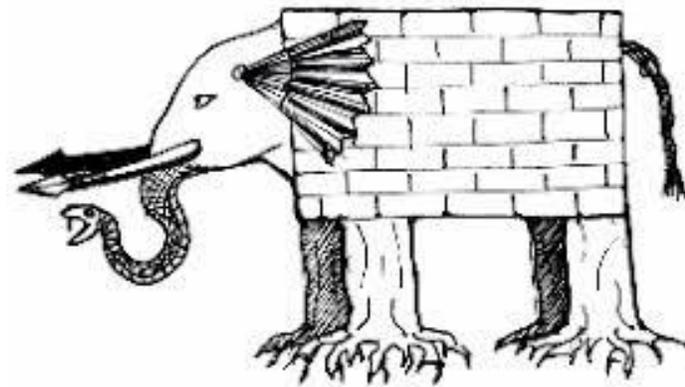# BCM-related hclog entries
for Winter 2017-Spring2018 Run:
the whole elephant

D. Mack

6/8/2018

Timeline
(each month is broken into quartiles)

WHAT	11/17				12/17				1/18				2/18				3/18				4/18				5/18		
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Unser calib.																											
BCM calib.																											
Lumi Scan																											
Physics																											
BCM1,2 down																											
BCM4a Saturated at 70+ muA																											

I can't find these periods in the hclog with the crappy elog search engine. But BCM4a saturated during a very few runs when Hall A was down and Hall C went to currents above 70 muA. The other bcms were not saturating however.

Topic	Date	Short Description	Hclog entry(ies)	Add'l Comments
CALIBRATION	Nov 2, 2017	**Unser wire calibration data** taken by Deepak	https://logbooks.jlab.org/entry/3490909 and https://logbooks.jlab.org/entry/3490907	shms run 1334, hms run 803
CALIBRATION	Dec 1, 2017	Results of Unser wire calibration by Deepak	https://logbooks.jlab.org/entry/3498575	based on shms run 1334
CONFIGURATION	Dec 5, 2017	Updates on processing of the Unser signal and BCMs.	https://logbooks.jlab.org/entry/3499770 and https://logbooks.jlab.org/entry/3499775	There was still some swapping back and forth between bcm4b and bcm17 the next few days.
COMMISSIONING	Dec 7, 2017	Verified the xscalers mapping in shms and hms is correct	https://logbooks.jlab.org/entry/3500632	
CONFIGURATION	Dec 10, 2017	**Beam operations begin**	https://logbooks.jlab.org/entry/3501416	Stuck at low currents for weeks though.
COMMISSIONING	Dec 10, 2017	Rough check that all bcm gains are in the right ballpark.	https://logbooks.jlab.org/entry/3501888	I based this on the MPS bcm reading of ~4.8muA. BCM4A was identified as a channel that would saturate somewhere around 80 muA. Max scheduled current in Hall C was 65muA.
CONFIGURATION	Dec 11, 2017	**BCM configuration frozen**	https://logbooks.jlab.org/entry/3502743	xscalers channel named "bcm17" was swapped from true signal 3C17 (which is broken) to true signal bcm4b (the channel with the broken tuner)

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CALIBRATION	Dec 12, 2017	**First BCM calibration data taken**, but only 1-19 muA .	https://logbooks.jlab.org/entry/3503311 and https://logbooks.jlab.org/entry/3503318 https://logbooks.jlab.org/entry/3503366 https://logbooks.jlab.org/entry/3503834	HMS runs 1178 and 1181 .
LUMISCANS	Dec 12-13, 2017	Luminosity scans 1-17 muA		The solid target data might be useful. As for liquid targets, the lever arm may not have been large enough. Plus, the fan speed on at least one loop was changed.
CONFIGURATION	Dec 13, 2017	**Start of physics**	https://logbooks.jlab.org/entry/3503878	After only 2 days of beam lol! Beginning with run 1173.
CALIBRATION	Dec 14, 2017	Debitwa Dec bcm calibration results	https://logbooks.jlab.org/entry/3504491	At the point the Unser gain in Deb's script was incorrect by ~3%. (Updated in an email to me on 5/29/18 .) Note Deb's nice plot demonstrating there is little differential nonlinearity between the ARs and the DRs for 2.5-19muA.
CALIBRATION	Dec 18, 2017	Deepak Dec bcm calibration results	https://logbooks.jlab.org/entry/3506509	At this point Deepak's script had a strange broken symmetry between bcm1,2 residuals and bcm4a,b,17 residuals. He fixed this in later calibrations, but I don't have an update for Dec 2017 .
MPSBCM	Dec 21, 2017	MPS bcm heater somehow got unplugged.	https://logbooks.jlab.org/entry/3508070	Does not affect physics normalization, but this is why MCC couldn't deliver more than 5 muA of beam to Hall C for a while.

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CONFIGURATION	Jan 11, 2018	Starting at 10am, the temperature regulation of bcm1,2 and Unser degraded to +-1.5degF .	https://logbooks.jlab.org/entry/3532785	This was only recognized a month later. In principle this temperature variation is no big deal, but it could be related to Brad's Feb 2 instability observation, and should have been caught by shift checklist.
CALIBRATION	Jan 17, 2018	**BCM calibration data taken**, 5-65 muA.	https://logbooks.jlab.org/entry/3515539	Only 7-9 points.
LUMISCAN	Jan 18-19, 2018	Extensive lumi scans.	Many.	See Simona's partial list of solid target run numbers at https://logbooks.jlab.org/entry/3517641
LUMISCAN	Jan 19, 2018	In a scaler analysis, Mark J demonstrates he can get a flatter lumi scan on carbon using the computer LT. (less than 2% slope)	https://logbooks.jlab.org/entry/3517452	Mark also demonstrated that there was significant excess noise. (This was before he added beam cuts.) I'm not sure which bcm1 calibration constants were used. Mark has an Excel-ish file of HMS carbon runs 1437-1443.
CALIBRATION	Jan 21, 2018	Deepak bcm calibration results.	https://logbooks.jlab.org/entry/3518569	This supersedes Deepak's preliminary results for bcm1,2 from Jan 19.
ONLINE	Jan 21,23 2018	Converted Deepak's bcm calibration constants for online.	https://logbooks.jlab.org/entry/3518569	
LUMISCAN	Jan 23, 2018	I noted that the bcm offsets were O(1)muA, so a cut is needed for beam trips.	https://logbooks.jlab.org/entry/3519752	

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LUMISCAN	Jan 27, 2018	Mark extended his carbon lumi scan results to event mode data and applied beam cuts. (No tracking though.) His main finding was that a beam cut removed the excess noise.	https://logbooks.jlab.org/entry/3522067	His new scan normalizing to bcm4a showed a 2% curvature suggesting a 0.2mua offset error. That's roughly consistent with the offset uncertainty from the short Jan bcm calibration.
ONLINE	Feb 2, 2018	Mark J says the order of the bcm calibration coefficients was scrambled up to now.	https://logbooks.jlab.org/entry/3525959	I'm not sure how this impacted Mark J's lumi scan results. It presumably means the online currents didn't agree.
CONFIGURATION	Feb 2, 2018	Brad S identifies a +-4% "breathing" with a 5 hour period in the ratio of bcm1,2 to the MPS bcm. There was definitely a problem with the MPS bcm RF cable found later.	https://logbooks.jlab.org/entry/3525910	This might have been due to a room temperature swing on the MPS bcm RF cable. A +-1.5F temperature swing should not have affected bcm1,2 significantly, and only affected mid-Jan to mid-Feb. Yet there are indications that the bcm1,2 gains may have changed even when the temperature was stable.
CONFIGURATION	Feb 10, 2018	Temperature regulation on bcm1,2 was down. **Cannot use bcm1,2 for current monitoring Feb10-13.**	https://logbooks.jlab.org/entry/3530289	
CONFIGURATION	Feb 13, 2018	Thermocouple reconnected on bcm1,2 and Unser girder.	https://logbooks.jlab.org/entry/3531298	

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CONFIGURATION	Feb 15, 2018	To try to improve temperature regulation on bcm1,2 and Unser, the Omega controller was replaced.	https://logbooks.jlab.org/entry/3532527	Didn't help.
CONFIGURATION	Feb 19, 2018	An attempt was made to fix the bcm1,2 temperature cycling. It was briefly turned off.	https://logbooks.jlab.org/entry/3534564	BCM4a,b,17 were turned off at the same time.
CONFIGURATION	Feb 21, 2018	Norris replaced the thermocouple used to regulate the bcm1,2 temperature.	https://logbooks.jlab.org/entry/3535668	At this point, I think that the bcm1,2 and Unser temperatures were finally regulating again to spec. The variation of +-1.5F is not supposed to matter, but …
MPSBCM	Feb 22, 2018	K Cole et al checked the Hall C MPS bcm tune, finding it only off by 38 KHz.	https://logbooks.jlab.org/entry/3536478 and https://logbooks.jlab.org/entry/3536550	Operator Dan Moser had been seeing significant virtual beam loss correlated with tiny temperature changes in the MPS bcm cavity. This was causing BLA trips.
ONLINE	Feb 24, 2018	Eric C updated gains (but not offsets) using Debitwa's latest calibration.	https://logbooks.jlab.org/entry/3537764	Looks like this changed the gains back to the same values that Deepak and I sent Mark J on Jan 21,23, https://logbooks.jlab.org/entry/3518569 I have no idea what was in the online.
MPSBCM	Feb 27, 2018	I concluded there had to be a problem inside or very close to the MPS cavity (eg, cable, port, or tuner).	https://logbooks.jlab.org/entry/3539735	The observed temperature sensitivity of the MPS bcm was higher by orders of magnitude than my calculation.

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MPSBCM	Mar 2, 2018	RF cable on MPS bcm was proven to be bad and swapped out by Cole and Delacruz.	https://logbooks.jlab.org/entry/3541448 and https://logbooks.jlab.org/entry/3541471 .	The problem was apparently a rad-damaged RF cable, a little present from Q-weak. It took a village and almost 2 weeks to track this down.
CALIBRATION	Mar 3, 2018	**BCM calibration data taken**, 2.5-60 muA, ~18 points.	https://logbooks.jlab.org/entry/3542143 ttps://logbooks.jlab.org/entry/3542165	shms run 2757 and hms run 1843
CONFIGURATION	Mar 20, 2018	Dave G patched some bcm V/F outputs over to his Moeller daq.	https://logbooks.jlab.org/entry/3545480	
LUMISCAN	Mar 30, 2018	It appears some useful lumi scan data were taken.	https://logbooks.jlab.org/entry/3551709	They couldn't do the highest currents due to beam instability.
LUMISCAN	Apr 2-3, 2018	Extensive lumi scan data.	See Sanghua's list of runs at https://logbooks.jlab.org/entry/3553700 .	
LUMISCAN	April 16	Mini lumi scan on LH2, 2-10 muA.	https://logbooks.jlab.org/entry/3561869	Might be useful for improving the bcm offsets for too-low current SIDIS running?
CALIBRATION	May 5, 2018	**BCM calibration data taken**, 2.5 to 65 muA, ~16 points.	https://logbooks.jlab.org/entry/3573440 and https://logbooks.jlab.org/entry/3573505 .	
CONFIGURATION	May 6, 2018	**End of run. Beam off.**	https://logbooks.jlab.org/entry/3573911	
CALIBRATION	May 17, 2018	**Unser wire calibration data taken** by Deepak.	https://logbooks.jlab.org/entry/3575500	Unser gain was stable.
CALIBRATION	May 18, 2018	Unser wire calibration results by Deepak.	https://logbooks.jlab.org/entry/3575766	