

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.06

Date(YYMMDD): 110607 From-To: BTC-BTC via PMW

I. Preflight

A. Day(s) before flight Date (YYMMDD) = _____

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: _____ Downstream: _____
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 106 Box #2 115
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and 7b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC _____ : _____
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC _____ : _____
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup _____ Pdown _____ Pbypass _____ then all power off

(only, 17)

Flask ID Table (View from Front of Box)

| | | | |
|----|----|----|----|
| 13 | 12 | 5 | 4 |
| | ← | | ← |
| 14 | 11 | 6 | 3 |
| 15 | 10 | 7 | 2 |
| 16 | 9 | 8 | 1 |
| | | ← | |
| 17 | 24 | 25 | 32 |
| | | → | |
| 18 | 23 | 26 | 31 |
| 19 | 22 | 27 | 30 |
| 20 | 21 | 28 | 29 |
| | → | | → |

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- 1) Load dry ice into dewar 0.5" from lid UTC _____ : _____
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup _____ / _____ Pdown _____ / _____ Pbypass _____ / _____
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
 MEDUSA time UTC 14 : 44 : 00 Laptop time UTC 14 : 44 : 00

- 6) Connect traps
- 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 8) Open all flask stopcocks 2 half turns Flasks opened by: JOB
- 9) Re-install splinter shields and complete rack book 9b
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset ___ Pdownset ___ prepurgeT ___ flushT ___
- 11) Verify that no values are blinking on screen
- 12) Note trap temperature Trap T: 41.5
- 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected
 Pup ___ Pdown ___ Pbypass ___ Flow ___
- 17) If necessary, "Clear All" (after being sure data from last flight copied)
- 18) Pump breaker off (PB and VB stay on)

EDIT
 Done
 V. 2011.06.12

II. In flight

- A. Immediately after take-off Take-off time UTC 17:04:58
- 1) Turn pump breaker on
 - 2) Verify pressures/flows agree with previous values from I.B.16.
 Pup 130 Pdown 370 Pbypass 800 Flow 4800
 - 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
 - 4) Start pre-purge UTC ___ : ___ : ___
 - 5) Note trap temperature Trap T: 40.0
 - 6) Record png of prepurge: (YYMMDD_rf###_prepurge) File: _____
- B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|-------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |

1) After sampling flask 16, close flasks 1-16

UTC: ___ : ___

2) Note trap temperature

Trap T: _____

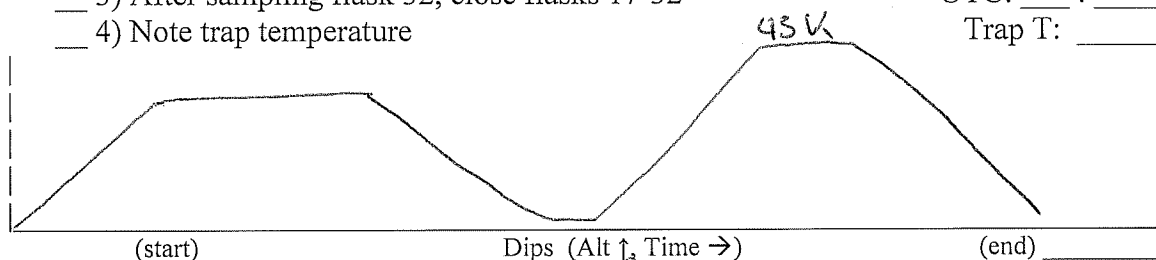
| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|----------|----------|-------|-----------|-------|
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | | | | | |
| 31 | | | | | | | |
| 32 | | | | | | | |

3) After sampling flask 32, close flasks 17-32

UTC: ____ : ____

4) Note trap temperature

Trap T: _____



III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Turn Mains breaker off
- 3) Turn valve box breaker off
- 4) Turn 28V breaker off
- 5) Ensure all flask valves closed

missed approach @
FMA, Farmington
near TCCON site

UTC ____ : ____

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4) Empty beads from upstream trap into 'wet' bead container to dry
- 5) Open downstream trap and set upright
- 6) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 7) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: _____ Box #2 _____

MEDUSA leak check procedures

Flask Leak Check Procedure #1: File: _____

- ___ 1) 28 V breaker on, Valve box on, Pump box on
- ___ 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- ___ 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- ___ 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- ___ 5) Adjust prepurge time to 20 seconds
- ___ 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- ___ 7) Run 20-second prepurge to evacuate lines. Start: _____ Finish: _____
- ___ 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- ___ 9) Close Pdn, turn pumps off (will leave in position 1)
- ___ 10) Turn bypass on

Flask Leak Check Procedure #2: File: _____

- ___ 1) "Clear All"
- ___ 2) Valve box off, main breaker off then on to reset, then valve box back on
- ___ 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- ___ 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- ___ 5) Close Pdn and turn pumps off
- ___ 6) Adjust prepurge time to 20 seconds
- ___ 7) Run 20-second prepurge to check all flask downstream tube Ps
- ___ 8) Record times for AEROS matching. Start: _____ Finish: _____
- ___ 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- ___ 10) Turn bypass on

Bypass / System Leak Check Procedure:

- ___ 1) Ensure bypass on, close PC1 and open PC2
- ___ 2) Turn on pump breaker and let run for 1 minute
- ___ 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- ___ 4) Switch PC2 to closed and turn off pump
- ___ 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- ___ 6) After 1 minute, record values again.
- ___ 7) After 5 minutes, record values again
- ___ 8) If Pdown and Pbyypass <2 torr/5 mins, skip to 11
- ___ 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- ___ 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

NCAR/SCRIPPS MEDUSA Checklist V. 2011.06.06
 Date(YYMMDD): 110609 From-To: B5C-B5C (w/ATV)

I. Preflight

- A. Day(s) before flight Date (YYMMDD) = 110608
- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
 - 2) Install new traps Upstream: F Downstream: D
 - 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
 - 4) Record Flask Box Numbers: Box #1 _____ Box #2 _____
 - 5) Install flask box retaining pins
 - 6) Connect plumbing. Confirm lines are correctly installed with red label up
 - 7a) Replace cover shields and 7b) complete rack book
 - 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
 - 9) If necessary, download data from previous flight to laptop and pen drive
 - 10) Check that flask table is clear. If not, "clear all"
 - 11) Complete flask leak check procedure #1 Start UTC ____ : ____
 - 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC ____ : ____
 - 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
 - 14) Record Ps: Pup _____ Pdown _____ Pbypass _____ then all power off

Flask ID Table (View from Front of Box)

X

| | | | |
|----|----|---|---|
| 13 | 12 | 5 | 4 |
| | ← | | ← |
| 14 | 11 | 6 | 3 |
| 15 | 10 | 7 | 2 |
| 16 | 9 | 8 | 1 |
| | | ← | |

X

| | | | |
|----|----|----|----|
| 17 | 24 | 25 | 32 |
| | | → | |
| 18 | 23 | 26 | 31 |
| 19 | 22 | 27 | 30 |
| 20 | 21 | 28 | 29 |
| | → | | → |

- B. 2-hours before take-off.: Dry ice and Sampler Set-up
- 1) Load dry ice into dewar 0.5" from lid UTC 14:45
 - 2) Ensure that MEDUSA valve control key is in place
 - 3) 28 V breaker on, Valve box on, Main breaker on
 - 4) Record P / Δ: Pup 618 / — Pdown 627 / — Pby pass 632 / —
 - 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
 MEDUSA time UTC 15:14:15 Laptop time UTC 15:14:14

- 6) Connect traps
- 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 8) Open all flask stopcocks 2 half turns Flasks opened by: _____
- 9) Re-install splinter shields and complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset 180 Pdownset 400 prepurgeT 45 flushT 120
- 11) Verify that no values are blinking on screen
- 12) Note trap temperature Trap T: 40
- 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected
 Pup 179 Pdown 398 Pbyass 784 Flow 4800
- 17) If necessary, "Clear All" (after being sure data from last flight copied)
- 18) Pump breaker off (PB and VB stay on)

EDIT
 check op ear bar?

II. In flight

A. Immediately after take-off Take-off time UTC 16:36:50

- 1) Turn pump breaker on 16:37:03
- 2) Verify pressures/flows agree with previous values from I.B.16.
 Pup 180 Pdown 400 Pbyass _____ Flow 5000
- 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- 4) Start pre-purge UTC 16:37:30
- 5) Note trap temperature Trap T: 40
- 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110609_#02-prepurge ? @ 5SLA

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

| Pos | Flow (V) | Psa (torr) | PC Supts | End Time | PALTF | Profile # | Notes |
|--------------|----------------|----------------|--------------------|---------------------|------------------|----------------|-------|
| 1800 1800 | 4.06 | 843 | 70/690 | 17:03:17 | 36 | 1 | |
| | 4.07 | 837 | 90/690 | 17:17:43 | 40 | 1 | |
| | 4.08 | 890 | 70/690 | 17:31:54 | 36 | 1 | |
| | 4.06 | 834 | 70/690 | 17:43:07 | ~22 | 1 | |
| | 4.04 | 811 | 90/690 | 17:48:32 | ~13 | 1 | |
| | 4.06 | 812 | 90/690 | 17:54:02 | ~6 | 1 | |
| | 4.03 | 814 | 90/690 | 17:59:37 | ~4900 | 1 | |
| ~5000 | 5.44 | 943 | 180/400 | 18:36:11 | 5.5K | 2 | |
| | 5.5 | 943 | 180/400 | 4418 | 18K | 502 | |
| | 5.0 | ~940 | 180/400 | 18:49:30 | 4900 | 2 | |
| | 5.0 | ~940 | 180/400 | | 4900 | 3 | |
| | 5.1 | 943 | 180/400 | 18:24:29 | 1800 | 3 | |
| | 5.5 | — | 180/400 | 18:32:33 | 12910 | 3 | |
| | 5.5 | 943 | 180/400 | 18:43:00 | 18900 | 4 | |
| | 5.4 | 944 | 180/400 | 18:59:45 | 14850 | 4 | |
| | 5.5 | 932 | 180/400 | 20:04:54 | 16000 | 4 | |
| | 5.4 | 944 | 180/400 | 20:09:06 | 5071 | 4 | |

1) After sampling flask 16, close flasks 1-16

UTC: 20:05

FOB

2) Note trap temperature

Trap T: 40.2

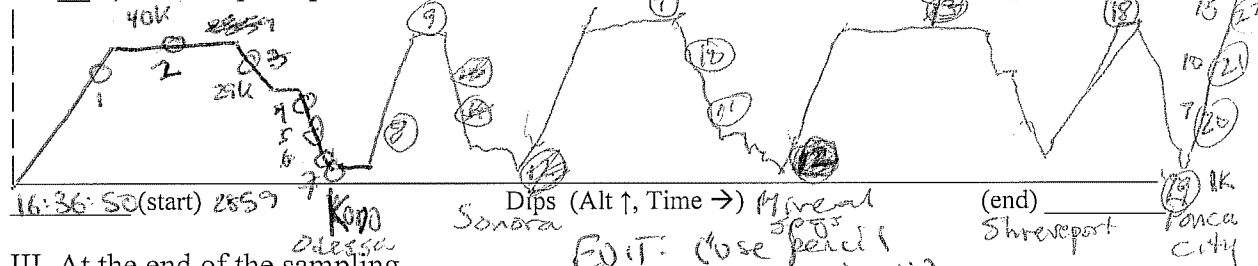
| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------------|----------------|----------|---------------------|-----------------|-----------|-------------------------------|
| 17 | 5.4 | 936 | 180/400 | 20:07:06 | 5297 | 4 | |
| 18 | 5.4 | 944 | 180/400 | 20:15:00 | 1197 | 5 | |
| 19 | 5.4 | 944 | 180/400 | 21:22:37 | 1360 | 6 | |
| 20 | 5.4 | 944 | " | 21:25:22 | 7107 | 6 | |
| 21 | 5.4 | 810 | " | 21:26:15 | 10028 | 6 | |
| 22 | 5.4 | 944 | " | 21:29:18 | 15020 | " | |
| 23 | 5.4 | 944 | " | 21:33:20 | 21042 | " | |
| 24 | 5.4 | 944 | " | 21:44:24 | 28028 | " | |
| 25 | 5.4 | 944 | 90/690 | 21:58:04 | 42475 | " | Lost Control; had to Δ setpts |
| 26 | 4.0 | 810 | 90/690 | 22:03:45 | 37323 | " | Doing flasks as fast |
| 27 | 4.0 | 810 | " | 22:09:36 | 28465 | " | as possible to try to |
| 28 | 3.9 | 802 | " | 22:15:19 | 19948 | " | get to all. |
| 29 | 5.4 | 802 | " | 22:18:15 | 21620 | " | |
| 30 | | | | | | | |
| 31 | | | | | | | |
| 32 | | | | | | | |

Continue to do prepurge for 15 sec after samp.

25 26 27 28 29 30 31 32

3) After sampling flask 32, close flasks 17-32
 4) Note trap temperature

UTC: ___:___:___
 Trap T: ___



III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Turn Mains breaker off
- 3) Turn valve box breaker off
- 4) Turn 28V breaker off
- 5) Ensure all flask valves closed

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4) Empty beads from upstream trap into 'wet' bead container to dry
- 5) Open downstream trap and set upright
- 6) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 7) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: ___ Box #2: ___

EDIT

UTC 22:36

MEDUSA leak check procedures

Flask Leak Check Procedure #1: File: _____

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: _____ Finish: _____
- 8) Save PNGs of AEROS P, Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

Flask Leak Check Procedure #2: File: _____

dso?

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to ~~check all flask downstream tube Ps~~ *checking up & down*
- 8) Record times for AEROS matching. Start: _____ Finish: _____
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and ~~turn off pump~~ STOP
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11 *10?*
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto STOP

negative?
rethink

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|-------------------------------------|
| 15:17:30 | 3 | 139 | 148 | pup rapidly up -- 19 @ 15:17:45 |
| 15:18:50 | 45 | 128 | 137 | |
| 15:20:30 | | | | |
| 15:28:30 | 98 | 114 | 124 | <input checked="" type="checkbox"/> |
| 15:33:30 | 102 | 114 | 124 | |

turn off pump

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110613

- ✓ 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- ✓ 2) Install new traps Upstream: ■ Downstream: ?
- ✓ 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- ✓ 4) Record Flask Box Numbers: Box #1 106 Box #2 115
- ✓ 5) Install flask box retaining pins
- ✓ 6) Connect plumbing. Confirm lines are correctly installed with red label up
- ✓ 7a) Replace cover shields and ✓ 7b) complete rack book
- ✓ 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- ✗ 9) If necessary, download data from previous flight to laptop and pen drive
- ✓ 10) Check that flask table is clear. If not, "clear all"
- ✓ 11) Complete flask leak check procedure #1 Start UTC 22:29:30
- ✓ 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2
~~Start UTC~~ Start UTC (): ()
- ✓ 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- ✗ 14) Record Ps: Pup ✗ Pdown ✗ Pbypass ✗ then all power off *didn't have time but did this earlier in day => was leak tight*

Flask ID Table (View from Front of Box)

| | | | | | | | | | | |
|----|------|---|----|------|---|------|------|----|------|------|
| 13 | 1254 | ← | 12 | 1385 | 5 | 1390 | ← | 4 | 1039 | |
| 14 | 1239 | | 11 | 1274 | 6 | 1032 | | 3 | 1298 | |
| 15 | 1386 | | 10 | 1270 | 7 | 1231 | | 2 | 1047 | |
| 16 | 1302 | | 9 | 1184 | ← | 8 | 1300 | 1 | 1345 | |
| 17 | 1123 | | 24 | 1161 | → | 25 | 1205 | 32 | 1028 | |
| 18 | 1141 | | 23 | 1021 | | 26 | 1255 | 31 | 1034 | |
| 19 | 1077 | | 22 | 1344 | | 27 | 1207 | 30 | 1318 | |
| 20 | 1309 | → | 21 | 1175 | | 28 | 1195 | → | 29 | 1356 |

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- ✓ 1) Load dry ice into dewar 0.5" from lid UTC 14 : 13
- ✓ 2) Ensure that MEDUSA valve control key is in place
- ✓ 3) 28 V breaker on, Valve box on, Main breaker on
- ✓ 4) Record P / Δ: Pup 294 / X Pdown 351 / X Pbyass 347 / X
- ✓ 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 14 : 31 : 30 Laptop time UTC 14 : 31 : 30
- ✓ 6) Connect traps if not already
- ✓ 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 8) Open all flask stopcocks 2 half turns Flasks opened by: AW
- ✓ 9a) Re-install splinter shields ✓ 9b) Complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 180 Pdownset 400 prepurgeT 50 flushT 120
- 11) Verify that no values are blinking on screen
- ✓ 12) Note trap temperature Trap T: 39.9
- ✓ 13) Complete bypass / system leak check
- ✓ 14) Ensure both controllers are to auto
- ✓ 15) Turn pumps on
- ✓ 16) Verify pressures are controlling and flow is as expected
Pup 180 Pdown 400 Pbyass 802 Flow 4900
- ✓ 17) Adjust flight code to 1 (130/580/30) 130 580 30 3100
- ✓ 18) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 19) Pump breaker off (PB and VB stay on)

II. In flight

A. Immediately after take-off

Take-off time UTC 16 : 03 : 42

- ✓ 1) Turn pump breaker on
- ✓ 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 130 Pdown 580 Pbyass 740 Flow 3
- ✓ 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- ✓ 4) Start pre-purge UTC 16 : 03 : 42
- ✓ 5) Note trap temperature Trap T: 39.1
- ✓ 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110614-RF01-prepurge PH

EDIT: prepurge P, F →

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

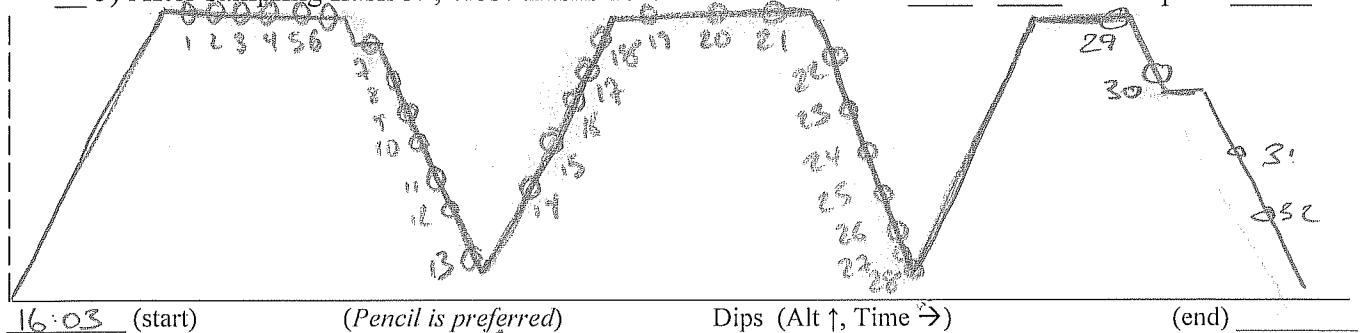
- ✓ After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|--|
| 1 | 4.87 | 849 | 130/580 | 16:40:06 | 40 | 1 | |
| 2 | 4.87 | 843 | 130/580 | 16:51:03 | 40 | 1 | Flasks 1, 2 closed @ 16:55:00 |
| 3 | 4.04 | 791 | 90/690 | 17:05:47 | 40 | 1 | 16:58:35 → 90/690 (FP3) |
| 4 | 4.0 | 787 | 90/690 | 17:14:33 | 40 | 1 | |
| 5 | 4.0 | 787 | 90/690 | 17:21:05 | 40 | 1 | 17:22:10 → closed F3, 4, 5 |
| 6 | 4.0 | 787 | 90/690 | 17:39:05 | 40 | 1 | 17:42:05 → closed F6 |
| 7 | 4.9 | 845 | 130/580 | 17:59:37 | 34.5 | 1 | 17:48:38 ⇒ 130/580 F7 closed @ 18:00 |
| 8 | 4.91 | 845 | 130/580 | 18:04:81 | 27.0 | 1 | After 1 st dive ⇒ Flight plan 2 |
| 9 | 4.89 | 840 | 130/580 | 18:07:56 | 19.5 | 1 | 18:10:10 → closed F8, 9 |
| 10 | 4.90 | 842 | 130/580 | 18:10:02 | 13.5 | 1 | |
| 11 | 4.95 | 843 | 130/580 | 18:14:06 | 7.6 | 1 | |
| 12 | 4.87 | 838 | 130/580 | 18:17:06 | 4.6 | 1 | |
| 13 | 4.90 | 843 | 130/580 | 18:23:42 | 3 | 1 | closed F10-13 @ 18:27 |
| 14 | 4.90 | 840 | 130/580 | 18:30:18 | 11.9 | 2 | |
| 15 | 4.90 | 851 | 130/580 | 18:33:25 | 16.8 | 2 | |
| 16 | 4.90 | 845 | 130/580 | 18:37:08 | 22.3 | 2 | closed F14-16 @ 18:38:20 |

1) After sampling flask 16, close flasks 1-16 UTC: 18:38 Trap T: 40.0
 x2a) Turn Pump off x2b) Replace upstream trap x2c) Turn pump back on NOT NECESSARY

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|----------|----------|-------|-----------|--|
| 17 | 4.91 | 843 | 130/580 | 18:41:51 | 29.5 | 2 | closed F17 @ 18:44:10 |
| 18 | 4.89 | 878 | 130/580 | 18:46:22 | 37.4 | 2 | outflowline slightly kinked → higher P |
| 19 | 4.90 | 887 | 130/580 | 18:52:17 | 40.0 | 2 | closed F19 @ 18:58:30 |
| 20 | 4.90 | 865 | 130/580 | 19:05:11 | 40.0 | 2 | closed F20 @ 19:05:45 |
| 21 | 4.88 | 880 | 130/580 | 19:24:45 | 40.0 | 3 | closed F21 @ 19:25:30 |
| 22 | 4.87 | 885 | 130/580 | 19:33:07 | 34 | 3 | closed F22 @ 19:34:15 |
| 23 | 4.88 | 869 | 130/580 | 19:39:35 | 24.5 | 3 | closed F23 @ 19:40:50 |
| 24 | 4.88 | 864 | 130/580 | 19:43:15 | 19.0 | 3 | closed F24 @ 19:44:30 |
| 25 | 4.87 | 863 | 130/580 | 19:47:10 | 13.2 | 3 | closed F25 @ 19:49:20 |
| 26 | 4.89 | 860 | 130/580 | 19:55:01 | 7.0 | 3 | |
| 27 | 4.88 | 862 | 130/580 | 19:59:57 | 4.1 | 3 | |
| 28 | 4.88 | 865 | 130/580 | 20:06:32 | 3.1 | 3 | closed F26-28 @ 20:12:30 |
| 29 | 4.89 | 860 | 130/580 | 21:12:46 | 40 | 4 | closed F29 @ 21:13:30 |
| 30 | 4.88 | 869 | 130/580 | 21:24:09 | 31.6 | 4 | closed F30 @ 21:24:45 |
| 31 | 4.87 | 872 | 130/580 | 21:34:29 | 22.2 | 4 | closed F31 @ 21:35:20 |
| 32 | 4.86 | 880 | 130/580 | 21:39:18 | 12.3 | 4 | closed F32 @ 21:40:00 |

3) After sampling flask 32, close flasks 17-32 UTC: _____ Trap T: _____



KBTC
 Edmonton, AB
 Watson Lake
 PANL

III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 21:39

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 117 Box #2 101

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110613_RF01_Leakcheck P/F

- 1) 28 V breaker on, Valve box on, Pump box on
 - 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
 - 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
 - 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
 - 5) Adjust prepurge time to 20 seconds
 - 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
 - 7) Run 20-second prepurge to evacuate lines. Start: 22:39:30 Finish: 22:44:40
 - 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
 - 9) Close Pdn, turn pumps off (will leave in position 1)
 - 10) Turn bypass on
- RAN ONCE BUT LINES ON BOX 2 WERE IN NEED OF REPAIR. RAN AGAIN @ 22:29:30

Flask Leak Check Procedure #2:

File: 110613_RF01_Leakcheck 2 P/F

- 1) "Clear All"
 - 2) Valve box off, main breaker off then on to reset, then valve box back on
 - 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
 - 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
 - 5) Close Pdn and turn pumps off
 - 6) Adjust prepurge time to 20 seconds
 - 7) Run 20-second prepurge to check all flask downstream tube Ps
 - 8) Record times for AEROS matching. Start: ? Finish: 22:57:35
 - 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
 - 10) Turn bypass on
- Actually ran as 10/15 sec samples

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| 14:45:10 | 3 | 151 | 161 | |
| 14:46:30 | 8 | 151 | 161 | |
| 14:51:10 | 15 | 150 | 160 | |
| | | | | |
| | | | | |

Plot standardizations

Flight:

MEDPBY 1100
MEDPCA 500

MEDSTAT1,2 50
0

MEDP1 700
MEDP2 0

MEDFLOW 7
1

Leakchecks

Purge

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110615

- ✓ 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- ✓ 2) Install new traps Upstream: E Downstream: B
- ✓ 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- ✓ 4) Record Flask Box Numbers: Box #1 117 Box #2 101
- ✓ 5) Install flask box retaining pins
- ✓ 6) Connect plumbing. Confirm lines are correctly installed with red label up
- ✓ 7a) Replace cover shields and ✓ 7b) complete rack book
- ✓ 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- ✗ 9) If necessary, download data from previous flight to laptop and pen drive
- ✓ 10) Check that flask table is clear. If not, "clear all"
- ✓ 11) Complete flask leak check procedure #1 Start UTC 19 : 06
- ✓ 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 20 : 09
- ✓ 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- ✓ 14) Record Ps: Pup 2 Pdown 178 Pbyass 182 then all power off

Flask ID Table (View from Front of Box)

| | | | |
|----------------------|------------------------|----------------------|------|
| 13 | 12 | 5 | 4 |
| 1256 ← | 1095 | 1197 ← | 1139 |
| 14 | 11 | 6 | 3 |
| 1334 | 1447 | 1390 1246 | 1206 |
| 15 | 10 | 7 | 2 |
| 1333 | 1036 | 1388 | 1048 |
| 16 | 9 | 8 | 1 |
| 1135 ↓ | 1300 1179 ← | 1283 | 1409 |
| 17 | 24 | 25 | 32 |
| 1082 1082 | 1245 → | 1210 | 1224 |
| 18 | 23 | 26 | 31 |
| 1110 | 1015 | 1249 | 1065 |
| 19 | 22 | 27 | 30 |
| 1004 | 1131 | 1183 | 1023 |
| 20 | 21 | 28 | 29 |
| 1272 → | 1433 | 1237 → | 1003 |

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- 1) Load dry ice into dewar 0.5" from lid UTC 16 : 15
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup 424 / 1422 Pdown 492 / 1314 Pby pass 457 / 1305
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 16 : 32 : 06 Laptop time UTC 16 : 32 : 05
- 6) Connect traps if not already *(Done yesterday before watch)*
- 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 8) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- 9a) Re-install splinter shields 9b) Complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 180 Pdownset 400 prepurgeT 45 flushT 120
- 11) Verify that no values are blinking on screen
- 12) Note trap temperature Trap T: 90.0
- 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected
Pup 169 Pdown 450 Pby pass 727 Flow 4500
THEY WERE NOT, BECAUSE NOW @ SEA LEVEL CHANGED TO 170/450
- 17) Adjust flight code to 1 (130/580/~~40~~) 45
(see pg 75 in MEDUSA III LAB BOOK)
- 18) If necessary, "Clear All" (after being sure data from last flight copied)
- 19) Pump breaker off (PB and VB stay on)

II. In flight

A. Immediately after take-off

Take-off time UTC 18 : 09 : 20

- 1) Turn pump breaker on
- 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 180 Pdown 580 Pby pass 760 Flow 3000
- 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- 4) Start pre-purge UTC 18 : 10 : 01
- 5) Note trap temperature Trap T: 89.6
- 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110616_rf02 - prepurge p/1

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

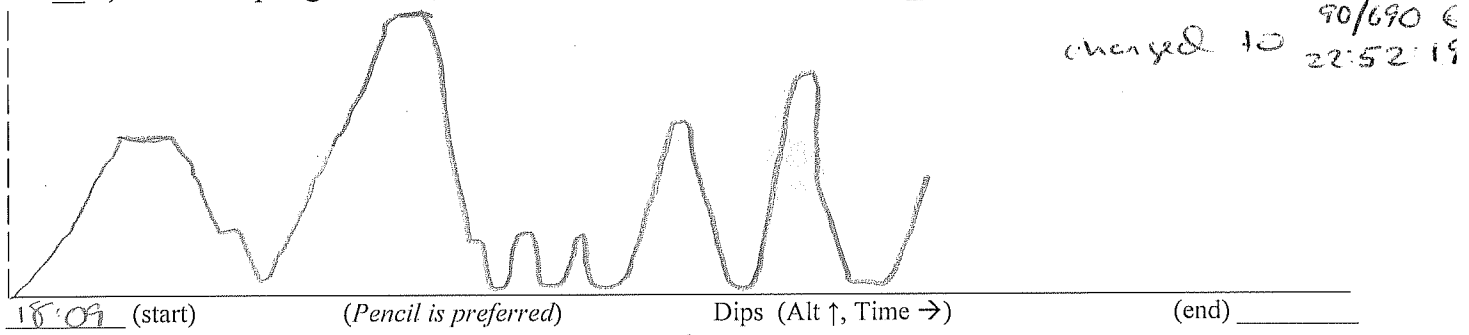
After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|----------------|-----------|----------|--------------------|-----------|---|
| 1 | 4.8 | 828 | 130/580 | 18:53:16 | 560ft | 1 | |
| 2 | 4.84 | 827 | 130/580 | 18:57:39 | 6100 | 1 | closed F1,2 @ 18:59:00 |
| 3 | 4.85 | 831 | 130/580 | 19:00:57 | 11.3 | 1 | |
| 4 | 4.87 | 837 | 120/580 | 19:04:07 | 16.3 | 1 | closed F3,4 @ 19:05:15 |
| 5 | 4.87 | 841 | 130/580 | 19:08:21 | 22.6 | 1 | (19:08:21) |
| 6 | 4.89 | 841 | 130/580 | 19:13:15 | 29.8 | 1 | closed F5,6 @ 19:14:40 |
| 7 | 4.90 | 841 | 130/580 | 19:18:10 | 37.2 | 1 | closed F7 @ 19:35:33 |
| 8 | 4.88 | 835 | 130/580 | 19:39:43 | 44.3 31 | 2 | After 1 st dive => Flight plan 2 |
| 9 | 4.85 | 831 | 130/580 | 19:44:29 | 24 | 2 | closed F8,9 @ 19:46:30 |
| 10 | 4.85 | 828 | 130/580 | 19:49:08 | 16.7 | 2 | closed F10 @ 19:50:08 |
| 11 | 4.84 | 828 | 130/580 | 19:54:21 | 8.8 | 2 | closed F11 @ 19:55:05 |
| 12 | 4.82 | 823 | 130/580 | 19:58:42 | 5.9 | 2 | closed F12 @ 19:59:30 |
| 13 | 4.84 | 829 | 130/580 | 20:03:25 | 2.9 | 2 | |
| 14 | 4.82 | 828 | 130/580 | 20:06:52 | 500ft | 2 | OVEROPEN SEA-CRAZY 02 #s!!! |
| 15 | 4.83 | 838 | 130/580 | 20:11:32 | 500ft | 2 | closed F13-15 @ 20:13:20 |
| 16 | 4.83 | 829 | 130/580 | 20:16:52 | 5kft | 2/3 | closed F16 @ 20:17:45 |

✓ 1) After sampling flask 16, close flasks 1-16 UTC: 20:17 Trap T: 40.1
 ✗ 2a) Turn Pump off ✗ 2b) Replace upstream trap ✗ 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|----------|----------|-------|-----------|-------------------------------|
| 17 | 4.84 | 825 | 130/580 | 20:27:48 | 500 | 2/3 | closed F17 @ 20:30 |
| 18 | 4.83 | 863 | 130/580 | 20:49:31 | 500 | 2/3 | @ ice edge closed F18 @ 20:51 |
| 19 | 4.82 | 865 | 130/580 | 20:55:38 | 5.8 | 3 | closed F19 @ 20:57 |
| 20 | 4.85 | 854 | 130/580 | 20:59:30 | 11.7 | 3 | closed F20 @ 21:01 |
| 21 | 4.83 | 872 | 130/580 | 21:04:58 | 20 | 3 | closed F21 @ 21:06 |
| 22 | 4.83 | 876 | 130/580 | 21:11:17 | 23 | 3 | closed F22 @ 21:12:15 |
| 23 | 4.86 | 865 | 130/580 | 21:57:10 | 27 | 3/4 | closed F23 @ 21:59 |
| 24 | 4.86 | 861 | 130/580 | 22:01:49 | 19.8 | 4 | closed F24 @ 22:03 |
| 25 | 4.85 | 855 | 130/580 | 22:26:53 | 500 | 5 | closed F25 @ 22:28 |
| 26 | 4.85 | 853 | 130/580 | 22:32:30 | 5600 | 5 | closed F26 @ 22:33:00 |
| 27 | 4.85 | 856 | 130/580 | 22:36:11 | 11.3 | 5 | closed F27 @ 22:37:00 |
| 28 | 4.85 | 860 | 130/580 | 22:39:30 | 16.3 | 5 | closed F28 @ 22:40:10 |
| 29 | 4.85 | 855 | 130/580 | 22:43:45 | 22.6 | 5 | closed F29 @ 22:44:25 |
| 30 | 4.85 | 865 | 130/580 | 22:51:52 | 28 | 5 | closed F30 @ 22:53:30 |
| 31 | 4.0 | 797 | 90/690 | 01:02:26 | 41 | 5/6 | closed F31 @ 01:04 |
| 32 | 4.0 | 800 | 90/690 | 01:56:16 | 41 | 5/6 | closed F32 @ 01:58 |

✓ 3) After sampling flask 32, close flasks 17-32 UTC: 01:58 Trap T: 40.6



III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 01 : 58

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 108 Box #2: 104

MEDUSA leak check procedures

*VLV1SET
VLV2SET*

Flask Leak Check Procedure #1:

File: 110615_RFO2_Leakcheck 1 p/f

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop) *config "leakcheck"*
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200 *(in AEROS) ← Pull bypass jumper*
- 7) Run 20-second prepurge to evacuate lines. Start: 19:06:25 Finish: 19:21:00
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

Flask Leak Check Procedure #2:

File: 110615_RFO2_Leakcheck 2 p/f

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on *@20:04 values:*
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording *Pup: ~190*
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times). *PSA: ~230*
- 5) Close Pdn and turn pumps off *P1: ~57*
- 6) Adjust prepurge time to 20 seconds *P2: ~190*
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 20:09:03 Finish: 20:23:50
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbypass | Comments |
|------------|-----|-----|---------|----------|
| 16 58 40 | 4 | 172 | 172 | |
| 16 59 70 | 7 | 172 | 172 | |
| | | | | |
| | | | | |
| | | | | |

To Do

- ~~tell Britt I'm not seeing~~ secs to purge, secs to cal
~~is run control window~~
- ~~Derive~~ new P setpoints
establish

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110617

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: Downstream:
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 108 Box #2 104
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 19 : 53
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 21 : 58
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup 4 Pdown 173 Pbyass 177 then all power off

Flask ID Table (View from Front of Box)

| | | | |
|--------------|------------------------------|-----------------------------|------------------------------|
| 13 ✓ 1216 | ← 12 ✓ 1002 | 5 ✓ 1305 | ← 4 ✓ 1404 |
| 14 ✓ 1301 | 11 ✓ 1408 | 6 ✓ 1423 | 3 ✓ 1424 |
| 15 ✓ 1434 | 10 ✓ 1412 | 7 ✓ 1437 1429 | 2 ✓ 1416 1416 |
| 16 ✓ 1421 | 9 ✓ 1445 | ← 8 ✓ 1431 | 1 1226 ✓ |
| 17 ✓ 1029 | 24 ✓ 1086 1084 | 25 ✓ 1199 | 32 ✓ 1268 1268 |
| 18 ✓ 1241 | 23 ✓ 1191 | 26 ✓ 1391 | 31 ✓ 1201 |
| 19 ✓ 1060 | 22 ✓ 1209 | 27 ✓ 1398 | 30 ✓ 1250 |
| 20 ✓ 1279 | 21 ✓ 1286 | 28 ✓ 1101 | 29 ✓ 1218 |

WITH THE RIGHT
 large seal!!!
 Stem broke
 Flask could be
 salvaged perhaps

B. 2 hours before take-off.: Dry ice and Sampler Set-up

- 1) Load dry ice into dewar 0.5" from lid UTC 18 : 06
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on,
- 4) Record P / Δ: Pup 492 / Pdown 509 / Pbypass 505 / PUT TRAPS IN AFTER STARTING
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 16 : 22 : 02 Laptop time UTC 16 : 22 : 02 TEST
- 6) Connect traps if not already
- 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 8) Open all flask stopcocks 2 half turns Flasks opened by: RFK/AW
- 9a) Re-install splinter shields 9b) Complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 430 prepurgeT 45 flushT 120
- 11) Verify that no values are blinking on screen
- 12) Note trap temperature Trap T: 40.0
- 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected
Pup 170 Pdown 430 Pbypass 750 Flow 4400
- 17) Adjust flight code to 1 (130/580/30) ~ (125/610/45)
- 18) If necessary, "Clear All" (after being sure data from last flight copied)
- 19) Pump breaker off (PB and VB stay on)

II. In flight

A. Immediately after take-off

Take-off time UTC 18 : 01 : 06

- 1) Turn pump breaker on
- 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 124 Pdown 609 Pbypass 750 Flow 2900
- 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- 4) Start pre-purge UTC 18 : 01 : 20
- 5) Note trap temperature Trap T: 40.0
- 6) Record png of prepurge: (YYMMDD_r###_prepurge) File: 110618-RF03-prepurge p/f

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

18:35:00 - 18:36:00

MEDUSA Inlet Breath Test

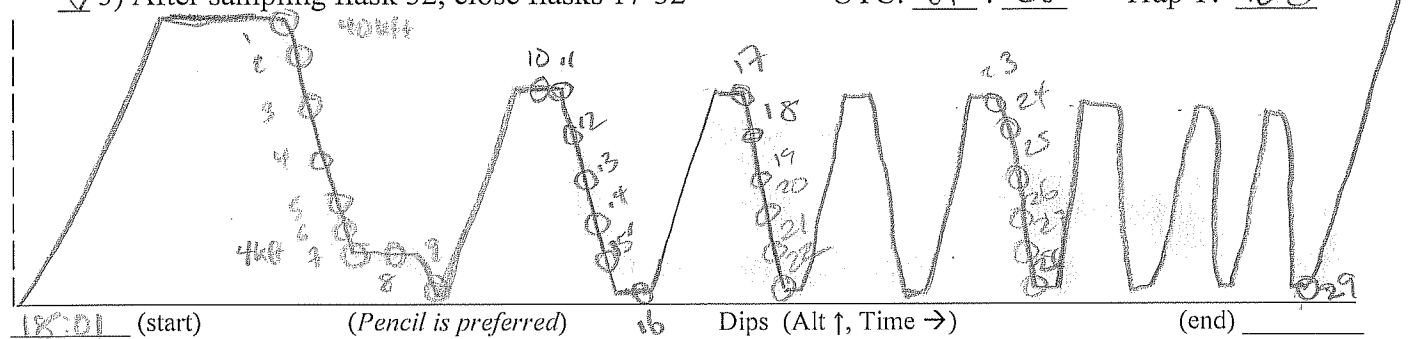
110618_RF03_MEDbreath test 35-36.png

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes closed | NOTES |
|-----|----------|------------|-----------|----------|-------|-----------|--------------|--|
| 1 | 4.81 | 846 | 125/610 | 18:51:16 | 40 | 1 | | |
| 2 | 4.80 | 843 | 125/610 | 18:55:00 | 34.4 | 1 | closed | F1,2 @ 18:56:30 |
| 3 | 4.76 | 832 | 125/610 | 19:00:51 | 25.6 | 1 | closed | F3 @ 19:03:00 |
| 4 | 4.74 | 827 | 125/610 | 19:04:24 | 20.0 | 1 | closed | F4 @ 19:04:45 |
| 5 | 4.72 | 828 | 125/610 | 19:08:26 | 14.0 | 1 | closed | F5 @ 19:09:00 |
| 6 | 4.71 | 828 | 125/610 | 19:11:48 | 39.0 | 1 | | F6 @ 19:12:30 |
| 7 | 4.71 | 821 | 125/610 | 19:15:50 | 4.1 | 1 | | 19:16:30 |
| 8 | 4.72 | 821 | 125/610 | 19:28:45 | 4.0 | 1 | | After 1 st dive => Flight plan 2 19:29:30 |
| 9 | 4.71 | 822 | 125/610 | 19:37:39 | 20.4 | 1 | | 19:45:00 API 2 @ 19:52:00 |
| 10 | 5.39 | 914 | 170/430 | 19:57:51 | 28 | 2 | | 19:58:30 |
| 11 | 5.39 | 915 | 170/430 | 20:05:56 | 28 | 2 | | 20:06:45 |
| 12 | 5.38 | 914 | 170/430 | 20:11:11 | 19.6 | 2 | | 20:11:45 |
| 13 | 5.37 | 910 | 170/430 | 20:15:26 | 13.3 | 2 | | 20:17:00 |
| 14 | 5.37 | 907 | 170/430 | 20:18:28 | 8.7 | 2 | | 20:19:45 |
| 15 | 5.35 | 923 | 170/430 | 20:22:32 | 2.7 | 2 | | 20:23:30 |
| 16 | 5.36 | 909 | 170/430 | 20:26:36 | 1.0 | 2 | | 20:27:20 |

1) After sampling flask 16, close flasks 1-16 UTC: ___ : ___ Trap T: ___
 2a) Turn Pump off 2b) Replace upstream trap 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes closed | NOTES |
|-----|----------|------------|----------|----------|-------|-----------|--------------|----------|
| 17 | 5.39 | 952 | 170/430 | 20:50:00 | 28 | 3 | | 20:51:00 |
| 18 | 5.35 | 982 | 170/430 | 20:55:16 | 19.7 | 3 | | 20:56:00 |
| 19 | 5.35 | 974 | 170/430 | 20:59:08 | 13.9 | 3 | | 21:00:00 |
| 20 | 5.35 | 947 | 170/430 | 21:02:37 | 8.6 | 3 | | 21:03:30 |
| 21 | 5.33 | 972 | 170/430 | 21:07:02 | 2.1 | 3 | | 21:08:00 |
| 22 | 5.33 | 974 | 170/430 | 21:10:02 | 1.0 | 3 | | 21:12:30 |
| 23 | 5.37 | 963 | 170/430 | 22:16:54 | 28 | 4 | | 22:19:30 |
| 24 | 5.36 | 952 | 170/430 | 22:22:00 | 20.2 | 4 | | 22:22:45 |
| 25 | 5.35 | 947 | 170/430 | 22:26:26 | 13.6 | 4 | | 22:28:00 |
| 26 | 5.34 | 941 | 170/430 | 22:30:02 | 8.3 | 4 | | 22:31:00 |
| 27 | 5.33 | 940 | 170/430 | 22:34:11 | 2.0 | 4 | | 22:35:15 |
| 28 | 5.33 | 940 | 170/430 | 22:37:09 | 1.0 | 4 | | 22:38:15 |
| 29 | 5.33 | 970 | 170/430 | 0:53:32 | 1.0 | 5 | | 0:54:15 |
| 30 | 5.34 | 955 | 170/430 | 01:03:50 | 1 | 5 | | 01:04:50 |
| 31 | 5.35 | 967 | 170/430 | 01:12:21 | 28.9 | 5 | | 01:13:15 |
| 32 | 3.94 | 791 | 90/690 | 01:26:06 | 43 | 5 | | 01:28:00 |

3) After sampling flask 32, close flasks 17-32 UTC: 01 : 28 Trap T: 40.0



CBA

III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 01:28

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 116 Box #2 103

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110617-RFO3_Leakcheck p/f

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 19:53:00 Finish: 20:08
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

Flask Leak Check Procedure #2:

File: 110617 RFO3

21:57:00
Pup 100
Pdn 185
Pby 187

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 21:58:50 Finish: 10:13
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbypass < 2 torr/5 mins, skip to 10
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

EDIT

| Time (UTC) | Pup | Pdn | Pbypass | Comments |
|------------|-----|-----|---------|----------|
| 16:26 | 5 | 173 | 173 | |
| 16:27 | 7 | 173 | 173 | |
| 16:28 | 11 | 173 | 173 | |
| 16:32 | 15 | 173 | 173 | |

Notes on calculating WT_{loss}

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110620

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: F Downstream: B
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 116 Box #2 103
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and 7b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all" 20110622 → 21:23
- 11) Complete flask leak check procedure #1 20110620 Start UTC 20:24
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2

Start UTC 21:56

- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup Pdown Pbypass then all power off

20110622 -
not
overnight

MAJOR LEAK
DETECTED
AND 20110620
ADDRESSED
20110621
(See MED III
book.
PP 80-92)

516 518 524 @ 21:21 on
Flask ID Table (View from Front of Box) 20110622

| | | | | | | | | | | | |
|----|------|-------------------------------------|----|------|-------------------------------------|----|------|-------------------------------------|----|------|-------------------------------------|
| 13 | 1234 | <input checked="" type="checkbox"/> | 12 | 1257 | <input checked="" type="checkbox"/> | 5 | 1130 | <input checked="" type="checkbox"/> | 4 | 1051 | <input checked="" type="checkbox"/> |
| 14 | 1225 | <input checked="" type="checkbox"/> | 11 | 1223 | <input checked="" type="checkbox"/> | 6 | 1042 | <input checked="" type="checkbox"/> | 3 | 1097 | <input checked="" type="checkbox"/> |
| 15 | 1362 | <input checked="" type="checkbox"/> | 10 | 1085 | <input checked="" type="checkbox"/> | 7 | 1340 | <input checked="" type="checkbox"/> | 2 | 1010 | <input checked="" type="checkbox"/> |
| 16 | 1098 | <input checked="" type="checkbox"/> | 9 | 1118 | <input checked="" type="checkbox"/> | 8 | 1273 | <input checked="" type="checkbox"/> | 1 | 1153 | <input checked="" type="checkbox"/> |
| 17 | 1086 | <input checked="" type="checkbox"/> | 24 | 1111 | <input checked="" type="checkbox"/> | 25 | 1369 | <input checked="" type="checkbox"/> | 32 | 1081 | <input checked="" type="checkbox"/> |
| 18 | 1269 | <input checked="" type="checkbox"/> | 23 | 1221 | <input checked="" type="checkbox"/> | 26 | 1230 | <input checked="" type="checkbox"/> | 31 | 1050 | <input checked="" type="checkbox"/> |
| 19 | 1106 | <input checked="" type="checkbox"/> | 22 | 1284 | <input checked="" type="checkbox"/> | 27 | 1093 | <input checked="" type="checkbox"/> | 30 | 1053 | <input checked="" type="checkbox"/> |
| 20 | 1193 | <input checked="" type="checkbox"/> | 21 | 1167 | <input checked="" type="checkbox"/> | 28 | 1108 | <input checked="" type="checkbox"/> | 29 | 1392 | <input checked="" type="checkbox"/> |

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- ✓ 1) Load dry ice into dewar 0.5" from lid UTC 21:15
- ✓ 2) Ensure that MEDUSA valve control key is in place
- ✓ 3) 28 V breaker on, Valve box on, Main breaker on 524
- ✓ 4) Record P / Δ: Pup ~~516~~ / ~~518~~ Pdown ~~430~~ / ~~431~~ Pbypass ~~431~~ / ~~432~~
- ✓ 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 22:16:01 Laptop time UTC 22:16:01
- ✓ 6) Connect traps if not already
- ✓ 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 8) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- ✓ 9a) Re-install splinter shields → actually ✓ 9b) Complete rack book Aaron just inspected station on the spot
- ✓ 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 430 prepurgeT ~~430~~ flushT 120
- ✓ 11) Verify that no values are blinking on screen 45
- ✓ 12) Note trap temperature Trap T: 39.1
- ✓ 13) Complete bypass / system leak check
- ✓ 14) Ensure both controllers are to auto
- ✓ 15) Turn pumps on
- ✓ 16) Verify pressures are controlling and flow is as expected
Pup 169 Pdown 430 Pbypass 729 Flow 4100
- ✓ 17) Adjust flight code to **1** (130/580/30)
- ✗ 18) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 19) Pump breaker off (PB and VB stay on)

20) Pup, Pdn controllers => closed to prevent air leaking back in through PC2.

II. In flight

A. Immediately after take-off Take-off time UTC 23:16:13

switch
Pc controllers
to auto

- ✓ 1) Turn pump breaker on
- ✓ 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 125 Pdown 610 Pbypass 763 Flow 2500
- ✓ 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- ✓ 4) Start pre-purge UTC 23:16:40
- ✓ 5) Note trap temperature Trap T: 39.1
- ✓ 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110622_RF04-prepurge

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan **3** (90/690/300) for at least the top samples

- ✓ After first dive (40 kft to 1000 ft) is finished, adjust flight plan to **2** (180/400/120)

RFO4

PHKO

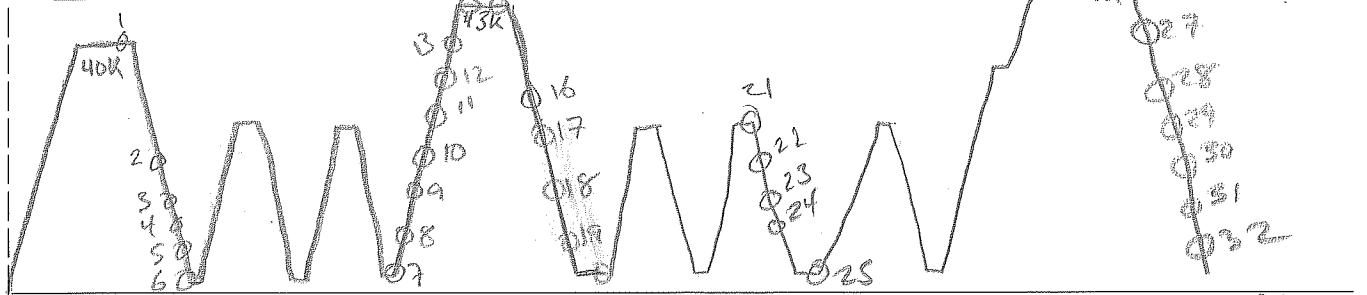
| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes closed |
|-----|----------|------------|-----------|----------|-------|-----------|--|
| 1 | 4.74 | 839 | 125/610 | 23:53:09 | 4.0 | 1 | 23:53:20 |
| 2 | 4.60 | 819 | " | 00:14:30 | 2.4 | 1 | 00:19:00 |
| 3 | 4.63 | 813 | " | 00:18:06 | 1.9 | 1 | 00:19:10 |
| 4 | 4.65 | 818 | " | 00:22:25 | 13.1 | 1 | 00:23:10 |
| 5 | 4.62 | 815 | " | 00:26:37 | 4.7 | 1 | 00:28:30 |
| 6 | 4.62 | 814 | " | 00:31:11 | 1 | 1 | 00:32:30 |
| 7 | 4.62 | 808 | " | 01:58:06 | 1 | 4 | 01:59:30 |
| 8 | 4.6 | 807 | " | 02:01:30 | 5.9 | 4 | After 1 st dive => Flight plan 2 02:02:10 |
| 9 | 4.61 | 809 | " | 02:04:51 | " | 4 | 02:05:30 |
| 10 | 4.65 | 813 | " | 02:08:17 | 16.2 | 4 | 02:08:50 |
| 11 | 4.67 | 819 | " | 02:12:45 | 22.9 | 4 | 02:14:00 |
| 12 | 4.69 | 821 | " | 02:17:02 | 29.4 | 4 | 02:17:35 |
| 13 | 4.71 | 826 | " | 02:23:04 | 37 | 4 | 02:23:40 |
| 14 | 3.97 | 781 | 90/690 | 02:35:15 | 43 | 4 | ← SWITCHED @ 02:25:20 TO 90/690 |
| 15 | 3.97 | 782 | 90/690 | 02:42:08 | 43 | 4 | 02:42:50 |
| 16 | 3.97 | 778 | 90/690 | 02:55:46 | 24 | 5 | ← switch to 170/430 |

1) After sampling flask 16, close flasks 1-16 UTC: 02:57 Trap T: 39.5

X 2a) Turn Pump off X 2b) Replace upstream trap X 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|----------|----------|-------|-----------|---------|
| 17 | 5.33 | 910 | 170/430 | 0300:11 | 16 | 5 | 0301:10 |
| 18 | 5.3 | 960 | 170/430 | 0306:22 | 9.5 | 5 | 0307:00 |
| 19 | 5.29 | 950 | 170/430 | 0311:56 | 2.0 | 5 | 0316:00 |
| 20 | 5.3 | 929 | " | 0316:10 | 1.0 | 5 | 0317:00 |
| 21 | 5.3 | 968 | " | 0424:33 | 28 | 7 | 0425:45 |
| 22 | 5.3 | 966 | " | 0430:30 | 19.5 | 7 | 0431:45 |
| 23 | 5.31 | 944 | " | 0434:10 | 13.7 | 7 | 0435:00 |
| 24 | 5.31 | 933 | " | 0438:21 | 7.6 | 7 | 0439:20 |
| 25 | 5.29 | 924 | " | 0445:17 | 1 | 7 | 0446:20 |
| 26 | 3.97 | 788 | 90/690 | 0700:23 | 47!! | 8 | 0702:00 |
| 27 | 4.0 | 783 | 90/690 | 0711:35 | 32 | 8 | 0713:00 |
| 28 | 5.35 | 951 | 170/430 | 0715:38 | 25 | 8 | 0716:30 |
| 29 | 5.35 | 941 | 170/430 | 0718:26 | 19.4 | 8 | 0719:30 |
| 30 | 5.34 | 953 | 170/430 | 0721:56 | 12.1 | 8 | 0723:00 |
| 31 | 5.32 | 958 | 170/430 | 0725:35 | 5.1 | 8 | 0726:30 |
| 32 | 5.31 | 976 | 170/430 | 0729:15 | 1.8 | 8 | 0729:30 |

3) After sampling flask 32, close flasks 17-32 UTC: 07:29 Trap T: 40.5



PHKO (start) (Pencil is preferred) 2D Dips (Alt ↑, Time →) (end) RAR

III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

^N
UTC 07:32

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap (too wet)
- 2) Unload flasks. Box #1: 15 Box #2 102

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110622-RFO4-Leakcheck1p/f.png

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 20:24:05 Finish: 20:39
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

21:23 on 20110622
21:38

Flask Leak Check Procedure #2:

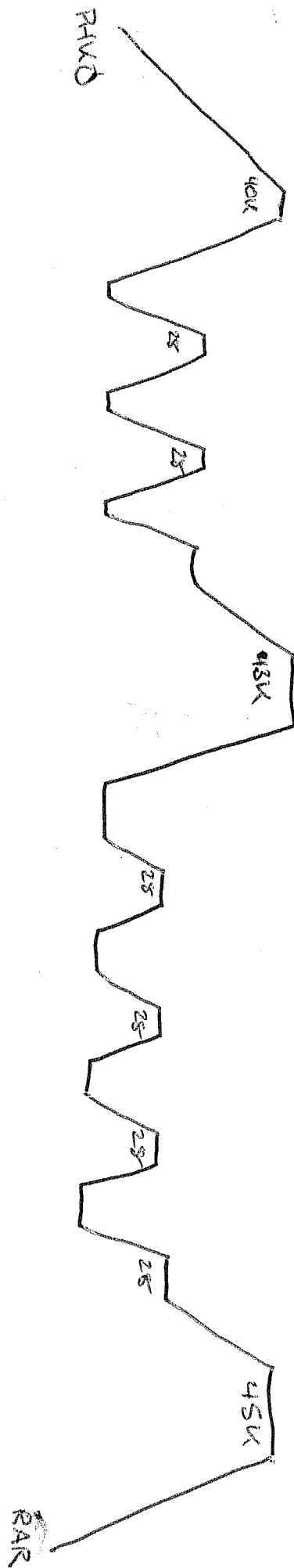
File: 110622-RFO4-Leakcheck2p/f.png

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times). 21:176/182
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps.
- 8) Record times for AEROS matching. Start: 21:56:35 Finish: 22:11:20
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 10
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbypass | Comments |
|------------|-----|-----|---------|----------|
| 22:30:20 | 5 | 167 | 172 | |
| 22:31:20 | 10 | 167 | 172 | |
| 22:34:20 | 13 | 169 | 173 | |
| 22:36:20 | 15 | 170 | 174 | |



5

Bypass
Leakcheck
w/ traps, pos 7

| MED PSA | | Pop | Edn | Pray |
|---------|-------|-----|-----|------|
| 731 | 01:28 | 6 | 77 | 102 |
| 731 | 01:29 | 7 | 77 | 102 |
| 731 | 01:31 | 8 | 77 | 102 |
| 731 | 01:34 | 10 | 78 | 102 |
| 731 | 01:37 | 12 | 78 | 102 |

Sample Leakcheck

| | | | | |
|-----|------|----|-----|-----|
| 186 | 1:41 | 9 | 206 | 102 |
| 187 | 1:42 | 10 | 206 | 102 |
| 187 | 1:43 | 11 | 206 | 102 |
| 188 | 1:47 | 14 | 207 | 102 |

147-25 system
back on

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110623

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: E Downstream: D
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 15 Box #2 102
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and 7b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 23 : 50
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 01 : 13
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup S Pdown 172 Pbypass 172 then all power off

Flask ID Table (View from Front of Box)

| | | | | | | | | | | | |
|----|------|---|----|------|---|----|------|---|----|------|---|
| 13 | 1018 | ↙ | 12 | 1311 | ↙ | 5 | 1024 | ↙ | 4 | 1188 | ↙ |
| 14 | 1259 | ↙ | 11 | 1119 | ↙ | 6 | 1165 | ↙ | 3 | 1059 | ↙ |
| 15 | 1017 | ↙ | 10 | 1143 | ↙ | 7 | 1448 | ↙ | 2 | 1417 | ↙ |
| 16 | 1331 | ↙ | 9 | 1450 | ↙ | 8 | 1182 | ↙ | 1 | 1091 | ↙ |
| 17 | 1169 | ↙ | 24 | 1055 | ↙ | 25 | 1157 | ↙ | 32 | 1443 | ↙ |
| 18 | 1444 | ↙ | 23 | 1414 | ↙ | 26 | 1407 | ↙ | 31 | 1287 | ↙ |
| 19 | 1366 | ↙ | 22 | 1163 | ↙ | 27 | 1103 | ↙ | 30 | 1442 | ↙ |
| 20 | 1401 | ↙ | 21 | 1422 | ↙ | 28 | 1025 | ↙ | 29 | 1222 | ↙ |

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- 1) Load dry ice into dewar 0.5" from lid UTC 18:30
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup 601 / +496 Pdown 607 / Pbypass 6B /
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 18:53:03 Laptop time UTC 18:53:02
- 6) Connect traps if not already
- 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 8) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- 9a) Re-install splinter shields (9b) Complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 430 prepurgeT 45 flushT 120
- 11) Verify that no values are blinking on screen
- 12) Note trap temperature Trap T: 39.8
- 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected
Pup 169 Pdown 430 Pbypass 725 Flow 4200
- 17) Adjust flight code to 1 (130/580/30)
- 18) If necessary, "Clear All" (after being sure data from last flight copied)
- 19) Pump breaker off (PB and VB stay on)

II. In flight

A. Immediately after take-off

Take-off time UTC 21:30:10

- 1) Turn pump breaker on
- 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 125 Pdown 60 Pbypass 735 Flow 7500
- 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- 4) Start pre-purge UTC 21:31:14
- 5) Note trap temperature Trap T: 39.6
- 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110625-rf05-prepurge p/f

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

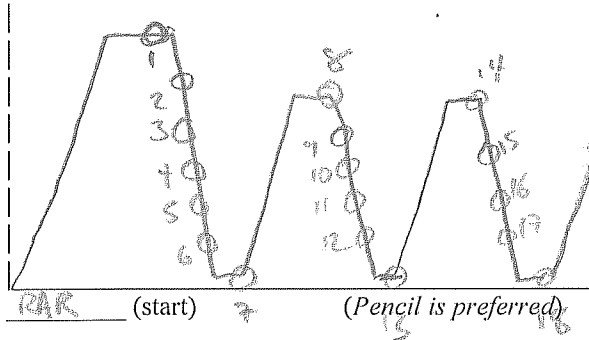
 After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|--|
| 1 | 4.69 | 827 | 125/610 | 22:18:01 | 40 | 1 | 22:19:00 |
| 2 | 4.69 | 825 | 125/610 | 22:35:11 | 33.6 | 1 | 22:36:00 |
| 3 | 4.65 | 817 | 125/610 | 22:40:02 | 26.4 | 1 | 22:40:30 |
| 4 | 4.61 | 809 | 125/610 | 22:44:30 | 19.6 | 1 | 22:46:00 |
| 5 | 4.60 | 811 | 125/610 | 22:48:46 | 13.2 | 1 | 22:49:30 |
| 6 | 4.60 | 808 | 125/610 | 22:53:17 | 6.5 | 1 | 22:54:00 |
| 7 | 4.60 | 806 | 125/610 | 23:00:21 | 1 | 1 | 23:01:10 |
| 8 | 4.70 | 822 | 125/610 | 23:23:49 | 28 | 2 | After 1 st dive => Flight plan 2 23:24:15 |
| 9 | 4.66 | 815 | 125/610 | 23:29:34 | 20.1 | 2 | 23:30:30 |
| 10 | 4.62 | 809 | 125/610 | 23:34:09 | 13.1 | 2 | 23:35:10 |
| 11 | 4.62 | 809 | 125/610 | 23:37:55 | 7.4 | 2 | 23:39:00 |
| 12 | 4.58 | 807 | 125/610 | 23:41:44 | 1.7 | 2 | 23:42:45 |
| 13 | 4.58 | 803 | 125/610 | 23:44:55 | 1 | 2 | 23:45:30 |
| 14 | 4.70 | 820 | 125/610 | 00:08:19 | 28 | 3 | 00:09:30 |
| 15 | 4.65 | 818 | 125/610 | 00:15:02 | 18.7 | 3 | 00:16:00 |
| 16 | 4.62 | 810 | 125/610 | 00:18:24 | 13.5 | 3 | 00:19:25 |

1) After sampling flask 16, close flasks 1-16 UTC: 00:19 Trap T: 39.9
 2a) Turn Pump off 2b) Replace upstream trap 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|----------|----------|-------|-----------|------------------------------------|
| 17 | 4.60 | 804 | 125/610 | 00:21:35 | 8.6 | 3 | 00:24:10 |
| 18 | 4.59 | 828 | 125/610 | 00:29:39 | 0.5 | 3 | 00:30:30 |
| 19 | 4.59 | 832 | 125/610 | 01:30:17 | 0.5 | 4 | 01:31:15 |
| 20 | 4.6 | 820 | 125/610 | 01:36:49 | 8.3 | 4 | 01:38:00 |
| 21 | 4.6 | 847 | 125/610 | 01:49:06 | 16 | 4 | 01:50:15 |
| 22 | 4.6 | 847 | 125/610 | 02:23:30 | 15 | 5~ | 02:24:30 |
| 23 | 4.64 | 834 | 125/610 | 02:36:59 | 15 | 5~ | 02:38:00 switched @ 38:50 to 17/43 |
| 24 | 5.32 | 943 | 170/430 | 02:50:25 | 16 | 5~ | 03:51:30 |
| 25 | 5.33 | 942 | 170/430 | 02:58:47 | 16 | 5~ | 03:00:00 |
| 26 | 5.33 | 939 | 170/430 | 03:06:21 | 16 | 5~ | 03:07:30 |
| 27 | 5.33 | 941 | 170/430 | 03:16:06 | 16 | 5~ | 03:17:00 |
| 28 | 5.32 | 941 | 170/430 | 03:21:37 | 16 | 5~ | 03:28:00 |
| 29 | 5.33 | 935 | 170/430 | 03:26:30 | 16 | 5~ | 03:28:00 |
| 30 | 5.32 | 946 | 170/430 | 03:58:50 | 16 | 6 | 04:02:00 |
| 31 | 5.3 | 954 | 170/430 | 04:09:32 | 4.8 | 6 | 04:22:30 |
| 32 | 5.29 | 966 | 170/430 | 04:14:17 | 1.9 | 6 | 04:22:30 |

3) After sampling flask 32, close flasks 17-32 UTC: 04:22 Trap T: 39.9



Dips (Alt ↑, Time →)

(end) _____

III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 04:15

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: _____ Box #2 _____

Per Britt:

JB spun regulator knobs in then back out. Checked to see they were all the way out.

Lo side Ps

LS = 12.7

HS = 11.0

LT = 11.0

WT = 13.4

Hi Side Ps (while we're at it)

t = 110625 17:00 Local

LS = 1610

HS = 1800

LT = 1810

WT = 376

oops, wrong checksheet. Transfer into AO2

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110623_RF04_Leakcheck1 p/f

- 1) 28 V breaker on, Valve box on, Pump box on
 - 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
 - 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
 - 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
 - 5) Adjust prepurge time to 20 seconds
 - 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
 - 7) Run 20-second prepurge to evacuate lines. Start: 23:22:00 Finish: 23:50:06
 - 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
 - 9) Close Pdn, turn pumps off (will leave in position 1)
 - 10) Turn bypass on
- (AEROS shut down) (10-sec)

Flask Leak Check Procedure #2:

File: 110623_RF04_Leakcheck2 p/f.png

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times). 60 191 192 189
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 01:13:11 Finish: 01:13:11
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass <2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| 19:10:45 | 7 | 171 | 174 | |
| 19:13:45 | 10 | 172 | 175 | |
| 19:18:45 | 16 | 173 | 175 | |
| | | | | |
| | | | | |

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110627 (local N2)

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: (F) Downstream: (B)
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 18 Box #2 110
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and 7b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 21 : 32
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 22 : 26
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup 1 Pdown 166 Pbyass 168 then all power off

Flask ID Table (View from Front of Box)

| | | | | | | | |
|----|-----------------|----|------|----|------|----|------|
| 13 | 1041 | 12 | 1383 | 5 | 1147 | 4 | 1154 |
| 14 | 1088 | 11 | 1145 | 6 | 1252 | 3 | 1339 |
| 15 | 1155 | 10 | 1026 | 7 | 1043 | 2 | 1275 |
| 16 | 1288 | 9 | 1046 | 8 | 1263 | 1 | 1109 |
| 17 | 1360 | 24 | 1354 | 25 | 1353 | 32 | 1382 |
| 18 | 1355 | 23 | 1351 | 26 | 1164 | 31 | 1364 |
| 19 | 1361 | 22 | 1358 | 27 | 1363 | 30 | 1078 |
| 20 | 1129 | 21 | 1357 | 28 | 1115 | 29 | 1316 |

13 BROKE AFTER 1041 SAMPLING

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- ✓ 1) Load dry ice into dewar 0.5" from lid UTC 20 : 30
- ✓ 2) Ensure that MEDUSA valve control key is in place
- ✓ 3) 28 V breaker on, Valve box on, Main breaker on
- ✓ 4) Record P / Δ: Pup 639 / 638 Pdown 647 / 519 Pby pass 652 / 7524
- ✓ 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 20 : 32 : 01 Laptop time UTC 20 : 32 : 01
- ✓ 6) Connect traps if not already
- ✓ 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 8) Open all flask stopcocks 2 half turns Flasks opened by: JPB/AW
- ✓ 9a) Re-install splinter shields 9b) Complete rack book
- ✓ 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 450 prepurgeT 45 flushT 120
- ✓ 11) Verify that no values are blinking on screen
- ✓ 12) Note trap temperature Trap T: 39.9
- ✓ 13) Complete bypass / system leak check
- ✓ 14) Ensure both controllers are to auto
- ✓ 15) Turn pumps on
- ✓ 16) Verify pressures are controlling and flow is as expected
Pup 169 Pdown 450 Pby pass 763 Flow 4500
- ✓ 17) Adjust flight code to 1 (130/580/30) 125 / 620 ... 2900
- ✓ 18) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 19) Pump breaker off (PB and VB stay on)
- ✓ 20) PC1, 2 → closed

(leaks @ DS Parker 3-way Bypass valve when system is turned off and bypass defaults to NO, sample)

II. In flight

A. Immediately after take-off Take-off time UTC 23 : 09 : 30

-1a) PC1, 2 → auto

- ✓ 1) Turn pump breaker on 23:0940
- ✓ 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 125 Pdown 620 Pby pass 756 Flow 2700
- ✓ 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- ✓ 4) Start pre-purge UTC 23 : 10 : 17
- ✓ 5) Note trap temperature Trap T: 38.7
- ✓ 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110628_RF06_prepurge/H.py

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible
If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples
✓ After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|---|
| 1 | 4.65 | 823 | 125/620 | 23:48:00 | 16 | 1 | 23:49:30 |
| 2 | 4.63 | 816 | 125/620 | 00:52:32 | 16 | 1 | 00:53:00 |
| 3 | 4.63 | 818 | 125/620 | 00:57:10 | 22.8 | 1 | 00:57:45 |
| 4 | 4.67 | 824 | 125/620 | 01:02:14 | 29.9 | 1 | 01:03:00 |
| 5 | 4.69 | 831 | 125/620 | 01:07:34 | 38.0 | 1 | 01:08:10 |
| 6 | 4.72 | 835 | 125/620 | 01:14:40 | 40.0 | 1 | 01:15:10 |
| 7 | 3.95 | 796 | 90/710 | 02:05:37 | 43 | 1 | 02:06:20 |
| 8 | 3.95 | 795 | 90/710 | 02:17:02 | 43 | 2 | After 1 st dive => Flight plan 2 |
| 9 | 4.72 | 833 | 125/620 | 02:25:17 | 31.6 | 2 | 02:26:10 |
| 10 | 4.69 | 827 | 125/620 | 02:29:21 | 26.0 | 2 | 02:30:00 |
| 11 | 4.64 | 819 | 125/620 | 02:33:44 | 19.2 | 2 | 02:34:15 |
| 12 | 4.63 | 818 | 125/620 | 02:37:45 | 13.2 | 2 | 02:38:15 |
| 13 | 4.63 | 818 | 125/620 | 02:42:19 | 8.6 | 2 | 02:43:30 |
| 14 | 4.63 | 816 | 125/620 | 02:45:53 | 3.4 | 2 | 02:47:30 |
| 15 | 4.65 | 824 | 125/620 | 02:51:25 | 0.5 | 2 | 02:52:00 |
| 16 | 5.35 | 919 | 170/450 | 03:16:57 | 28 | 3 | 03:17:45 |

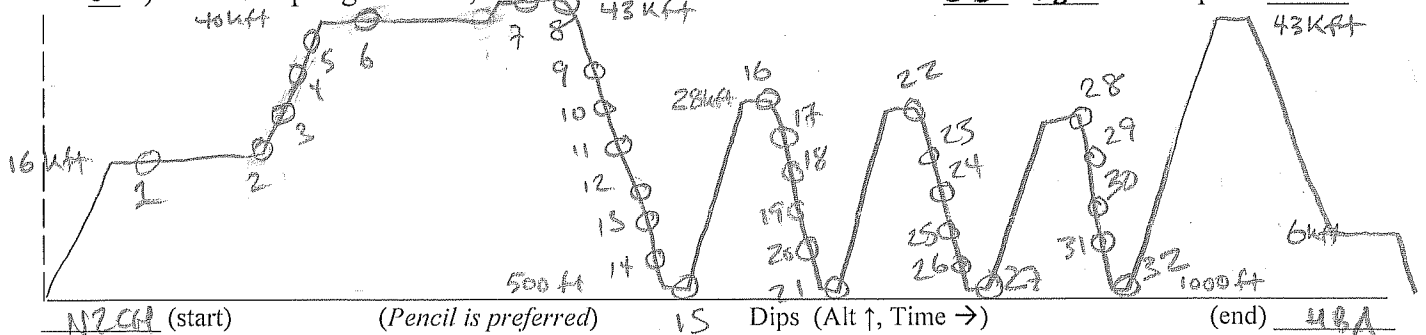
✓ 1) After sampling flask 16, close flasks 1-16 UTC: 03:17 Trap T: 40.2

× 2a) Turn Pump off × 2b) Replace upstream trap × 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|----------|----------|-------|-----------|----------|
| 17 | 5.34 | 922 | 170/450 | 03:22:35 | 19.7 | 3 | 03:23:30 |
| 18 | 5.31 | 972 | 170/450 | 03:27:03 | 13.2 | 3 | 03:28:10 |
| 19 | 5.31 | 964 | 170/450 | 03:30:06 | 8.7 | 3 | 03:31:10 |
| 20 | 5.31 | 946 | 170/450 | 03:33:55 | 2.7 | 3 | 03:34:40 |
| 21 | 5.30 | 969 | 170/450 | 03:39:29 | 0.5 | 3 | 03:40:30 |
| 22 | 5.31 | 976 | 170/450 | 04:04:37 | 28 | 4 | 04:05:30 |
| 23 | 5.32 | 955 | 170/450 | 04:10:16 | 20 | 4 | 04:11:15 |
| 24 | 5.32 | 947 | 170/450 | 04:15:05 | 12.6 | 4 | 04:16:00 |
| 25 | 5.32 | 945 | 170/450 | 04:18:51 | 7.0 | 4 | 04:20:00 |
| 26 | 5.31 | 941 | 170/450 | 04:21:37 | 3.6 | 4 | 04:22:40 |
| 27 | 5.31 | 940 | 170/450 | 04:28:19 | 0.5 | 4 | 04:31:10 |
| 28 | 5.30 | 947 | 170/450 | 04:55:10 | 27.2 | 5 | 05:00:00 |
| 29 | 5.32 | 937 | 170/450 | 05:00:13 | 19.6 | 5 | 05:00:30 |
| 30 | 5.31 | 951 | 170/450 | 05:04:29 | 13.1 | 5 | 05:05:10 |
| 31 | 5.31 | 958 | 170/450 | 05:08:59 | 6.5 | 5 | 05:09:50 |
| 32 | 5.29 | 970 | 170/450 | 05:17:38 | 1.0 | 5 | 05:18:30 |

✓ 3) After sampling flask 32, close flasks 17-32

UTC: 05:18 Trap T: 40



III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 05:20?

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 111 Box #2: 7

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110627-RFOG-Leakcheck1/f.png

- ✓ 1) 28 V breaker on, Valve box on, Pump box on 110628-RFOG-Leakcheck1/f.png
- ✓ 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on (2) BYPSET=1
- ✓ 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- ✓ 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- ✓ 5) Adjust prepurge time to 20 seconds (Plan code 9)
- ✓ 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- ✓ 7) Run 20-second prepurge to evacuate lines. Start: 0:43:15 Finish: 12:58 ~21:32:00 → 21:47
- ✓ 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- ✓ 9) Close Pdn, turn pumps off (will leave in position 1)
- ✓ 10) Turn bypass on

VLV1SET
VLV2SET
VLV3SET
Jonathan's Lamb Vindaloo
Leakcheck110628.png

Flask Leak Check Procedure #2:

File: 110627-RFOG-Leakcheck1/f.png

- ✓ 1) "Clear All"
- ✓ 2) Valve box off, main breaker off then on to reset, then valve box back on 110628-RFOG-Leakcheck1/f.png
- ✓ 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- ✓ 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- ✓ 5) Close Pdn and turn pumps off
- ✓ 6) Adjust prepurge time to 20 seconds
- ✓ 7) Run 20-second prepurge to check all flask downstream tube Ps 22:26:06
- ✓ 8) Record times for AEROS matching. Start: 01:47:00 Finish: _____
- ✓ 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png) -Leak on Box 2, prob at origin, which warned up end looser quite a bit
- ✓ 10) Turn bypass on

Bypass / System Leak Check Procedure:

- ✓ 1) Ensure bypass on, close PC1 and open PC2
- ✓ 2) Turn on pump breaker and let run for 1 minute
- ✓ 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- ✓ 4) Switch PC2 to closed and turn off pump
- ✓ 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- ✓ 6) After 1 minute, record values again.
- ✓ 7) After 5 minutes, record values again
- ✗ 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- ✗ 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- ✓ 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------------------------------|
| 20:55:00 | 3 | 171 | 173 | also (stupidly) evacuated sample |
| 20:56:00 | 4 | 171 | 174 | |
| 20:57:00 | 5 | 171 | 174 | |
| 21:05:00 | 12 | 172 | 174 | |

to ~250, not thinking that it was actually an open flask

YMHB
Hobart, Tasmania
Darwin, Australia
V. 2011.06.12

NCAR/SCRIPPS MEDUSA Checklist

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110629

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: E Downstream: D
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 111 Box #2 7
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and 7b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 00:15
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 01:02
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup 5 Pdown 171 Pbyass 171 then all power off

Flask ID Table (View from Front of Box)

| | | | | | | | | | | | |
|----|------|-------------------------------------|----|------|-------------------------------------|----|------|-------------------------------------|----|------|-------------------------------------|
| 13 | 1006 | <input checked="" type="checkbox"/> | 12 | 1277 | <input checked="" type="checkbox"/> | 5 | 1342 | <input checked="" type="checkbox"/> | 4 | 1349 | <input checked="" type="checkbox"/> |
| 14 | 1185 | <input checked="" type="checkbox"/> | 11 | 1276 | <input checked="" type="checkbox"/> | 6 | 1178 | <input checked="" type="checkbox"/> | 3 | 1140 | <input checked="" type="checkbox"/> |
| 15 | 1138 | <input checked="" type="checkbox"/> | 10 | 1069 | <input checked="" type="checkbox"/> | 7 | 1054 | <input checked="" type="checkbox"/> | 2 | 1113 | <input checked="" type="checkbox"/> |
| 16 | 1027 | <input checked="" type="checkbox"/> | 9 | 1160 | <input checked="" type="checkbox"/> | 8 | 1187 | <input checked="" type="checkbox"/> | 1 | 1075 | <input checked="" type="checkbox"/> |
| 17 | 1120 | <input checked="" type="checkbox"/> | 24 | 1067 | <input checked="" type="checkbox"/> | 25 | 1181 | <input checked="" type="checkbox"/> | 32 | 1232 | <input checked="" type="checkbox"/> |
| 18 | 1150 | <input checked="" type="checkbox"/> | 23 | 1227 | <input checked="" type="checkbox"/> | 26 | 1016 | <input checked="" type="checkbox"/> | 31 | 1253 | <input checked="" type="checkbox"/> |
| 19 | 1099 | <input checked="" type="checkbox"/> | 22 | 1242 | <input checked="" type="checkbox"/> | 27 | 1019 | <input checked="" type="checkbox"/> | 30 | 1198 | <input checked="" type="checkbox"/> |
| 20 | 1238 | <input checked="" type="checkbox"/> | 21 | 1127 | <input checked="" type="checkbox"/> | 28 | 1144 | <input checked="" type="checkbox"/> | 29 | 1292 | <input checked="" type="checkbox"/> |

one valve completely open purge for extra time

YMHB
Habitat Derivation

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- ✓ 1) Load dry ice into dewar 0.5" from lid UTC 22 : 10
- ✓ 2) Ensure that MEDUSA valve control key is in place
- ✓ 3) 28 V breaker on, Valve box on, Main breaker on
- ✓ 4) Record P / Δ: Pup 642 / +637 Pdown 654 / 477 Pby pass 654 / 477
- ✓ 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 22 : 20 : 01 Laptop time UTC 22 : 20 : 01
- ✓ 6) Connect traps if not already
- ✓ 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 8) Open all flask stopcocks 2 half turns Flasks opened by: JDP
- ✓ 9a) Re-install splinter shields ✓ 9b) Complete rack book
- ✓ 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 450 prepurge T 45 flush T 120
- ✓ 11) Verify that no values are blinking on screen
- ✓ 12) Note trap temperature Trap T: 40.0
- ✓ 13) Complete bypass / system leak check
- ✓ 14) Ensure both controllers are to auto
- ✓ 15) Turn pumps on
- ✓ 16) Verify pressures are controlling and flow is as expected
Pup 170 Pdown 450 Pby pass 744 Flow 4300
- ✓ 17) Adjust flight code to 1 (130/580/30) 125/620/45
- ✓ 18) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 19) Pump breaker off (PB and VB stay on)

a little low but prob from all the temp changes in the cabin

Drake Tilbrook
Arrive Kortzinger
O₂ in North Atlantic
O₂ measurement on Argos floats
bronte.tilbrook@csiro.au

II. In flight

A. Immediately after take-off Settings to 170/450/30/120 to get profile out of Cape Grim Take-off time UTC 00 : 05 : 00

- ✓ 1) Turn pump breaker on
- ✓ 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 169 Pdown 450 Pby pass 730 Flow 4300
- ✓ 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- ✓ 4) Start pre-purge UTC 00 : 06 : 14
- ✓ 5) Note trap temperature Trap T: 38.3
- ✓ 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110630-rf07_

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

✓ PC1
PC2 → auto

prepurge 1:15

2011

YMHB

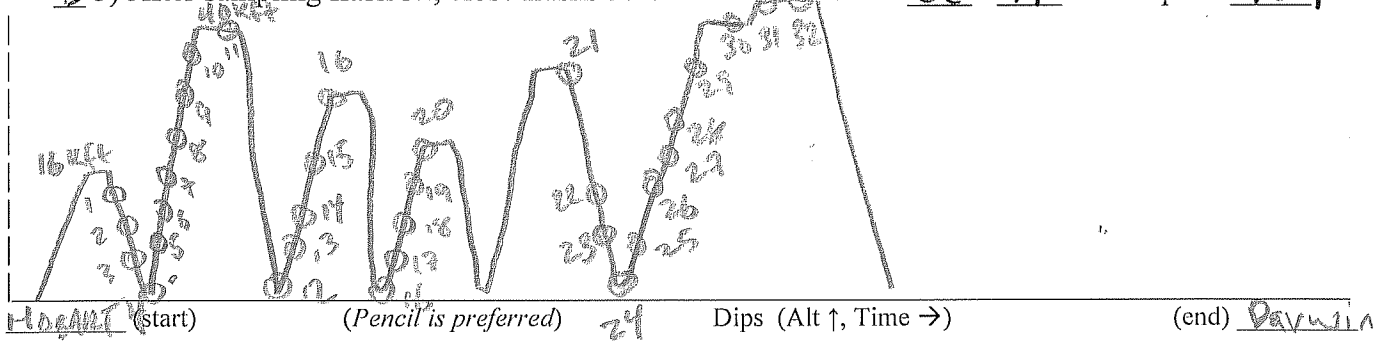
Date: 110630 Campaign: HIPPO4 Flight: KFO7 From: HBA To: YPDN Page 3 of 5
Robert Derwin

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes closed | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|---|---|
| 1 | 5.34 | 917 | 170/450 | 00:29:37 | 13.6 | 1 | 00:30:45 | CGO PROFILE |
| 2 | 5.34 | 912 | 170/450 | 00:33:40 | 7.7 | 1 | 00:34:10 | |
| 3 | 5.32 | 903 | 170/450 | 00:37:27 | 2.6 | 1 | 00:41:30 | |
| 4 | 5.32 | 904 | 170/450 | 00:40:05 | 7004 | 1/2 | 00:41:45 | |
| 5 | 5.33 | 910 | 170/450 | 00:43:36 | 6.1 | 2 | 00:44:00 | |
| 6 | 5.33 | 910 | 170/450 | 00:47:01 | 11.2 | 2 | 00:47:45 | |
| 7 | 5.33 | 910 | 170/450 | 00:50:43 | 16.8 | 2 | 00:51:15 | |
| 8 | 5.33 | 909 | 170/450 | 00:54:46 | 22.9 | 2 | After 1 st dive => Flight plan 2 | 00:55:15 |
| 9 | 5.34 | 909 | 170/450 | 00:59:32 | 29.8 | 2 | 01:00:15 | 125/620 @ 01:00:25 |
| 10 | 4.70 | 826 | 125/620 | 01:04:17 | 35.5 | 2 | 01:05:25 | PURGE extra! one view. operation shipping |
| 11 | 4.73 | 832 | 125/620 | 01:15:17 | 40 | 2 | 01:16:00 | STRAT AIR |
| 12 | 5.34 | 908 | 170/450 | 02:25:12 | 1000 | 3 | 02:26:00 | 170/450 @ 02:29 |
| 13 | 5.34 | 913 | 170/450 | 02:32:58 | 13.4 | 3 | 02:33:45 | |
| 14 | 5.34 | 911 | 170/450 | 02:39:09 | 22.5 | 3 | 02:40:00 | |
| 15 | 5.33 | 928 | 170/450 | 02:44:35 | 28 | 3 | 02:46:00 | |
| 16 | 5.32 | 908 | 170/450 | 03:13:39 | 1000 | 4 | 03:14:30 | |

1) After sampling flask 16, close flasks 1-16 UTC: 03:14 Trap T: 40
 2a) Turn Pump off 2b) Replace upstream trap 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes closed |
|-----|----------|------------|----------|----------|-------|-----------|--------------|
| 17 | 5.32 | 915 | 170/450 | 03:17:43 | 6.2 | 4 | 03:18:45 |
| 18 | 5.30 | 971 | 170/450 | 03:21:22 | 11.7 | 4 | 03:22:30 |
| 19 | 5.31 | 965 | 170/450 | 03:24:34 | 16.5 | 4 | 03:25:30 |
| 20 | 5.31 | 946 | 170/450 | 03:29:23 | 20 | 4 | 03:30:30 |
| 21 | 5.30 | 969 | 170/450 | 04:38:44 | 28 | 5 | 04:39:15 |
| 22 | 5.29 | 966 | 170/450 | 04:52:24 | 10 | 5 | 04:53:00 |
| 23 | 5.28 | 939 | 170/450 | 04:58:13 | 4 | 5 | 04:59:30 |
| 24 | 5.29 | 933 | 170/450 | 05:04:28 | 1.3 | 5/6 | 05:08:20 |
| 25 | 5.29 | 935 | 170/450 | 05:07:16 | 6.6 | 5/6 | 05:08:30 |
| 26 | 5.31 | 937 | 170/450 | 05:13:44 | 16.4 | 6 | 05:15:00 |
| 27 | 5.31 | 939 | 170/450 | 05:19:55 | 25.6 | 6 | 05:20:45 |
| 28 | 5.31 | 941 | 170/450 | 05:23:08 | 30 | 6 | 05:24:00 |
| 29 | 3.87 | 792 | 90/710 | 05:30:28 | 40.9 | 6 | 05:31:30 |
| 30 | 3.89 | 800 | 90/710 | 05:36:17 | 43 | 6 | 05:37:00 |
| 31 | 3.92 | 806 | 90/710 | 06:01:53 | 45 | 6 | 06:02:45 |
| 32 | 3.93 | 810 | 90/710 | 06:16:49 | 45 | 6 | 06:17:20 |

3) After sampling flask 32, close flasks 17-32 UTC: 06:17 Trap T: 40.1



III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC06: 17:50

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 23 Box #2 107

MEDUSA leak check procedures

110629-RF07_Leakcheck1p1f.png (BAD)
 File: 110629-RF07_Leakcheck1p1f_good.png

Flask Leak Check Procedure #1:

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 23:56:25 Finish: 00:02:37
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1) → 001530 103014
- 10) Turn bypass on

Toggle 6 port and desolve on pps 17

Toggleing Valve 3 messed up box 1 evacuation

Flask Leak Check Procedure #2:

File: 110629-RF07_Leakcheck2p1f.png

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times). 28 188 186
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 01:02:10 Finish: 01:17:05
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| 23:05:30 | 4 | 172 | 171 | |
| 23:11:30 | 10 | 173 | 172 | |
| | | | | |
| | | | | |

Darwin Saipan

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110703

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: E Downstream: D
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 23 Box #2 107
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls) (includes) correction to note 1243 replacing 1452
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 01:06
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 02:09
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup 6 Pdown 173 Pbyass 177 then all power off

Flask ID Table (View from Front of Box)

| | | | | | | | | | | | |
|----|------|---|----|------|---|----|------|---|----|----------------------|---|
| 13 | 1428 | ↙ | 12 | 1438 | ↙ | 5 | 1121 | ↙ | 4 | 1214 | ↙ |
| 14 | 1285 | ↙ | 11 | 1346 | ↙ | 6 | 1035 | ↙ | 3 | 1452 1243 | ↙ |
| 15 | 1244 | ↙ | 10 | 1457 | ↙ | 7 | 1124 | ↙ | 2 | 1373 | ↙ |
| 16 | 1347 | ↙ | 9 | 1202 | ↙ | 8 | 1329 | ↙ | 1 | 1189 | ↙ |
| 17 | 1206 | ↙ | 24 | 1336 | ↙ | 25 | 1148 | ↙ | 32 | 1393 | ↙ |
| 18 | 1281 | ↙ | 23 | 1064 | ↙ | 26 | 1030 | ↙ | 31 | 1208 | ↙ |
| 19 | 1136 | ↙ | 22 | 1014 | ↙ | 27 | 1403 | ↙ | 30 | 1073 | ↙ |
| 20 | 1156 | ↙ | 21 | 1008 | ↙ | 28 | 1107 | ↙ | 29 | 1133 | ↙ |

1452/2
BROKEN
THREADS
ON
PLUGGER

Darwin Saipan

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- 1) Load dry ice into dewar 0.5" from lid UTC 23:00
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup 466 / 460 Pdown 512 / 339 Pby pass 511 / +334
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 23:53:01 Laptop time UTC 23:53:01
- 6) Connect traps if not already
- 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 8) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- 9a) Re-install splinter shields 9b) Complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 450 prepurge T 45 flush T 120
- 11) Verify that no values are blinking on screen
- 12) Note trap temperature Trap T: 40.0
- 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected
Pup 169 Pdown 449 Pby pass 732 Flow 4200
- 17) Adjust flight code to 1 (130/580/30) 125/620/45
- 18) If necessary, "Clear All" (after being sure data from last flight copied)
- 19) Pump breaker off (PB and VB stay on)
- 20) Controller(s) → closed

II. In flight

A. Immediately after take-off Take-off time UTC 01:44:12

as a result
to
get to

- 1) Turn pump breaker on 01:44:30
- 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 125 Pdown 60 Pby pass 745 Flow 2550
- 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- 4) Start pre-purge UTC 01:45:46
- 5) Note trap temperature Trap T: 38.9
- 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110704_RFO8-prepurge p/f.p

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes closed | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|---|----------|
| 1 | 4.67 | 831 | 125/620 | 02:38:30 | 40 | 1 | 02:39:10 | |
| 2 | 4.70 | 831 | 125/620 | 03:12:00 | 40 | 1 | 03:12:00 | 03:12:30 |
| 3 | 4.70 | 830 | 125/620 | 03:26:50 | 40 | 1 | 03:27:45 | |
| 4 | 4.71 | 833 | 125/620 | 03:43:56 | 40 | 1 | 03:44:50 | |
| 5 | 4.72 | 835 | 125/620 | 03:51:54 | 40 | 1 | 03:52:45 | |
| 6 | 4.71 | 834 | 125/620 | 04:02:17 | 40 | 1 | 04:03:10 | |
| 7 | 4.72 | 832 | 125/620 | 04:12:55 | 40 | 1 | 04:13:40 | |
| 8 | 4.72 | 832 | 125/620 | 04:24:49 | 40 | 1/2 | After 1 st dive => Flight plan 2 | 04:25:30 |
| 9 | 4.71 | 830 | 125/620 | 04:32:08 | 33 | 2 | 04:32:50 | |
| 10 | 4.65 | 818 | 125/620 | 04:37:28 | 25.4 | 2 | 04:38:10 | |
| 11 | 4.61 | 812 | 125/620 | 04:41:32 | 19.3 | 2 | 04:42:20 | |
| 12 | 4.61 | 814 | 125/620 | 04:45:29 | 13.3 | 2 | 04:46:10 | |
| 13 | 4.60 | 812 | 125/620 | 04:48:49 | 8.3 | 2 | 04:49:20 | |
| 14 | 4.62 | 814 | 125/620 | 04:52:48 | 2.3 | 2 | 04:53:15 | |
| 15 | 4.61 | 818 | 125/620 | 04:57:40 | 500ft | 2 | 04:58:30 | |
| 16 | 4.68 | 828 | 125/620 | 05:21:07 | 28 | 3 | 05:21:50 | |

✓ 1) After sampling flask 16, close flasks 1-16 UTC: 05:21 Trap T: 39.9

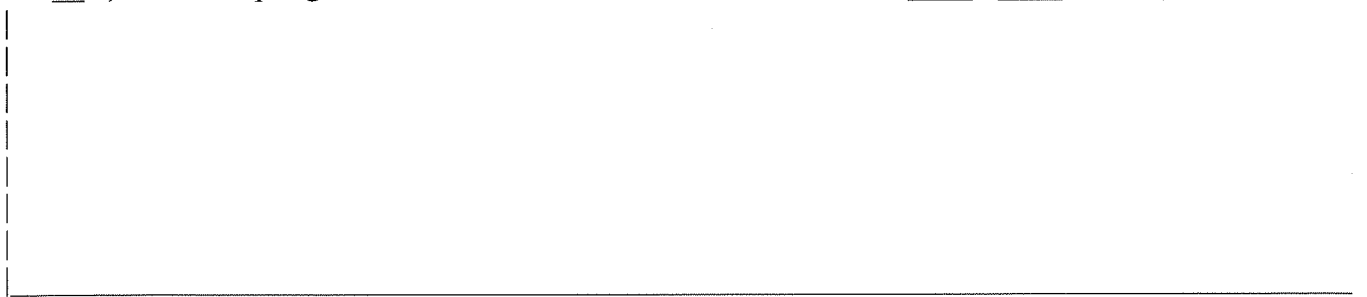
✗ 2a) Turn Pump off ✗ 2b) Replace upstream trap ✗ 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes closed | Notes |
|-----|----------|------------|----------|----------|-------|-----------|--------------|----------|
| 17 | 4.64 | 813 | 125/620 | 05:26:50 | 19.7 | 3 | 05:28:10 | |
| 18 | 4.60 | 835 | 125/620 | 05:31:55 | 12.0 | 3 | 05:32:45 | |
| 19 | 4.60 | 841 | 125/620 | 05:36:39 | 6.5 | 3 | 05:39:00 | 05:37:00 |
| 20 | 4.59 | 825 | 125/620 | 05:38:42 | 1.7 | 3 | 05:39:45 | |
| 21 | 4.59 | 846 | 125/620 | 05:41:42 | 500.4 | 3 | 05:45:00 | |
| 22 | 4.64 | 859 | 125/620 | 06:05:20 | 28.8 | 4 | 06:07:15 | |
| 23 | 4.58 | 831 | 125/620 | 06:15:14 | 12.7 | 4 | 06:16:15 | |
| 24 | 4.57 | 829 | 125/620 | 06:26:32 | 500ft | 4/5 | 06:27:45 | |
| 25 | 4.56 | 825 | 125/620 | 06:30:31 | 6.8 | 5 | 06:31:45 | |
| 26 | 4.57 | 825 | 125/620 | 06:33:50 | 12.5 | 5 | 06:35:15 | |
| 27 | 4.61 | 835 | 125/620 | 06:37:40 | 19.0 | 5 | 06:38:40 | |
| 28 | 4.62 | 837 | 125/620 | 06:40:58 | 24.7 | 5 | 06:42:00 | |
| 29 | 4.66 | 839 | 125/620 | 06:46:20 | 32.5 | 5 | 06:47:40 | |
| 30 | 4.68 | 853 | 125/620 | 06:51:06 | 39.1 | 5 | 06:52:40 | |
| 31 | 4.68 | 862 | 125/620 | 06:58:06 | 41 | 5 | 06:59:20 | |
| 32 | 4.67 | 869 | 125/620 | 07:01:51 | 38.9 | 5 | 07:02:57 | |

3) After sampling flask 32, close flasks 17-32

UTC: _____ : _____

Trap T: _____



(start)

(Pencil is preferred)

Dips (Alt ↑, Time →)

(end)

III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 07:03

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 114 Box #2 105

Flask Leak Check Procedure #1:

File: 110703_RF08_Leakcheck1p/f.png

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 01:06:35 Finish: 01:22
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

Flask Leak Check Procedure #2:

File: 110703_RF08_Leakcheck1p/f.png

110703_RF08_Leakcheck-whole.p

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 02:09 Finish: 02:24:20
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| 0:10:30 | 5 | 170 | 172 | |
| 0:11:30 | 6 | 170 | 172 | |
| 0:15:30 | 10 | 171 | 173 | |
| | | | | |

Sanipen Midway
 V. 2011.06.12

NCAR/SCRIPPS MEDUSA Checklist

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110705

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: B Downstream: F
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 114 Box #2 105
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and 7b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 00 : 05
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 01 : 10
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup 8 Pdown 170 Pbypass 173 then all power off

Flask ID Table (View from Front of Box)

| | | | | | | | |
|------------|---|------------|---|------------|---|------------|---|
| 13 1215 | ↔ | 12 1247 | ↔ | 5 1260 | ↔ | 4 1332 | ↔ |
| 14 1437 | ↔ | 11 1162 | ↔ | 6 1271 | ↔ | 3 1265 | ↔ |
| 15 1180 | ↔ | 10 1152 | ↔ | 7 1319 | ↔ | 2 1415 | ↔ |
| 16 1056 | ↔ | 9 1092 | ↔ | 8 1304 | ↔ | 1 1396 | ↔ |
| 17 1192 | L | 24 1293 | L | 25 1125 | L | 32 1204 | L |
| 18 1151 | L | 23 1203 | L | 26 1282 | L | 31 1384 | L |
| 19 1174 | L | 22 1013 | L | 27 1337 | L | 30 1261 | L |
| 20 1079 | L | 21 1194 | L | 28 1350 | L | 29 1335 | L |

Broken Dip tube but sample fine

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- ✓ 1) Load dry ice into dewar 0.5" from lid UTC 00 : 35
- ✓ 2) Ensure that MEDUSA valve control key is in place
- ✓ 3) 28 V breaker on, Valve box on, Main breaker on
- ✓ 4) Record P / Δ: Pup 434 / 426 Pdown 473 / 303 Pbyass 479 / 306
- ✓ 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 01 : 03 : 05 Laptop time UTC 01 : 03 : 05
- ✓ 6) Connect traps if not already
- ✓ 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 8) Open all flask stopcocks 2 half turns Flasks opened by: JPB
- ✓ 9a) Re-install splinter shields ✓ 9b) Complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 450 prepurgeT 45 flushT 120
- ✓ 11) Verify that no values are blinking on screen
- ✓ 12) Note trap temperature Trap T: 39.9
- ✓ 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- ✓ 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected

| | | | | |
|----------|-----------|------------|------------|-----|
| | | Pup | Pdn | Pby |
| 01:21: | <u>9</u> | <u>171</u> | <u>178</u> | |
| | <u>30</u> | | | |
| 01:22:30 | <u>8</u> | <u>172</u> | <u>178</u> | |
- ✓ 17) Adjust flight code to 1 (130/580/30)
- ✓ 18) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 19) Pump breaker off (PB and VB stay on)
- ✓ 20) Controllers to auto

II. In flight

A. Immediately after take-off Take-off time UTC 02 : 26 : 15

— 1a)
controllers
to auto

- ✓ 1) Turn pump breaker on 02:26:37
- ✓ 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 124 Pdown 620 Pbyass 740 Flow 2500
- ✓ 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- ✓ 4) Start pre-purge UTC 02 : 27 : 18
- ✓ 5) Note trap temperature Trap T: 39.7
- ✓ 6) Record png of prepurge: (YYMMDD_rf###_prepurge) File: 110706_RFO9_prepurge p1f.

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

- ✓ After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes Closed | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|--|---------------------|
| 1 | 4.63 | 828 | 125/620 | 03:11:05 | 40 | 1 | 03:11:45 | |
| 2 | 4.62 | 824 | 125/620 | 03:14:26 | 40 | 1 | 03:15:30 | |
| 3 | 4.61 | 820 | 125/620 | 03:22:52 | 30.1 | 1 | 03:23:45 | |
| 4 | 4.59 | 818 | 125/620 | 03:26:00 | 25.6 | 1 | 03:26:30 | |
| 5 | 4.59 | 821 | 125/620 | 03:30:08 | 19.3 | 1 | 03:31:00 | |
| 6 | 4.58 | 818 | 125/620 | 03:34:05 | 13.4 | 1 | 03:34:30 | |
| 7 | 4.57 | 814 | 125/620 | 03:41:23 | 2.3 | 1 | 03:42:00 | |
| 8 | 4.57 | 813 | 125/620 | 03:44:52 | 0.5 | 1 | After 1 st dive => Flight plan 2 03:45:45 | 45 |
| 9 | 4.56 | 812 | 125/620 | 03:52:19 | 11.6 | 1 | (to fill in missing alt) | |
| 10 | 5.29 | 893 | 170/450 | 04:32:03 | 0.5 | 2 | 04:33:00 | 04:28:50 => 170/450 |
| 11 | 5.27 | 891 | 170/450 | 04:47:16 | 8.4 | 2 | 04:38:15 | |
| 12 | 5.29 | 900 | 170/450 | 04:40:57 | 13.7 | 2 | 04:41:25 | |
| 13 | 5.30 | 902 | 170/450 | 04:43:26 | 17.4 | 2 | 04:44:00 | |
| 14 | 5.30 | 902 | 170/450 | 04:46:48 | 22.6 | 2 | 04:47:45 | |
| 15 | 5.30 | 918 | 170/450 | 04:54:39 | 28 | 2 | 04:55:15 | |
| 16 | 5.30 | 907 | 170/450 | 05:38:21 | 28 | 3 | 05:39:30 | |

1) After sampling flask 16, close flasks 1-16

UTC: ___ : ___ Trap T: ___

2a) Turn Pump off

2b) Replace upstream trap

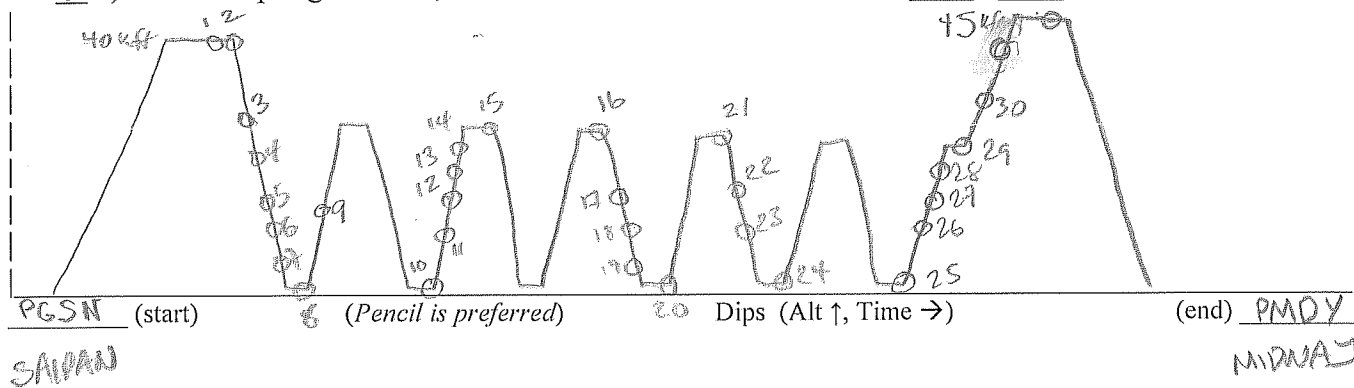
2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes Closed | Notes |
|-----|----------|------------|----------|----------|-------|-----------|--------------|--------------------|
| 17 | 5.29 | 908 | 170/450 | 05:47:08 | 15.8 | 3 | 05:48:30 | |
| 18 | 5.25 | 950 | 170/450 | 05:52:00 | 8.5 | 3 | 05:54:30 | |
| 19 | 5.24 | 944 | 170/450 | 05:55:55 | 2.5 | 3 | 05:56:50 | |
| 20 | 5.25 | 928 | 170/450 | 05:59:40 | 0.5 | 3 | 06:02:00 | |
| 21 | 5.27 | 964 | 170/450 | 06:19:35 | 28 | 4 | 06:20:45 | |
| 22 | 5.26 | 963 | 170/450 | 06:25:41 | 19.7 | 4 | 06:26:30 | |
| 23 | 5.27 | 941 | 170/450 | 06:31:48 | 10.3 | 4 | 06:32:50 | |
| 24 | 5.27 | 931 | 170/450 | 06:40:40 | 0.5 | 4 | 06:41:45 | |
| 25 | 5.26 | 925 | 170/450 | 07:21:44 | 0.5 | 5 | 07:24:30 | |
| 26 | 5.26 | 926 | 170/450 | 07:27:39 | 9.2 | 5 | 07:28:30 | |
| 27 | 5.27 | 933 | 170/450 | 07:31:48 | 15.6 | 5 | 07:32:50 | |
| 28 | 5.27 | 936 | 170/450 | 07:35:26 | 21.5 | 5 | 07:36:40 | |
| 29 | 5.28 | 930 | 170/450 | 07:40:34 | 28 | 5 | 07:41:20 | 07:42:50 -> 90/710 |
| 30 | 3.81 | 797 | 90/710 | 07:46:09 | 34.1 | 5 | 07:47:20 | |
| 31 | 3.80 | 798 | 90/710 | 07:51:48 | 41.9 | 5 | 07:52:40 | |
| 32 | 3.84 | 804 | 90/710 | 08:02:18 | 45 | 5 | 08:03:00 | |

3) After sampling flask 32, close flasks 17-32

UTC: 08 : 03

Trap T: 40.0



III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 08:03

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)
- 9) Check that all boxes are filled/checked

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 13 Box #2 112

MEDUSA leak check procedures

RF09

Flask Leak Check Procedure #1:

File: 110705ALeakcheck1p/f.png

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 00:05:00 Finish: 00:20
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

RF09

Flask Leak Check Procedure #2:

File: 110705ALeakcheck2p/f.png

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 01:10:06 Finish: 01:23:45
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

110705 RF09 Leakcheck w/ob p/f.png

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass <2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| 01:11:30 | 8 | 167 | 174 | |
| 01:12:30 | 12 | 167 | 175 | |
| 01:13:30 | 13 | 168 | 175 | |
| 01:14:30 | 14 | 168 | 175 | |
| 01:16:30 | 16 | 169 | 175 | |

Midway
V. 2011.06.12

NCAR/SCRIPPS MEDUSA Checklist

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110706

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: D Downstream: E
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 13 Box #2 12
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and 7b) complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 23:11
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 23:56
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup 8 Pdown 175 Pbyass 140 then all power off

Flask ID Table (View from Front of Box)

| | | | | | | | |
|------------|---|------------|---|------------|---|------------|---|
| 13 1212 | L | 12 1117 | L | 5 1159 | L | 4 1149 | L |
| 14 1094 | L | 11 1436 | L | 6 1280 | L | 3 1289 | L |
| 15 1405 | L | 10 1248 | L | 7 1264 | L | 2 1217 | L |
| 16 1045 | L | 9 1365 | L | 8 1400 | L | 1 1146 | L |
| 17 1001 | L | 24 1061 | L | 25 1038 | L | 32 1341 | L |
| 18 1177 | L | 23 1037 | L | 26 1299 | L | 31 1233 | L |
| 19 1315 | L | 22 1065 | L | 27 1229 | L | 30 1267 | L |
| 20 1122 | L | 21 1058 | L | 28 1142 | L | 29 1126 | L |

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- ✓1) Load dry ice into dewar 0.5" from lid UTC 13:50
- ✓2) Ensure that MEDUSA valve control key is in place
- ✓3) 28 V breaker on, Valve box on, Main breaker on
- ✓4) Record P / Δ: Pup 370 / 382 Pdown 386 / +211 Pbyass 370 / +200
- ✓5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 14:12:03 Laptop time UTC 14:12:02
- ✓6) Connect traps if not already
- ✓7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓8) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- ✓9a) Re-install splinter shields 9b) Complete rack book
- ✓10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 450 prepurge T 45 flush T 120
- ✓11) Verify that no values are blinking on screen
- ✓12) Note trap temperature Trap T: 39.9
- ✓13) Complete bypass / system leak check
- ✓14) Ensure both controllers are to auto
- ✓15) Turn pumps on
- ✓16) Verify pressures are controlling and flow is as expected
Pup 169 Pdown 450 Pbyass 712 Flow 4000
- ✓17) Adjust flight code to 1 (130/580/30)
- ✓18) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓19) Pump breaker off (PB and VB stay on)
- ✓20) PCs to closed

(a little low, but this has been slowly decreasing possibly inlet sept drift (likely) or pump performance)
open to room
Pop - 762
Pdn 768
Pby 786

II. In flight

A. Immediately after take-off

Take-off time

UTC 15:33:52

- (a) PCs to auto

- ✓1) Turn pump breaker on 15:38:00
- ✓2) Verify pressures/flows agree with previous values from I.B.17.
Pup 124 Pdown 620 Pbyass 759 Flow 2500
- ✓3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- ✓4) Start pre-purge UTC 15:39:07
- ✓5) Note trap temperature Trap T: 38.6
- ✓6) Record png of prepurge: (YYMMDD_rf###_prepurge) File: 110707-RF10-prepurge P/A JDB

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|-----------|----------|-------|-----------|--|
| 1 | 4.67 | 830 | 125/620 | 16:16:52 | 40 | 1 | 16:17:50 |
| 2 | 4.67 | 827 | 125/620 | 16:26:07 | 32.8 | 1 | 16:26:45 |
| 3 | 4.62 | 816 | 125/620 | 16:30:28 | 26.3 | 1 | 16:31:05 |
| 4 | 4.61 | 818 | 125/620 | 16:35:37 | 18.4 | 1 | 16:36:30 |
| 5 | 4.61 | 819 | 125/620 | 16:39:13 | 13.1 | 1 | 16:40:00 |
| 6 | 4.61 | 818 | 125/620 | 16:42:36 | 7.9 | 1 | 16:43:30 |
| 7 | 4.61 | 816 | 125/620 | 16:45:49 | 3.1 | 1 | 16:46:20 |
| 8 | 4.61 | 816 | 125/620 | 16:50:39 | 0.5 | 1 | After 1 st dive => Flight plan 2 16:51:20 |
| 9 | 5.30 | 897 | 170/450 | 17:35:59 | 0.5 | 2 | 17:37:00 @ 17:33:25 => 170/450 |
| 10 | 5.29 | 893 | 170/450 | 17:40:31 | 6.7 | 2 | (one valve very sticky) |
| 11 | 5.31 | 900 | 170/450 | 17:43:38 | 11.4 | 2 | |
| 12 | 5.31 | 903 | 170/450 | 17:47:24 | 17.0 | 2 | |
| 13 | 5.32 | 906 | 170/450 | 17:51:51 | 23.8 | 2 | |
| 14 | 5.32 | 906 | 170/450 | 17:58:43 | 28 | 2 | 2 AM DEPARTURE = |
| 15 | 5.30 | 916 | 170/450 | 19:22:20 | 28 | 3 | FELL ASLEEP |
| 16 | 5.31 | 906 | 170/450 | 19:25:41 | 28 | 3 | |

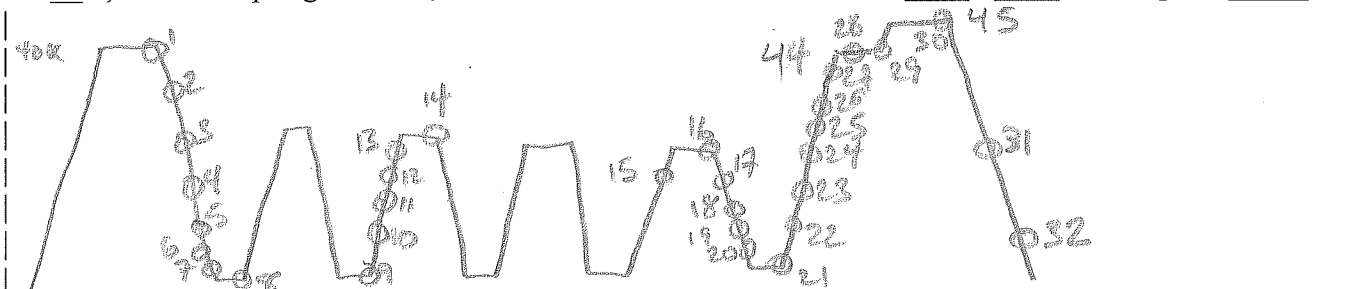
✓ 1) After sampling flask 16, close flasks 1-16 UTC: 19:26 Trap T: 40.1

✗ 2a) Turn Pump off ✗ 2b) Replace upstream trap ✗ 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes |
|-----|----------|------------|----------|----------|-------|-----------|------------------------------|
| 17 | 5.30 | 912 | 170/450 | 19:30:46 | 19.4 | 3 | 19:32:00 |
| 18 | 5.28 | 961 | 170/450 | 19:34:27 | 13.2 | 3 | 19:35:30 |
| 19 | 5.28 | 958 | 170/450 | 19:37:24 | 7.8 | 3 | 19:38:30 |
| 20 | 5.29 | 938 | 170/450 | 19:40:26 | 3 | 3 | 19:41:30 |
| 21 | 5.27 | 958 | 170/450 | 19:44:21 | 0.5 | 3/4 | 19:45:20 |
| 22 | 5.27 | 961 | 170/450 | 19:48:02 | 6.4 | 4 | 19:49:00 |
| 23 | 5.28 | 945 | 170/450 | 19:50:56 | 11.5 | 4 | 19:51:50 |
| 24 | 5.28 | 937 | 170/450 | 19:54:21 | 17.3 | 4 | 19:55:20 |
| 25 | 5.29 | 937 | 170/450 | 19:57:31 | 22.3 | 4 | 19:58:30 |
| 26 | 5.30 | 938 | 170/450 | 20:02:11 | 29.1 | 4 | 20:03:10 20:17:30 |
| 27 | 3.82 | 797 | 90/710 | 20:09:22 | 38.7 | 4 | 20:10:30 20:17:30 |
| 28 | 3.90 | 803 | 90/710 | 20:26:45 | 44 | 4 | 20:28:00 |
| 29 | 3.92 | 799 | 90/710 | 20:34:01 | 44 | 4 | 20:35:00 |
| 30 | 3.84 | 790 | 90/710 | 21:13:18 | 45 | 5 | 21:15:05 Perform A02 inlet |
| 31 | 5.29 | 957 | 170/450 | 21:24:52 | 27.7 | 5 | breath test! |
| 32 | 5.28 | 970 | 169/449 | 21:38:12 | 4.9 | 5 | not pass - broken |

✓ 3) After sampling flask 32, close flasks 17-32 UTC: 20:40 Trap T: 40.0 ramp

STUPIDLY closed flask 28 instead of 26, so flow => pop-off, went when I tried to sample 28



PMDY (start) (Pencil is preferred) Dips (Alt ↑, Time →) (end) PANX

Anchorage

III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC ? : ?

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 101 Box #2: 113

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110706-RF10-Leakcheck1P/F.png

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 231056 Finish: 2326
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

Flask Leak Check Procedure #2:

File: 110706-RF10-Leakcheck2P/F.png

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 235652 Finish: 02:23:54
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| 14:36:00 | 9 | 172 | 176 | |
| 14:41:00 | 14 | 173 | 177 | |
| | | | | |
| | | | | |

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110709

- 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- 2) Install new traps Upstream: B Downstream: F
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 101 Box #2 113
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7a) Replace cover shields and D7b complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 17 : 03
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 18 : 43
- 13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- 14) Record Ps: Pup 7 Pdown 79 Pbyass 180 then all power off

Flask ID Table (View from Front of Box)

| | | | | | | | | | | | |
|----|------|---|----|------|---|----|------|---|----|------|---|
| 13 | 1345 | ↙ | 12 | 1270 | ↙ | 5 | 1184 | ↙ | 4 | 1021 | ↙ |
| 14 | 1231 | ↙ | 11 | 1207 | ↙ | 6 | 1205 | ↙ | 3 | 1175 | ↙ |
| 15 | 1034 | ↙ | 10 | 1123 | ↙ | 7 | 1255 | ↙ | 2 | 1077 | ↙ |
| 16 | 1344 | ↙ | 9 | 1309 | ↙ | 8 | 1356 | ↙ | 1 | 1028 | ↙ |
| 17 | 1052 | ↙ | 24 | 1295 | ↙ | 25 | 1102 | ↙ | 32 | 1161 | ↙ |
| 18 | 1439 | ↙ | 23 | 1012 | ↙ | 26 | 1057 | ↙ | 31 | 1141 | ↙ |
| 19 | 1166 | ↙ | 22 | 1196 | ↙ | 27 | 1296 | ↙ | 30 | 1318 | ↙ |
| 20 | 1040 | ↙ | 21 | 1011 | ↙ | 28 | 1303 | ↙ | 29 | 1451 | ↙ |

possibly something on D-ring tube side

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- ✓1) Load dry ice into dewar 0.5" from lid UTC 16 : 00
- ✓2) Ensure that MEDUSA valve control key is in place
- ✓3) 28 V breaker on, Valve box on, Main breaker on
- ✓4) Record P / Δ: Pup 473 / +466 Pdown 487 / +304 Pby pass 483 / +303
- ✓5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 16 : 48 : 30 Laptop time UTC 16 : 48 : 30
- ✗6) Connect traps if not already
- ✓7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓8) Open all flask stopcocks 2 half turns Flasks opened by: ABW
- ✓9a) Re-install splinter shields 9b) Complete rack book
- ✓10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 170 Pdownset 450 prepurgeT 45 flushT 120
- ✓11) Verify that no values are blinking on screen
- ✓12) Note trap temperature Trap T: 40
- ✓13) Complete bypass / system leak check
- ✓14) Ensure both controllers are to auto
- ✓15) Turn pumps on
- ✓16) Verify pressures are controlling and flow is as expected
Pup 170 Pdown 449 Pby pass 732 Flow 4050
- ✓17) Adjust flight code to 1 (130/580/30) — 125/620/45
- ✓18) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓19) Pump breaker off (PB and VB stay on)
- ✓20) ~~PCs~~ PCs to close

II. In flight

A. Immediately after take-off

Take-off time UTC 18 : 06 : 41

— 1a) PCs →
auto

- ✓1) Turn pump breaker on 18: 06 : 56
- ✓2) Verify pressures/flows agree with previous values from I.B.17.
Pup 125 Pdown 620 Pby pass 745 Flow 2600
- ✓3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- ✓4) Start pre-purge UTC 18 : 07 : 43
- ✓5) Note trap temperature Trap T: 39.5
- ✓6) Record png of prepurge: (YYMMDD_rf###_prepurge) File: 110710_RF11-prepurge/fl.png

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan 3 (90/690/300) for at least the top samples

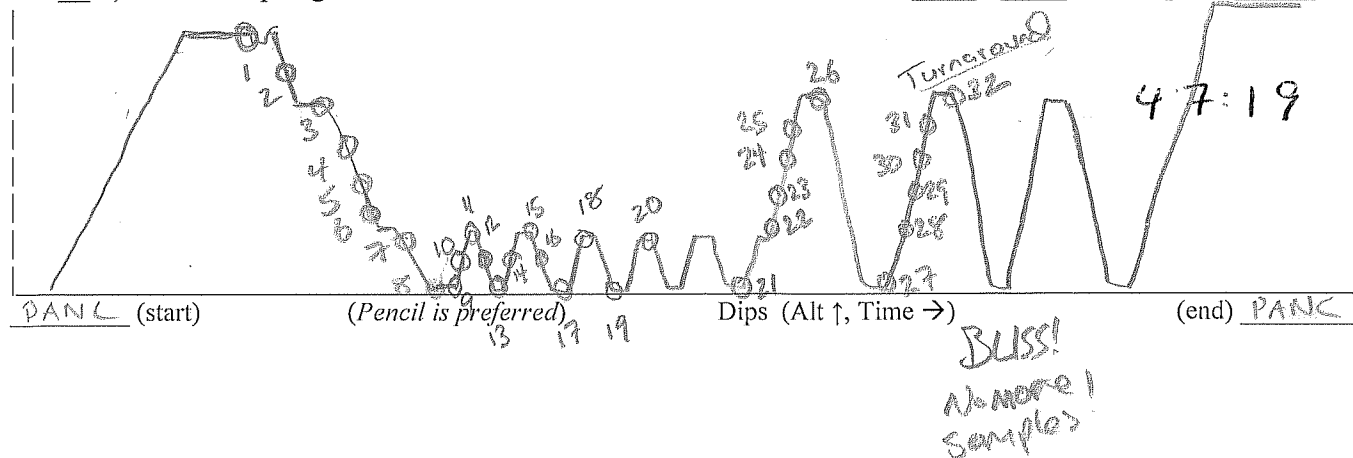
○ After first dive (40 kft to 1000 ft) is finished, adjust flight plan to 2 (180/400/120)

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes closed |
|-----|----------|------------|-----------|----------|-------|-----------|--|
| 1 | 4.68 | 833 | 125/620 | 19:05:28 | 4.0 | 1 | 19:06:10 ✓ A02 Inlet Breath |
| 2 | 4.68 | 828 | 125/620 | 19:13:21 | 33.5 | 1 | 19:13:45 |
| 3 | 4.66 | 824 | 125/620 | 19:18:34 | 2.8 | 1 | 19:19:00 |
| 4 | 4.59 | 815 | 125/620 | 19:23:46 | 19.6 | 1 | 19:24:15 should have shot for air |
| 5 | 4.59 | 815 | 125/620 | 19:28:57 | 13.5 | 1 | 19:29:45 |
| 6 | 4.58 | 812 | 125/620 | 19:33:29 | 8.0 | 1 | 19:34:05 |
| 7 | 4.59 | 809 | 125/620 | 19:36:59 | 4.2 | 1 | 19:37:35 1945:30 44 |
| 8 | 4.59 | 810 | 125/620 | 19:43:51 | 0.5 | 1 | After 1 st dive => Flight plan 2 19:44:30 |
| 9 | 5.33 | 907 | 170/450 | 19:47:35 | 0.5 | 2 | 19:48:00 |
| 10 | 5.33 | 908 | 170/450 | 19:51:12 | 2.7 | 2 | 19:51:45 |
| 11 | 5.33 | 908 | 170/450 | 19:55:01 | 5.5 | 2/3 | 19:55:30 |
| 12 | 5.33 | 909 | 170/450 | 19:58:18 | 1.8 | 3 | 19:58:55 |
| 13 | 5.32 | 907 | 170/450 | 20:04:36 | 0.5 | 3/4 | 20:05:10 |
| 14 | 5.33 | 907 | 170/450 | 20:09:23 | 2.9 | 3/4 | 20:10:15 |
| 15 | 5.32 | 922 | 170/450 | 20:15:37 | 5.5 | 4/5 | 20:16:10 |
| 16 | 5.32 | 908 | 170/450 | 20:18:46 | 1.9 | 5 | 20:19:15 |

✓ 1) After sampling flask 16, close flasks 1-16 UTC: 20:19 Trap T: 40.0
 ✗ 2a) Turn Pump off ✗ 2b) Replace upstream trap ✗ 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes closed |
|-----|----------|------------|----------|----------|-------|-----------|-----------------------|
| 17 | 5.31 | 912 | 170/450 | 20:24:22 | 0.5 | 5/6 | 20:25:00 |
| 18 | 5.28 | 959 | 170/450 | 20:35:21 | 5.5 | 6 | 20:36:10 |
| 19 | 5.28 | 959 | 170/450 | 20:47:26 | 0.5 | 6/7 | 20:48:30 |
| 20 | 5.30 | 939 | 170/450 | 20:57:07 | 5.5 | 7 | 20:58:00 |
| 21 | 5.27 | 955 | 170/450 | 21:30:27 | 0.5 | 8 | 21:31:30 |
| 22 | 5.27 | 960 | 170/450 | 21:36:43 | 6.5 | 8 | 21:37:30 |
| 23 | 5.29 | 943 | 170/450 | 21:40:03 | 11.6 | 8 | 21:41:00 |
| 24 | 5.29 | 939 | 170/450 | 21:44:25 | 18.2 | 8 | 21:45:30 |
| 25 | 5.30 | 938 | 170/450 | 21:48:22 | 24.1 | 8 | 21:49:25 |
| 26 | 5.30 | 937 | 170/450 | 21:55:56 | 2.8 | 8 | 21:57:00 |
| 27 | 5.29 | 935 | 170/450 | 22:22:12 | 0.5 | 9 | 22:23:45 |
| 28 | 5.29 | 937 | 170/450 | 22:28:49 | 6.0 | 9 | 22:29:30 |
| 29 | 5.30 | 931 | 170/450 | 22:32:36 | 11.7 | 9 | 22:33:40 A02 Inlet |
| 30 | 5.29 | 945 | 170/450 | 22:36:26 | 17.2 | 9 | 22:37:10 Breath Test! |
| 31 | 5.29 | 954 | 170/450 | 22:39:30 | 22.6 | 9 | 22:40:30 |
| 32 | 5.28 | 970 | 170/450 | 22:46:55 | 2.8 | 9 | 22:48:00 |

✓ 3) After sampling flask 32, close flasks 17-32 UTC: 22:48 Trap T: 39.8



III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 22: 47:19

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 117 Box #2 108

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110709_RF11_Leakcheck1/f.png

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 17:03:07 Finish: 17:17:50
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

Flask Leak Check Procedure #2:

File: 110709_RF11_Leakcheck2/f.png
- whole p/f .png

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 18:45:30 Finish: 19:00:15
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160 ^{4, 170, 173}
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-------|---------|----------|----------|
| 17:05:30 | 170.7 | 173.170 | 173 | |
| 17:06:30 | 9 | 170 | 173 | |
| 17:11:30 | 12 | 171 | 174 | |
| | | | | |
| | | | | |

Some notes on the ice:

- o Melt pools seem to be forming into narrowing melt rivers
- o Preferential cloud formation over open spots of water in the broken ice field.
- o Very dirty/muddy bits of ice near coast. Anne says this is dirty ice that comes from bottom of icebergs that touched coast/bottom.

NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110711

1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane

2) Install new traps Upstream: E Downstream: D

3) Load flasks, confirm old and record new flask IDs, and inspect o-rings

4) Record Flask Box Numbers: Box #1 117 Box #2 108

5) Install flask box retaining pins

6) Connect plumbing. Confirm lines are correctly installed with red label up

7a) Replace cover shields and 7b) complete rack book

8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)

9) If necessary, download data from previous flight to laptop and pen drive

10) Check that flask table is clear. If not, "clear all"

11) Complete flask leak check procedure #1

Start UTC 03:14

12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2

Start UTC 16:30

13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed

14) Record Ps: Pup ~~157~~ Pdown ~~157~~ Pbypass ~~157~~ then all power off

8 150 150 @ 03:32

110711 on 110711

Don't turn
VIB on. Start
system.
Run Flask
LC2.

Flask ID Table (View from Front of Box)

| | | | | | | | | | | | |
|----|------|---|----|------|---|----|------|---|----|-------------------------|---|
| 13 | 1254 | L | 12 | 1390 | L | 5 | 1135 | L | 4 | 1283 | L |
| 14 | 1298 | L | 11 | 1385 | L | 6 | 1386 | L | 3 | 1095 | L |
| 15 | 1274 | L | 10 | 1302 | L | 7 | 1039 | L | 2 | 1409 | L |
| 16 | 1300 | L | 9 | 1047 | L | 8 | 1239 | L | 1 | 1036 | L |
| 17 | 1333 | L | 24 | 1388 | L | 25 | 1048 | L | 32 | 1447 | L |
| 18 | 1334 | L | 23 | 1256 | L | 26 | 1197 | L | 31 | 1139 | L |
| 19 | 1005 | L | 22 | 1183 | L | 27 | 1023 | L | 30 | 1082 | L |
| 20 | 1131 | L | 21 | 1110 | L | 28 | 1200 | L | 29 | 1246 1032 | L |

B. 2-hours before take-off.: Dry ice and Sampler Set-up

- 1) Load dry ice into dewar 0.5" from lid UTC 16:10
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup 469 / +461 Pdown 512 / 433 Pbyass 507 / 328 16:15
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 16:29:28 Laptop time UTC 16:29:27
- 6) Connect traps if not already
- 7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 8) Open all flask stopcocks 2 half turns Flasks opened by: JDB/AWJ
- 9a) Re-install splinter shields 9b) Complete rack book
- 10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 85 Pdownset 690 prepurgeT 20 flushT 300
- 11) Verify that no values are blinking on screen
- 12) Note trap temperature Trap T: 40.0
- 13) Complete bypass / system leak check
- 14) Ensure both controllers are to auto
- 15) Turn pumps on
- 16) Verify pressures are controlling and flow is as expected
Pup 85 Pdown 690 Pbyass 745 Flow 1567-1597
- 17) Adjust flight code to **1** (130/580/30)
- 18) If necessary, "Clear All" (after being sure data from last flight copied)
- 19) Pump breaker off (PB and VB stay on)
- 20) Close PC 1, 2

II. In flight

A. Immediately after take-off

Take-off time UTC 18:24:22

- 1) Turn pump breaker on
- 2) Verify pressures/flows agree with previous values from I.B.17.
Pup 127 Pdown 619 Pbyass 761 Flow 2900
- 3) Verify that Vstat2, CO₂, and H₂O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO₂ and H₂O stabilize
- 4) Start pre-purge UTC 18:26:32
- 5) Note trap temperature Trap T: 38.4
- 6) Record png of prepurge: (YYMMDD_rf##_prepurge) File: 110711-RF12-PrepurgeP1f.jpg

B. Sample 45 secs after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Whenever possible, favor flushing a flask as long as reasonable possible

If pilots ascend to over 41 kft on initial, switch to flight plan **3** (90/690/300) for at least the top samples

- After first dive (40 kft to 1000 ft) is finished, adjust flight plan to **2** (180/400/120)

Handwritten scribbles at the top of the page.

| Pos | Flow (V) | Psa (torr) | PC Setpts | End Time | PALTF | Profile # | Notes Closed | Notes |
|-----|----------|------------|-----------|----------|-------|----------------|-------------------------------|--------------------------|
| 1 | 4.70 | 834 | 125/620 | 19:17:54 | 40 | 1 | 19:19:00 | |
| 2 | 4.67 | 825 | 125/620 | 19:23:14 | 32.1 | 1 | 19:23:50 | |
| 3 | 4.65 | 818 | 125/620 | 19:27:40 | 25.7 | 1 | 19:28:05 | |
| 4 | 4.60 | 813 | 125/620 | 19:32:29 | 19.5 | 1 | 19:33:00 | |
| 5 | 4.61 | 816 | 125/620 | 19:39:51 | 14.4 | 1 | 19:40:30 | |
| 6 | 4.60 | 815 | 125/620 | 19:43:53 | 8.3 | 1 | 19:44:20 | |
| 7 | 4.61 | 813 | 125/620 | 19:48:53 | 6.8 | 1 | 19:49:25 | |
| 8 | 4.61 | 813 | 125/620 | 19:59:36 | 0.6 | 1/2 | After 1 st dive => | Flight plan 2 20:02:00 |
| 9 | 4.63 | 818 | 125/620 | 20:04:54 | 9.4 | 2 | 20:05:30 | |
| 10 | 4.64 | 818 | 125/620 | 20:10:45 | 22 | 2 | 20:11:20 | |
| 11 | 4.63 | 820 | 125/620 | 20:20:08 | 28 | 2 | 20:21:00 | |
| 12 | 4.65 | 820 | 125/620 | 20:33:36 | 28 | 2 3 | 20:34:10 | PCAB Test |
| 13 | 4.63 | 819 | 125/620 | 20:41:34 | 16 | 2 3 | 20:42:20 | |
| 14 | 4.63 | 817 | 125/620 | 20:45:42 | 9.6 | 2 3 | 20:46:10 | |
| 15 | 4.62 | 821 | 125/620 | 20:51:07 | 4.9 | 3 | 20:51:50 | } night steps back |
| 16 | 4.62 | 817 | 125/620 | 20:55:53 | 0.5 | 3 | 20:56:30 | |

✓ 1) After sampling flask 16, close flasks 1-16 UTC: 20:56 Trap T: 40.2

✗ 2a) Turn Pump off ✗ 2b) Replace upstream trap ✗ 2c) Turn pump back on

| Pos | Flow (V) | Psa (torr) | P Setpts | End Time | PALTF | Profile # | Notes Closed | Notes |
|-----|----------|------------|----------|----------|-------|-----------|--------------|--------------------------------|
| 17 | 3.94 | 786 | 90/710 | 21:55:48 | 43 | 4 | 21:57:30 | 21:48:30 -> 90/710 |
| 18 | 3.93 | 800 | 90/710 | 22:19:29 | 43 | 4 | 22:20:30 | |
| 19 | 3.93 | 804 | 90/710 | 22:56:42 | 43 | 4 | 22:57:30 | |
| 20 | 3.92 | 797 | 90/710 | 23:04:59 | 34.5 | 4 | 23:06:00 | CasIn CO ₂ 23:14:10 |
| 21 | 3.91 | 809 | 90/710 | 23:10:55 | 26 | 4 | 23:12:00 | Test ✓ back |
| 22 | 5.30 | 972 | 170/450 | 23:18:22 | 15.0 | 4 | 01:00 | 170/450 smells like ozone |
| 23 | 5.30 | 950 | 170/450 | 23:26:40 | 10.1 | 4 | 01:00 | |
| 24 | 5.30 | 939 | 170/450 | 23:33:15 | 4.8 | 4 | | 23:50:20 -> 90/710 |
| 25 | 3.97 | 803 | 90/710 | 00:02:18 | 45 | 5 | | |
| 26 | 3.95 | 805 | 90/710 | 00:17:28 | 45 | 5 | | |
| 27 | 3.95 | 806 | 90/710 | 00:28:32 | 31 | 5 | | |
| 28 | 5.32 | 948 | 170/450 | 00:34:11 | 20 | 5 | | 170/450 @ 00:29:15 |
| 29 | 5.31 | 936 | 170/450 | 00:37:13 | 13.9 | 5 | | |
| 30 | 5.30 | 950 | 170/450 | 00:39:58 | 8.8 | 5 | | 102 Bath Test #2 |
| 31 | 5.24 | 955 | 170/450 | 00:46:04 | 6.9 | 5 | | |
| 32 | 5.28 | 970 | 170/450 | 00:49:18 | 6.9 | 5 | | |

3) After sampling flask 32, close flasks 17-32 UTC: 01:00 Trap T: 40

III. At the end of the sampling

- 1) Turn Pumps breaker off
- 2) Ensure all flask valves closed

UTC 00:44

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Download flask sampling data to laptop and pen drive
- 4a) Turn off Mains breaker 4b) Valve box breaker 4c) 28V breaker
- 5) Empty beads from upstream trap into 'wet' bead container to dry
- 6) Open downstream trap and set upright
- 7) ftp *.tab, and MED_*_Notes.txt files for this flight to the ao2raw directory on catalog.eol.ucar.edu (or email if ftp does not work)
- 8) email a scan of this checksheet to BBS (or fax if scanner not available)

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: _____ Box #2 _____

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

File: 110711 ^{RF12} ~~12~~ LeakcheckP1C.png

- 1) 28 V breaker on, Valve box on, Pump box on
- 2) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, Bypass on
- 3) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 4) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 5) Adjust prepurge time to 20 seconds
- 6) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 7) Run 20-second prepurge to evacuate lines. Start: 03:35:53 Finish: 03:28
- 8) Save PNGs of AEROS P,Flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
- 9) Close Pdn, turn pumps off (will leave in position 1)
- 10) Turn bypass on

Flask Leak Check Procedure #2:

File: 110711 ^{RF12} Leakcheck2B/f

- 1) "Clear All"
- 2) Valve box off, main breaker off then on to reset, then valve box back on
- 3) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust prepurge time to 20 seconds
- 7) Run 20-second prepurge to check all flask downstream tube Ps
- 8) Record times for AEROS matching. Start: 16:30:06 Finish: 16:45
- 9) Save PNGs of AEROS P/Flow/Stat to laptop (YYMMDD_RF##_Leakcheck2.png)
- 10) Turn bypass on

Bypass / System Leak Check Procedure:

- 1) Ensure bypass on, close PC1 and open PC2
- 2) Turn on pump breaker and let run for 1 minute
- 3) Verify Pup ~ 10, Pdown ~160, Pbyypass ~160
- 4) Switch PC2 to closed and turn off pump
- 5) Wait 15 seconds and note Pu, Pd, Pb in table below.
- 6) After 1 minute, record values again.
- 7) After 5 minutes, record values again
- 8) If Pdown and Pbyypass < 2 torr/5 mins, skip to 11
- 9) If values are not ok, turn PC1/PC2 to auto, run gas for 15 seconds, close PC2 for 1 second, and then shut off pump to pressurize system in bypass. Snoop trap fittings, and fittings between and to boxes, and fix/tighten as necessary
- 10) Return PC1 and PC2 to auto

| Time (UTC) | Pup | Pdn | Pbyypass | Comments |
|------------|-----|-----|----------|----------|
| 17:00:20 | 6 | 169 | 171 | |
| 17:01:20 | 6 | 169 | 171 | |
| 17:05:20 | 9 | 170 | 172 | |
| | | | | |
| | | | | |

