AMS Hardware Updates, Tips and Tricks

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AMS User's Meeting 2013

9/8/13

AMS Maintenance Tips

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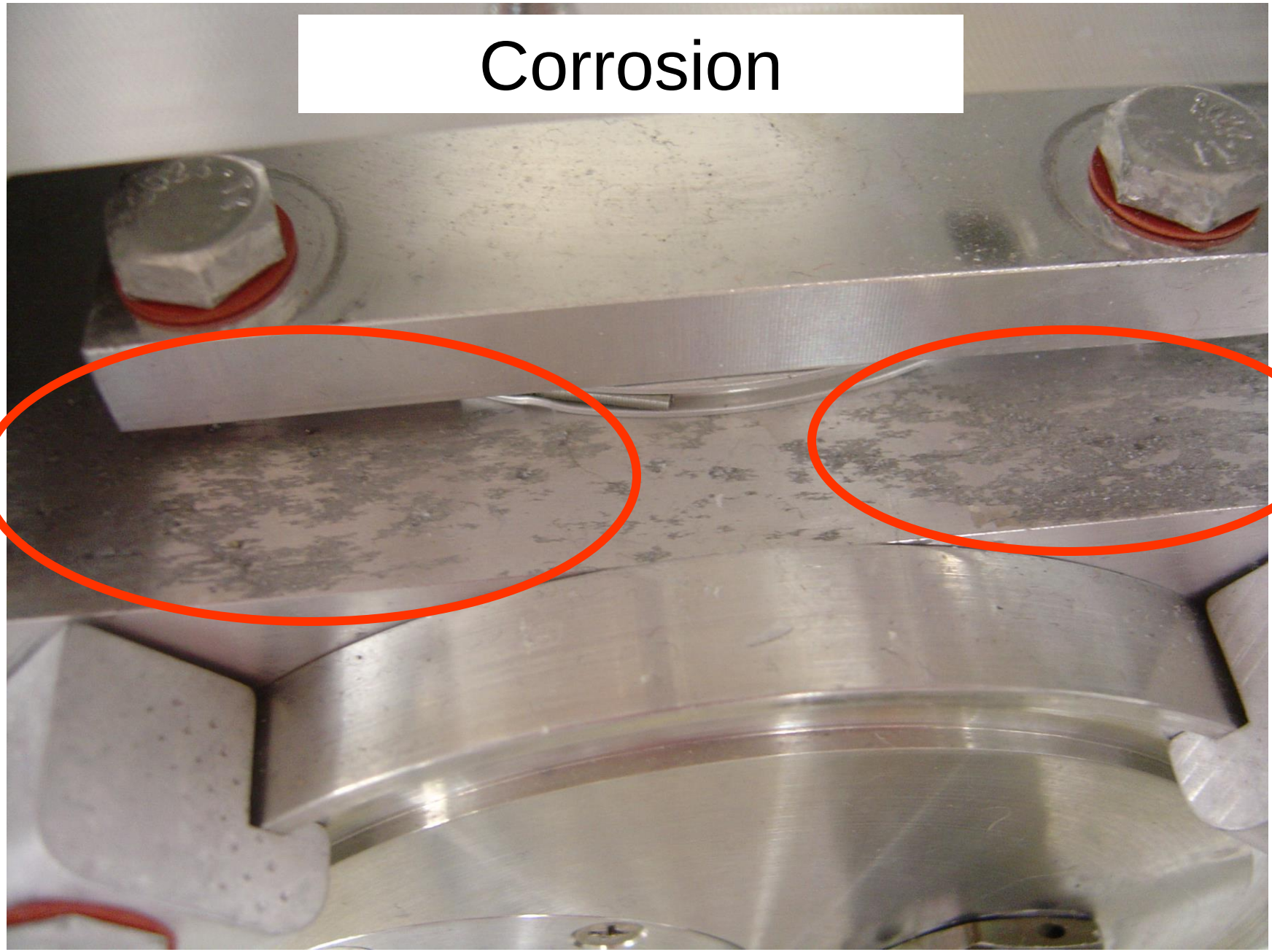
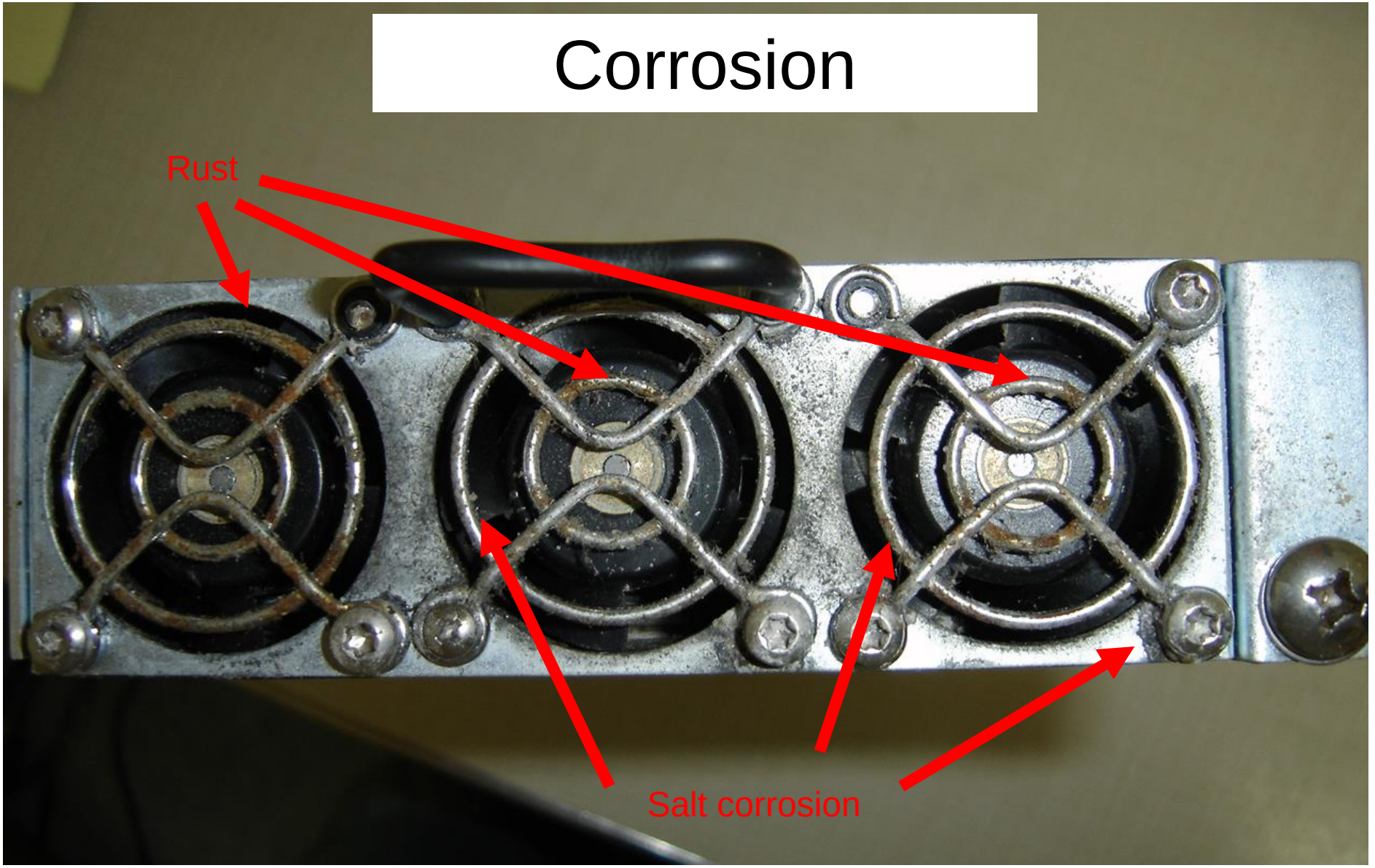
- Clean vacuum chamber surface
- Check for loose/missing connections/fasteners
- Check for stressed cables
- Always monitor pump performance
- Always monitor MD1/Lens pressures (load/no load)
- Clean cooling fan filters
- Dirt inside computer
- *“Dirt”* on computer HD (clean up and defrag)

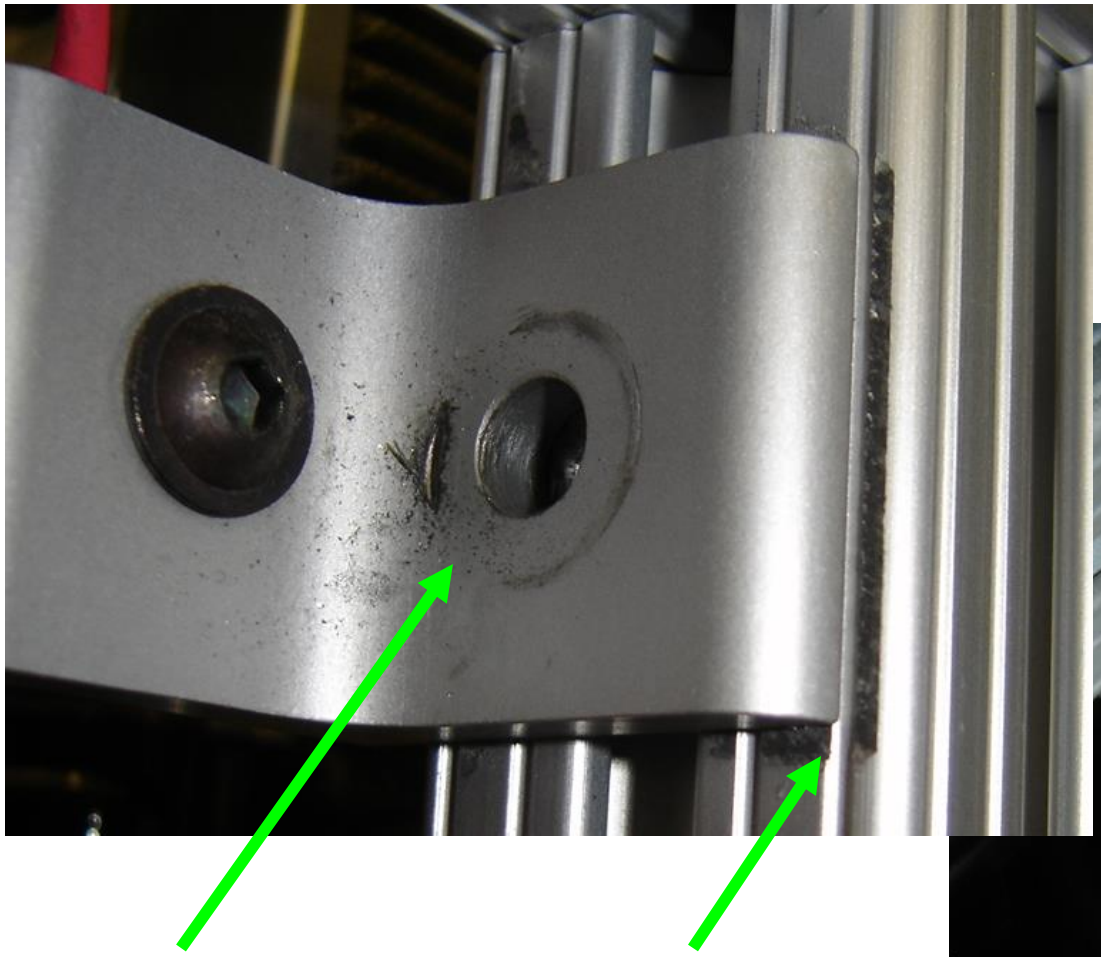
Corrosion



Corrosion

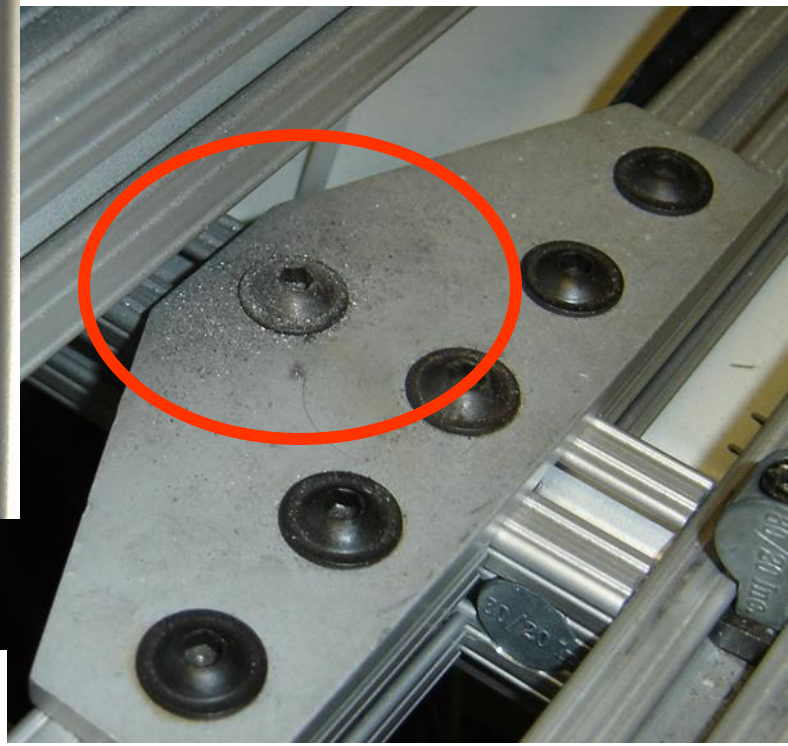


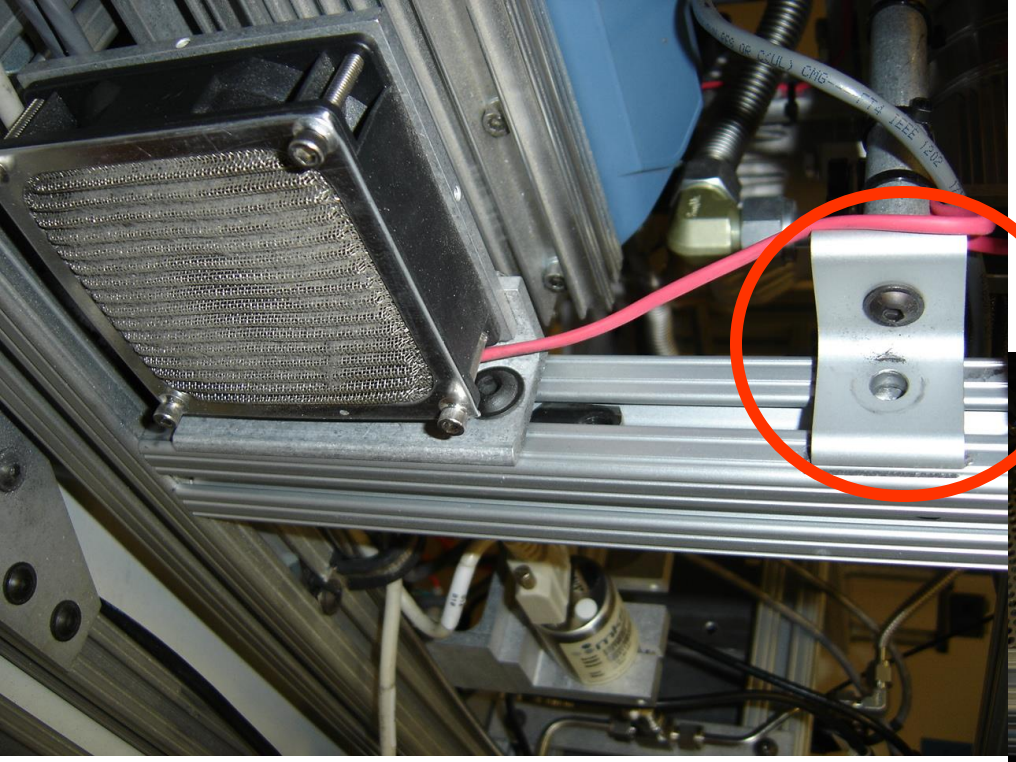
Missing fasteners

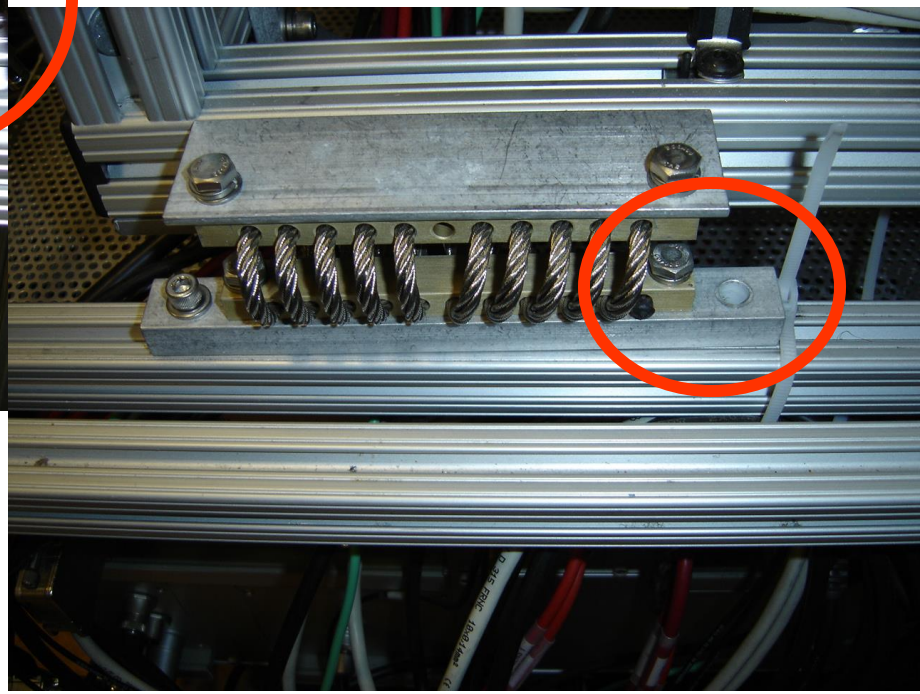


Missing fastener, chaffing metal

Aluminum dust

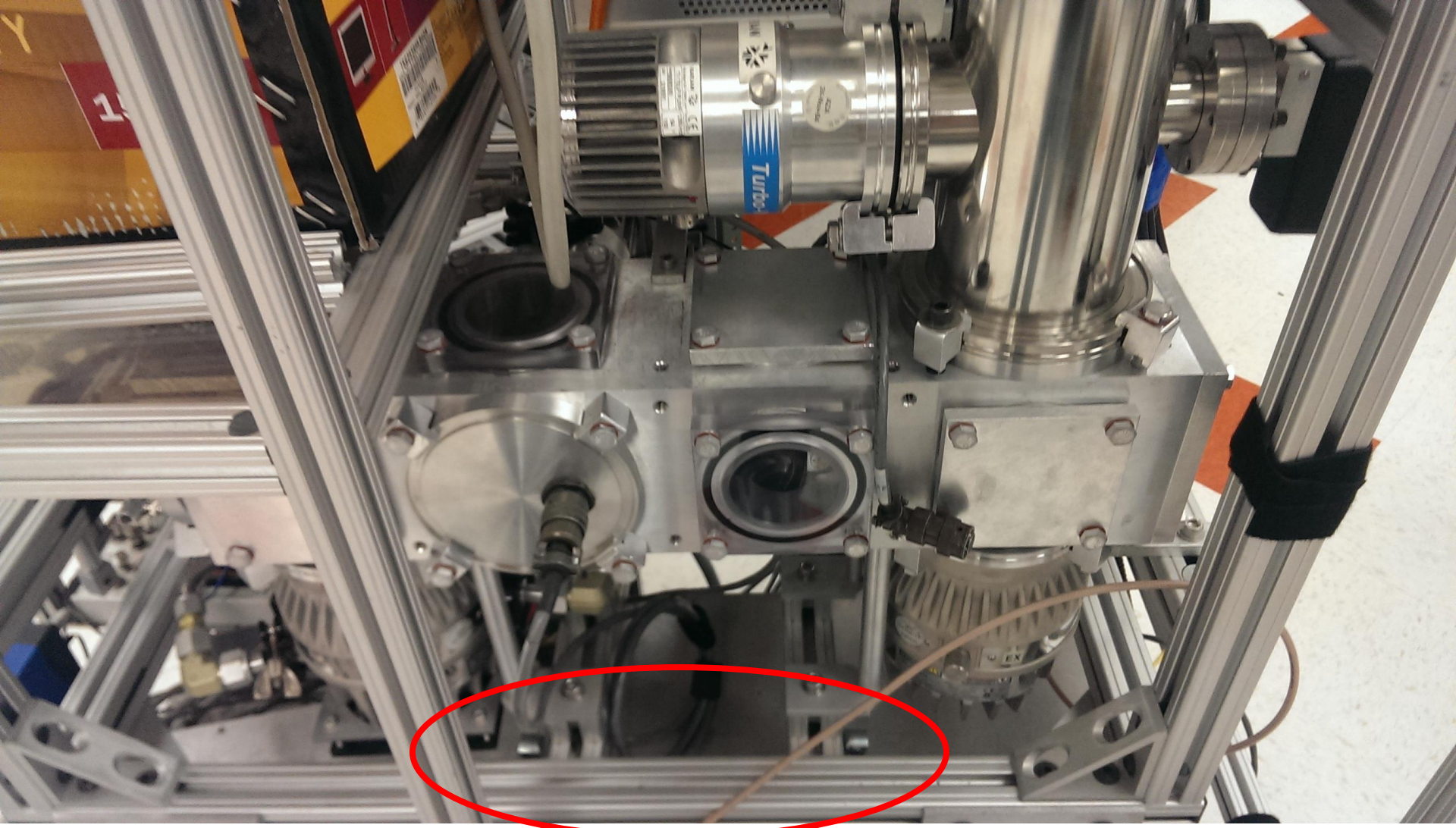




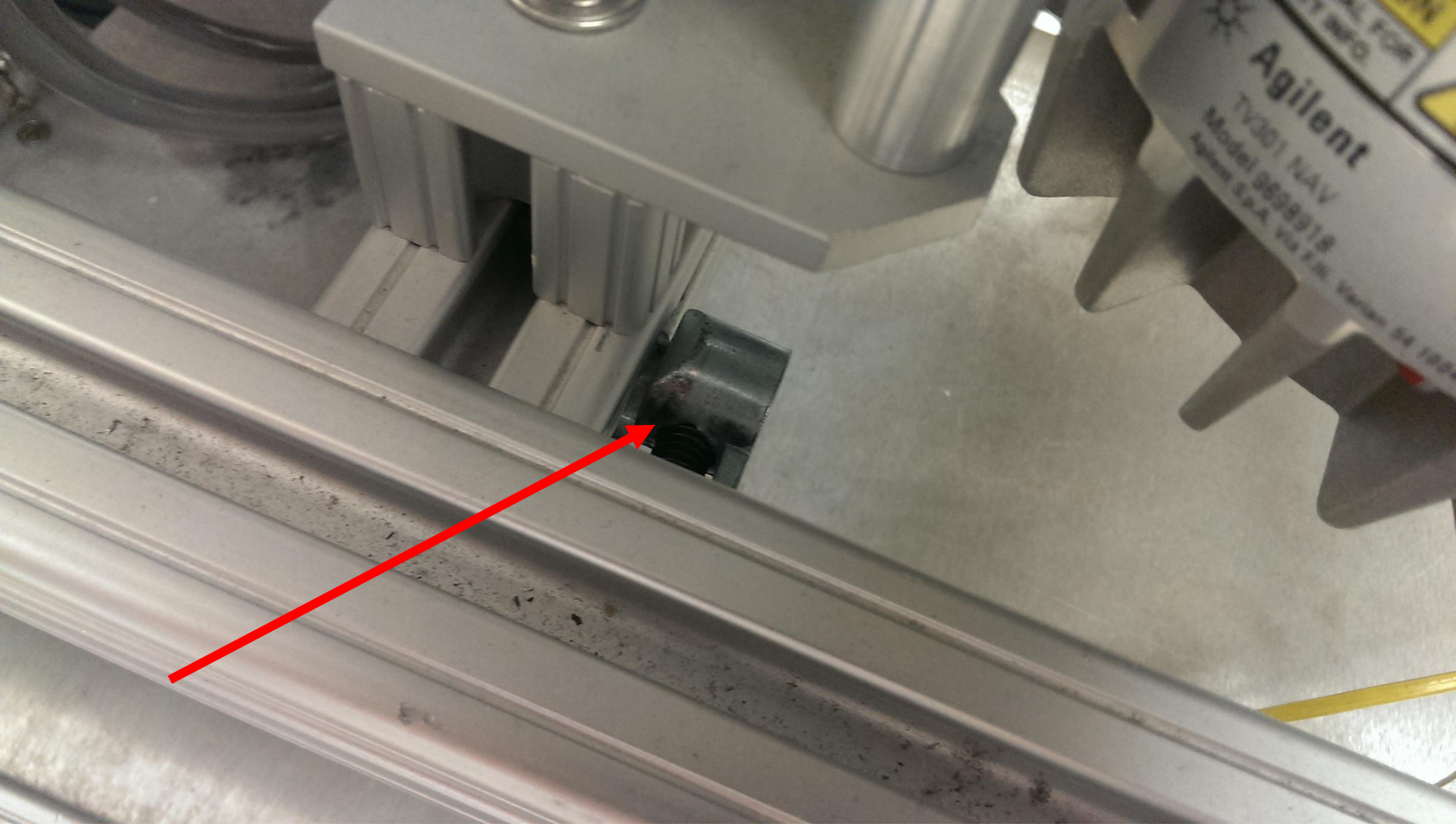


Tighten all fasteners.

This includes Chamber, Electronics, and 80/20 Frame.



What is wrong with this picture??



Every Bolt should be tight,

Especially when shipping!

Dust Removal

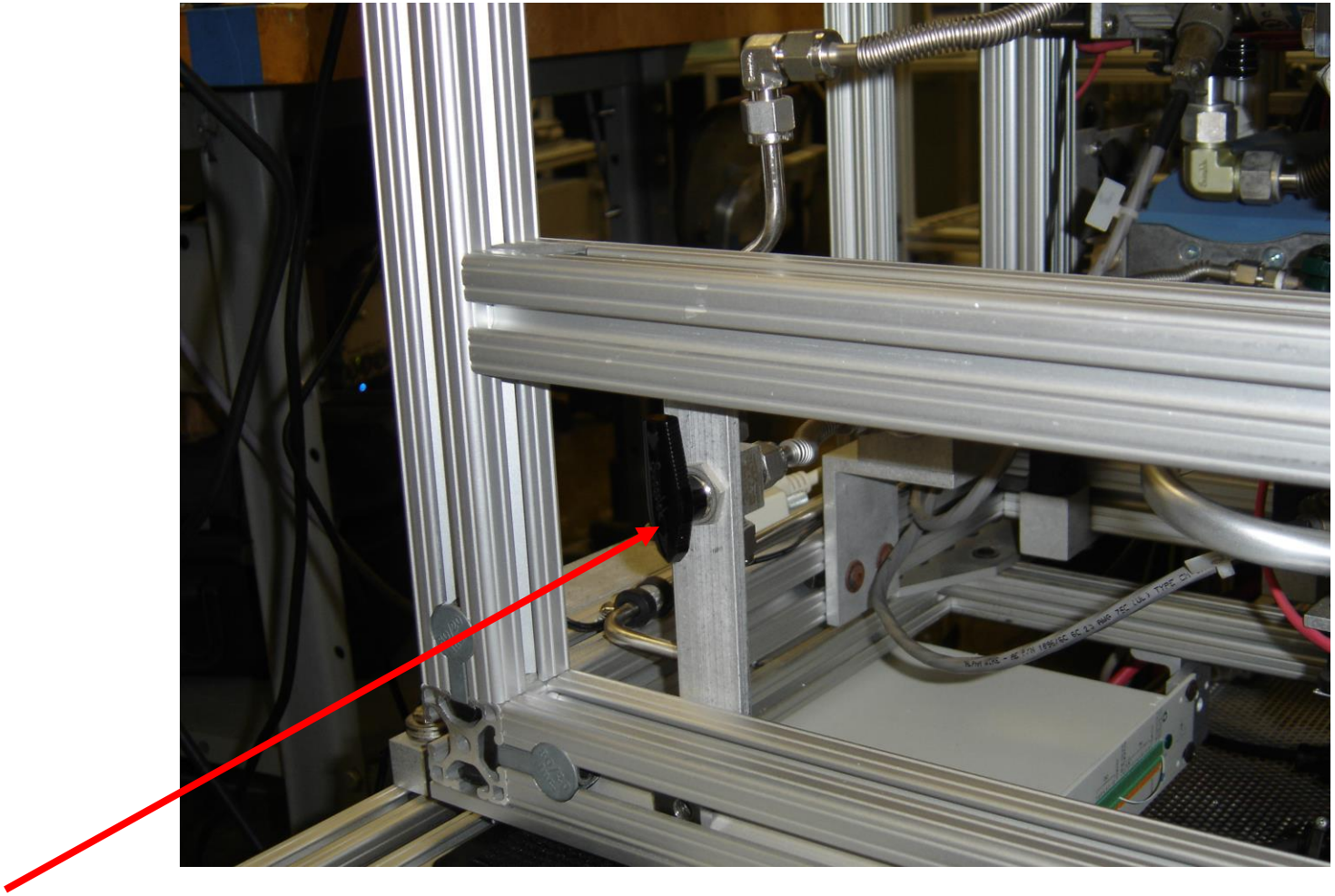
Dust and Electronics are mortal enemies!

Inspect Shipping Container

Fork Lift Damage

Don't leave instrument in the shipping container

Monitor MD1/Lens Pressures



Typical Pressures (Torr)

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	No Load	Load
MD1	~1.5	~4.0
Lens	~0.00	~1.3

Know what they are on your specific AMS, so you can note any changes.

What are the operating currents for all pumps?

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	Gas Load Off (mA)	Gas Load On (mA)	Delta T* (Degrees C) (Closed/Open)
P2	~ 450	~ 850	9/13.3
P3	~ 250	~ 300	9/9.3
P4	~ 200	~ 250	6/5.9
P5	< 200	< 200	6.2/6.5
P6	~ 200	~ 200	9.6/9.6

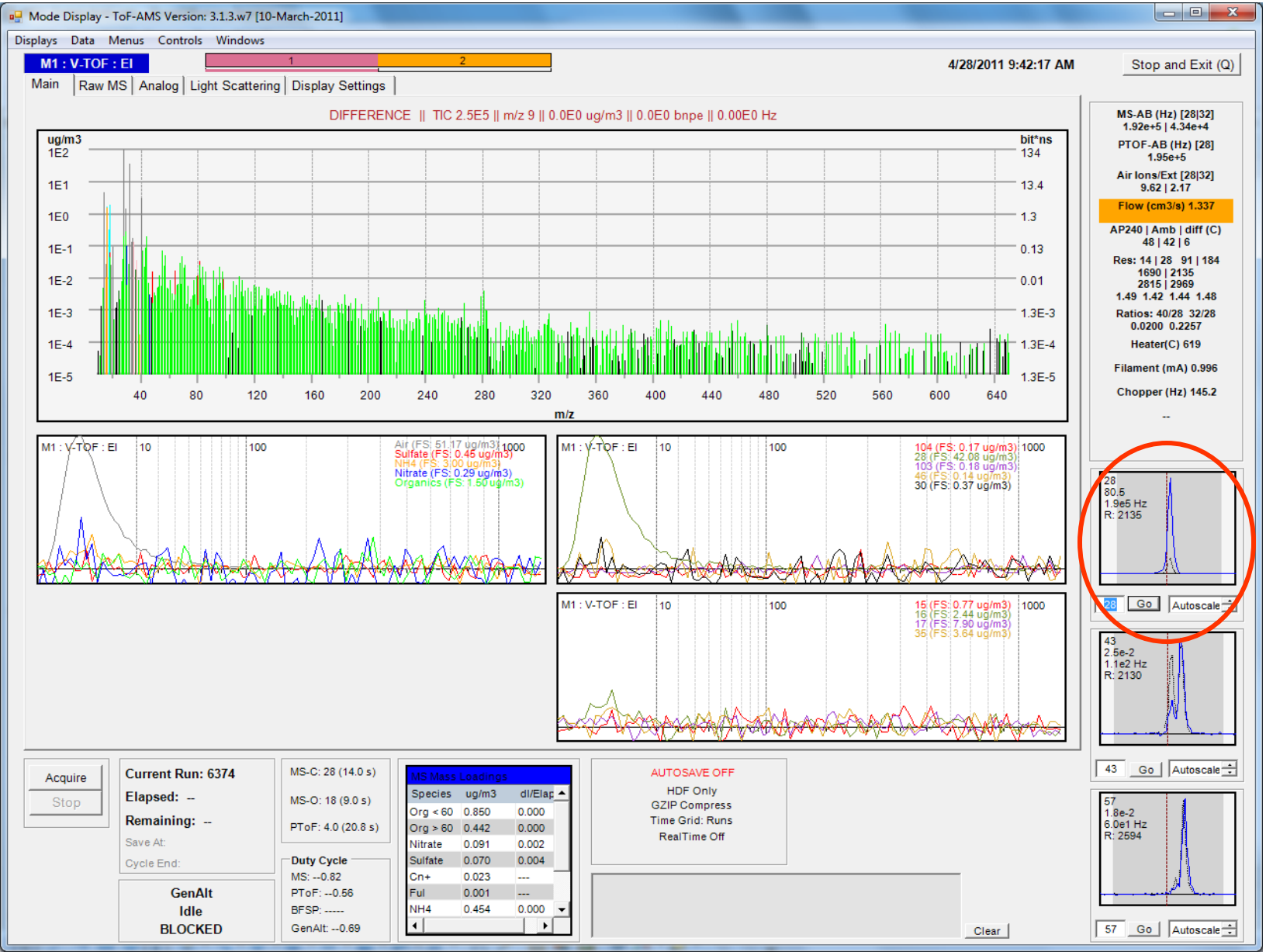
*Delta T = Pump Temp – Ambient Temp

Record Pump Data with Pump Control Software

Pump Speeds

	Speed (Hz)
P2	963
P3	1250
P4	1100
P5	963
P6	1150

Leak Checking Tricks



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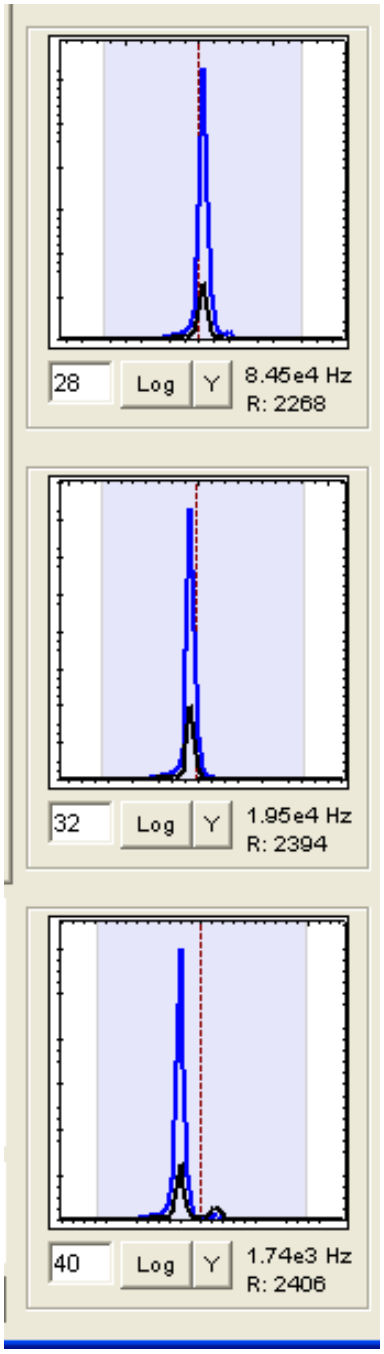
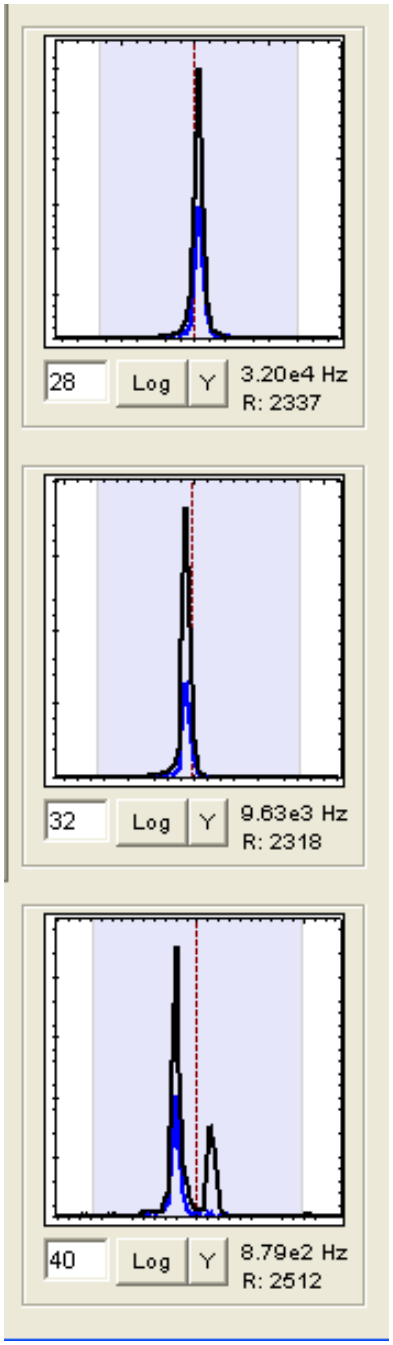
Normal



Leak



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If the Airbeam (m/z 28,32,40) has a diff/closed ratio of < 2 you probably have a leak.

Note: Incorrect chopper servo alignment can also cause these symptoms.

One can further get a clue as to where the leak is by *carefully* looking at your closed and difference Airbeam.

If the leak is in the PToF region, the difference Airbeam will be attenuated and the closed AB will not be changed too much from normal.

If it's in the detection region, the difference AB will be about the same as normal, but the closed air signal will have an elevated background.

Using ToF as Leak Checker

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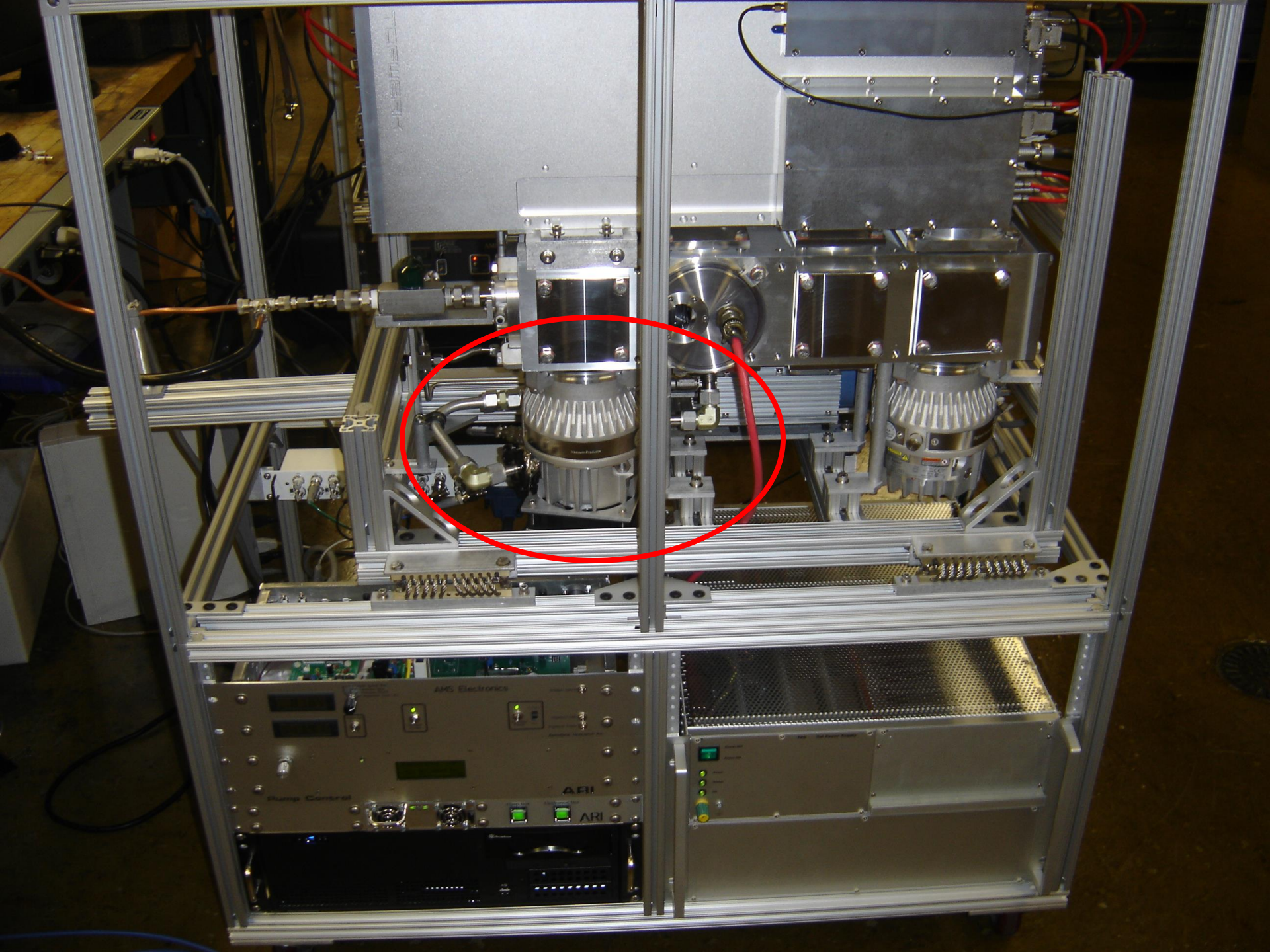
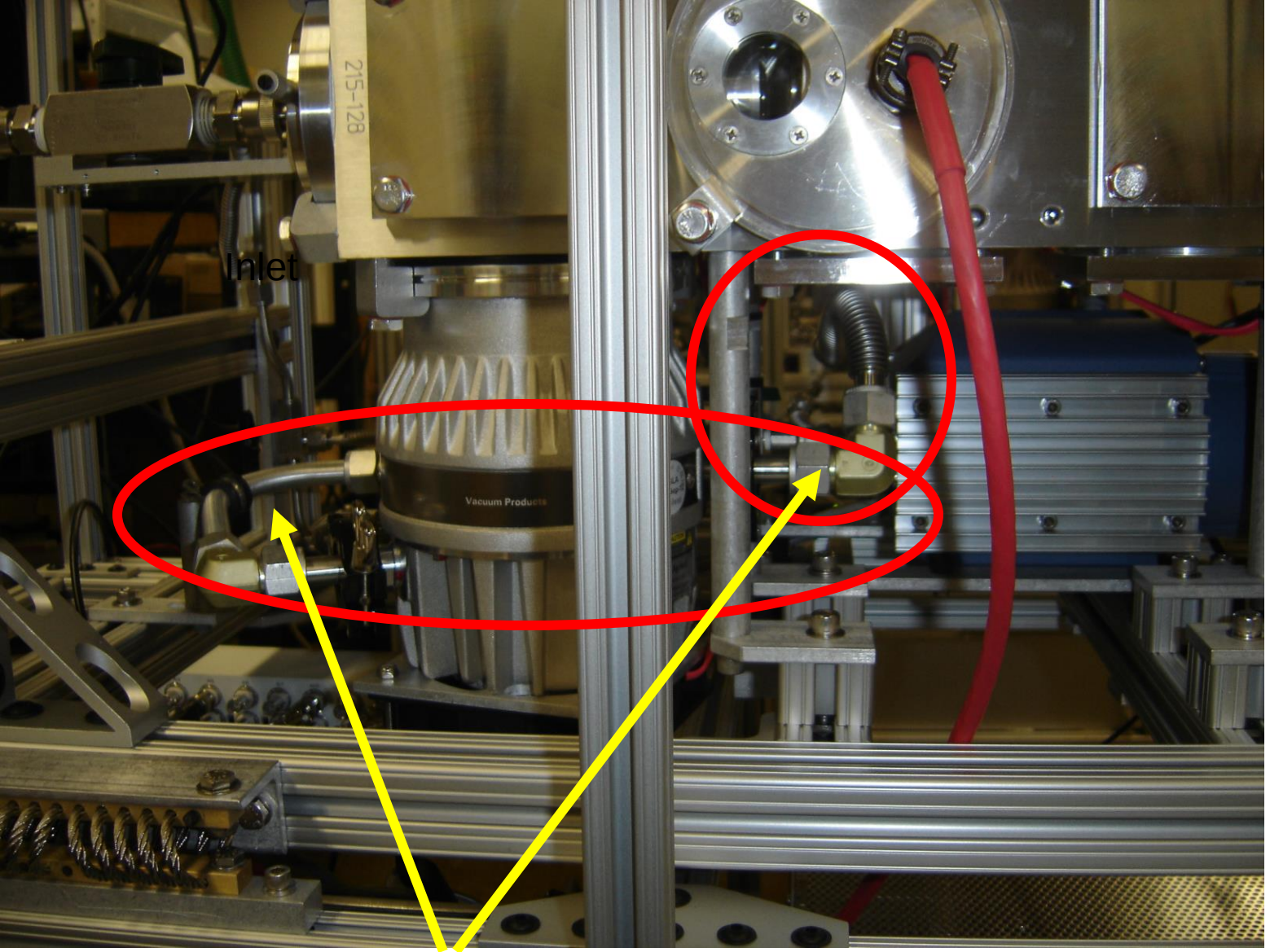
- He or Ar are good choices.
- Using He may require a change in the timing window.
- Use controlled bursts of gas, don't "flood" system.
- Depending on where the leak is, may need to wait several seconds for a response.


AMS Electronics
Pump Control
ARI
ARI



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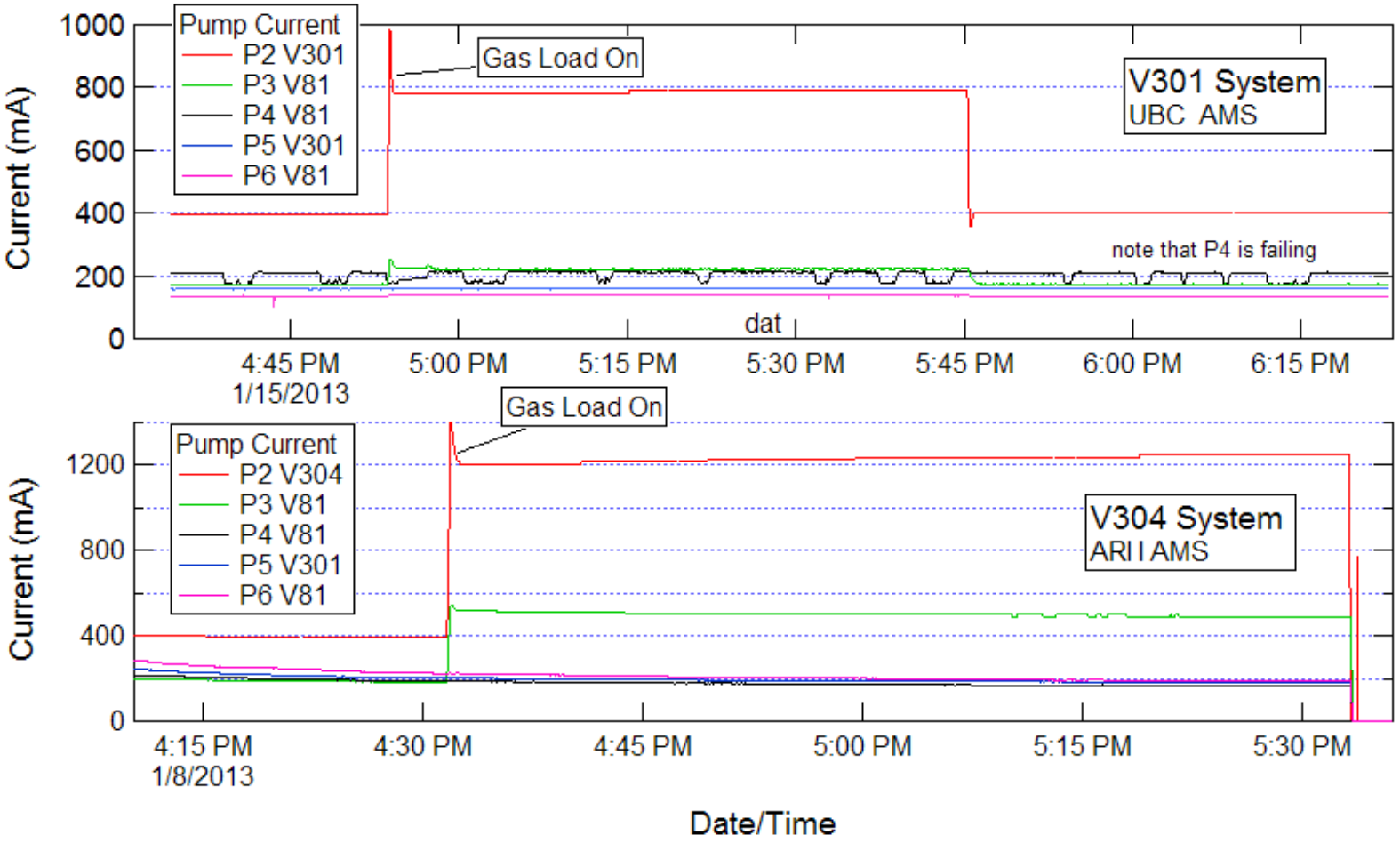
Doesn't work as well here… But leaks here will cause a higher Backing Pressure

Consult Pump Currents, Lens and Backing Pressures to get a clue of where to look

Agilent Pump Updates

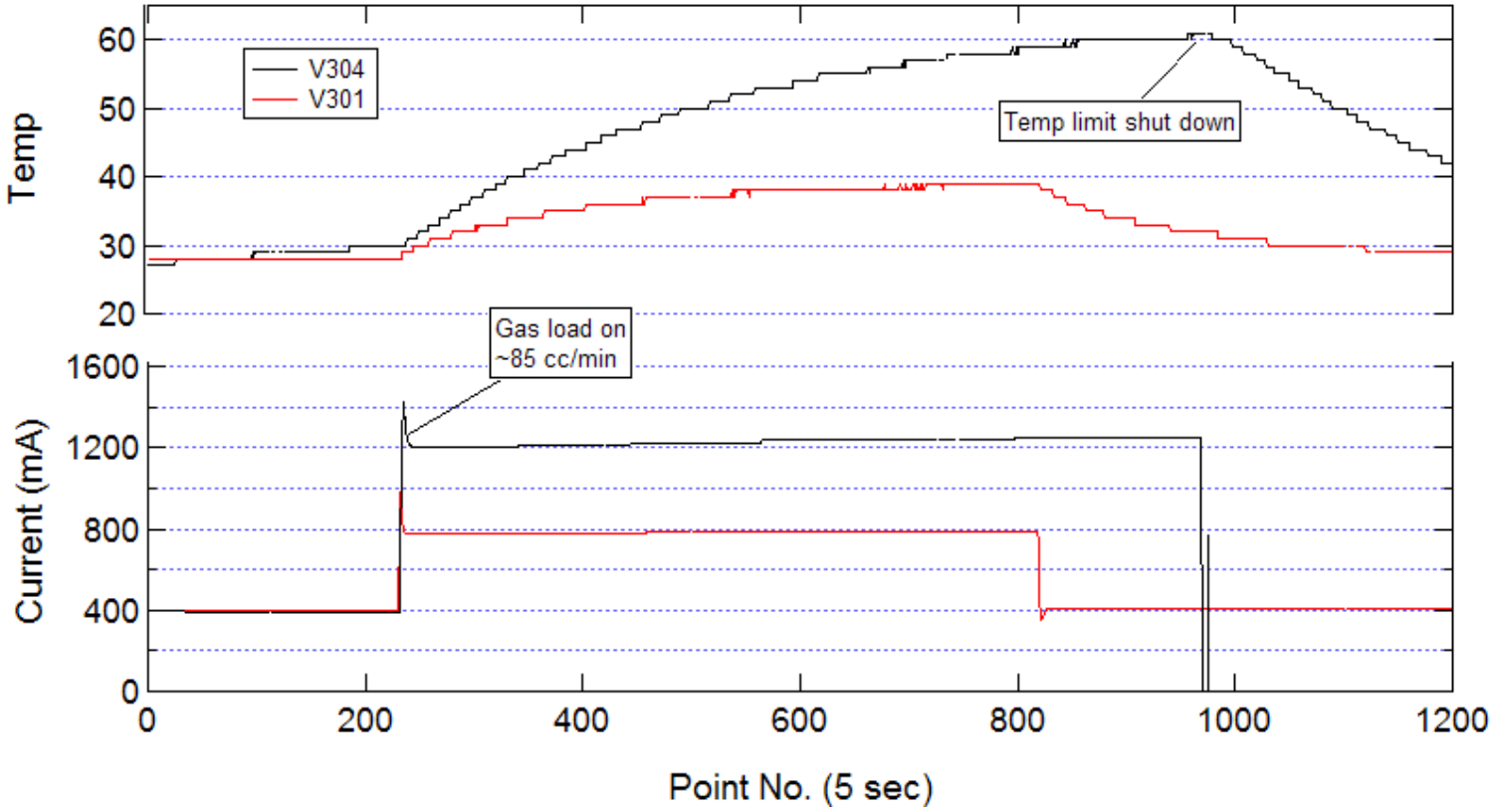
- V304 not a good fit for AMS
- V84 to be tested in Oct.
- V301 “obsolescence”
- New AMS’s to continue to use V301
- Support longer than 7 years likely
- New online RMA system starting ~Nov 2013
- Working with Agilent to potentially keep a supply of exchange pumps in Lexington, MA specifically for AMS users

Compares V301 System to V304 System
Data for all pumps is shown (85 cc/min gas load)



V304 running at 50% higher load than V301.
P3 also running ~50% higher.

Compares V301 and V304
mounted on AMS at P2 position
as load is turned on



V304 ultimately shut down due to 60C temperature limit

Bench Tests Comparing V304 and V301

	V304	V301
No Load	0.22A/ 16W	0.25A/ 18W
Load	0.95A/ 69W	0.79A/ 58W

- Each pump was run independently on the bench with and without the nominal gas load (85 cc/min air). The backing pump was a turbo drag pump, ~0.1 - 0.2 torr pressure.
- This testing did not have gas entering the vent port as we do in our instrument application.
- Pump was powered using the AC powered V301 controller.

Pump Comparison Summary

- Under no load, the V301 and V304 perform comparably.

- With load (85 cc/min) the V304 consumes higher power and ultimately shuts down after exceeding the max bearing temperature limit.

- The use of the vent port as a pumping port puts a larger burden on the V304 compared to the V301.

- Bench tests also show V304 consumes more current than V301. These tests had no gas leak into the vent stage.

- For our application the V304 does *not* look like it will be a suitable replacement for the V301.

Other comments:

There is no “seat” at the inlet of the V304 top accommodate the standard inlet screen.