 825.0 V -- 825.6 V -- On -- 02.0019		
hodo_L19 882.0 V -- 882.6 V -- On -- 02.0020		
hodo_L20 716.0 V -- 716.6 V -- On -- 02.0021		
hodo_L21 838.0 V -- 838.6 V -- On -- 02.0022		
hodo_L22 978.0 V -- 978.8 V -- On -- 02.0023		

hodo_L23 919.0 V -- 919.6 V -- On -- 02.0024		
hodo_L24 929.0 V -- 929.6 V -- On -- 02.0025		
hodo_L25 867.0 V -- 867.6 V -- On -- 02.0026		
odo_L26 712.0 V -- 712.4 V -- On -- 02.0027		
hodo_L27 833.0 V -- 833.6 V -- On -- 02.0028		
hodo_L28 788.0 V -- 788.6 V -- On -- 02.0029		
hodo_L29 884.0 V -- 884.4 V -- On -- 02.0030		
hodo_L30 962.0 V -- 962.8 V -- On -- 02.0031		

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hodo_L31 975.0 V -- 975.6 V -- On -- 02.0032		
hodo_L32 796.0 V -- 796.0 V -- On -- 02.0033		
hodo_L33 880.0 V -- 880.8 V -- On -- 02.0034		
hodo_L34 797.0 V -- 797.6 V -- On -- 02.0035		
hodo_L35 846.0 V -- 846.6 V -- On -- 02.0036		
hodo_L36 924.0 V -- 924.6 V -- On -- 02.0037		
hodo_L37 847.0 V -- 847.6 V -- On -- 02.0038		
hodo_L38 829.0 V -- 829.4 V -- On -- 02.0039		
hodo_L39 1041.0 V -- 1041.8 V -- On -- 02.0040		
hodo_L40 854.0 V -- 854.8 V -- On -- 02.0041		
hodo_L41 851.0 V -- 851.8 V -- On -- 02.0042		
hodo_L42 905.0 V -- 905.8 V -- On -- 02.0043		

hodo_L43 910.0 V -- 910.8 V -- On -- 02.0044		
hodo_L44 831.0 V -- 831.6 V -- On -- 02.0045		
hodo_L45 920.0 V -- 920.4 V -- On -- 02.0046		
hodo_L46 946.0 V -- 946.8 V -- On -- 02.0047		
hodo_L47 1104.0 V -- 1105.0 V -- On -- 02.0048		
HV_BBhodo_2 1300.0 V 12.00 mA 1301.4 V 8.92 mA On 1350 04.0000		
hodo_R48 1014.0 V -- 1014.8 V -- On -- 04.0001		
hodo_R49 748.0 V -- 748.8 V -- On -- 04.0002		
hodo_R50 903.0 V -- 904.0 V -- On -- 04.0003		
hodo_R51 922.0 V -- 922.8 V -- On -- 04.0004		
hodo_R52 826.0 V -- 826.6 V -- On -- 04.0005		
hodo_R53 977.0 V -- 977.6 V -- On -- 04.0006		
hodo_R54 833.0 V -- 833.6 V -- On -- 04.0007		
hodo_R55 838.0 V -- 838.6 V -- On -- 04.0008		
hodo_R56 915.0 V -- 915.8 V -- On -- 04.0009		
hodo_R57 895.0 V -- 895.8 V -- On -- 04.0010		
hodo_R58 843.0 V -- 843.6 V -- On -- 04.0011		
hodo_R59 927.0 V -- 927.8 V -- On -- 04.0012		
hodo_R60 882.0 V -- 883.0 V -- On -- 04.0013		
hodo_R61 789.0 V -- 789.6 V -- On -- 04.0014		

hodo_R62 880.0 V -- 880.6 V -- On -- 04.0015		
hodo_R63 893.0 V -- 893.6 V -- On -- 04.0016		
hodo_R64 981.0 V -- 981.8 V -- On -- 04.0017		
hodo_R65 1013.0 V -- 1014.0 V -- On -- 04.0018		
hodo_R66 985.0 V -- 985.8 V -- On -- 04.0019		
hodo_R67 940.0 V -- 940.6 V -- On -- 04.0020		
hodo_R68 806.0 V -- 806.4 V -- On -- 04.0021		
hodo_R69 992.0 V -- 992.8 V -- On -- 04.0022		
hodo_R70 972.0 V -- 972.4 V -- On -- 04.0023		
hodo_R71 893.0 V -- 893.8 V -- On -- 04.0024		
hodo_R72 970.0 V -- 970.4 V -- On -- 04.0025		
hodo_R73 827.0 V -- 827.6 V -- On -- 04.0026		
hodo_R74 903.0 V -- 903.8 V -- On -- 04.0027		
hodo_R75 905.0 V -- 906.0 V -- On -- 04.0028		
hodo_R76 719.0 V -- 719.6 V -- On -- 04.0029		
hodo_R77 991.0 V -- 991.8 V -- On -- 04.0030		
hodo_R78 897.0 V -- 897.8 V -- On -- 04.0031		
hodo_R79 859.0 V -- 859.6 V -- On -- 04.0032		
hodo_R80 908.0 V -- 908.8 V -- On -- 04.0033		
hodo_R81 800.0 V -- 800.6 V -- On -- 04.0034		
hodo_R82 824.0 V -- 824.8 V -- On -- 04.0035		

hodo_R83 882.0 V -- 882.4 V -- On -- 04.0036		
hodo_R84 1073.0 V -- 1073.8 V -- On -- 04.0037		
hodo_R85 983.0 V -- 983.8 V -- On -- 04.0038		
hodo_R86 811.0 V -- 811.6 V -- On -- 04.0039		
hodo_R87 954.0 V -- 954.6 V -- On -- 04.0040		
hodo_R88 824.0 V -- 824.6 V -- On -- 04.0041		
hodo_R89 500.0 V -- 536.0 V -- On -- 04.0042		
spare 500.0 V -- 500.4 V -- On -- 04.0043		
spare 867.0 V -- 867.6 V -- On -- 04.0044		
spare 919.0 V -- 919.6 V -- On -- 04.0045		
spare 966.0 V -- 966.8 V -- On -- 04.0046		

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spare 500.0 V -- 500.2 V -- On -- 04.0047		
spare 500.0 V -- 500.4 V -- On -- 04.0048		
HV_BBhodo_3 1300.0 V 12.00 mA 1301.8 V 8.61 mA On 1350 06.0000		
hodo_L48 714.0 V -- 714.4 V -- On -- 06.0001		
hodo_L49 788.0 V -- 788.4 V -- On -- 06.0002		
hodo_L50 1085.0 V -- 1085.6 V -- On -- 06.0003		
hodo_L51 883.0 V -- 883.8 V -- On -- 06.0004		
hodo_L52 760.0 V -- 760.8 V -- On -- 06.0005		
hodo_L53 855.0 V -- 855.8 V -- On -- 06.0006		

hodo_L54 946.0 V -- 946.8 V -- On -- 06.0007		
hodo_L55 833.0 V -- 833.6 V -- On -- 06.0008		
hodo_L56 782.0 V -- 782.4 V -- On -- 06.0009		
hodo_L57 861.0 V -- 861.4 V -- On -- 06.0010		
hodo_L58 846.0 V -- 846.6 V -- On -- 06.0011		
hodo_L59 781.0 V -- 781.4 V -- On -- 06.0012		
hodo_L60 948.0 V -- 948.6 V -- On -- 06.0013		
hodo_L61 884.0 V -- 884.4 V -- On -- 06.0014		
hodo_L62 883.0 V -- 883.6 V -- On -- 06.0015		
hodo_L63 853.0 V -- 853.8 V -- On -- 06.0016		
hodo_L64 886.0 V -- 886.6 V -- On -- 06.0017		
hodo_L65 852.0 V -- 852.8 V -- On -- 06.0018		
hodo_L66 870.0 V -- 870.8 V -- On -- 06.0019		
hodo_L67 981.0 V -- 981.6 V -- On -- 06.0020		
hodo_L68 978.0 V -- 978.8 V -- On -- 06.0021		
hodo_L69 977.0 V -- 977.8 V -- On -- 06.0022		
hodo_L70 893.0 V -- 893.8 V -- On -- 06.0023		
odo_L71 873.0 V -- 873.6 V -- On -- 06.0024		
hodo_L72 857.0 V -- 857.8 V -- On -- 06.0025		
hodo_L73 921.0 V -- 921.6 V -- On -- 06.0026		
hodo_L74 844.0 V -- 844.8 V -- On -- 06.0027		

hodo_L75 935.0 V -- 935.6 V -- On -- 06.0028		
hodo_L76 973.0 V -- 973.8 V -- On -- 06.0029		

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hodo_L77 967.0 V -- 967.4 V -- On -- 06.0030		
hodo_L78 798.0 V -- 798.4 V -- On -- 06.0031		
hodo_L79 913.0 V -- 913.6 V -- On -- 06.0032		
hodo_L80 814.0 V -- 814.8 V -- On -- 06.0033		
hodo_L81 814.0 V -- 814.4 V -- On -- 06.0034		
hodo_L82 817.0 V -- 817.4 V -- On -- 06.0035		
hodo_L83 947.0 V -- 948.0 V -- On -- 06.0036		
hodo_L84 976.0 V -- 976.8 V -- On -- 06.0037		
hodo_L85 950.0 V -- 950.6 V -- On -- 06.0038		
hodo_L86 777.0 V -- 777.6 V -- On -- 06.0039		
hodo_L87 910.0 V -- 910.6 V -- On -- 06.0040		
hodo_L88 939.0 V -- 939.8 V -- On -- 06.0041		
spare 0.0 V -- 612.0 V -- On Ovw -- 06.0042		
pare 928.0 V -- 928.8 V -- On -- 06.0043		
spare 945.0 V -- 945.8 V -- On -- 06.0044		
spare 0.0 V -- 613.2 V -- On Ovw -- 06.0045		
spare 500.0 V -- 542.2 V -- On -- 06.0046		
spare 0.0 V -- 613.2 V -- On Ovw -- 06.0047		

spare 500.0 V -- 540.2 V -- On -- 06.0048			
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- Do not edit the values in the link provided above unless you are one of the hodoscope experts

- From the command line type:

- ssh aslow@adaqsc (password 12daq:CODA3)
- go_hv

- The EPICS gui will open with no vnc server necessary, give it a few seconds. There will be drop down menus for all detectors, find the

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primary, left side, and right side menus for hodoscope high voltage values.

- If the primary channels are off, then all other channels on the left and right will be off as well. If the primary channels are on, then all other channels on the left and right should be on as well. The primary channels should look as follows. To turn the whole detector off use primary channels.

Ch ID	On/Off	Status	Vmax	Imax	Volt	Itrip	Vmax	RngUp	RngDwn
HODO_S10_Primary	ON	ON	1301.20	9	1300.0	12.0	1350.0	150.0	150.0
HODO_S12_Primary	ON	ON	1302.20	9	1300.0	12.0	1350.0	150.0	150.0
HODO_S14_Primary	ON	ON	1301.40	9	1300.0	12.0	1350.0	150.0	150.0
HODO_S16_Primary	ON	ON	1301.80	9	1300.0	12.0	1350.0	150.0	150.0
ALL CHANNELS	OFF	ON							
						0.000	0.000	0.000	0.000

ON/OFF CONTROL BUTTONS

- To check the high voltage values are set correctly, compare the values in EPICS to the values set using telnet.
- To telnet into the high voltage main frame from the command line type:
 - ssh bbhodo@tedbbdaq (password D4q!23)
 - telnet bbth-hv 1527
 - (username BBhodo, password bbhodo19)

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- Use keyboard arrows and tab key to maneuver through the channels, navigate to Main, hit enter, navigate to Channels, hit enter, navigate through the columns and rows to change values, use the VOSet column to change HV values.

Channel Name	V0Set	I0Set	VMon	IMon	Pw	Status	SVMax	Ch#
HV_BBhodo_0	1300.0 V	12.00 mA	1301.4 V	8.90 mA	On		1350	00.0000
hodo_R0	749.0 V	--	749.8 V	--	On		--	00.0001
hodo_R1	877.0 V	--	877.8 V	--	On		--	00.0002
hodo_R2	500.0 V	--	500.4 V	--	On		--	00.0003
hodo_R3	849.0 V	--	849.6 V	--	On		--	00.0004
hodo_R4	966.0 V	--	966.8 V	--	On		--	00.0005
hodo_R5	950.0 V	--	951.0 V	--	On		--	00.0006
hodo_R6	500.0 V	--	500.4 V	--	On		--	00.0007
hodo_R7	787.0 V	--	787.8 V	--	On		--	00.0008
hodo_R8	873.0 V	--	873.6 V	--	On		--	00.0009
hodo_R9	812.0 V	--	812.8 V	--	On		--	00.0010
hodo_R10	883.0 V	--	884.0 V	--	On		--	00.0011
hodo_R11	756.0 V	--	756.8 V	--	On		--	00.0012
hodo_R12	876.0 V	--	877.0 V	--	On		--	00.0013
hodo_R13	891.0 V	--	892.0 V	--	On		--	00.0014
hodo_R14	921.0 V	--	922.2 V	--	On		--	00.0015
hodo_R15	883.0 V	--	883.8 V	--	On		--	00.0016
hodo_R16	853.0 V	--	853.8 V	--	On		--	00.0017
hodo_R17	844.0 V	--	844.6 V	--	On		--	00.0018

Channels Display/Edit Screen LocEn V0 I0 N | CAEN SY1527

- The set values in telnet should match the set values in EPICS. If not, then adjust the set values in EPICS to what the values are set to in telnet.

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B.2 How to Turn On the High Voltage:

***remote control is always the preferred first action a.** Remotely Turning On High Voltage Main Frame:

- From the command line type:
 - ssh aslow@adaqsc (password 12daq:CODA3)

- go_hv
- Use the EPICS gui to turn the high voltage on remotely, either press the ON button at the very bottom to turn on all channels in that tab or press the ON/OFF button on individual channels to turn on channels individually.
- To telnet into the high voltage main frame from the command line type:
 - ssh bbhodo@tedbbdaq (password D4q!23)
 - telnet bbth-hv 1527
 - (username BBhodo, password bbhodo19)
 - Use keyboard arrows and tab key to maneuver through the channels (See Section B.1)
- Use the telnet connection to turn the high voltage on remotely, this is as an alternative to using EPICS. In EPICS the primary channels can be turned on individually, as well as the individual channels on the left and right sides. In telnet the primary channels can be turned on individually, but the individual channels can only be turned off and on in groups of eight on the left and right sides.

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b. Manually Turning On High Voltage Main Frame:

***requires controlled access**

- Only power cycle HV manually as a last resort and with agreed controlled access permission from the RC.
- Locate the SBS detector electronics bunker in Hall A



TIMING HODOSCOPE ELECTRONICS RACK

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- Locate the electronics rack housing the high voltage main frame **HIGH**

VOLTAGE MAIN FRAME

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- Turn the power key from “OFF” position to the right so the power key is in the “LOCAL” position



LED LIGHTS POWER KEY

- “MAIN”, “OK”, “5+”, “12+”, and “12-” LEDs should turn on, as well as LEDs for “48+” corresponding to the high voltage channels being used
- If the high voltage main frame does not turn on, or if one of the LEDs is not turned on, check the power switch on the back of the high voltage main frame. If that does not work, then please contact an expert for help.

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B.3 How to Turn Off the High Voltage:

***remote control is always the preferred first action a. Remotely Turning Off High Voltage Main Frame:**

- From the command line type:

- ssh aslow@adaqsc (password 12daq:CODA3)
- go_hv
- Use the EPICS gui to turn the high voltage off remotely, either press the OFF button at the very bottom to turn off all channels in that tab or press the ON/OFF button on individual channels to turn off channels individually.
- To telnet into the high voltage main frame from the command line type:
 - ssh bbhodo@tedbbdaq (password D4q!23)
 - telnet bbth-hv 1527
 - (username BBhodo, password bbhodo19)
 - Use keyboard arrows and tab key to maneuver through the channels (See Section B.1)
- Use the telnet connection to turn the high voltage off remotely, this is as an alternative to using EPICs. In EPICs the primary channels can be turned off individually, as well as the individual channels on the left and right sides. In telnet the primary channels can be turned off individually, but the individual channels only be turned off and on in groups of eight on the left and right sides.

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b. Manually Turning Off the High Voltage Main Frame:

***requires controlled access**

- Only power cycle HV manually as a last resort and with agreed controlled access permission from the RC.
- Locate the SBS detector electronics bunker in Hall A



TIMING HODOSCOPE ELECTRONICS RACK

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- Locate the electronics rack housing the high voltage main frame **HIGH**

VOLTAGE MAIN FRAME

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- The power key should be in the “LOCAL” position, turn the power key to the left so the power key is in the “OFF” position.



LED LIGHTS POWER KEY

- “MAIN”, “OK”, “5+”, “12+”, and “12-” LEDs should turn off, as well as LEDs for “48+” corresponding to the high voltage channels being used
- If the high voltage main frame does not turn on, or if one of the LEDs is not turned on, check the power switch on the back of the high voltage main frame. If that does not work, then please contact an expert for help.

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B.4 How to Turn On the Low

Voltage: *requires controlled access

a. Manually Turning On Low Voltage Power Supply:

- Locate the SBS detector electronics bunker in Hall A



TIMING HODOSCOPE ELECTRONICS RACK

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- Locate the electronics rack housing the low voltage power supply **LOW**

VOLTAGE POWER SUPPLY

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- The power switch should be in the off position, flip the power switch to the on position. Adjust the voltage or current controls until the supply reads ~**7.1** volts and ~**15.79** amps.
- These values are set such that the NINO cards receive the minimum **5** volts necessary, and their thresholds are set to **1.6** volts.



POWER SWITCH SUPPLY CONTROLS

- If the low voltage power supply does not turn on, or if one of the supply controls do not work properly, then please contact an expert for help.

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B.5 How to Turn Off the Low

Voltage: *requires controlled access

a. Manually Turning Off Low Voltage Power Supply:

- Locate the SBS detector electronics bunker in Hall A



TIMING HODOSCOPE ELECTRONICS RACK

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- Locate the electronics rack housing the low voltage power supply **LOW**

VOLTAGE POWER SUPPLY

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- The power switch should be in the on position. Adjust the voltage or current controls until the supply reads ~**0.0** volts and ~**0.0** amps, then flip the power switch to the off position.



POWER SWITCH SUPPLY CONTROLS

- If the low voltage power supply does not turn off, or if one of the supply controls do not work properly, then please contact an expert for help.

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B.6 How to Power Cycle VME Crate:

***requires controlled access**

a. Manually Power Cycling the VME Crate:

- Locate the SBS detector electronics bunker in Hall A



TIMING HODOSCOPE ELECTRONICS RACK

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- Locate the electronics rack housing the VME crate. **VME CRATE**

- The power switch should be in the on position. Flip the power switch to the off position and then the on position to power cycle the VME crate.

POWER SWITCH

- If the VME crate does not power cycle correctly, then please contact an expert for help.