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| **Important: Don'ts:** 1) Don't start computer without disconnecting the usb to COM adapter  2) Never shutdown or close TPS software when AMS DAQ has control of TPS (checked in main DAQ window);  3) Be very, very careful not to flip of main 24V when switching on Aux2 (PCI pump);  4) be sure that main bypass valve to Venturi (big green handle valve) or little bypass just after PCI MD1 is open before turning on PCI MD1. 5) Do not start taxiing without having the bypass valve open and the little bypass valve closed  6) Wait till log shows up in the ToF-DAQ software till you hit any buttons/checkboxes (about 15 s after the window comes up)  7) You cannot “refine” your m/z cal while acquiring in the cal window. Stop it first, or take advantage of the 1 s run taken when the cal window opens | | |
| STEPS | Done? | Logged to file? |
| Disconnect COM3 (COM3: white serial cable at the back of the computer) - Note: Com assignments are taped to left side of monitor. Try to leave it hanging in front of the USB port, it will make reconnecting it much easier |  |  |
| Power up rack (Sequence: Station Power Switch -> Power Bar -> Hard UPS Switch – Aisle Side is On– -> 24 V Main Switch -> Computer) pw: passjimenez |  |  |
| Open up .txt and .ppt file; name RFxx.txt and RFxx.ppt. Enter in the ppt the flight objectives and your name. Save in "DC3\_Palmdale" folder inside My Documents (shortcut on Desktop) |  |  |
| Record AMS pressure. Should be <0.2 torr. If much greater, it suggests a possible leak that should be investigated. |  |  |
| Once booted, switch on Meinberg IRIG client (if LED clock by main computer station of DC8 is on, otherwise wait) |  |  |
| Start Pumpbox software, set "Update rate" to 5 s and autoupdate. Start pumps via software. Set File and Directory (Directory: ToFAMSDAta/LogFiles/; File Convention: Pumplog MMDDYY (RFxx) (Last is optional on flight days) - click "enable logging" |  |  |
| Turn all pumps on under "control" menu "on/off control". Choose "All On" then "Send CMD" (NOTE: IF all buttons show red, you either have a communication problem - in which case you want to exit, press update and reenter the PumpControl Window- or the software thinks the MD1 is off, in which case you should press the MD1 button till it turns green) |  |  |
| When all pumps are above 300 Hz, open MD-1 valve |  |  |
| Reconnect COM3 USB adapter. |  |  |
| Check MD1 backing pressure. Record "inlet closed" value (Should be around 1.4 torr, except if the plane is really hot) |  |  |
| When all pumps but P5 are up (Heater params will become visible), switch on Heater. Then start Cryopump software. Just ok standard settings. Press “Cool” button |  |  |
| Once P5 is up to speed (963 Hz), start TPS. Note the time, MCP start should be 1 h after this. |  |  |
| Change update rate of pumpbox software to 60 s |  |  |
| Start TPS software and load TOFAMSMenu.set (1st File in the list). Set both filament current and MCP to 0, PostAccel to 1400 V. Press “Set all” |  |  |
| Start TCP-Com Software and active COM5 (AMS data feed to plane) |  |  |
| Start TofAMS-DAQ. Choose PToF Menu (#3). Do not enable TPS yet. Go to calibration window and start pulsing (hit "start" in cal window)  Open both vacuum valves to pump down spare MCP (~10 seconds is fine). If you see a large bump in MD-1 pressure, wait till it comes down and record it, |  |  |
| Switch pressure inlet valve back to lens |  |  |
| Once heater voltage >3 V (typically 10 min), set emission current to 1.5 mA |  |  |
| Start chopper. Make sure both chopper and filament are on and at the right settings before leaving (chopper reads on Ebox, you see the filament glowing and at 1.5 mA, not full power) |  |  |
| One hour after switch on, inspect toolbag and make sure you have all the spares for a orifice exchange. Bring toolbag on the plane. |  |  |
| Check valves: Calibration line should be closed (on both ends), HIMIL should be open, HIMIL flow should enter the AMS thu the filter, Top bypass line should be closed, PCI valve should be closed, small PCI bypass line should be closed and main exhaust valve should be open) |  |  |
| Switch on PCI pump. Slowly open the PCI pump valve and watch the PCI pressure come down. |  |  |
| Once the PCI pressure is under 100 Torr (or a bit more on really hot days), slowly crack open the lens valve (should take you about 20s to open it, try to keep the pressure under 3 Torr). Make sure you fully open it. |  |  |
| Once all flows stabilize, you should read: 94.4 Torr on the PCI, 1.400 Torr on the lens pressure (make small allowances for a cold or very hot plane) and 380 sccm on the PCI bypass flow (this is the upside-down Alicat FM after the PCI MD1). If either lens pressure or bypass flow are low (10% or more), one of the orifices is likely plugged and needs service. |  |  |
| Check the MD-1 backing pressure, should be around 4.4 Torr |  |  |
| Check heater power (b/c TC temp is low). Should be ~3.8 watts (~3.7V, ~1.06A). Set voltage is T dependent, so it will change in a toasty airplane |  |  |
| Check chopper speed (~152 Hz) (same as above, T dependence, if you readjust it now, consider monitoring it during the first hour of flight and readjusting it back) |  |  |
| Confirm that the Cryopump is at 90 K. Confirm that the turbo pumps are cool (<45 C) and the pump currents are normal (<900 mA for P2, less than 250 for everything else) |  |  |
| Exit calibration menu, go into Bitwise and record baseline with the MCP off (Threshold breakers should be less than 3 bits). Screenshot it. |  |  |
| Enable TPS in TOFAMS-DAQ (Menu 1, FMS). Hit “Set” and confirm by looking at the TPS window that the MCP is coming up. |  |  |
| Wait for MCP in TPS window to come up. Start calibration window. Calibrate while stopped (until further notice). Measure AB (should be 7.6 ipe or more). Record. If low, consider doing a quick bitwise and repeat. |  |  |
| Check resolution. m/z 32 should be ~2000, m/z 184 ~3400 |  |  |
| Perform leak test: Go to Leak Test Menu (#2). Make sure that a) the chopper is in the open position b) you are still going thru the filter c) the top bypass flow valve (and the cal line valve) are still closed. Set your timetrace to m/z 4 (with resolution display disabled) & 32 and MS display to log (so you can see it in relation with the other peaks). Then close the inlet valve on the window side, and after 1-2 min the PCI valve. Wait till pressure drops below 8 Torr. Then start spraying all fittings from the lens valve on to the HIMIL valve liberally with Helium (no need to do them individually, just bath individual sections in a good cloud and see if something comes up). |  |  |
| After the leak test, close the lens valve and vent the PCI veeeeeeeery slowly thru the filter and HIMIL valve. When it hits >100 Torr open the PCI valve again. Then open the lens valve again and recheck all pressures and flows for a plugged orifice |  |  |
| Switch to PToF Menu (#3). Calibrate and HB tune, adjust heater if necessary. |  |  |
| Switch to servo window and do a full top hat with 700 ms increments (screenshot). Ideally you will start this right before the preflight brief.  Once it is done, also run the MS delay diagnostic (not needed for acq). Use Y-Zoom. If it needs more than 250 ms, the servo might be on its last legs. Screenshot. |  |  |
| Stay in calibration menu and let it pulse till about 30 min before the flight. You might consider closing the lens and shutting down the PCI pump in the meantime, especially if it’s hot. |  |  |
| Inspect tool bag and make sure you have orifice spares |  |  |
| 30 min before the flight, start PCI pump and open lens. |  |  |
| Turn on yellow thermocouple amplifier for measuring ambient Temp (set to fahrenheit) |  |  |
| Plug in Flowcontroller. Press bottom right button so it displays vlpm |  |  |
| Go to FMS Menu (#1). Calibrate, then do bitwise |  |  |
| Go back to FMS Menu Cal window and pulse till the power switch is completed. If the UPS still beeps after the power comes back on, cycle the back switch of the UPS |  |  |
| Do bitwise and write AP240 temperature down (go briefly into acq window to find it) |  |  |
| Go into the Menu editing window and copy the baseline and SI setting over to the PToF cal group (ie Group 1 to 3) |  |  |
| Confirm you are using the proper menus (FMS/Ptof for 30s or the longer cycle, depending on mission) and that timegrid by menucycle is enabled |  |  |
| Go to acquisition and start (about 5 min before take off) - this will be still filtered air |  |  |
| When they start taxiing, open the top bypass flow valve (as late as possible but before they yell at you) |  |  |
| Note Run # at take off point and the official UTC take off time. |  |  |
| Once you are cleared to get up, wait for the next ptof cycle and switch from filter to ambient. Good luck! |  |  |
| **Taxi List (go thru after powerswitch/before taxing)** |  |  |
| Are baseline, SI,Heater Bias (ie FC setting) consistent across menus? |  |  |
| Are you on the proper menu switching cycle for take off? Is menuswitching enabled as well as timegrid on menucycle? |  |  |
| Is Real Time with serial output on? Did the Daq find the COM Port? |  |  |
| Can you read CabinTemp on AI0 in F? |  |  |
| Is the Inlet FC on and displaying vlpm? |  |  |
| Are all your lens and PCI flows in the right ballpark? |  |  |
| Are the cryopump, the turbos and the AP240 happy (cryo<40 skin and 90 K), P2<50 C, P3-P6<40C, AP240<55 C |  |  |
| Are the exhaust valve and window HIMIL valve open? Are you on Filter? Is the little PCI exhaust valve closed? Is the water container and the cal line closed? |  |  |
| Are you on Xchat? Is the IRIG active? Is Igor quickview up and running? |  |  |
| Is the toolbag on the plane? Do you have fresh orifice spares and Kimwipes? |  |  |
| Heater, Chopper and bias all working? |  |  |
| Is your AB in the right ballpark? |  |  |
| **Shutdown Procedures** |  |  |
| As above, note R# of touchdown and UTC time |  |  |
| Request from mission to shut bypass valve at first opportunity after landing |  |  |
| At that point, stop cryo and start regenerating. Note time in the log. |  |  |
| Stop acquisition |  |  |
| Optional: If temp control was crappy during flight, do a quick bitwise and document the results |  |  |
| Disable TPS control in AMS DAQ, Close AMS DAQ, shutdown TPS software and switch off chopper |  |  |
| Close the aerosol lens, close & stop the PCI pump (watch for that main switch), disconnect FC (you might need a screwdriver), switch off TPS |  |  |
| Shutdown xchat, quickview (save the file first!), irig, browser, powerpoint log |  |  |
| Set the autoupdate on the pump software to 5 s |  |  |
| Connect external drive and run both viceversa profiles (make sure the /Timetrace/Processed directory is empty before starting this) |  |  |
| Monitor the current of P5 and P6 when the cryo hits 192 K |  |  |
| Once the cryo hits 210 K, switch the heater off (and head to the debrief) |  |  |
| About 20 min later, come back, verify that the cryo is over 300 K, and then shut down both the cryo and the turbos (by software) |  |  |
| When P6 hits 200 Hz, close the MD1 valve |  |  |
| Wait till P5 is at least below 400 Hz, then shutdown the computer, flip the main 24 V switch and switch off the UPS AC (2 right front buttons) |  |  |
| Switch off UPS (back switch should face window), switch off power bar and flip off 60 Hz switch |  |  |

**Regular checks during flight**

1) Check turbo and cryo temperatures and currents every 30 min, more often if the cabin temperature changes a lot.

2) Check Chopper Speed (leave as default setting on the EB Box) and heater power every 30 min, more often if cabin temperature changes a lot

3) Monitor AP240 temperature (every 10 min or so). If temperature changes appreciably (especially between 40 and 50 C), consider doing a baseline after the next filter

4) Try to do a filter every 45-90 min. ideally you want a range of altitudes, and certainly always a filter at top altitude (to check for leaks). Try to get 60-100 points, ie 2 minutes (2 slow cycles, 4 fast cycles)

5) Monitor the PCI flow vs Inlet Pressure closely (every 10 min or so, more often during altitude changes) to check for plugging of orifice 2

6) Try to record # for filters and altitude changes (begin/end, monitor the climb/sink rate in the main parameter window for that)

7) If possible, try to record the endpoints of the wall and anvil segments. If you can pinpoint where you were closest to the storm during the individual segment, that would be great.

8) Try to record interesting features in our data by screenshot to powerpoint

9) Try to record interesting trends in other people’s data to the txt log

10) Keep an eye on the PCI pressure, especially above 35 kft. Monitor the Inletflow (FC display), should be ~ 22 vlpm except when flying very high or very low, when it will be somewhat less

11) When flying low, monitor RH and total temp in the parameter table. If you suspect that Inlet line RH will be >50%, make a note in the log

12) If temperatures vary a lot, consider taking some screenshots of the TPS window