Vacuum: 12GeV Hardening

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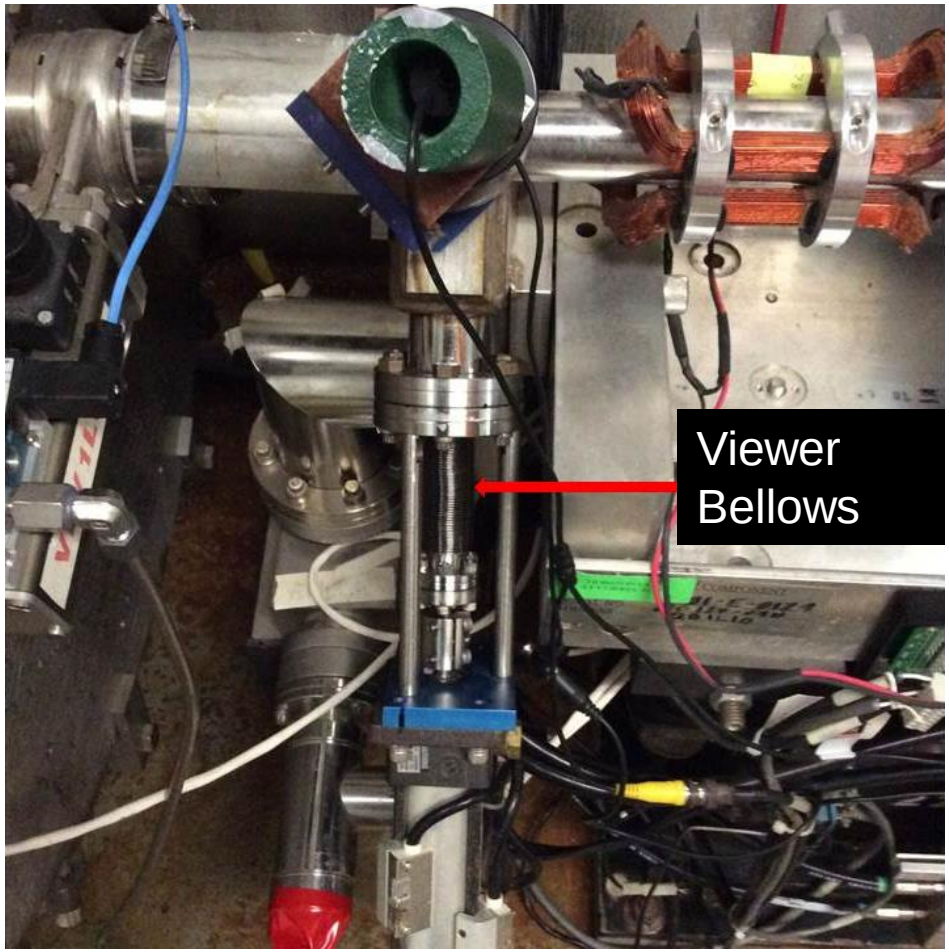
Vacuum: 12GeV Hardening

- Vacuum Improvements & Status
- Synchrotron Radiation Effects
- Vacuum Spares

Vac Improvements - Linac Viewer Bellows

9 of 11 Done

Viewer Location	New Bellows
1L02	
1L06	
1L10	Done
1L14	Done
1L18	Done
1L22	Done
2L02	Done
2L06	Done
2L10	Done
2L14	Done
2L18	Done

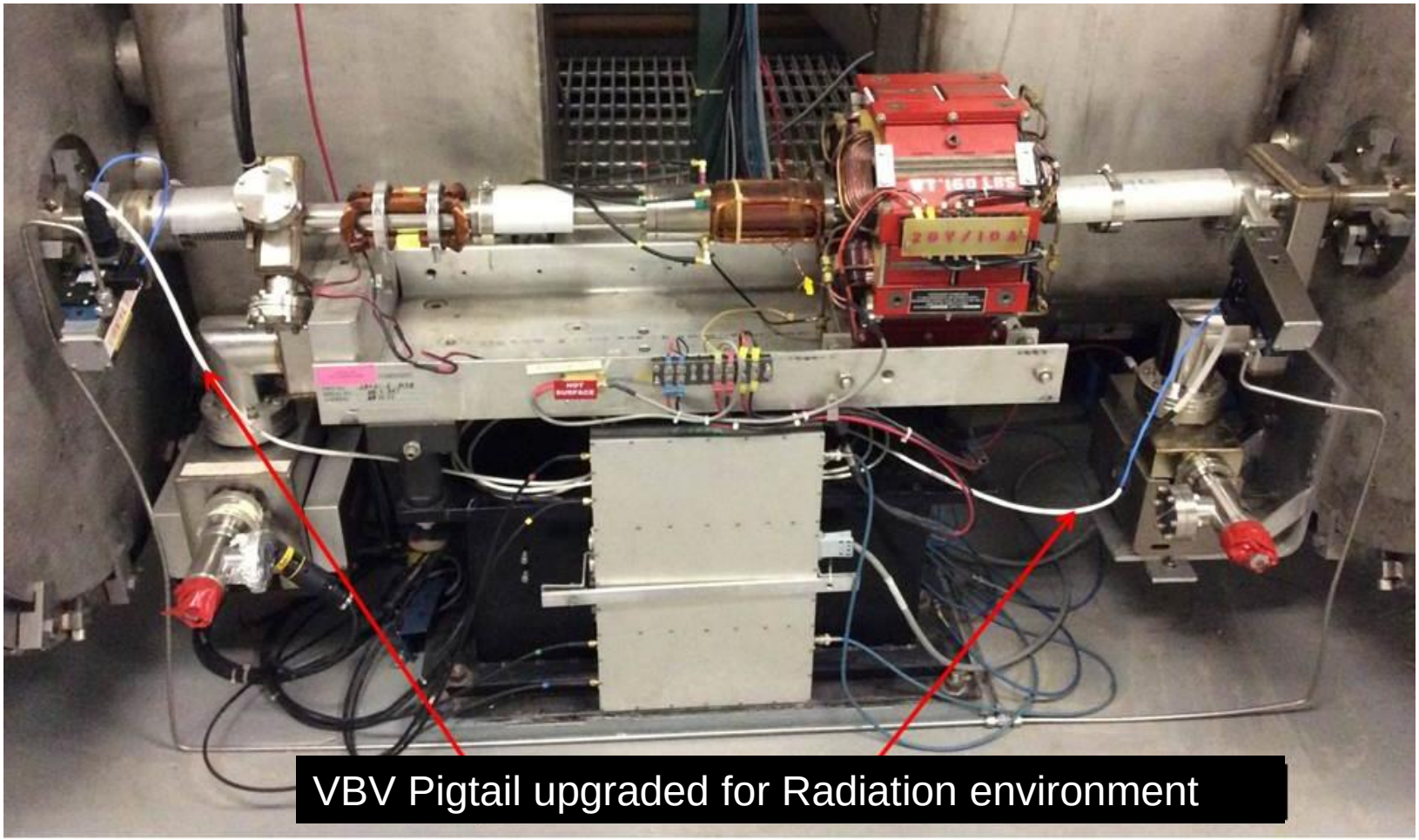


Vac Improvements - Air Lines

- Air Lines changed from Poly to Copper
  - 100% Complete

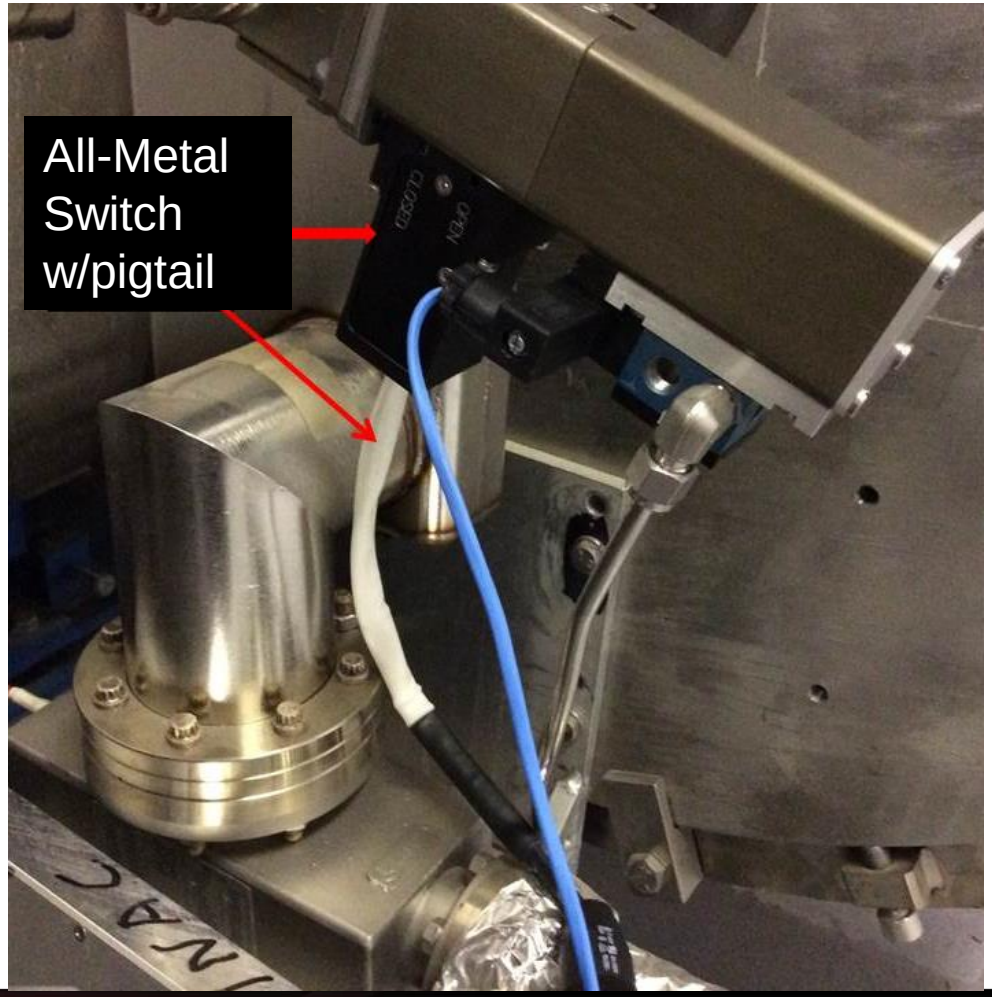
Vac Improvements - VBV Pigtails

- New Connectors & Cables to replace Rad damage
  - 100% Complete North and South



Vac Improvements - Position Switches

- VBV Position Switches from Plastic to Metal
  - 41% Complete



Vac Improvements - Position Switches

VBV Position Switches from Plastic to Metal

Switches Replaced:		
PreSAD	9	
SAD	32	
Total	41	
Remaining	59	$38k

VBV Position Switches (A,B)	Replaced Metal switches	Steve's Rad Survey List	Mike's Data Avg Radial	Mike's Data Max Radial	Mike's Data Avg BL	Mike's Data Max BL	Replace during SAD 2015
2L24	2L24A	2L24	14310	25828	18964	30790	2L24B
2L22	2L22B	2L22	12861	25278	29167	46439	2L22A
2L23	2L23A & B	2L23	10773	24127	10947	33016	
2L03			10241	37414	18387	32537	2L03A & B
2L25	2L25A	2L25	9280	18504	16101	22827	2L25B
1L05		1L05	8487	15458	17753	24932	1L05A & B
1L26	1L26A	1L26	8477	18791	17264	29080	1L26B
1L21			7744	25107	13095	27204	1L21A & B
1L17			7645	29932	10042	20304	1L17A & B
2L11			7515	39940	7335	25834	2L11A & B
2L08	2L08A		7294	31405	15642	27668	2L08 B
2L26		2L26	6892	14864	11204	21240	2L26A & B
2L16	2L16A	2L16	6813	19658	7482	23771	2L16B
1L24		1L24	6729	19440	10628	19998	1L24A & B
2L15			6614	37020	11860	38074	2L15A & B
1L11			5717	15853	13506	28183	1L11A & B
2L07			5474	12225	15625	35212	2L07A & B
2L02			5346	16099	15090	25201	
2L06			5164	21834	14594	31348	
2L12			5054	27510	13738	25189	2L12A & B
1L02			5016	20928	5265	18226	
1L12		1L12	4935	33561	5925	20519	1L12A & B
1L19			4930	32688	11810	29611	
1L13		1L13	4657	14807	7533	21421	1L13A & B
1L10			4459	18698	11045	31768	
2L21			4311	16005	10765	36347	
1L18			4288	9416	11913	45666	
1L14			3809	11576	11513	47077	
1L09			3806	11173	6264	28979	
1L03			3674	8719	11798	25852	
1L22			3321	18218	5973	23824	
1L23		1L23	2952	16929	6646	28138	
2L18			2552	7491	5404	22704	
2L13			2417	8782	6399	18516	
2L14			2307	6815	8890	23024	
2L05			2252	7469	7642	23682	
1L25		1L25	2212	9837	1983	13798	
2L20			2184	11635	8409	23812	
1L06		1L06	2116	7138	10732	28415	
1L07			2098	7347	4277	24006	
1L20			1958	3678	12370	21459	
1L15			1372	2776	5760	21597	
2L19			1263	6802	7795	30006	
1L16			1147	4060	4896	20528	
2L10			1118	8771	830	6414	
1L08			990	6142	7024	31234	
2L17	2L17A		870	1712	4880	12489	
1L04			248	1075	3528	17874	
2L09			88	200	245	857	
2L04			32	230	159	1202	

Vac Improvements – VIP's

- VIP Recovery
  - Goal is 100%
  - Status @ SAD Start

VIP	Problem	Status
3A17	Pump Shorted	Red
4S00B	Railed	Red
4S01A	Railed	Red
4S03A	Railed	Red
4S00C	Railed	Red
BS00	Clean High Volt Feed through. Install pwr supplies	Red
3S02	Clean High Volt Feed through. Install pwr supplies	Red
9S01	Clean High Volt Feed through. Install pwr supplies	Red
7S01A	Clean High Volt Feed through. Install pwr supplies	Red
AT02	Railed	Red
6E03	Railed	Red
AT05B	Railed plus Small Leak found	Red
0L10	Suspect leak	Red
AA05	Spurious Burps in Pressure needs investigation	Red
AA06	Spurious Burps in Pressure needs investigation	Red
AA08	Spurious Burps in Pressure needs investigation	Red
AA09	Spurious Burps in Pressure needs investigation	Red
2L24A	Leak check	Red
1L18A	degraded due to leaking ITV	Red
1L22A	buggered out widen trip level	Red
0102	not communicating with epics- had been intermittent	Red
1P01	Configuration issue-Ketchum	Red
1A24	Railed needs investigation	Red
1A26	Railed needs investigation	Red
2A16	Railed needs investigation	Red
4T09A	Railed needs investigation	Red
6S03A	Railed needs investigation	Red
6E01A	Railed needs investigation	Red
6E02	Railed needs investigation	Red
6T06A	Railed needs investigation	Red
6A01	Railed needs investigation	Red
8A25	Yellow needs investigation	Red
8R01	Yellow needs investigation	Red
5C03	Intermittant grn, yellow, railed. Investigate	Red
9A22	Railed needs investigation	Red
9R07A	Railed needs investigation	Red
1R09	Railed new	Red

Counts	
0	Green
37	Red
0	Yellow
37	Total VIP's

Vac Improvements – VIP's

- VIP Recovery
  - 81% Complete

Joint effort troubleshooting by Vac & Vac ICN to include cables, connectors, cards, VIP hi-potting, VIP repair, and power supply replacements.

Additional improvements made by Vac ICN to Rad harden the VIP power supplies with upgraded HV diodes.

VIP	Problem	Status
3A17	Pump Shorted	Green
4S00B	Railed	Red
4S01A	Railed	Red
4S03A	Railed	Green
4S00C	Railed	Red
BS00	Clean High Volt Feed through. Install pwr supplies	Green
3S02	Clean High Volt Feed through. Install pwr supplies	Green
9S01	Clean High Volt Feed through. Install pwr supplies	Green
7S01A	Clean High Volt Feed through. Install pwr supplies	Green
AT02	Railed	Green
6E03	Railed	Green
AT05B	Railed plus Small Leak found	Green
0L10	Suspect leak	Green
AA05	Spurious Burps in Pressure needs investigation	Green
AA06	Spurious Burps in Pressure needs investigation	OFF
AA08	Spurious Burps in Pressure needs investigation	OFF
AA09	Spurious Burps in Pressure needs investigation	OFF
2L24A	Leak check	Green
1L18A	degraded due to leaking ITV	Green
1L22A	buggered out widen trip level	Green
0102	not communicating with epics- had been intermittent	Green
1P01	Configuration issue-Ketchum	Green
1A24	Railed needs investigation	Green
1A26	Railed needs investigation	Green
2A16	Railed needs investigation	Green
4T09A	Railed needs investigation	Green
6S03A	Railed needs investigation	Green
6E01A	Railed needs investigation	Green
6E02	Railed needs investigation	Green
6T06A	Railed needs investigation	Green
6A01	Railed needs investigation	Green
8A25	Yellow needs investigation	Green
8R01	Yellow needs investigation	Green
5C03	Intermittant grn, yellow, railed. Investigate	OFF
9A22	Railed needs investigation	Green
9R07A	Railed needs investigation	Green
1R09	Railed new	Green

Counts		
30	Green	<80 uA
3	Red	≥100 uA
0	Yellow	80-99 uA
4	OFF	
37	Total VIP's	

Synchrotron Radiation Effects

- Analysis of Thermal effects*

  Synchrotron radiation heating was evaluated in the higher energy arcs (x-direction) and the higher energy spreader/recombiner dipoles (y-direction).

  Arc's max temperature at girder bellows flange is 70 deg C (158F)

  ZA's max temperature at top of chamber is 39 deg C (102 F).

  Reports indicate these are conservative temps higher than expected and indicate the synchrotron radiation heating will not be a problem for 12GeV CEBAF.

- Run Experience

  During our Spring run some vacuum excursions were noted in the 2R and 2S regions. As a precautionary measure additional Turbo pumps were added to the common vacuum in 2R and 2S (unexpected synchrotron radiation effect?). The pumps provided no change in the vacuum state and were valved out. The machine settled out and the Turbo's remained valved out for the duration of the run.

- Actions Taken

  The turbo pumps were removed and serviced, if needed they are ready to be deployed.

*"Synchrotron Radiation Power at CEBAF 12 GeV Upgrade" B Yunn and Eduard Pozdeyev. TN-06-004

*"Synchrotron Radiation Thermal Effect on the 12 GeV CEBAF" - June 20, 2006, M. Wiseman, S. Slachtouski, K. Wilson, and B. Yunn

*"Synchrotron Light Radiation Heating in 1st Spreader" – 2010 (unreleased), C. Dubbe

Vacuum Spares

- Position Switches, Metal - 0 ($640 ea), Plastic - 24
- VBV's
  - Linacs – 4
  - General Accel – 20
- VIP's
  - New 11 L/s – 2
  - New 25 L/s – 1 ($1800 ea)
  - 11 L/s ready for rebuild ($600 ea)
  - 11 L/s on Rad Hold – 21 (approx. 6 mo to 1 yr to release)
- VIP Ion Packs/ Power Supplies - 11
- Tunnel Pump Carts - 4

Vacuum: 12GeV Hardening - Conclusion

- Proactive improvements have been made to the Vacuum System based on downtime and repairs and is ready for the 12 GeV run.

- Vacuum Improvements will continue during upcoming SAD's.

Vacuum: 12GeV Hardening

Thank You!!!

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