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: 06  Box #2: 15
   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)

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B. 2-hours before take-off.: Dry ice and Sampler Set-up
   1) Load dry ice into dewar 0.5" from lid
   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 : 08  Laptop time UTC 14 : 44 : 08
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
P upset ____ P downstream ____ prepurge T ____ flush T ____
11) Verify that no values are blinking on screen
12) Note trap temperature  
Trap T:  
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
P upset ____ P downstream ____ P bypass ____ Flow ____
17) If necessary, "Clear All" (after being sure data from last flight copied)
18) Pump breaker off (PB and VB stay on)

II. In flight
A. Immediately after take-off  
Take-off time UTC 13:04:58
1) Turn pump breaker on
2) Verify pressures/flows agree with previous values from I.B.16.
P upset 350 P downstream 350 P bypass 350 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:  
6) Record png of prepurge: (YYMMDD_r##_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)

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<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
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1) After sampling flask 16, close flasks 1-16  
UTC: 


2) Note trap temperature

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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

---

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:**

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:**

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, 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 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

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<th>Time (UTC)</th>
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<th>Pbypass</th>
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NCAR/SCRIPPS MEDUSA Checklist  
Date (YYMMDD): 10609 From-To: B3C - 952 (via TW)  
V. 2011.06.06

I. Preflight
A. Day(s) before flight  
   ✓ 1) Prepare new traps w/ clean beads filled to 3\textquotedbl} below edge and bring to plane
   ✓ 2) Install new traps  
   ✓ 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

<table>
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<tr>
<th>Flask ID Table (View from Front of Box)</th>
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B. 2-hours before take-off: Dry ice and Sampler Set-up
   ✓ 1) Load dry ice into dewar 0.5\textquotedbl} from lid
   ✓ 2) Ensure that MEDUSA valve control key is in place
   ✓ 3) 28 V breaker on, Valve box on, Main breaker on
   ✓ 4) Record $P/\Delta P$: Pup $\text{LH}$ Pdown $\text{LH}^2$ Pbypass $\text{LH}^2$
   ✓ 5) Sync MEDUSA clock with clock on laptop +/- 1 sec  
      MEDUSA time UTC $\text{LH}^2$ Laptop time UTC $\text{LH}^2$
II. In flight
A. Immediately after take-off
   1) Turn pump breaker on 16:37:00
   2) Verify pressures/flows agree with previous values from I.B.16.
      Pup 1800 Pdown 400 Pby 40 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
      UTC 16:34:30
   4) Start pre-purge
      UTC 16:34:30
   5) Note trap temperature
   6) Record png of prepurge: (YYMMDD_rff##_prepurge) File: 110609_1f02_prepurge.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)

<table>
<thead>
<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
<th>Profile #</th>
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1) After sampling flask 16, close flasks 1-16

UTC: 16:05
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 ___
MEDUSA leak check procedures

**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: __________ 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:**

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, 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 9
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

<table>
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<tr>
<th>Time (UTC)</th>
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<th>Pdn</th>
<th>Pbypass</th>
<th>Comments</th>
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</tr>
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NCAR/SCRIPPS MEDUSA Checklist

I. Preflight

A. Day(s) before flight

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

Flask ID Table (View from Front of Box)

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<th>13</th>
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Date (YYMMDD) = 110613
Start UTC 22:29:30

Didn't have time but did this earlier in deg => was...
B. 2 hours before take-off: Dry ice and Sampler Set-up

1) Load dry ice into dewar 0.5" from lid
2) Ensure that MEDUSA valve control key is in place
3) 28 V breaker on, Valve box on, Main breaker on
4) Record P / A: Pup \( 2^{74} / \times \) Pdown \( \approx 351 / \times \) Pbypass \( \approx 347 / \times \)
5) Sync MEDUSA clock with clock on laptop +/- 1 sec

MEDUSA time UTC 14 : 34 : 30 Laptop time UTC 14 : 31 : 30

6) Connect traps if not already
7) Ensure VL V1 = 1, VL V2 = 1, VL V3 = odd, bypass on, pumps off
8) Open all flask stopcocks 2 half turns

- Flasks opened by: AWD
- 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 500 min flushT 120

11) Verify that no values are blinking on screen

12) Note trap temperature
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 140 P bypass 502 Flow 4900

17) Adjust flight code to 1 (130/580/30) 150 580 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

1) Turn pump breaker on
2) Verify pressures/flows agree with previous values from I.B.17.

Pup 130 Pdown 580 P bypass 140 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
5) Note trap temperature

6) Record start of pre-purge: (YYMMDD_rf##_prepurge) File: 110614-rf01-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)
<table>
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<th>Psa (torr)</th>
<th>PC Setpts</th>
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1) After sampling flask 16, close flasks 1-16

UTC: 18:38:20

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

---

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

UTC: 

Trap T: ___________
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 ao2.raw 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: ✔️ 7   Box #2: ☐️ 7
MEDUSA leak check procedures

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
- 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:

- 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
- 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 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

<table>
<thead>
<tr>
<th>Time (UTC)</th>
<th>Pup</th>
<th>Pdn</th>
<th>Pbypass</th>
<th>Comments</th>
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Plot standardizations

Flight:
- MCPBY: 1100
- MDPKA: 500
- MEDSTAT1: 2
- MEDFLW: 7
- MEDPT1: 700
- MEDPT2: 0

Leakchecks

Presures
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

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 2 198  Pdown 198  Pbypass 182 then all power off

Flask ID Table (View from Front of Box)

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</table>
B. 2-hours before take-off.: Dry ice and Sampler Set-up
   1) Load dry ice into dewar 0.5” from lid
   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 42'4' / 42'2' Pdown 42'2' / 31'4' Pbypass 45'7' / 30'5
   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
   7) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
   8) Open all flask stopcocks 2 half turns Flasks opened by: 1/13
   9a) Re-install splinter shields 9b) Complete rack book
   10) Confirm P upstream, P downstream, pre purge T, and min flush T settings
       Pupset 16'9' Pdownset 45'0' pre purge T 45' flush T 12'0
   11) Verify that no values are blinking on screen
   12) Note trap temperature Trap T: 49'0
   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 16'9' Pdown 45'0' Pbypass 72'7' Flow 45'0'0
   17) Adjust flight code to 1 (130/580/18'0'45
   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 15:09:29
   1) Turn pump breaker on
   2) Verify pressures/flows agree with previous values from I.B.17.
      Pup 13'0' Pdown 55'0' Pbypass 76'0' 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
   5) Note trap temperature
   6) Record ping of pre-purge: (YYMMDD_r###_pre purge) File: 11062022_r****_pre purge.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)
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<th>End Time</th>
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After sampling flask 16, close flasks 1-16

UTC: 20 : 17    Trap T: 40.1

\(\sqrt{2b})\) Turn Pump off \(\sqrt{2b})\) Replace upstream trap \(\sqrt{2b})\) Turn pump back on

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After sampling flask 32, close flasks 17-32

UTC: 01 : 25    Trap T: 14.6

\(\sqrt{3b})\) After sampling flask 32, close flasks 17-32

UTC: 01 : 25    Trap T: 14.6

\(\sqrt{90/970}°C\)
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) 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
   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

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 (pull bypass jumper)
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:

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
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 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

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To Do

- tell Britt I'm not seeing secs to purge, secs to cal in run control window
- establish
- Define new P set points
NCAR/SCRIPPS MEDUSA Checklist

I. Preflight

A. Day(s) before flight

✓ 1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
✓ 2) Install new traps
✓ 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
✓ 7) 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 11 Pdown 173 Pby 177 then all power off

Flask ID Table (View from Front of Box)

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

1) Load dry ice into dewar 0.5" from lid
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 = 16:22:02 Laptop time UTC = 16:22:02
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
9) Re-install splinter shields
   Complete rack book
10) Confirm P upstream, P downstream, pre purge, T, and min flush T settings
    Pupset = Pdownset = 430 prepurge T = 45 flush T = 120
11) Verify that no values are blinking on screen
12) Note trap temperature
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 = 430 Pbypass = 750 Flow = 4400
17) Adjust flight code to 1 (130/580/30) ~ (125/610/95)
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

1) Turn pump breaker on
2) Verify pressures/flows agree with previous values from I.B.17.
   Pup = Pdown = 430 Pbypass = 750 Flow = 4400
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
5) Note trap temperature
   Trap T = 40.0
6) Record png of pre-purge: (YYMMDD_rf##_pre purge) 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)
   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_MEDbreathtest35_36.png
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1) After sampling flask 16, close flasks 1-16

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

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

UTC: 01:28  Trap T: 400
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) 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
   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:
- 28 V breaker on, Valve box on, Pump box on
- 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 pre purge 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 pre purge to evacuate lines. Start: 14:53:00. Finish: 15:03:00
- 8) Save PNGs of AEROS PFlow/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:
- 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, MEDPYP recording
- 4) Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times).
- 5) Close Pdn and turn pumps off
- 6) Adjust pre purge time to 20 seconds
- 7) Run 20-second pre purge to check all flask downstream tube Ps
- 9) Save PNGs of AEROS PFlow/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

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<tr>
<th>Time (UTC)</th>
<th>Pup</th>
<th>Pdn</th>
<th>Pbypass</th>
<th>Comments</th>
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<td>16:29</td>
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</table>
Now on calichy... W.I.T. losses
NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight
A. Days before flight

1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring the plane to plane
2) Install new traps
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”
11) Complete flask leak check procedure #1
12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2
13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
14) Record Ps: Pup Pdown Pbypass then all power off

<table>
<thead>
<tr>
<th>Flask ID Table (View from Front of Box)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
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<td>19</td>
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<tr>
<td>20</td>
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</tbody>
</table>

Major leak detected and addressed 20110621 (see MED III book pp 80-92)
B. 2-hours before take-off: Dry ice and Sampler Set-up
   1) Load dry ice into dewar 0.5” from lid
   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 946 / Pdown 818 / Pbypass 421
   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  
   9b) Complete rack book → actually Aaron just
      10) Confirm P upstream, P downstream, pre purge T, and min flush T settings
      Pupset 130  Pdownset 430  pre purge T 120  flush T 120
      11) Verify that no values are blinking on screen
      Trap T: 39.1
   12) Note trap temperature
   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 121  Flow 1100
   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)
      22) Pup, Pdown 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
   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
      Trap T: 39.1
   5) Note trap temperature
   6) Record png of pre-purge: (YYMMDD_rf##_prepurge) File: 06 22_04-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)
<table>
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<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
<th>Profile #</th>
<th>Notes</th>
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1) After sampling flask 16, close flasks 1-16

UTC: 02:57
Trap T: 37.5

x 2a) Turn Pump off

x 2b) Replace upstream trap

x 2c) Turn pump back on

<table>
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<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
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3) After sampling flask 32, close flasks 17-32

UTC: 07:29
Trap T: 40.5

PHUO (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

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: 15  Box #2 162
MEDUSA leak check procedures

**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
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:**

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 Ps, 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
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 12
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

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<tr>
<th>Time (UTC)</th>
<th>Pup</th>
<th>Pdn</th>
<th>Pbypass</th>
<th>Comments</th>
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</table>
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 10 2
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)
9a) 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 ≤ Pdown 172  Pbypass 72  then all power off

<table>
<thead>
<tr>
<th>Flask ID Table (View from Front of Box)</th>
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</thead>
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<td>19</td>
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</tbody>
</table>
B.  2-hours before take-off: Dry ice and Sampler Set-up

1. Load dry ice into dewar 0.5" from lid
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 66.1 / +116 / Pdown 667 / ___ Pbypass 613 / ___
5. Sync MEDUSA clock with clock on laptop +/- 1 sec
   MEDUSA time UTC 18:53:00 Laptop time UTC 18:53:00
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: ___
9a) Re-install splinter shields ___ 9b) Complete rack book
10. Confirm P upstream, P downstream, pre purge T, and min flush T settings
   Puser 170 Pdownset 430 pre-purge T 45 flush T 120
11. Verify that no values are blinking on screen
12. Note trap temperature
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 161 Pdown 430 Pbypass 425 Flow 4200
17. Adjust flight code to 1 (130/580/30)
X 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 21:30:00
1. Turn pump breaker on
2. Verify pressures/flows agree with previous values from I.B.17.
   Pup 125 Pdown 630 Pbypass 425 Flow 200
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 pre-purge: (YYMMDD_rf##_prepurge) File: mo625_rfs_prepurge.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)
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

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

UTC: 04:22  Trap T: 39.9
III. At the end of the sampling
   ✓ 1) Turn Pumps breaker off
   2) 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
   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 their back out. Checked to see they were all the way out.

Lo side Ps

\[ \begin{align*}
\text{LS} &= 12.7 \\
\text{LT} &= 11.0 \\
\text{WT} &= 13.4
\end{align*} \]

Hi side Ps (while we’re at it)

\[ \begin{align*}
\text{t} &= 110625 \ 17:00 \ \text{Local} \\
\text{LS} &= 1610 \\
\text{LT} &= 1810 \\
\text{WT} &= 370
\end{align*} \]

Oops, wrong. Checksheet. Transfer into AO2
MEDUSA leak check procedures

**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
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:**
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): 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: 
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 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

<table>
<thead>
<tr>
<th>Time (UTC)</th>
<th>Pup</th>
<th>Pdn</th>
<th>Pbypass</th>
<th>Comments</th>
</tr>
</thead>
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<td></td>
</tr>
<tr>
<td>19:16:45</td>
<td>16</td>
<td>173</td>
<td>175</td>
<td></td>
</tr>
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</table>
NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

- Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- Install new traps
- Load flasks, confirm old and record new flask IDs, and inspect o-rings
- Record Flask Box Numbers: Box #1 18 Box #2 110
- Install flask box retaining pins
- Connect plumbing. Confirm lines are correctly installed with red label up
- Replace cover shields and complete rack book
- Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- If necessary, download data from previous flight to laptop and pen drive
- Check that flask table is clear. If not, “clear all”
- Complete flask leak check procedure #1
- Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2
- Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- Record Ps: Pup 1 Pdown 146 Pbypass 168 then all power off

<table>
<thead>
<tr>
<th>Flask ID Table (View from Front of Box)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
<tr>
<td>11</td>
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<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

Start UTC 21:32

Start UTC 22:26
B. 2-hours before take-off: Dry ice and Sampler Set-up

1. Load dry ice into dewar 0.5” from lid
2. Ensure that MEDUSA valve control key is in place
3. 28 V breaker on, Valve box on, Main breaker on
4. Record P / A: Pup 129 638 Pdown 69 7 / 619 Pby 582 / 514
5. Sync MEDUSA clock with clock on laptop +/- 1 sec
   MEDUSA time UTC 12:32:01 Laptop time UTC 12:32:00
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, pre purge T, and min flush T settings
    Pupset 170 Pdownset 450 pre purge T < flush T 120
11. Verify that no values are blinking on screen
12. Note trap temperature
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 129 Pdown 450 Pby 763 Flow 4800
17. Adjust flight code to 1 (130/500/30) 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. RC 1, 2 → closed

II. In Flight

A. Immediately after take-off
1. Take-off time UTC 23:09:30
2. Turn pump breaker on
3. Verify pressures/flows agree with previous values from I.B.17.
   Pup 129 Pdown 620 Pby 456 Flow 7400
4. 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
5. Start pre-purge
6. Note trap temperature
7. Record png of pre purge: (YYMMDD_r#_prepurge) File: 110628_RFO6_prepurge.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)
<table>
<thead>
<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
<th>Profile #</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>823</td>
<td>125/620</td>
<td>23:48:00</td>
<td>1</td>
<td>1</td>
<td>23:49:30</td>
</tr>
<tr>
<td>2</td>
<td>4.63</td>
<td>816</td>
<td>125/620</td>
<td>00:52:32</td>
<td>1</td>
<td>1</td>
<td>00:53:10</td>
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<tr>
<td>3</td>
<td>4.63</td>
<td>815</td>
<td>125/620</td>
<td>00:57:10</td>
<td>22.8</td>
<td>1</td>
<td>00:57:45</td>
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<td>824</td>
<td>125/620</td>
<td>01:02:14</td>
<td>29.9</td>
<td>1</td>
<td>01:03:00</td>
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<td>4.67</td>
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<td>125/620</td>
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<td></td>
<td>01:09:10</td>
</tr>
<tr>
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<td>125/620</td>
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<td>40.0</td>
<td>1</td>
<td>01:15:10</td>
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<td>796</td>
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<tr>
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<td>833</td>
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<td>31</td>
<td>2</td>
<td>02:26:10</td>
</tr>
<tr>
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<td>125/620</td>
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<tr>
<td>11</td>
<td>4.64</td>
<td>814</td>
<td>125/620</td>
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<td>19.2</td>
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<td>03:16:57</td>
<td>2.8</td>
<td>3</td>
<td>03:17:45</td>
</tr>
</tbody>
</table>

✓ 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

<table>
<thead>
<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
<th>Profile #</th>
<th>Notes</th>
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<tbody>
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<td>3</td>
<td>03:28:10</td>
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<tr>
<td>19</td>
<td>5.31</td>
<td>964</td>
<td>170/450</td>
<td>03:30:00</td>
<td>8.7</td>
<td>3</td>
<td>03:31:10</td>
</tr>
<tr>
<td>20</td>
<td>5.31</td>
<td>976</td>
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<td>03:33:55</td>
<td>2.7</td>
<td>3</td>
<td>03:34:40</td>
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<tr>
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<td>170/450</td>
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<td>0.5</td>
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<tr>
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<td>05:13:28</td>
<td>1.0</td>
<td>5</td>
<td>05:18:30</td>
</tr>
</tbody>
</table>

✓ 3) After sampling flask 32, close flasks 17-32
UTC: 05:18
Trap T: 40

\[ NWSH \] (start)  \[ \text{(Pencil is preferred)} \]  \[ Dips (Alt ↑, Time →) \]  \[ \text{(end) } NWA \]
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) 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
   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: III  Box #2: 7
MEDUSA leak check procedures

**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 pre purge time to 20 seconds (Plan Code d)
6. Toggle between bypass on/off 6 times over 1 min to pull PSA down to < 200
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:**

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 pre purge time to 20 seconds
7. Run 20-second pre purge to check all flask downstream tubing Ps
8. Record times for AEROS matching. Start: 01:47:00 Finish: 20:48:40
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 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

<table>
<thead>
<tr>
<th>Time (UTC)</th>
<th>Pup</th>
<th>Pdn</th>
<th>Pbypass</th>
<th>Comments</th>
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</thead>
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<td>173</td>
<td>(screwed)</td>
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<td>174</td>
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<td>20:57:00</td>
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<tr>
<td>21:05:00</td>
<td>12</td>
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<td>174</td>
<td></td>
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</tbody>
</table>
NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight
A. Day(s) before flight

1) Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
2) Install new traps
3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
4) Record Flask Box Numbers: Box #1 111 Box #2 17
5) Install flask box retaining pins
6) Connect plumbing. Confirm lines are correctly installed with red label up

a) 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 00:00:00
12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 01:00:02
13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
14) Record Ps: Pup ≤ Pdown ≤18 Pbypass ≤14 then all power off

Flask ID Table (View from Front of Box)

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<thead>
<tr>
<th>Flask IDs</th>
<th>Flask IDs</th>
<th>Flask IDs</th>
<th>Flask IDs</th>
<th>Flask IDs</th>
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</table>

One valve completely open for extra time
B. 2-hours before take-off: Dry ice and Sampler Set-up

1. Load dry ice into dewar 0.5" from lid
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 $\frac{642}{654}$, Pdown $\frac{654}{477}$, Pbypass $\frac{654}{477}$
5. Sync MEDUSA clock with clock on laptop +/- 1 sec
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
9a) Re-install splinter shields  
9b) Complete rack book
10. Confirm P upstream, P downstream, prepurge T, and min flush T settings
    Pup $\frac{130}{450}$, Pdown $\frac{450}{450}$, Pbypass $\frac{450}{120}$
11. Verify that no values are blinking on screen
12. Note trap temperature  
13. Complete bypass / system leak check
14. Ensure both controllers are to auto
15. Turn pumps on
16. Verify pressures are controlling and flows as expected
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. Pup $\frac{130}{450}$, Pdown $\frac{450}{450}$, Pbypass $\frac{450}{120}$

II. In flight

A. Immediately after take-off  
1. Turn pump breaker on
2. Verify pressures/flows agree with previous values from I.B.17.
3. Pup $\frac{130}{450}$, Pdown $\frac{450}{450}$, Pbypass $\frac{450}{120}$
4. Verify that Vstat2, CO2, and H2O are all reading correctly and no values on screen. If sampling schedule allows, let CO2 and H2O stabilize
5. Start pre-purge
6. Note trap temperature
7. 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)
<table>
<thead>
<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>P Setpts</th>
<th>End Time</th>
<th>PALTF</th>
<th>Profile #</th>
<th>Notes/Closed</th>
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<td>909</td>
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<td>1000</td>
<td>4</td>
<td>03:14:30</td>
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</table>

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

2a) Turn Pump off

2b) Replace upstream trap

2c) Turn pump back on

UTC: 03:17
Trap T: 40

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

UTC: 06:17
Trap T: 40.1

Pencil is preferred

Dips (Alt ↑, Time →)

(end) PD601

(start)
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) Ensure all flask valves closed

UTC 06:13:50

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

**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)
   - Adjust pre purge time to 20 seconds
   - Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
   - Run 20-second pre purge to evacuate lines. Start: 23:56:25 Finish: 00:12:37
   - Save PNGs of AEROS P flow/Stat to laptop (YYMMDD_RF##_Leakcheck1.png)
   - Close Pdn, turn pumps off (will leave in position 1)
10. Turn bypass on

**Flask Leak Check Procedure #2:**

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 Psao, MEDPYPB recording
4. Open Pdn, turn pumps on and evacuate sample and bypass (toggle 6 times). 25 155 156
5. Close Pdn and turn pumps off
6. Adjust pre purge time to 20 seconds
7. Run 20-second pre purge 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, 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 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

<table>
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<tr>
<th>Time (UTC)</th>
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<th>Pbypass</th>
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<td>23:11:30</td>
<td>10</td>
<td>173</td>
<td>172</td>
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</table>
I. Preflight
   A. Day(s) before flight
      - Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
      - Install new traps
      - Load flasks, confirm old and record new flask IDs, and inspect o-rings
      - Record Flask Box Numbers: Box #1 123, Box #2 107
      - Install flask box retaining pins
      - Connect plumbing. Confirm lines are correctly installed with red label up
      - Replace cover shields and (b) complete rack book
      - Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
      - If necessary, download data from previous flight to laptop and pen drive
      - Check that flask table is clear. If not, “clear all”
      - Complete flask leak check procedure #1
      - Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2
      - Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
      - Record Ps: Pup 6, Pdown 123, Pbypass 147, then all power off

---

### Flask ID Table (View from Front of Box)

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Correction to note 1243 replacing 1452

1452/2 Broken Threads on Plunger
B. 2-hours before take-off: Dry ice and Sampler Set-up

- Load dry ice into dewar 0.5" from lid
- Ensure that MEDUSA valve control key is in place
- 28 V breaker on, Valve box on, Main breaker on
- Record P/Δ: Pup 466 / Pdown 512 Lb; P bypass 511 / +334
- Sync MEDUSA clock with clock on laptop +/- 1 sec
  MEDUSA time UTC 23:59:01 Laptop time UTC 23:58:01
- Connect traps if not already
- Ensure VL1 = 1, VL2 = 1, VL3 = odd, bypass on, pumps off
- Open all flask stopcocks 2 half turns
- Flasks opened by: JPD
- Re-install splinter shields (9b) Complete rack book
- Confirm P upstream, P downstream, pre-purge T, and min flush T settings
  Pupset 130 Pdownset 450 pre-purgeT 45 flushT 120
- Verify that no values are blinking on screen
- Note trap temperature
- Complete bypass / system leak check
- Ensure both controllers are auto
- Turn pumps on

- Verify pressures are controlling and flow is as expected
  Pup 161 Pdown 419 P bypass 752 Flow 4200
- Adjust flight code to 1(120/80/30) 125/620/45
- If necessary, “Clear All” (after being sure data from last flight copied)
- Pump breaker off (PB and VB stay on)

II. In flight

A. Immediately after take-off

- Take-off time UTC 01:44:12

- Turn pump breaker on
- Verify pressures/flows agree with previous values from I.B.17.
  Pup 125 Pdown 620 P bypass 745 Flow 2550
- 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
- Start pre-purge
- Note trap temperature
  Trap T: 38.9
- Record png of pre-purge: (YYMMDD_rf##_prepurge) File: 040407_002808-prepurge.png

B. Sample 45 secs after desired altitude at 3 SLP (1:15 at 1.8 SLP), 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)
<table>
<thead>
<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
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- 1) After sampling flask 16, close flasks 1-16
- 2a) Turn Pump off
- 2b) Replace upstream trap
- 2c) Turn pump back on

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<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
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- 3) After sampling flask 32, close flasks 17-32

UTC: 05:21
Trap T: 39.9
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) 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
   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
MEDUSA leak check procedures

** 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: 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:**

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, 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 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

<table>
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<tr>
<th>Time (UTC)</th>
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NCAR/SCRIPPS MEDUSA Checklist  V. 2011.06.12

I. Preflight

A. Day(s) before flight

1. Prepare new traps w/ clean beads filled to 2” up from the bottom and bring to plane
2. Install new traps
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 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 00:00
12. Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2  Start UTC 00:10
13. Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
14. Record Ps:  Pup 170  Pdown 170  Pbypass 173 then all power off

Flask ID Table (View from Front of Box)

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

1) Load dry ice into dewar 0.5" from lid UTC 02:35
2) Ensure that MEDUSA valve control key is in place
3) 28 V breaker on, Valve box on, Main breaker on
4) Record P / ΔP: Pup 431 / 126 Pdown 173 / 83 Pbypass 479 / 4306
5) Sync MEDUSA clock with clock on laptop +/- 1 sec
   MEDUSA time UTC 01:03:05 Laptop time UTC 01:05:05
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: 2D 13
9a) Re-install splinter shields 9b) Complete rack book
10) Confirm P upstream, P downstream, prepurge T, and min flush T settings
    Pupset 120 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 Pbypass 750 Flow 4200
    01:21:09 171 178 30 01:22:30 8 172 178
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

1) Turn pump breaker on 02:26:15
2) Verify pressures/flows agree with previous values from 1.B.17.
   Pup 124 Pdown 620 Pbypass 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_r##_prepurge) File:

B. Sample 45 secs after desired altitude at 3 SLP (1:15 at 1.8 SLP), 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)
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<th>Pos</th>
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<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
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</table>

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

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

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

---
UTC: _ : _ Trap T: _ _

---
\( ^3 \) After sampling flask 32, close flasks 17-32
UTC: _ _ Trap T: _ _
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) 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
   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 check sheet 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: 13 Box #2 17

UTC 08: 03
MEDUSA leak check procedures

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: 00:05:00 Finish: 00:25
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:
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: 01:10:00 Finish: 01:23:45
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, 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 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

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</table>
NCAR/SCRIPPS MEDUSA Checklist

V. 2011.06.12

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 110706

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

<table>
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<td>18  1177</td>
</tr>
<tr>
<td>19  1315</td>
</tr>
<tr>
<td>20  1122</td>
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</table>
B. 2-hours before take-off: Dry ice and Sampler Set-up  
   1) Load dry ice into dewar 0.5” from lid  
   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 310 / 482 Pdown 186 / 124 Pbypass 510 / 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, pre-purge T, and min flush T settings  
      P u p s e t 1 7 0  
      P d o w n s e t 4 5 0  
      p r e p u r g e T 4 5  
      f l u s h T 1 2 0  
  11) Verify that no values are blinking on screen  
  12) Note trap temperature  
      T r a p T : 3 9 . 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  
      P u p 1 6 9  
      P d o w n 4 5 0  
      P b y p a s s 7 1 2  
      F l o w 4 0 0 0  
  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

II. In flight  
A. Immediately after take-off  
   Take-off time UTC 15:33:52  
   1) Turn pump breaker on  
      T r a n s i t : 1 5 : 3 8 : 0 0  
   2) Verify pressures/flows agree with previous values from I.B.17.  
      P u p 1 2 4  
      P d o w n 6 6 0  
      P b y p a s s 7 5 9  
      F l o w 2 5 0 0  
   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  
   5) Note trap temperature  
      T r a p T : 3 8 . 6  
   6) Record png of pre-purge: (YYMMDD_rf##_prepurge) File: 110710_rf10_prepurge_07_07.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)
<table>
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<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
<th>Profile #</th>
<th>Notes</th>
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After sampling flask 16, close flasks 1-16

UTC: 19:26
Traps: 40.1

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After sampling flask 32, close flasks 17-32

UTC: 21:40
Traps: 40.1

---

Diagram:
- PMD (start)
- (Pencil is preferred)
- Dips (Alt ↑, Time →)
- (end) PANC

ArcheoPay

Notes:
- After 1st dive: Flight plan 2
- After 2nd dive:
  - 17:54:15:2 AM departure
  - Fell asleep
- Turn Pump off
- Replace upstream trap
- Turn pump back on
- 20:17:30
- 20:17:45
- 20:55 changed
- Perform TO2, net
- Breath test
- Not good: brown
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) 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
   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: 10  Box #2: 11 5
MEDUSA leak check procedures

**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 is secure)  
5. Adjust prepurge time to 20 seconds  
6. Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200  
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:**

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 PPs  
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 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

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<tr>
<th>Time (UTC)</th>
<th>Pup</th>
<th>Pdn</th>
<th>Pbypass</th>
<th>Comments</th>
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</table>

I. Preflight

A. Day(s) before flight

- [ ] Prepare new traps w/ clean beads filled to 2" up from the bottom and bring to plane
- [ ] Install new traps
- [ ] Load flasks, confirm old and record new flask IDs, and inspect o-rings
- [ ] Record Flask Box Numbers: Box #1 101  Box #2 113
- [ ] Install flask box retaining pins
- [ ] Connect plumbing. Confirm lines are correctly installed with red label up
- [ ] Replace cover shields and (7b) complete rack book
- [ ] Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF##.xls)
- [ ] If necessary, download data from previous flight to laptop and pen drive
- [ ] Check that flask table is clear. If not, “clear all”
- [ ] Complete flask leak check procedure #1
  - Start UTC 17:03
- [ ] Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2
  - Start UTC 18:48
- [ ] Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
- [ ] Record Ps: Pup 17 Pdown 179 Pbypass 180 then all power off

<table>
<thead>
<tr>
<th>Flask ID Table (View from Front of Box)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 1345</td>
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<tr>
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<td>17 1052</td>
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<td>18 1439</td>
</tr>
<tr>
<td>19 1166</td>
</tr>
<tr>
<td>20 1040</td>
</tr>
</tbody>
</table>
B. 2-hours before take-off: Dry ice and Sampler Set-up

1. Load dry ice into dewar 0.5” from lid
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 47.2/46.6 Pdown 48.7/30.4 Pbypass 48.1/30.3
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 1/2 turns
   Flasks opened by: A3
9a) Re-install splinter shields
9b) Complete rack book
10. Confirm P upstream, P downstream, pre purge T, and min flush T settings
    - Puset 1/0 Pdownset 450 prepurgeT 45 flushT 120
11. Verify that no values are blinking on screen
12. Note trap temperature
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 44.9 Pbypass 73.2 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)
   - Step 1: 
   - Step 2: 

II. In flight
A. Immediately after take-off
   - Take-off time UTC 16:04:11
1. Turn pump breaker on
2. Verify pressures/flows agree with previous values from I.B.17.
   - Pup 125 Pdown 620 Pbypass 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
5. Note trap temperature
   - Trap T: 39.5
6. Record png of prepurge: (YYMMDD_r#_prepurge) File: n0700_r##_prepurge.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)
<table>
<thead>
<tr>
<th>Pos</th>
<th>Flow (V)</th>
<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
<th>PALTF</th>
<th>Profile #</th>
<th>Notes &lt;Close&gt;</th>
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√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

<table>
<thead>
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<th>Pos</th>
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<th>Psa (torr)</th>
<th>PC Setpts</th>
<th>End Time</th>
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<td>22:46:55</td>
<td>28.5</td>
<td>9</td>
<td>22:48:00</td>
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</table>

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

---

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<tr>
<th>(start) <em>PANC</em> (Pencil is preferred)</th>
<th>Dips (Alt †, Time †)</th>
<th>(end) <em>PANC</em></th>
</tr>
</thead>
</table>

---

(canvas-related information)
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) 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
   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:**

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
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:**

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, 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 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

<table>
<thead>
<tr>
<th>Time (UTC)</th>
<th>Pup</th>
<th>Pdn</th>
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</table>
Some notes on the ice:

- Melt pools seem to be forming into *melt rivers*

- Preferential cloud formation over open spots of water in the broken ice field.

- Very dirty/muddy bits of ice near coast. Ana says this is dirty ice that comes from the bottom of icebergs that touched coast/bottom.
NCAR/SCRIPPS MEDUSA Checklist

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

Start UTC 08:14
Start UTC 16:30

B. Prior to takeoff

13) Pull bypass pressure down (PC2 open), then pumps off and PC2 closed
14) Record Ps: Pup 1095 Pdown 1039 Pbypass 1239 then all power off

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<tr>
<th>Flask ID Table (View from Front of Box)</th>
</tr>
</thead>
<tbody>
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<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
</tbody>
</table>
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 16.9 / +461 Pdown 51.2 / +323 Pbypass 50.4 / +328 UTC 16:15
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec

   MEDUSA time UTC 16:29:25 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: WB
- 9a) Re-install splinter shields 9b) Complete rack book
- 10) Confirm P upstream, P downstream, pre purge T, and min flush T settings

   Pup <0.5 Pdown <0.5 Pbypass <1.5 Flow <15 L/min

- 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 <0.5 Pdown <0.5 Pbypass <1.5 Flow <15 L/min

- 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

- 1) Turn pump breaker on

   UTC 15:24:27

- 2) Verify pressures/flows agree with previous values from I.B.17.

   Pup <0.5 Pdown <0.5 Pbypass <1.5 Flow <15 L/min

- 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 15:26:32

- 5) Note trap temperature

   Trap T: 38.7

- 6) Record png of pre-purge: (YYMMDD_rf##_prepurge) File: 01011T1R2.83C3p00.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)
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√1) After sampling flask 16, close flasks 1-16
UTC: 20:56
Trap T: 40

路由器 

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 |
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√3) After sampling flask 32, close flasks 17-32
UTC: 00:00
Trap T: 40
III. At the end of the sampling
   1) Turn Pumps breaker off
   2) Ensure all flask valves closed
   UTC: 4:49

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 checklist 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:

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
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:

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, 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 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

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