

**NCAR MEDUSA Checklist**

**V. 08.06.27**

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 081213

- WP
- 1) Prepare traps w clean glass beads filled to 3" below edge and bring to plane
  - 2) Load flasks and connect plumbing
  - 3) Record flask box number that flasks came out of: \_\_\_\_\_
  - 4) Record flask IDs below
  - 6) If necessary, download data (prev. flight \_\_\_\_\_) and clear flask table data
  - 5) Record flask IDs into MEDUSA software using laptop and comm. cable.

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

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

NO FLASKS

B. 2-hours before take-off (do steps 1 and 2 even if no samples are to be collected)

Date (YYMMDD) 081213 Flight (e.g. RF01) JF01 Operator J Bent

- 1) Ensure that flask retaining pin is secured up and shield is screwed on
- 2) Install traps into dewar if necessary
- 3) Load dry ice into dewar UTC 18 : 10
- First trap letter: B Second trap letter: D (1<sup>st</sup> is upstream of 2<sup>nd</sup>)
- 4) Ensure that MEDUSA valve control key is in place
- 5) Open all flask stopcocks 2 half turns Flasks opened by: \_\_\_\_\_
- 6) Turn MEDUSA 28 V power supply switch at back of rack on (*push*)
- 7) Turn MEDUSA main power breaker on (*push*)
- 8) Ensure that Position number and Bypass value are not blinking
- 9) Set P upstream, P downstream, prepurge T, and min flush T  
 Pupset 140 Pdownset 580 prepurgeT        flushT
- 10) Ensure that flask table data is clear
- 11) Turn pump breaker on (*push*)
- 12) Verify pressures are controlling and flow is as expected  
 Pupl 40 Pdown 580 Pby pass 70 Flow 3100
- 13) Verify that signals are displaying in AEROS software correctly
- 14) Snoop all trap connections (including 1/4" swage, QCs, and flanges)
- 15) Turn pump breaker off (*pull*)
- 16) Sync MEDUSA clock with clock on laptop  
 MEDUSA time UTC \_\_\_ : \_\_\_ : \_\_\_ Laptop time UTC \_\_\_ : \_\_\_ : \_\_\_

They aren't  
 MENT20 is  
 -32676, or  
 working.  
 coz it 0.5 or  
 working

Check Air / TPO1  
 UTC 20:27 / 22:48

II. In flight

A. Take-off Time.

B. Immediately after take-off

- 1) Turn pump breaker on (*push*)
- 2)  $\geq$  1-min later, start pre-purge  
 Nominal flow voltage \_\_\_\_\_ Pre-purge end time UTC \_\_\_\_\_
- 3) Note any anomalous flows and if so tighten connectors / open stopcocks

UTC was on before  
 UTC \_\_\_\_\_  
 UTC \_\_\_\_\_

C. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time and record values in chart below

Port	Flow	Sample Time	PALT	O3MR_CL	AO2CO2	Notes
1	<input type="checkbox"/>	: :				
2	<input type="checkbox"/>	: :				
3	<input type="checkbox"/>	: :				
4	<input type="checkbox"/>	: :				
5	<input type="checkbox"/>	: :				
6	<input type="checkbox"/>	: :				
7	<input type="checkbox"/>	: :				
8	<input type="checkbox"/>	: :				
9	<input type="checkbox"/>	: :				
10	<input type="checkbox"/>	: :				
11	<input type="checkbox"/>	: :				
12	<input type="checkbox"/>	: :				
13	<input type="checkbox"/>	: :				
14	<input type="checkbox"/>	: :				
15	<input type="checkbox"/>	: :				
16	<input type="checkbox"/>	: :				

III. Done sampling

- 1) Turn Pumps breaker off (*pull*) UTC \_\_\_\_\_
- 2) Turn Mains breaker off (*pull*) UTC \_\_\_\_\_
- 3) Turn 28V breaker (on back of rack) off (*pull*) UTC \_\_\_\_\_

IV. Post-flight

- 1) Close all flask valves Flasks closed by: \_\_\_\_\_
- 2) Remove and empty traps and plug holes in dewar lid
- 3) Download flask sampling data to lab laptop as YYMMDDf\_RF##.tab
- 4) Unload flasks to Box #: \_\_\_\_\_
- 5) (*Before next flight*) Replace Samp. flasks w/ new flasks from Box #: \_\_\_\_\_
- 6) (*Before next flight*) Record New Flask IDs on next checksheet

V. Additional Comments: MED H<sub>2</sub>O, MED CO<sub>2</sub> vals to DSM aren't quite right - H<sub>2</sub>O shows either -32676 or a value (not sure where) and CO<sub>2</sub> shows either 0.5 or 40

ADD under snoop, use Kimwipe under all fittings  
 ✓ at end of I.B., add "remove DSM comp shield"  
 NCAR MEDUSA Checklist V. 2009.01.06  
 ✓ Noting leaks at \_\_\_\_\_ under snoop connections

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 20090106 (day of)

- ✓ 1) Prepare new trap w/ clean beads filled to 3" below edge and bring to plane
- ✓ 2) Move downstream trap to upst. location and install new downstream trap.
- ✓ 3) Load flasks and connect plumbing. Confirm synflex lines are correctly installed. Odd positions: "TO FLASK" → diptube; even positions "FROM FLASK → diptube). (TO FLASK is upper bank on both flask boxes.) (Flasks 1-16 not conn) (1-4, 32 are jumpered)
- ✓ 4) Record Flask Box Number: \_\_\_\_\_
- ✓ 5) Record flask IDs below NOT sampling
- ✓ 6) Record flask IDs into a TEXT file on laptop.
- ✓ 7) If necessary, download data from previous flight to laptop, and back up on pen drive (date rf ##): \_\_\_\_\_

Flask ID Table (View from Front of Box)

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

TO ADD 1) ~~1) 2) 3)~~ Pg 4 (in whatever order) should be leak checking chart, should start w/ PC<sub>a</sub> = clos  
 PC<sub>d</sub> = 0 → c, flow → bypass  
 ✓ 2) btw 1) and 2) in I.B. add "Verify press are cont..." (a corr of I.B. 13)  
 ✓ 3) flight \_\_\_\_\_ to front page Top Middle

B. 2-hours before take-off.

Date (YYMMDD) 2007 Flight (e.g. RF01) TF03

- 1) Ensure that both flask retaining pins are secured in the upper position
- 2) Install traps into dewar if necessary
- 3) Install protective cover on exposed DSM computer
- 4) Load dry ice into dewar UTC 15 : 14
- First trap letter:      Second trap letter:      (1<sup>st</sup> is upstream of 2<sup>nd</sup>)
- 5) Ensure that MEDUSA valve control key is in place
- 6) Ensure that PC1, PC2 switches are in central, control, position
- 7) Open all flask stopcocks 2 half turns Flasks opened by:
- 8) Turn MEDUSA 28 V power supply switch at back of rack on (*push*)
- 9) Turn MEDUSA valve box power breaker on (*push*)
- 10) Turn MEDUSA main power breaker on (*push*)
- 11) Set P upstream, P downstream, prepurge T, and min flush T  
(Usually 150, 400, 30, 150, other presets reached by toggling plan code)  
Pupset 150 Pdownset 400 prepurgeT 30 flushT 150

17) Ensure flask table is cleared

- 12) Turn pump breaker on (*push*)
- 13) Verify pressures are controlling and flow is as expected  
Pup 150 Pdown 400 Pbyass 789 Flow 3400 (flow, P<sub>33P</sub> look high)
- 14) Snoop all trap connections (including 1/4" swage, QCs, and flanges)
- 15) Turn pump breaker off (*pull*)
- 16) Sync MEDUSA clock with clock on laptop  
MEDUSA time UTC 16 : 13 : 00 Laptop time UTC 16 : 13 : 00
- 17) Install splinter shields

(-18 checking P @ flask loop zero = -0.5 in H<sub>2</sub>O @ 2600 psi) P gauge reads 7.6 psig

II. In flight

A. Take-off Time.

UTC 16 : 41 : 30

B. Immediately after take-off

- 1) Turn pump breaker on (*push*)
- 2) >= 1-min later, start pre-purge and note flow voltages
- 3) Pre-purge end time/Sample 1 Start Time

UTC 16 : 41 : 40  
UTC      :      :       
UTC      :      :     

NOT DOING PRE PURGES / NOT SAM. FLASKS

C. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time and record values in chart below

III. At the End of the Flight

- 1) Turn Pumps breaker off (*pull*)
- 2) Turn Mains breaker off (*pull*)
- 3) Turn valve box breaker off (*pull*)
- 4) Turn 28V breaker (on back of rack) off (*pull*)

UTC 18 : 11 : 49  
UTC 18 : 26 : 00  
UTC 18 : 26 : 00 isy  
UTC 18 : 26 : 00

## IV. Post-flight

- \_\_\_ 1) Close all flask valves Flasks closed by: \_\_\_\_\_
- \_\_\_ 2) Remove upstream trap, and place downstream in its place.
- \_\_\_ 3) Plug holes in dewar lid
- \_\_\_ 4) Empty beads from upstream trap into other container to dry
- \_\_\_ 5) Download flask sampling data to lab laptop
- \_\_\_ 6) Unload flasks to Box #: \_\_\_\_\_
- \_\_\_ 7) (*Before next flight*) Replace Samp. flasks w/ new flasks from Box #: \_\_\_\_\_
- \_\_\_ 8) (*Before next flight*) Record New Flask IDs on next checksheet

Port	Pre-Purge Flow (V)	Samp. Flow(V)	Sample End Time	PALTF (kft)	AO2CO2	Notes
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						

ADDITIONAL COMMENTS:

Pressure @ <sup>Trap</sup> flask test

$P_u$	$P_d$	$P_b$ (in b.p.)	Flow	$P_{upst}$ <sup>psig</sup> <del>trap flask</del>	$P_{downst.}$ <del>trap flask</del>
150	400	790 (tooth)	3400	7.6	7.5
90	670	787 (w)	1800	4.8	4.2

Leak testing w/ P gauge in ~~upstr~~ <sup>Downstr</sup> of flasks (may have small leak)

T	$P_u$	$P_d$	$P_b$	Scenario $P_u/P_d$	Comments
16:29	152	158	158	c-c	Probably P gauge leaking.
16:30	1	154	160	e-c	
16:31	2	154	160		
16:34	3	157	163		

~~HAVE taken P gauge out - let out a bit of <sup>Press</sup>  $P_d$ s of flask, and suddenly  $P_u$  is equilibrating w/  $P_d/P_b$  much faster.~~

16:35	330	415	408	A
16:38	362	398	392	
16:39	370	395	390	
16:41	377	393	388	

was bcz I set  $P_{c1/2}$  to Auto

NCAR MEDUSA Checklist

V. 2009.01.08

FLIGHT: RFOZ LEG: Billings - ANC  
 DATE (YYMMDD): 090109

I. Preflight

A. Day(s) before flight <sup>morning of</sup> Date (YYMMDD) = 090109

- 1) Prepare new trap w/ clean beads filled to 3" below edge and bring to plane
- 2) Move downstream trap to upst. location and install new downstream trap.
- 3) Load flasks and connect plumbing. Confirm synflex lines are correctly installed. Odd positions: "TO FLASK" → diptube; even positions "FROM FLASK → diptube). (TO FLASK is upper bank on both flask boxes.)
- 4) Install flask box retaining pins.
- 5) Record Flask Box Numbers: \_\_\_\_\_
- 6) Record flask IDs below
- 7) Record flask IDs into a TEXT file on laptop.
- 8) If necessary, download data from previous flight to laptop, and back up on pen drive (yymmdd\_rf##): 090108a.tab
- 9) If possible, start System Leak-Check Procedure

SET TO SAMPLE (no prepurge b/c 1-5 have filled flasks)

Flask ID Table (View from Front of Box)

13	1154	12	1346	5	<del>1246</del>	4	<del>1266</del>
14	1149?	11	1292	6	1301	3	<del>1275</del>
15	1339	10	1305	7	1109	2	<del>1295</del>
16	1045	9	1147	8	1252	1	<del>1017</del>
17	1279	24	1293	25	1266	32	1275
18	1097	23	1317	26	1094	31	1295
19	1311	22	1316	27	1319	30	1017
20	1175	21	1177	28	1302	29	1216

FN MIXED ORDER

Moved 5 flasks from pos 25, 28, 30, 31, 32

NEED TO RECORD POSITIONS HERE AND ON LAPTOP





- ✓ 19) After leak checking, and with system in bypass, pump OFF, open all flask stopcocks 2 half turns Flasks opened by: RBS
- ✓ 20) Install Splinter Shields
- ✓ 21) Set P upstream, P downstream, prepurge T, and min flush T (Usually 150, 330, 30, 150, other presets reached by toggling plan code) Pupset \_\_\_\_\_ Pdownset \_\_\_\_\_ prepurgeT \_\_\_\_\_ flushT \_\_\_\_\_
- ✓ 22) Turn pump breaker on (*push*)
- ✓ 23) Verify pressures are controlling and flow is as expected Pup 149 Pdown 348 Pbypass 775 Flow 3300
- ✓ 24) Snoop all trap connections (including 1/4" swage, QCs, and flanges), with a Kimwipe under fittings, and with rubber cover on DSM comp
- ✓ 25) Turn pump breaker off (*pull*)
- ✓ 26) Sync MEDUSA clock with clock on laptop MEDUSA time UTC 19 : 00 : 11 Laptop time UTC 19 : 00 : 10
- ✓ 27) Remove rubber DSM computer shield; stow in beige in-reach tool bag.
- ✓ 28) Leave mains and valve power ON

hazardous!

was ~~810~~ yesterday  
re check flask p

ended up 31 sec fast

II. In flight

- A. Take-off Time. UTC 20 : 24 : 10
- B. Immediately after take-off
  - ✓ 1) Turn pump breaker on (*push*) UTC 20 : 24 : 40
  - ✓ 2) Verify pressures/flows agree with previous values from II.B. Pup 149 Pdown 329 Pbypass 788 Flow 3450
  - ✓ 3) >= 1-min later, start pre-purge and note flow voltages UTC 20 : 26 : 20
  - ✓ 4) Pre-purge end time/Sample 1 Start Time UTC 20 : 37 : 20
- C. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude, and record values in chart below

this is low flow leak of later in flight

III. At the End of the Flight

- ✓ 1) Turn Pumps breaker off (*pull*) UTC 04 : 25 : 00
- 2) Turn Mains breaker off (*pull*) UTC \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_
- 3) Turn valve box breaker off (*pull*) UTC \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_
- 4) Turn 28V breaker (on back of rack) off (*pull*) UTC \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_

~ 15 min > landing for flow tests

flasks 1-5 show wet → tubing was opened in pre flight...

~~How, not says~~ let run back to 1.-

tried pushing stop purge → didn't work was switching every 30 sec through box 2...

Flow has experienced some large excursions → not sure if real or signal related... Page 4 of 4

IV. Post-flight

- \_\_\_ 1) Close all flask valves
- \_\_\_ 2) Remove upstream trap, and place downstream in its place.
- \_\_\_ 3) Plug hole in dewar lid
- \_\_\_ 4) Empty beads from upstream trap into wet bead container to dry
- \_\_\_ 5) Download flask sampling data to lab laptop
- \_\_\_ 6) Unload flasks to Boxes #: \_\_\_\_\_
- \_\_\_ 7) (Before next flight) Follow procedures in Section I.A. for next flight

Flasks closed by: \_\_\_\_\_

→ check if any ice

Shoot, some or all from my laptop which crashed and is no longer sync'd

Port	Pre-Purge Flow (V)	Samp. Flow (V)	Sample End Time	PALTF (kft)	MEDCO2	Notes
1		3537.18	22:20:20	27		Flaw on MEDUS variable carrier - real or not?
2		3500	22:30:24	14		
3		3512	22:33:50	9		
4		3300	22:37:45	4		low flow? V=6
5		3300	22:40:29	4		steep climb
6		3450	23:46:33	27.5		
7			23:57:47	20		collocated w/ MWTS
8			23:55:02	14		followed ~ 1m by MWTS
9			23:58:01	9		
10			02:23:05	27		
11	3500		02:27:20	20		150/330 good to ~ 40 kft.
12			02:31:17	14		
13	3450		02:35:38	11		
14			02:52:58	38		03:00:00 to plan 1
15			03:11:06	43		90/670
16			03:23:33	43		
17						by going to bypass (b/c valve 3 not working, want show in table)
18						
19						
20						
21						
22			23:54:00		LS laptop +	03:03:45
23						
24			23:54:31		MEDUSA	03:04:17
25						
26						
27						0056 checked dry ice → none
28						visible, but a few bubbles (102 he
29						some chunks and is @ -70!
30						
31						
32						@ 3:25 back to plan 0 (140/330)

likely bad b/c flow off

23:50:50 → 05:07

Just noticed MEDUSA clock is off

Flare leak checked (3) SHOULD HAVE SWAPPED more degreaser

NEED A NOTES SECTION! record on laptop!

Flow on screen = 3485 @ 21:59

see screen

~ 01:26:30 rechecked trap fittings → one made a click and flow jumped way up → (ice finally did not fix) → SHOULD HAVE CHECKED MUCH

screen 3360

ARTEK

NCAR MEDUSA Checklist

V. 2009.01.08

FLIGHT: RFO1 LEG: BTC-Billings  
→ ANZ  
 DATE (YYMMDD): 20080108

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 090107

- 1) Prepare new trap w/ clean beads filled to 3" below edge and bring to plane
- 2) Move downstream trap to upst. location and install new downstream trap.
- 3) Load flasks and connect plumbing. Confirm synflex lines are correctly installed. Odd positions: "TO FLASK" → diptube; even positions "FROM FLASK → diptube). (TO FLASK is upper bank on both flask boxes.)
- 4) Install flask box retaining pins.
- 5) Record Flask Box Numbers: \_\_\_\_\_ unknown
- 6) Record flask IDs below
- 7) Record flask IDs into a TEXT file on laptop. 090108 - RFO1
- 8) If necessary, download data from previous flight to laptop, and back up on pen drive (yymmdd\_rf##): \_\_\_\_\_
- 9) If possible, start System Leak-Check Procedure

EDIT  
ADD

→ clear flask table

Flask ID Table (View from Front of Box)

13	1154	12	1346	5	1046	4	1043
14	1149 (on MGW on top)	11	1292	6	1301	3	1026
15	1339	10	1305	7	1109	2	1211
16	1045	9	1147	8	1252	1	1088

17	1279	24	1293	25	1266	32	1275
18	1097	23	1317	26	1094	31	1295
19	1311	22	1316	27	1319	30	1017
20	1175	21	1177	28	1302	29	1216



EDIT  
ADD

go to screen 4,  
clear all  
flask data

- ✓ 19) After leak checking, and with system in bypass, pump OFF, open all flask stopcocks 2 half turns Flasks opened by: 1013
- ✓ 20) Install Splinter Shields
- ✓ 21) Set P upstream, P downstream, prepurge T, and min flush T (Usually 150, 330, 30, 150, other presets reached by toggling plan code) Pupset 150 Pdownset 330 prepurgeT 30 flushT 150
- ✓ 22) Turn pump breaker on (push)
- ✓ 23) Verify pressures are controlling and flow is as expected Pup 149 Pdown 331 Pbyass 787 Flow 3300
- ✓ 24) Snoop all trap connections (including 1/4" swage, QCs, and flanges), with a Kimwipe under fittings, and with rubber cover on DSM comp
- ✓ 25) Turn pump breaker off (pull)
- ✓ 26) Sync MEDUSA clock with clock on laptop  
MEDUSA time UTC 15:34:00 Laptop time UTC 15:34:00 02/08/88
- ✓ 27) Remove rubber DSM computer shield; stow in beige in-reach tool bag.
- ✓ 28) Leave mains and valve power ON

II. In flight

- A. Take-off Time.
- B. Immediately after take-off

- ✓ 1) Turn pump breaker on (push) UTC 16:11:30
- ✓ 2) Verify pressures/flows agree with previous values from II.B. Pup 149 Pdown 329 Pbyass 806 Flow 3450
- ? ✓ 3) >= 1-min later, start pre-purge and note flow voltages UTC 16:13:00
- ✓ 4) Pre-purge end time/Sample 1 Start Time done by UTC 16:45:00

date = 1/08/0\*  
 started @ 88 +  
 not 12k problem  
 drifting?  
 had to reset  
 (maybe changed  
 when  
 playing w/  
 date)

- C. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude, and record values in chart below

III. At the End of the Flight

- \_\_\_ 1) Turn Pumps breaker off (pull) UTC \_\_\_:\_\_\_:\_\_\_
- \_\_\_ 2) Turn Mains breaker off (pull) UTC \_\_\_:\_\_\_:\_\_\_
- \_\_\_ 3) Turn valve box breaker off (pull) UTC \_\_\_:\_\_\_:\_\_\_
- \_\_\_ 4) Turn 28V breaker (on back of rack) off (pull) UTC \_\_\_:\_\_\_:\_\_\_

IV. Post-flight

- \_\_\_ 1) Close all flask valves Flasks closed by: \_\_\_\_\_
- \_\_\_ 2) Remove upstream trap, and place downstream in its place.
- \_\_\_ 3) Plug hole in dewar lid
- \_\_\_ 4) Empty beads from upstream trap into wet bead container to dry
- \_\_\_ 5) Download flask sampling data to lab laptop
- \_\_\_ 6) Unload flasks to Boxes #: \_\_\_\_\_
- \_\_\_ 7) (Before next flight) Follow procedures in Section I.A. for next flight

*Need to record chemistry sample*

Port	Pre-Purge Flow (V)	Samp. Flow(V)	Sample End Time	PALTF (kft)	MEDCO2	Notes
1			16:59:00	27 x	400	Flow off @ high alt, back on by 16:48 → ≥ 11 min stable flow
2			17:03:35	20 x	398	
3			17:07:43	14 x	400	
4			17:11:30	8 x	400	
5	3300		17:15:45	4 x		on approach → turned pump off
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						

*35 kft.*  
*17:16:35*

*Descent into Billings @ 4 kft saw stepping bottom*

NCAR MEDUSA Checklist

V. 2009.01.08

**FLIGHT:** RFO3 **LEG:** ANC - N. Pole  
**DATE (YYMMDD):** 20090112

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 090112

- 1) Prepare new trap w/ clean beads filled to 3" below edge and bring to plane
- 2) Move downstream trap to upst. location and install new downstream trap.
- 3) Load flasks and connect plumbing. Confirm synflex lines are correctly installed. Odd positions: "TO FLASK" → diptube; even positions "FROM FLASK → diptube). (TO FLASK is upper bank on both flask boxes.)
- 4) Install flask box retaining pins.
- 5) Record Flask Box Numbers: 101 108 (1/2 box - 5 ~~5~~ sample flasks put in here)
- 6) Record flask IDs below
- 7) Record flask IDs into a TEXT file on laptop.
- 8) If necessary, download data from previous flight to laptop, and back up on pen drive (yymmdd\_rf##): 090112 - preflight\_justincase
- 9) *If possible*, start **System Leak-Check Procedure**

Flask ID Table (View from Front of Box)

13	1262	12	1206	5	1040	4	1064
14	1107	11	1219	6	1188	3	1141
15	1280	10	1208	7	1030	2	1136
16	1078	9	1014	8	1073	1	1079
17	1279	24	1293	25	1394	32	1392
18	1097	23	1317	26	1094	31	1395
19	1311	22	1316	27	1319	30	1402
20	1175	21	1177	28	1302	29	1401

NOTE: PROGRAM: BUNKING @ STARTUP

80/670; 140/400

B. 2-hours before take-off.: Leak-Checking and Preparation

- 1) Ensure that both flask retaining pins are secured in the upper position
- 2) Install trap(s) into dewar if necessary
- 3) Install protective cover on exposed DSM computer
- 4) Load dry ice into dewar UTC 17:00
- 5) Ensure that MEDUSA valve control key is in place  
 First trap letter: B Second trap letter: D (1<sup>st</sup> is upstream of 2<sup>nd</sup>)
- 6) **Leak Checking:** Turn boxes on, in this order  
 i) 28V \_\_\_ ii) V. Box \_\_\_ iii) P Box Mains \_\_\_
- 7) Close PC1 (top switch ↓) and open PC2 (bott switch ↑)
- 8) Verify MEDUSA Key is in place, and that system is in pos 1 \_\_\_
- 9) Turn on pump breaker (*push*)
- 10) Verify Pup → 0, Pdown → ~150, Pbypass → ~150
- 11) Switch PC2 to closed and immediately turn off pump (*pull breaker*)
- 12) Wait 15 seconds and note Pu, Pd, Pb in table below
- 13) After 1 minute, record values again.
- 14) After 5 minutes, record values again
- 15) If all values are fine (Pu < 5 torr/min, Pd, Pb < 2 torr/5 mins), skip to 17)
- 16) 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. (Pressurizes system in bypass.)
- 17) Snoop fittings in between, and to, boxes, and fix/tighten as necessary
- 18) Return switches to center. Ensure pump OFF. Mains, valve box ON.

Did exactly  
looked  
OK

**Leak Checking**

Byp or Pos #	Time (UTC)	PC1 stat	PC2 stat	Pup	Pdn	Pby	Flo w	Comments
	1502			<del>2</del>	181	181		
	1504			3	181	182		
	1506				180	182		
<hr/>								
<b>SETTING FLOWS</b>								
		140	400			717		
		"	440			740		
		"	470			780 + 3200		
			460			<del>7</del>		
			440			784		
		140	400			782		
		130	400			740		
		90	680			780?		
		90	670			776 1725		



- 19) After leak checking, and with system in bypass, pump OFF, open all flask stopcocks 2 half turns Flasks opened by: JB
- 20) Install Splinter Shields
- 21) Set P upstream, P downstream, prepurge T, and min flush T  
(Usually 150, 330, 30, 150, other presets reached by toggling plan code)  
Pupset 140 Pdownset 400 prepurgeT 30 flushT 150
- 22) Turn pump breaker on (push)
- 23) Verify pressures are controlling and flow is as expected  
Pup 140 Pdown 400 Pbyass 770 Flow 3200
- 24) Snoop all trap connections (including 1/4" swage, QCs, and flanges), with a Kimwipe under fittings, and with rubber cover on DSM comp
- 25) Turn pump breaker off (pull)
- 26) Sync MEDUSA clock with clock on laptop  
MEDUSA time UTC 18:36:01 Laptop time UTC 18:36:01
- 27) Remove rubber DSM computer shield; stow in beige in-reach tool bag.
- 28) Leave mains and valve power ON

140/400  
 EOFF  
 valve  
 box off  
 on

A02 Laptop → watch → MEDUSA  
 RF laptop  
 is off!

OFF

II. In flight

A. Take-off Time.

UTC 18:44:23

B. Immediately after take-off

1) Turn pump breaker on (push)

~ UTC 18:45:30

2) Verify pressures/flows agree with previous values from II.B.

Pup 140 Pdown 399 Pbyass 754 Flow 3152

3) >= 1-min later, start pre-purge and note flow voltages

UTC 18:47:35

4) Pre-purge end time/Sample 1 Start Time

UTC 19:07:36

C. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude, and record values in chart below

18:46:50  
 valve  
 on

III. At the End of the Flight

1) Turn Pumps breaker off (pull)

UTC \_\_\_ : \_\_\_ : \_\_\_

2) Turn Mains breaker off (pull)

UTC \_\_\_ : \_\_\_ : \_\_\_

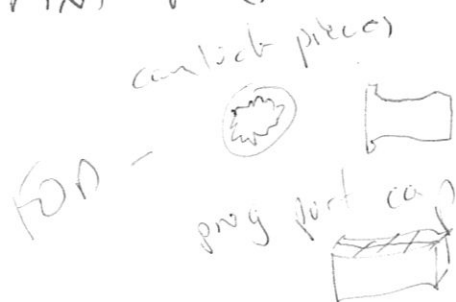
3) Turn valve box breaker off (pull)

UTC \_\_\_ : \_\_\_ : \_\_\_

4) Turn 28V breaker (on back of rack) off (pull)

UTC \_\_\_ : \_\_\_ : \_\_\_

see notes.txt file



IV. Post-flight

- ✓ 1) Close all flask valves
- ✓ 2) Remove upstream trap, and place downstream in its place.
- ✓ 3) Plug hole in dewar lid
- ✓ 4) Empty beads from upstream trap into wet bead container to dry
- ✓ 5) Download flask sampling data to lab laptop
- 6) Unload flasks to Boxes #: \_\_\_\_\_
- 7) (Before next flight) Follow procedures in Section I.A. for next flight

Flasks closed by: BBS

Removed B

POIT

Port	Pre-Purge Flow (V)	Samp. Flow (V)	Sample End Time	PALTF (kft)	MEDCO2	Notes
profile #1		3250	19:10:10	18x	390	couldn't take sampler 1/2 of
			19:13:59	12.5x		AEROS was freeze submitted
			19:16:43	8x		"
			19:20:35	5-		just above BL
			19:24:20	2x		made it to 500 AGL
profile #2			20:12:00	26x		
			20:17:05	18.5x		somehow missed 21 (b/c
			20:22:45	8x		had to wait for flush
			20:25:27	3x		
			20:34:47	2x		
profile #3			20:48:07	22x		5 kft goes by
			21:00:52	28x		
			21:06:39	20x	391	
			21:10:43	14x		
			21:13:54	9x		
profile #4			22:18:52	2x		missed 5 kft
			22:29:37	2x		
			22:23:41	28-		
			22:48:56	20x		
			22:52:52	14x		
profile #5			22:57:24	8x		
			23:01:18	2x		missed 19.5 kft
			23:04:01	1-		
			22:11:20	12x		
			22:16:20	19x		
profile #6			21:20:01	25x		
			22:34:57	31x		
			23:39:10	31x		
			23:44:06	37x		@ 23:48 set to 80/670
			00:03:40	43-		High 03
		00:09:15	43-		High 03	
		00:17:50	43-			

pre-purge 15 k a little 10 k

hit MEM instead of sample?

by 5/15 = 3.3 min need 2.5

50-11

profile #1

profile #2

profile #3

profile #4

profile #5

profile #6

7000

$$\int_0^{\infty} e^{-1/T} = e^{-1}$$

102 106 AC AD

NCAR MEDUSA Checklist

V. 2009.01.08

FLIGHT: RFO4 LEG: ANC → HNL  
DATE (YYMMDD): 20090114

280

I. Preflight

A. Day(s) before flight Date (YYMMDD) = 20090113

- ✓ 1) Prepare new trap w/ clean beads filled to 3" below edge and bring to plane
- ✓ 2) Move downstream trap to upst. location and install new downstream trap. (EDIT: if not already done)
- ✓ 3) Load flasks and connect plumbing. Confirm synflex lines are correctly installed. Odd positions: "TO FLASK" → diptube; even positions "FROM FLASK → diptube). (TO FLASK is upper bank on both flask boxes.)
- ✓ 4) Install flask box retaining pins.
- ✓ 5) Record Flask Box Numbers: 110 105 EDIT 1-16 17-32
- ✓ 6) Record flask IDs below
- ✓ 7) Record flask IDs into a TEXT file on laptop.
- ✓ 8) If necessary, download data from previous flight to laptop, and back up on pen drive (yymmdd\_rf##): 090113-ef03 justice case
- ✓ 9) If possible, start System Leak-Check Procedure

Flask ID Table (View from Front of Box)

13 1185	12 1331	5 1277	4 1113
14 1160	11 1140	6 1349	3 1138
15 1054	10 1075	7 1069	2 1027
16 1276	9 1342	8 1098	1 1178 <del>1178</del>
17 1241	24 1004	25 1233	32 1050
18 1257	23 1037	26 1220	31 1214
19 1038	22 1226	27 1021	30 1126
20 1061	21 1204	28 <del>1021</del> 1340	29 1267

Double checked #s  
✓

B. 2-hours before take-off.: Leak-Checking and Preparation

- 1) Ensure that both flask retaining pins are secured in the upper position
- 2) Install trap(s) into dewar if necessary
- 3) Install protective cover on exposed DSM computer
- 4) Load dry ice into dewar  
 First trap letter: D Second trap letter: A (1<sup>st</sup> is upstream of 2<sup>nd</sup>) UTC 17:09
- 5) Ensure that MEDUSA valve control key is in place
- 6) **Leak Checking:** Turn boxes on, in this order  
 i) 28V \_\_\_ ii) V. Box \_\_\_ iii) P Box Mains \_\_\_
- 7) Close PC1 (top switch ↓) and open PC2 (bott switch ↑)
- 8) Verify MEDUSA Key is in place, and that system is in pos 1 \_\_\_
- 9) Turn on pump breaker (*push*)
- 10) Verify Pup → 0, Pdown → ~150, Pby → ~150
- 11) Switch PC2 to closed and immediately turn off pump (*pull breaker*)
- 12) Wait 15 seconds and note Pu, Pd, Pb in table below
- 13) After 1 minute, record values again.
- 14) After 5 minutes, record values again
- 15) If all values are fine (Pu < 5 torr/min, Pd, Pb < 2 torr/5 mins), skip to 17)
- 16) 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. (Pressurizes system in bypass.)
- 17) Snoop fittings in between, and to, boxes, and fix/tighten as necessary
- 18) Return switches to center. Ensure pump OFF. Mains, valve box ON.

T-shoot cable in w/ DB-9's conn. (bypass off but valves work...)  
 17:12:40 started prepurge...  
 [let CO2 + H2O warm up first!]  
 Pby on startup ~ 340  
 P2 ~ 340  
 P1 ~ 480

Leak Checking

Byp or Pos #	Time (UTC)	PC1 stat	PC2 stat	Pup	Pdn	Pby	Flo w	Comments
Byp (1)	22:10	C-C	O-C	3	172	176	/	By-le. Check before Instru.
Byp (1)	22:11	,	,	3	1	1	/	
Byp (1)	22:12	,	,	3	173	1	/	
								Power off ~ 18:25:30
Byp	18:38	C	O	0	171	176	=	
Byp	18:39	C	C	0	171	176	=	
"	40:30	C	C	2	171	176		
	47:30	C	C	7	171	176		✓ today good

PAY BEFORE  
 17  
 22  
 32  
 Total change = + 50 torr  
 Pumped all down for 30 sec  
 finish ~ 18:00:21  
 let sit for 5 min...  
 pump off  
 DS. closed  
 T-shoot on w/ DB9's conn  
 OFF, on, clear all, prepurge...  
 restarted @ 18:15:30

Controllers to auto

A

- ✓ 19) After leak checking, and with system in bypass, pump OFF, open all flask stopcocks 2 half turns Flasks opened by: BS
- ✓ 20) Install Splinter Shields
- ✓ 21) Set P upstream, P downstream, prepurge T, and min flush T (Usually ~~140~~, 330, 30, 150, other presets reached by toggling plan code) Pupset 140 Pdownset 400 prepurgeT 30 flushT 150
- ✓ 22) Turn pump breaker on (*push*)
- ✓ 23) Verify pressures are controlling and flow is as expected Pup 139 Pdown 400 Pby pass 764 Flow 3120
- ✓ 24) Snoop all trap connections (including 1/4" swage, QCs, and flanges), with a Kimwipe under fittings, and with rubber cover on DSM comp
- ✓ 25) Turn pump breaker off (*pull*)
- ✓ 26) Sync MEDUSA clock with clock on laptop MEDUSA time UTC 18 : 57 : 10 Laptop time UTC 18 : 57 : 10
- ✓ 27) Remove rubber DSM computer shield; stow in beige in-reach tool bag.
- ✓ 28) Leave mains and valve power ON

II. In flight

A. Take-off Time.

~ UTC 19 : 26 : 30

B. Immediately after take-off

✓ 1) Turn pump breaker on (*push*)

~ UTC 19 : 31 : 10

✓ 2) Verify pressures/flows agree with previous values from II.B.

Pup 139 Pdown 399 Pby pass 765 Flow 3100

} forgot to clear all 4

✓ 3) >= 1-min later, start pre-purge and note flow voltages UTC 19 : 34 : 00

✓ 4) Pre-purge end time/Sample 1 Start Time ~ UTC 19 : 35 : 00

C. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude, and record values in chart below

edit

III. At the End of the Flight

✓ 1) Turn Pumps breaker off (*pull*)

UTC \_\_\_ : \_\_\_ : \_\_\_

✓ 2) Turn Mains breaker off (*pull*)

UTC \_\_\_ : \_\_\_ : \_\_\_

✓ 3) Turn valve box breaker off (*pull*)

UTC \_\_\_ : \_\_\_ : \_\_\_

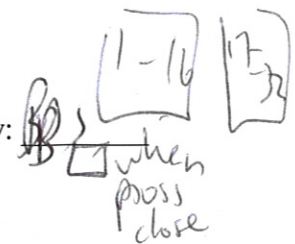
✓ 4) Turn 28V breaker (on back of rack) off (*pull*)

UTC \_\_\_ : \_\_\_ : \_\_\_

} 03:34

IV. Post-flight

- ✓ 1) Close all flask valves
- ✓ 2) Remove upstream trap, and place downstream in its place.
- ✓ 3) Plug hole in dewar lid
- ✓ 4) Empty beads from upstream trap into wet bead container to dry
- ✓ 5) Download flask sampling data to lab laptop - EDIT: Pull up terminal; type in "Minicom"; toggle menu to "Output flask table"; hit set; in minicom type ctrl-A, L; type in "gymnoid"
- \_\_\_ 6) Unload flasks to Boxes #: 102 106
- \_\_\_ 7) (Before next flight) Follow procedures in Section I.A. for next flight



28 & 73

Profile #1

#2

#3

#4

Port	Pre-Purge Flow (V)	Samp. Flow (V)	Sample End Time	PALTF (kft)	MEDCO2	Notes
1	X	3.200	20:58:28	28-		
2			21:03:54	21x		NWAS match 03:45-08:58
3		3.200	21:10:05	15x	380	
4			21:23:37	9x		NWAS @10 kft (missed)
5		9.99	21:26:34	5x	380	
6			21:29:29	2-		(PALTF = 2 kft but slip 28.73)
7			22:23:07	28-		(so actually 1 kft)
8			22:40:41	21x		
9		9.97	22:47:34	10x		(missed 15)
10		9.97	22:51:06	5x	381	
11		9.97	22:54:20	2-	381	(really 1 kft AGL)
12		9.98	00:00:17	28-	378	
13		9.98	00:06:37	21x	378	
14		9.	00:09:36	15x		
15		9.93	00:12:57	10x	381	
16		9.95	00:16:19	5x	380	
17		10.02	00:19:42	2-		(actually 7 kft AGL)
18		10.04	01:23:24	28-	380	
19		10.0	01:29:08	21x		closed 1-16 ~ 00:30
20			01:33:57	13.5x		
21			01:36:31	9.5x		
22		9.95	01:39:48	5x		
23			01:43:31	6.5		actually 1 kft AGL
24		9.95	02:27:06	1-		NWAS match
25			02:30:10	5↑		
26			02:33:53	10.5↑		
27			02:36:46	15↑		
28			02:40:46	21↑		
29			02:45:27	28↑		
30		9.86	02:51:33	36↑		→ to 90/670 @ 02:52:15
31			03:03:35	44-		
32			03:12:05	44-		

KF# .tab  
now hit  
set on  
scrn.  
Hit ctrl-A  
L again,  
select  
flocc.  
File should  
show up  
under  
ads on  
Desktop

closed 17-32 ~ 03:15

29.01

NCAR MEDUSA Checklist

V. 2009.01.08

FLIGHT: RF05 LEG: HNL-SMO  
 DATE (YYMMDD): 090115

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 090115

- 1) Prepare new trap w/ clean beads filled to 3" below edge and bring to plane
- 2) Move downstream trap to upst. location and install new downstream trap.
- 3) Load flasks and connect plumbing. Confirm synflex lines are correctly installed. Odd positions: "TO FLASK" → diptube; even positions "FROM FLASK → diptube). (TO FLASK is upper bank on both flask boxes.)
- 4) Install flask box retaining pins.
- 5) Record Flask Box Numbers: 106 102
- 6) Record flask IDs below Box #1 Box #2
- 7) Record flask IDs into a TEXT file on laptop.
- 8) If necessary, download data from previous flight to laptop, and back up on .pen drive (yymmdd\_rf ##): \_\_\_\_\_
- 9) If possible, start **System Leak-Check Procedure**

Flask ID Table (View from Front of Box)

13	1369	12	1380	5	1367	4	1378
14	1290	11	1376	6	1371	3	1374
15	1377	10	1372	7	1375	2	1370
16	1381	9	1368	8	1379	1	1366

17	1018	24	1271	25	1056	32	1059
18	1265	23	1152	26	1304	31	1260
19	1180	22	1347	27	1092	30	1215
20	1309	21	1247	28	1332	29	1162

pos 23! off/on - mfx - car on tank & valves changing, but still 23  
 pumped down w/ 10 sec pre-purge ~ 8:30  
 30  
 448  
 491  
 502  
 - RF05 on...  
 1  
 now OK??





clear all + off on PA  
 left VB off, PB on  
 for take-off  
 then pumps on, VB on  
 → pre-purge  
 NEVER DSD!

- ✓ 19) After leak checking, and with system in bypass, pump OFF, open all flask stopcocks 2 half turns Flasks opened by: BBS
- ✓ 20) Install Splinter Shields
- ✓ 21) Set P upstream, P downstream, prepurge T, and min flush T (Usually 150, 330, 30, 150, other presets reached by toggling plan code) Pupset 150 Pdownset 400 prepurgeT 30 flushT 80
- ✓ 22) Turn pump breaker on (*push*)
- ✓ 23) Verify pressures are controlling and flow is as expected Pup 190 Pdown 400 Pbypass      Flow 3000
- X 24) Snoop all trap connections (including 1/4" swage, QCs, and flanges), with a Kimwipe under fittings, and with rubber cover on DSM comp
- ✓ 25) Turn pump breaker off (*pull*)
- 26) Sync MEDUSA clock with clock on laptop MEDUSA time UTC 22:19:19 Laptop time UTC 22:19:20
- ✓ 27) Remove rubber DSM computer shield; stow in beige in-reach tool bag.
- ✓ 28) Leave mains and valve power ON

6 sec fast

II. In flight

A. Take-off Time.

~ UTC 20:56:28

B. Immediately after take-off

- ✓ 1) Turn pump breaker on (*push*) UTC     :     :
- ✓ 2) Verify pressures/flows agree with previous values from II.B. Pup 190 Pdown 400 Pbypass      Flow
- ✓ 3) >= 1-min later, start pre-purge and note flow voltages UTC     :     :
- X 4) Pre-purge end time/Sample 1 Start Time UTC     :     :

C. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude, and record values in chart below

III. At the End of the Flight

- 2 ✓ 1) Turn Pumps breaker off (*pull*) ~ UTC 03:16:
- 3 ✓ 2) Turn Mains breaker off (*pull*) UTC     :     :
- 1 ✓ 3) Turn valve box breaker off (*pull*) UTC     :     :
- 4 ✓ 4) Turn 28V breaker (on back of rack) off (*pull*) UTC     :     :

no foam / cardboard

IV. Post-flight

~ 03:15

Flasks closed by: BRS

- 1) Close all flask valves
- 2) Remove upstream trap, and place downstream in its place.
- 3) Plug hole in dewar lid
- 4) Empty beads from upstream trap into wet bead container to dry
- 5) Download flask sampling data to lab laptop + pen drive
- 6) Unload flasks to Boxes #: 107
- 7) (Before next flight) Follow procedures in Section I.A. for next flight

A-D  
now  
0

Port	Pre-Purge Flow (V)	Samp. Flow (V)	Sample End Time	PALTF (kft)	MEDCO2	Notes
1			21:56:36	28x		Flow stable since 21:49 (only)
2			22:21:05	21x		
3			22:05:07	15x		
4			22:08:18	10x		
5			22:11:38	5x		NWAS 22:11:23 - 26
6			22:15:10	1x		NWAS 50-52
7			23:17:29	28x		
8			23:22:56	21x		
9			23:27:22	14.5x		
10			23:30:16	10x		
11			23:33:49	5x		
12			23:37:35	1x		
13			01:03:12	1x		
14			01:07:30	13x		
15			01:10:38	21x		
16			01:15:44	28x		
17			01:25:40	21x		
18			01:29:39	15x		
19			01:36:17	5x		NWAS 01:35:54-57
20			02:02:01	28x		
21			02:07:33	24x		
22			02:11:52	15x		
23			02:15:01	10x		
24			02:18:25	5x		
25			02:22:08	1x		NWAS - 02:21:48
26			02:29:27	10x		
27			02:29:53	16.5x		
28			02:36:05	21x		
29			02:47:59	28x		
30			02:49:41	36x		02:50 to 90/670
31			03:00:00	43x		
32			03:05:39	43x		NWAS 03:05:03 - 03:05:30

Profile #1

Profile #2

Profile #3

21:56: NWAS 13-23 see

23-26

Have to climb fast for APC  
Variable flow

only 1 trap in line

NCAR MEDUSA Checklist

V. 2009.01.15

FLIGHT: RF06 LEG: P60-CAC DATE (YYMMDD): 090118

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 090117

(Both new)

- 1) Prepare new trap w/ clean beads filled to 3" below edge and bring to plane
- 2) Move downstream trap to upst. location and install new downstream trap
- 3) Load flasks and connect plumbing. Confirm lines are correctly installed
- 4) Install flask box retaining pins
- 5) Record Flask Box Numbers: Box #1 107 Box #2 104
- 6) Record flask IDs below
- 7) Record flask IDs into a TEXT file on laptop
- 8) If necessary, download data from previous flight to laptop and pen drive
- 9) Initiate system leak-check procedure

missing foam  
+ cardboard  
inserts

1 broken in shipping  
broken = 1384, left  
in box  
sampled RF05 to  
left in rack

no power → did during preflight

UTC \_\_\_:\_\_\_

Flask ID Table (View from Front of Box)

13	1350	12	1363	5	1364	4	1365
14	1354	11	1359	6	1360	3	1361
15	1358	10	1355	7	1356	2	1357
16	1362	9	1351	8	1382	1	1353

17	1047	24	1184	25	1239	32	—
18	1032	23	1390	26	1389	31	1300
19	1387	22	1386	27	1385	30	1388
20	1383	21	1192	28	1270	29	1254

B. 2-hours before take-off.: Leak-checking and Preparation

- ~~1) Ensure that both flask retaining pins are secured in the upper position~~
- ~~2) Install new trap into downstream position, verify upstream trap is new or from previous downstream. Upstream trap A Downstream trap D~~
- 3) Install protective cover on exposed DSM computer
- 4) Load dry ice into dewar ~~or finished full @~~ UTC 19:24
- 5) Remove rubber DSM computer shield
- 6) Ensure that MEDUSA valve control key is in place
- 7) Complete bypass / system leak check ~~CRASH broken~~
- 8) Complete overnight leak check procedure UTC 20:30
- 9) With system in bypass, pump OFF, open all flask stopcocks 2 half turns  
ensure  
Flasks opened by: BBS

EDIT  
EDIT

EDIT

+ mains off/on, clear all, valve box off

✓ save PNG

0.5" unless  
tropical, then  
0.0"  
Cor 1.0 ulm  
just testing  
procedures,  
no wait  
tm

EDIT  
(no need to record)

- ✓ 10) Install Splinter Shields *confirm*
- ✓ 11) Set P upstream, P downstream, prepurge T, and min flush T  
(Usually 140, 400, 30, 150, other presets reached by toggling plan code)  
Pupset 140 Pdownset 400 prepurgeT 30 flushT 150
- ✓ 12) Verify that Vstat2, CO<sub>2</sub>, and H<sub>2</sub>O are all reading correctly and no values blinking on screen *fontz? can't b/c @ VAC*
- ✓ 13) Set controllers to auto
- ✓ 14) Turn valve box off, turn pumps on
- ✓ 15) Verify pressures are controlling and flow is as expected  
Pup 139 Pdown 401 Pbypass 706 Flow 2850  
693 2880 *? Both low!*
- ✓ 16) Turn pump breaker off
- ✓ 17) Sync MEDUSA clock with clock on laptop  
MEDUSA time UTC 21:05:15 Laptop time UTC 21:05:16
- ✓ 18) "Clear All" and pump box power off then on

did above

II. In flight

A. Immediately after take-off

Take-off Time UTC 21:03:30

- ✓ 1) Turn pump breaker on
- ✓ 2) Verify pressures/flows agree with previous values from II.B.  
Pup 139 Pdown 399 Pbypass 739 Flow 3000 *Both climbing*
- ✓ 3) Turn valve box on
- ✓ 4) Verify that Vstat2, CO<sub>2</sub>, and H<sub>2</sub>O are all reading correctly and no values blinking on screen *fontz → let CO<sub>2</sub> + H<sub>2</sub>O stabilize (~ UTC 21:16:59 → ~ 21:37*
- ✓ 5) Start pre-purge

started late...

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 17 seconds after desired altitude, and record values in chart below

- 1) After sampling flask 16, close flasks 1-16.
- 2) After sampling flask 32, close flasks 17-32.

some flow was (26...)

Pos	Flow (V)	End Time	GALTF	Profile #	Notes
1		22:10:18	21.5	1	NWAS 22:11
2	9.83	22:14:50	15	1	
3	9.84	22:17:52	10	1	NWAS 22:17:30
4		22:20:53	5	1	<del>NWAS 22:21</del>
5	9.86	22:24:31	1	1	NWAS 22:24:15
6		22:47:57	28	2	only 9-mm of stable Plan
7		22:53:26	21	2	
8		22:57:17	15	2	
9		23:03:46	9	2	missed 110
10	9.78	23:03:30	5	2	
11	9.77	23:06:49	1	2	NWAS 23:06:40
12		23:29:56	28	3	
13		23:35:50	20.5	3	
14		23:40:22	13.5	3	missed 15
15		23:42:47	9.5	3	
16	9.72	23:45:50	5	3	

low P likely

high P likely

all 5 had no response Pbypass of 705

all 6 had no response Pbypass of 780 but checked @ end and was 76

31 flasks

close 1-16

EDIT

6 6 6 8  
5

Pos	Flow(V)	End Time	GGALTF	Profile #	Notes
17	9.82	23:48:52	1-	3	NWTS 23:48:42
18	9.82	00:10:50	28-	4	NWTS a few mm earlier
19		00:19:35	20x	4	
20		00:22:56	15x	4	
21		00:26:23	9.5x	4	
22		00:30:08	3.5x	4	missed 5
23		00:32:55	1-	4	NWTS 00:32:30
24		01:15:32	1-	5	NWTS 01:16:11
25	9.82	01:19:45	5x	5	
26	9.74	01:23:25	10x	5	Big MED CO2 anomaly
27		1:27:52	17.5x	5	missed
28		1:32:25	~25x	5	
29		1:36:28	~30x	5	
30		1:40:17	~36x	5	
31	7.83	1:59:00	43-	5	to 90/690
32					

EOTT — ~~else~~ 17-32  
 III. At the end of the sampling

- ✓ 1) Turn valve box breaker off (pull)
- ✓ 4) Turn Pumps breaker off (pull)
- ✓ 2) Turn Mains breaker off (pull)
- ✓ 3) Turn 28V breaker (on back of rack) off (pull)

UTC 02:04:45

IV. Post-flight

- ✓ 1) Remove upstream trap, and place downstream in its place.
- ✓ 2) Plug hole in dewar lid
- 3) Empty beads from upstream trap into wet bead container to dry
- ✓ 4) Download flask sampling data to Lab Laptop
- 5) Unload flasks. Box #1: 18 Box #2: 15

EOTT

next day:  
 Maint Day

MEDUSA leak check procedures

Overnight, flask downstream connectors/tubes: ~~delete~~ <sup>add,</sup>

- 1) Valve box on for Pump box power-on, ~~then valve box power off~~
- 2) Pup Closed, Pdn Open, Pump On, Bypass On - pull down bypass line for 1 minute
- 3) Valve box on
- 4) Run 20-second prepurge to pull all flask d.s. tubes to low P (requires clearing all and powering down/up to reset)
- 5) Handlink: Valve Box to position 1,
- 6) Go To 1 (6-way to odd, Pump box to 1)
- 7) Valve box off ~~then pump off~~
- 8) Close Pdn, turn pumps off, pump box off
- 9) Wait some amount of time (5 minutes too low, overnight good)
- 10) Turn valve box on, pump box on
- 11) Troubleshoot cable on w/ DB-9s mated to prevent bypass, but allow valve switching
- 12) Run 20-second prepurge to check all flask d.s. tube Ps (requires clearing all and powering down/up to reset)
- 13) Record times for AEROS matching: Start 20:26:04 Finish ~20:42
- 14) When done replace MEDUSA key to put into bypass and turn valve box off

(Keep)  
try w/ w/ added bypass?  
" " " " " " pump on?

add, Ensure pump #2 to 1 + 6-way odd then v box off + ensure bypass = 1

Watch on AEROS  
step up to 17 then goto 1  
ensure only stop first

make sure AEROS on

System Bypass Leak Checking:

- ✓ 1) Ensure in bypass
- ✓ 2) Close PC1 (top switch ↓) and open PC2 (bott switch ↑)
- ✓ 3) Verify MEDUSA Key is in place, and that system is in pos 1
- ✓ 4) Turn on pump breaker (push)
- ✓ 5) Verify Pup → 0, Pdown → ~160, Pbyass → ~170 after 1 min
- ✓ 6) Switch PC2 to closed and turn off pump
- ✓ 7) Wait 15 seconds and note Pu, Pd, Pb in table below
- ✓ 8) After 1 minute, record values again.
- ✓ 9) After 5 minutes, record values again
- ✓ 10) If all values are fine (Pu < 5 torr/min, Pd, Pb < 2 torr/5 mins), skip to 13)
- ✗ 11) 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. (Pressurizes system in bypass.)
- ✗ 12) Snoop fittings in between, and to, boxes, and fix/tighten as necessary
- ✓ 13) Return switches to center.

+ valve box off

could be through pump so don't worry about

and traps

EDIT  
EDIT

EDIT

Time (UTC)	Pup	Pdn	Pbypass	Comments
19:42:30	3	161	170	
19:43:30	4	161	170	
19:48:30	8	162	170	

- amb on flask tubes

Jumps @ 1, 17, +22, maybe 32, maybe others  
saw previously → need to snoop

NB. Becz of having to toggle positions during trouble shooting total sample pump time in MED comp flask table will not match calculate  $\Delta$ Time b/w flasks.

NCAR MEDUSA Checklist

V. 2009.01.20

FLIGHT: 2F07 LEG: NZCH-NZCH DATE (YYMMDD): 20090121

I. Preflight

A. Day(s) before flight Date (YYMMDD) = 20090120

- 1) Prepare new trap w/ clean beads filled to 3.5" below edge and bring to plane
- 2) Move downstream trap to upstream location and install new downstream trap, (using 1/4" spacer on tropical flights) Up trap D Down trap B
- 3) Load flasks and connect plumbing. Confirm lines are correctly installed
- 4) Install flask box retaining pins
- 5) Record Flask Box Numbers: Box #1 18 Box #2 25
- 6) Record flask IDs below
- 7) Record flask IDs into a TEXT file on laptop
- 8) If necessary, download data from previous flight to laptop and pen drive
- 9) Complete overnight leak check procedure #1 UTC \_\_\_ : \_\_\_

except pos 8  
(stem broken)

RECHECK  
ORINO

loose dip tube

Flask ID Table (View from Front of Box)

13	1085	12	1145	5	1264	4	1273
14	1123	11	1151	6	1052	3	1182
15	1130	10	1118	7	1340	2	1042
16	1196	9	1051	8	1166	1	1336
17	1124	24	1255	25	1289	32	1225
18	1223	23	1007	26	1234	31	1205
19	1287	22	1077	27	1121	30	1146
20	1169	21	1153	28	1303	29	1217

B. 2-hours before take-off.: Leak-checking and Preparation

- 1) Install protective cover on exposed DSM computer
- 2) Load dry ice into dewar (1.0" down on tropical flights) UTC 19:00  $\rightarrow$  19:35
- 3) Remove rubber DSM computer shield
- 4) Ensure that MEDUSA valve control key is in place
- 5) Main breaker on  $\rightarrow$  upon startup P<sub>udb</sub> = 452, 342, 338
- 6) Complete bypass / system leak check
- 7) Complete overnight leak check procedure #2 UTC 20:31
- 8) "Clear All" and pump box power off then on
- 9) Set controllers to auto  $\leftarrow$  EDIT: ensure that valves are to 1), add

EDIT

check O-ring  
on pos 8

NOTE: P<sub>33P</sub> is reading 23 torr high relative to an expected ~760  
it reads 783. Noted during maint day 20090120  
NET

✓ 10) Ensure bypass on and pump off, open all flask stopcocks 2 half turns  
 Flasks opened by:

EDIT

EDIT

✓ 11) Install splinter shields, ~~complete rack book~~ *JDB Bs 23, 1121007 - valve stopcock crunched.*

✓ 12) Confirm P upstream, P downstream, prepurge T, and min flush T  
 Pupset 139 Pdownset 400 prepurgeT 30 flushT 150

✓ 13) Verify that Vstat2 is reading correctly and no values blinking on screen

✓ 14) Turn valve box off, turn pumps on

✓ 15) Verify pressures are controlling and flow is as expected  
 Pup 139 Pdown 400 Pby pass 740 - Flow 2900 -

✗ 16) Turn pump breaker off 720 3200

✓ 17) Sync MEDUSA clock with clock on laptop  
 MEDUSA time UTC 21 : 23 : 00 Laptop time UTC 21 : 23 : 00 *seconds in flight*  
*won't ask for time, but only 8 seconds ahead*

II. In flight

A. Immediately after take-off Take-off Time UTC 21 : 13 : 30 MED

1) Turn pump breaker on

✗ 2) Verify pressures/flows agree with previous values from II.B.  
 Pup 140 Pdown 400 Pby pass 710 Flow 29-300 NO

✓ 3) Turn valve box on

✓ 4) Verify that Vstat2, CO<sub>2</sub>, and H<sub>2</sub>O are all reading correctly and no values blinking on screen, if possible let CO<sub>2</sub> and H<sub>2</sub>O stabilize

5) Start pre-purge UTC 21 : 14 : 30 MED

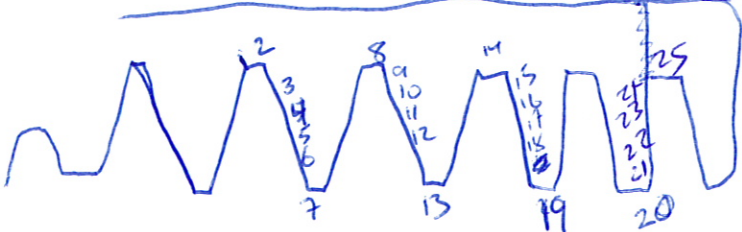
B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 17 seconds after desired altitude, and record values in chart below  
*(not counting nose landing)*

Pos	Flow (V)	End Time	GGALTF	Profile #	Notes
1	9.98	23:16:25	28	2	Taking extra flask at top to ensure sample
2	9.98	23:19:37	28	2	This should be official bp flask
3	9.98	23:24:26	21	2	
4	..	23:28:46	15	2	
5	..	23:32:07	10	2	
6	9.98	35:51	42	2	LATE
7	9.98	23:28:50	890ft	2	Sounded w/ Fred.
8	9.98	23:59:50	28	3	
9	9.98	00:06:30	21	3	
10	..	00:10:47	14.5	3	LATE
11	..	00:13:49	10	3	
12	9.94	00:17:08	5	3	roughly in clouds
13	..	00:20:20	790ft	3	
14	9.98	00:41:50	28	4	
15	9.98	00:48:25	20.6	4	LATE
16	9.98	00:52:09	15	4	

*ensure sample  
 proceed is  
 working  
 despite  
 monkeying  
 earlier*

✓ 1) After sampling flask 16, close flasks 1-16. UTC 01 : 05

EDIT





Pos	Flow(V)	End Time	GGALTF	Profile #	Notes
17	9.8	00:55:28	10	4	
18	9.8	00:58:50	5	4	just out of clouds (still above others)
19	9.85	1:02:30	800ft	4	
20	9.85	1:41:35	800ft	5	choppy water beneath
21	9.85	1:44:56	5	5	
22	9.85	1:48:29	10	5	
23	9.85	1:52:02	15	5	
24	9.85	1:56:30	22	5	late
25	9.85	2:01:40	28	5	
26	9.85	2:21:20	850	5/6	scattered clouds
27	9.8	2:28:15	10	6	
28	9.8	2:35:40	21	6	
29	9.8	2:44:17	31	6	
30	9.8	2:53:41	41	6/10	back to N7
31	9.8	2:56:25	42	"	shouldn't be poss to close, but will try.
32	7.95	3:03:27	42	"	now 2/90/670 sept.

closed values on Flasks 1-16

10  
28  
30  
43

Sw. reads to 90/670 @ 2:59:30

2) After sampling flask 32, close flasks 17-32.

UTC: 03 07

III. At the end of the sampling

- 1) Turn valve box breaker off
- 2) Turn Pumps breaker off
- 3) Download flask sampling data to laptop
- 4) Transfer \*.tab file and \*.txt file to pen drive
- 5) Turn Mains breaker off
- 6) Turn 28V breaker off

UTC 03: 24

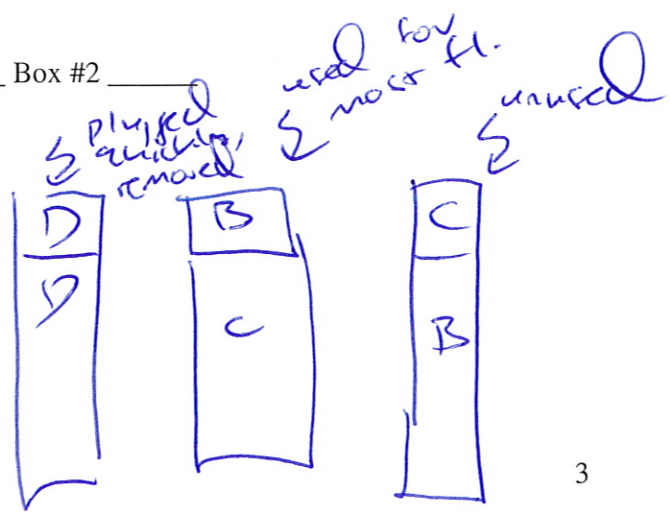
IV. Post-flight

- 1) Remove upstream trap, and place downstream in its place.
- 2) Plug hole in dewar lid
- 3) Empty beads from upstream trap into wet bead container to dry

Both removed

V. Day after flight

- 1) Unload flasks. Box #1: 112 Box #2 \_\_\_\_\_



**MEDUSA leak check procedures**

**Overnight Leak Check Procedure #1:**

- 1) Valve box on
- 2) Ensure that Valcos #1 and #2 to position 1, Valco #3 to an odd position, and Bypass on
- 3) Valve box off
- 4) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 5) ~~Pdn Ctrl Closed~~
- 6) Valve box on *run 10-sec*
- 7) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 8) Run 20-second prepurge to evacuate all flask downstream tubes (watch on AEROS)
- 9) Step Up to 17, then GoTo 1 to put Valcos #1 and #2 to 1, and Valco #3 to an odd
- 7) Valve box off
- 8) Close Pdn, turn pumps off, main breaker off, 28 V breaker off

**Overnight Leak Check Procedure #2:**

- 1) Pumps ~~on~~, then valve box on *OFF (if new) - ensure 1, 1, odd*
- 2) "Clear All"
- 3) Ensure AEROS is running
- 4) Run 20-second prepurge to check all flask downstream tube Ps
- 5) Record times for AEROS matching: Start 20:16 Finish 20:31

**Bypass / System Leak Check Procedure**

- 1) Ensure bypass on
- 2) Close PC1 (top switch ↓) and open PC2 (bott switch ↑)
- 3) Valve box off
- 4) Turn on pump breaker and let run for 1 minute
- 5) Verify Pup → 0, Pdown → ~170, Pbyypass → ~170
- 6) Switch PC2 to closed and turn off pump
- 7) Wait 15 seconds and note Pu, Pd, Pb in table below
- 8) After 1 minute, record values again.
- 9) After 5 minutes, record values again
- 10) If Pdown and Pbyypass < 2 torr/5 mins, ~~skip to 13~~
- 11) 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
- 12) Snoop fittings in between, and to, boxes, and fix/tighten as necessary
- 13) Return switches to center



Time (UTC)	Pup	Pdn	Pbyypass	Comments
20:07:06	1	165	169	
20:10:06	5	166/5	169/70	Valis good after 4 mins
20:11:06	6	166	170	

NCAR MEDUSA Checklist

V. 2009.01.21

FLIGHT: RF08 LEG: CTC-PPT DATE (YYMMDD): 090124

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 090122

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new downstream trap Down trap B
- 3) Load flasks and connect plumbing. Confirm lines are correctly installed
- 4) Install flask box retaining pins, , complete rack book
- 5) Record Flask Box Numbers: Box #1 112 Box #2 16?
- 6) Record flask IDs below
- 7) Record flask IDs into a text file on laptop (YYMMDD\_RF##\_Flasks.txt)
- 8) If necessary, download data from previous flight to laptop and pen drive
- 9) Complete flask leak check procedure #1 UTC 21 : 56
- 10) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 UTC 22 : 42
- 11) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 12) Record Ps: Pup \_\_\_ Pdown \_\_\_ Pbypass \_\_\_ then all power off

~~EDIT~~ EDIT <B>  
Flask Leak  
Check  
Procedure #1 <B>

Flask ID Table (View from Front of Box)

13	1127	12	<del>1310</del> 1155	5	1238	4	1067
14	1099	11	1232	6	1144	3	1227
15	1120	10	1198	7	1181	2	1008
16	1016	9	1242	8	1139	1	1253
17	1093	24	1201	25	1269	32	1115
18	1081	23	1230	26	1334	31	1284
19	1101	22	1084	27	1218	30	1174
20	1250	21	1288	28	1285	29	1029

*edited in flask table - JDB*

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

- 1) Install protective cover on exposed DSM computer
- 2) Load dry ice into dewar 1.0" from lid UTC 19 : 00
- 4) Ensure that MEDUSA valve control key is in place
- 5) 28 V breaker on, Valve box on, Main breaker on
- 6) Record P / Δ: Pup \_\_\_ / \_\_\_ Pdown \_\_\_ / \_\_\_ Pbypass \_\_\_ / \_\_\_
- 7) Sync MEDUSA clock with clock on laptop  
MEDUSA time UTC 19 : 43 : 00 Laptop time UTC 19 : 43 : 01

Accid. left PCs in Auto overnight

- 8) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, bypass on, pumps off
  - 9) Open all flask stopcocks 2 half turns Flasks opened by: JDB 20.00
  - 10) Re-install splinter shields
  - 11) Confirm P upstream, P downstream, prepurge T, and min flush T settings  
 Pupset 140 Pdownset 510 prepurgeT 30 flushT 150
  - 12) Verify that Vstat2 is reading correctly and no values blinking on screen
- C. 30 minutes before take-off.: Upstream trap and Leak-checking
- 1) Slowly install new upstream trap with 1/4" spacer Up trap c/k
  - 2) Remove rubber DSM computer shield
  - 3) Complete bypass / system leak check
  - 4) Ensure valve box off, both controllers to auto, turn pumps on
  - 5) Verify pressures are controlling and flow is as expected  
 Pup 140 Pdown 510 Pbybass 783 Flow 3100
  - 6) Pump breaker off

F.D.T.:  
 open both  
 PCs and  
 note P, byb, d, w II.  
 @ ground

OPEN TO AMB P<sub>udb</sub> = 759 771 785

- II. In flight
- A. Immediately after take-off Take-off Time UTC 21:04:00
- 1) Turn pump breaker on 21:15
  - 2) Verify pressures/flows agree with previous values from II.C.  
 Pup 140 Pdown 510 Pbybass 785 Flow 2950 → a bit lower!
  - 3) Turn valve box on → after 5 mins, reads 815+, so lowering id
  - 4) Verify that Vstat2, CO<sub>2</sub>, and H<sub>2</sub>O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO<sub>2</sub> and H<sub>2</sub>O stabilize to 420  
 UTC 21:24:38 P<sub>b</sub> → 777.
  - 5) Start pre-purge
- B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 17 seconds after desired altitude, and record values in chart below

Pos	Flow (V)	End Time	GGALTF	Profile #	Notes
1	9.98	22:20:00	1	1	
2		22:23:07	5	1	
3		22:26:20	10	1	
4		22:30	16	1	Late - Aeros quit on me
5	10.02	22:34:05	21	1	
6		22:41:40	28	1	
7	10.02	23:41:38	1	3	
8		23:45:50	0.7	3	Late - was chatting w/ Ralphi
9		23:48:25	10	3	
10		23:51:30	15	3	
11		23:56:00	22	3	ARG!! LATE! gotta stop talking on XCell.
12		00:01:36	28	3	
13		00:42:57	28	5	
14		0:51:53	21	5	
15		0:55:42	15	5	
16	9.9	0:58:50	10	5	

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

UTC 01:07



Pos	Flow(V)	End Time	GGALTF	Profile #	Notes
17	9.88	02:06:00	1	<del>5</del>	missed shift
18	9.86	02:10:00	28	7	
19	9.86	<del>02:21:30</del>	14	7	LATE missed 21-CHAT!!!!
20	9.83	02:25	8	7	LATE
21		02:27:30	3.5	7	Had to wait bar at last late
22	9.9	02:30:44	1	7	very cloudy - H2O → 20000
23	9.8	02:40:50	15	8	ascent to 40kft AGAIN LATE
24	9.8	02:44:28	21	8	missed
25		48:38	28		5,10
26	9.88	2:59:23	37		WHAT
27	9.8	3:39:30	40	9	Down into airport
28	9.9	3:42:45	36	9	IS WRONG
29	9.9	3:55:16	21	9	WITH
30	9.83	3:58:38	15	9	ME
31		04:01:20	10	9	PONAJ?
32		04:04:00			

02:25:00

105+ second trap.

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

UTC \_\_\_:\_\_\_

III. At the end of the sampling

- 1) Turn valve box breaker off
- 2) Turn Pumps breaker off
- 3) Download flask sampling data to laptop
- 4) Transfer \*.tab file and \*.txt file to pen drive
- 5) Turn Mains breaker off
- 6) Turn 28V breaker off

UTC \_\_\_:\_\_\_

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Empty beads from upstream trap into 'wet' bead container to dry
- 4) Empty beads from downstream trap into 'used' bead container to dry

V. Day after flight

1) Unload flasks. Box #1: \_\_\_\_\_ Box #2: \_\_\_\_\_

THIS WAS V. FRUSTRATING -  
TWO TRAPS PLUGGED (TOT. 3X),  
AND I MISSED MANY SAMPLES  
BCZ OF DISTRACTION.



NCAR MEDUSA Checklist

V. 2009.01.21

FLIGHT: RFO9 LEG: TAHITI - EASTER ISLAND DATE (YYMMDD): 2009 01 26

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 090126 (Day of - no maint day)

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new downstream trap Down trap OK
- 3) Load flasks and connect plumbing. Confirm lines are correctly installed
- 4) Install flask box retaining pins, , complete rack book
- 5) Record Flask Box Numbers: Box #1      Box #2
- 6) Record flask IDs below
- 7) Record flask IDs into a text file on laptop (YYMMDD\_RF##\_Flasks.txt)
- 8) If necessary, download data from previous flight to laptop and pen drive
- 9) Complete flask leak check procedure #1 UTC 01:07
- 10) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 UTC 01:50
- 11) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 12) Record Ps: Pup      Pdown      Pbypass      then all power off

NO MAINT DAY TO P-LEAK CHECK

Flask ID Table (View from Front of Box)

13 1396	← 12 1286	5 1397	← 4 1391
14 1133	11 1398	6 1268	3 1191
15 1199	10 1209	7 1060	2 1025
16 11611	9 1399	← 8 1187	1 0001
↓			
17 1194	24 1164	→ 25 1207	32 1102
18 1156	23 1041	26 1159	31 1183
19 1157	22 1298	27 1028	30 1117
20 1090	→ 21 1125	28 1282	→ 29 1229

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

- 1) Install protective cover on exposed DSM computer
- 2) Load dry ice into dewar 1.0" from lid UTC 00:45
- 4) Ensure that MEDUSA valve control key is in place
- 5) 28 V breaker on, Valve box on, Main breaker on
- 6) Record P / Δ: Pup      /      Pdown      /      Pbypass      /
- 7) Sync MEDUSA clock with clock on laptop

MEDUSA time UTC 04:22:22 Laptop time UTC 04:22:22

NO MAINT DAY FOR P-LEAK CHECK

$P_{\text{when open}} = P_u = 755 P_d = 764 P_b = 780$

- ✓ 8) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, bypass on, pumps off
- ✓ 9) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- ✓ 10) Re-install splinter shields
- ✓ 11) Confirm P upstream, P downstream, prepurge T, and min flush T settings  
Pupset 140 Pdownset 400 prepurgeT 30 flushT 150
- ✓ 12) Verify that Vstat2 is reading correctly and no values blinking on screen

C. 30 minutes before take-off.: Upstream trap and Leak-checking

- ✓ 1) Slowly install new upstream trap with 1/4" spacer Up trap
- ✓ 2) Remove rubber DSM computer shield
- ✓ 3) Complete bypass / system leak check
- ✓ 4) Ensure valve box off, both controllers to auto, turn pumps on
- ✓ 5) Verify pressures are controlling and flow is as expected  
Pup 140 Pdown 530 Pbypass 780 Flow 2850
- ✓ 6) Pump breaker off

NOT - P is still not accept. in Bypass. Have to bring Pdownset → 530

II. In flight

A. Immediately after take-off

Take-off Time UTC 02:22:18

- ✓ 1) Turn pump breaker on
- ✓ 2) Verify pressures/flows agree with previous values from II.C.  
Pup 140 Pdown 460 Pbypass 764 Flow 3200
- ✓ 3) Turn valve box on
- ✓ 4) Verify that Vstat2, CO<sub>2</sub>, and H<sub>2</sub>O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO<sub>2</sub> and H<sub>2</sub>O stabilize
- ✓ 5) Start pre-purge UTC 04:03:55, stopped 04:07:14

Running w  
140 / 460

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 17 seconds after desired altitude, and record values in chart below

Pos	Flow (V)	End Time	GGALTF	Profile #	Notes
1	9.9	04:40:24	28	2	well into flight bcz of
2	9.9	4:50:07	21	2	long strat by beginning
3	9.9	4:53:48	15	2	
4	9.9	4:57:04	10	2	
5	9.9	5:00:08	5	2	
6	9.9	5:03:40	1	2	
7	9.9	5:26:04	28	3	
8	9.9	5:38:47	21	3	5:33:47
9	9.9	5:39:00	15	3	
10	9.9	5:43:35	10	3	
11	9.9	5:48:35	5	3	
12	9.9	5:54:13	1	3	
13	9.85	6:15:57	28	4	
14	9.85	6:23:22	21	4	perhaps slightly late
15	9.85	6:26:47	15	4	
16	9.85	6:30:05	10	4	

restarted  
04:12:14  
ended  
04:28:14

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

UTC 6:34 (closed, 16 first)





Pos	Flow(V)	End Time	GGALTF	Profile #	Notes
17	9.75	6:37:50	1	4	Misc @ Shift
18	<del>9.85</del>	6:59:49	28	5	9.85
19	<del>9.85</del>	7:06:51	21	5	9.85
20	9.83	7:10:35	15	5	9.85
21	9.85	7:13:44	10	5	
22	9.85	7:17:03	5	5	
23	9.85	7:20:35	1	5	
24	9.81	7:23:42	5	5	
25	9.8	7:26:51	10	5	
26	9.8	7:29:57	15	5	
27	9.8	7:33:47	21	5	
28	9.8	7:38:09	28	5	
29	9.8	7:43:22	35	5	
30	9.8	7:48:35	40	5	
31	9.8	7:52:14	40	5	
32	9.8	7:55:03	40	5	

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

UTC 7:58

### III. At the end of the sampling

- 1) Turn valve box breaker off
- 2) Turn Pumps breaker off
- 3) Download flask sampling data to laptop
- 4) Transfer \*.tab file and \*.txt file to pen drive
- 5) Turn Mains breaker off
- 6) Turn 28V breaker off

UTC 7:59

### IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid
- 3) Empty beads from upstream trap into 'wet' bead container to dry
- 4) Empty beads from downstream trap into 'used' bead container to dry

### V. Day after flight

- 1) 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) Valve box off
- 4) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 5) Valve box on
- 6) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 7) Adjust prepurge time to 20 seconds
- 8) Run 20-second prepurge to evacuate all flask downstream tubes (watch on AEROS)
- 9) Save PNG of AEROS Ps and Stats to laptop (YYMMDD\_RF##\_Leakcheck1.png)
- 10) Valve box off . *Recs closed*
- 11) Close Pdn, turn pumps off (will leave in position 32)

00:51:46

**Flask Leak Check Procedure #2:**

- 1) Pump box off, Valve box on, Pump box on (will send to position 1)
- 2) "Clear All"
- 3) Ensure AEROS is running
- 4) Adjust prepurge time to 20 seconds
- 5) Run 20-second prepurge to check all flask downstream tube Ps00
- 6) Record times for AEROS matching: Start 01:34:20 Finish 01:50
- 7) Save PNG of AEROS Ps and Stats to laptop (YYMMDD\_RF##\_Leakcheck2.png)
- 8) Address any apparent leaks

*General leak seen across rotor on PB, as noted before. Small, but must be add. by HIPPOZ*

**Bypass / System Leak Check Procedure**

- 1) Ensure bypass on
- 2) Close PC1 and open PC2
- 3) Turn valve box off
- 4) Turn on pump breaker and let run for 1 minute
- 5) Verify Pup → 0, Pdown → ~170, Pbyypass → ~170
- 6) Switch PC2 to closed and turn off pump
- 7) Wait 15 seconds and note Pu, Pd, Pb in table below
- 8) After 1 minute, record values again.
- 9) After 5 minutes, record values again (3.3)
- 10) If Pdown and Pbyypass < 2 torr/5 mins, skip to 13
- 11) 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
- 13) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
0:33:00	0	167	171	
0:34:00	13	166	170	
0:36:30	15	165	169	Dropping sl. bez of Dry ice cooling

NCAR MEDUSA Checklist

V. 2009.01.21

FLIGHT: RF10 LEG: Easter Island DATE (YYMMDD): 090128  
 - Costa Rica

I. Preflight

- A. Day(s) before flight Date (YYMMDD) = 090127
- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
  - 2) Install new downstream trap Down trap
  - 3) Load flasks and connect plumbing. Confirm lines are correctly installed
  - 4) Install flask box retaining pins, , complete rack book
  - 5) Record Flask Box Numbers: Box #1  Box #2
  - 6) Record flask IDs below
  - 7) Record flask IDs into a text file on laptop (YYMMDD\_RF##\_Flasks.txt)
  - 8) If necessary, download data from previous flight to laptop and pen drive
  - 9) Complete flask leak check procedure #1 UTC 18:12
  - 10) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 UTC      :
  - 11) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
  - 12) Record Ps: Pup      Pdown      Pbypass      then all power off

0 vals  

756	765	774
-----	-----	-----

Flask ID Table (View from Front of Box)

13 1013	← 12 1134	5 1105	← 4 1170
14 1278	11 1033	6 1236	3 1096
15 1158	10 1258	7 1297	2 1072
16 1137	9 1119	← 8 1087	1 1189
↓ 17 1086	24 1070	→ 25 1318	32 1345
18 1335	23 1108	26 1053	31 1195
19 1034	22 1006	27 1168	30 1148
20 1111	→ 21 1106	28 1167	→ 29 1261

090127  
 checked  
 twice  
~~090127~~

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

- 1) Install protective cover on exposed DSM computer
- 2) Load dry ice into dewar 1.0" from lid UTC 14:20
- 4) Ensure that MEDUSA valve control key is in place
- 5) 28 V breaker on, Valve box on, Main breaker on
- 6) Record P / Δ: Pup 624 /      Pdown 631 /      Pbypass 639 /
- 7) Sync MEDUSA clock with clock on laptop  
 MEDUSA time UTC 14:31:09 Laptop time UTC 14:31:10

140/580

624 631  
 639

Ps after  
 Full Leak check

- 8) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, bypass on, pumps off
- 9) Open all flask stopcocks 2 half turns Flasks opened by: JDJ 16:50
- 10) Re-install splinter shields
- 11) Confirm P upstream, P downstream, prepurge T, and min flush T settings  
 Pupset 140 Pdownset 590 prepurgeT 30 flushT 150
- 12) Verify that Vstat2 is reading correctly and no values blinking on screen

C. 30 minutes before take-off.: Upstream trap and Leak-checking

- 1) Slowly install new upstream trap with 1/4" spacer Up trap
- 2) Remove rubber DSM computer shield
- 3) Complete bypass / system leak check
- 4) Ensure valve box off, both controllers to auto, turn pumps on
- 5) Verify pressures are controlling and flow is as expected  
 Pup 140 Pdown 590 Pbyass 842 Flow 3000  
↑ expected w/ new, higher setpoint
- 6) Pump breaker off

II. In flight

A. Immediately after take-off

Take-off Time UTC 17:25:55

- 1) Turn pump breaker on 18:38:00
- 2) Verify pressures/flows agree with previous values from I.I.C.  
 Pup 140 Pdown 590 Pbyass 890 Flow 3100
- 3) Turn valve box on
- 4) Verify that Vstat2, CO<sub>2</sub>, and H<sub>2</sub>O are all reading correctly and no values blinking on screen. If sampling schedule allows, let CO<sub>2</sub> and H<sub>2</sub>O stabilize
- 5) Start pre-purge UTC 18:41:34

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 17 seconds after desired altitude, and record values in chart below

Pos	Flow (V)	End Time	GGALTF	Profile #	Notes
1	9.5	192445	29	2	
2		193452	24	2	
3		193852	15	2	
4		194300	8	2	LATE Fred come back to meet dips
5		194538	3.9	2	LATE h2 of last one
6		19:49:11	1	2	
7		21:13:54	1	4	
8		21:17:10	5	4	
9		21:20:30	10	4	
10		21:24:36	16	4	LATE Again, Fred come back to check on P. issue and I miss target
11		21:27:16	21	4	
12		21:34:28	28	4	
13		21:50:20	10	5	Shuka thought I was telling him to take some oops!!!
14		21:56:51	1	5	
15		22:01:40	7	5	LATE
16		22:04:16	11	5	LATE h2 of last

closed valves 1-12

1) After sampling flask <sup>12</sup>16, close flasks <sup>12</sup>1-16



UTC 21:42 (long wait until 16 would be closed - wanted to be safe)  
 UTC 22:21

Pos	Flow(V)	End Time	GGALTF	Profile #	Notes
17	9.5	220657	15	5	
18	9.5	221004	21	5	
19	9.5	221815	28	5	
20	9.5	223900	1	6	MISTAKE - resample?
21	9.5	232509	1	7	
22	9.5	232922	5	7	
23	9.5	233240	10	7	
24	9.5	233550	15	7	
25	9.5	233854	20.5	7	a little early
26	9.5	234429	28	7	
27	9.5	005739	28	8	Descent into Costa Rica
28	9.5	010405	20	8	LATE check about A02 issue
29	9.5	010650	13	8	LATE - fast descent rate
30	9.5	010830	10	8	
31	9.5	0112:25	7.5	8	
32	9.5	0118:29	4	8	over Costa Rica on descent. Should

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

UTC 01: 50

III. At the end of the sampling

1) Turn valve box breaker off

2) Turn Pumps breaker off

3) Download flask sampling data to laptop

4) Transfer \*.tab file and \*.txt file to pen drive

5) Turn Mains breaker off

6) Turn 28V breaker off

UTC 01: 23: 50

IV. Post-flight

1) Remove traps

2) Plug holes in dewar lid

3) Empty beads from upstream trap into 'wet' bead container to dry

4) Empty beads from downstream trap into 'used' bead container to dry

V. Day after flight

1) 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) Valve box off
- 4) Pup Ctrl Closed, Pdn Ctrl Open, Pump On - pull down bypass line for 1 minute
- 5) Valve box on
- 6) If necessary, "Clear All" (after being sure data from last flight secure on laptop)
- 7) Adjust prepurge time to 20 seconds
- 8) Run 20-second prepurge to evacuate all flask downstream tubes (watch on AEROS)
- 9) Save PNG of AEROS Ps and Stats to laptop (YYMMDD\_RF##\_Leakcheck1.png)
- 10) Valve box off
- 11) Close Pdn, turn pumps off (will leave in position 32)

**Flask Leak Check Procedure #2:**

- 1) Pump box off, Valve box on, Pump box on (will send to position 1)
- 2) "Clear All"
- 3) Ensure AEROS is running
- 4) Adjust prepurge time to 20 seconds
- 5) Run 20-second prepurge to check all flask downstream tube Ps00
- 6) Record times for AEROS matching: Start 14:32 Finish 14:48 *Ps00 end = 427 787 407*
- 7) Save PNG of AEROS Ps and Stats to laptop (YYMMDD\_RF##\_Leakcheck2.png)
- 8) Address any apparent leaks

*still in Pos 32*  
*Ps00 end = 427 787 407*

**Bypass / System Leak Check Procedure**

- 1) Ensure bypass on
- 2) Close PC1 and open PC2
- 3) Turn valve box off
- 4) Turn on pump breaker and let run for 1 minute
- 5) Verify Pup → 0, Pdown → ~170, Pbyypass → ~170
- 6) Switch PC2 to closed and turn off pump
- 7) Wait 15 seconds and note Pu, Pd, Pb in table below
- 8) After 1 minute, record values again.
- 9) After 5 minutes, record values again *NOT EN. TIME*
- 10) If Pdown and Pbyypass < 2 torr/5 mins, skip to 13
- 11) 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
- 13) Return PC1 and PC2 to auto

<i>Ps in Bypass</i>	<i>428 437 435</i>
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Time (UTC)	Pup	Pdn	Pbyypass	Comments
16:06:00	<del>7</del>	162	171	DAD BEFORE
16:07	8	162	171	
16:14	26	163	171	
14:59	1	164	168	DAD OF
15:00	7	164	168	

NCAR MEDUSA Checklist

V. 2009.01.21

FLIGHT: RF11 LEG: Costa Rica DATE (YYMMDD): 20090130  
- Boulder

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 20090129

Flasks  
 Didn't  
 Arrive in  
 Time in  
 Costa Rica  
NOT SAMPLING

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new downstream trap Down-trap
- 3) Load flasks and connect plumbing. Confirm lines are correctly installed
- 4) Install flask box retaining pins, , complete rack book
- 5) Record Flask Box Numbers: Box #1      Box #2
- 6) Record flask IDs below
- 7) Record flask IDs into a text file on laptop (YYMMDD\_RF##\_Flasks.txt)
- 8) If necessary, download data from previous flight to laptop and pen drive
- 9) Complete flask leak check procedure #1 UTC      :
- 10) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 UTC      :
- 11) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 12) Record Ps: Pup      Pdown      Pbypass      then all power off

Flask ID Table (View from Front of Box)

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

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

- 1) Install protective cover on exposed DSM computer
- 2) Load dry ice into dewar 1.0" from lid UTC 14 : 42
- 4) Ensure that MEDUSA valve control key is in place
- 5) 28 V breaker on, Valve box on, Main breaker on
- 6) Record P / Δ: Pup      /      Pdown      /      Pbypass      /
- 7) Sync MEDUSA clock with clock on laptop  
 MEDUSA time UTC      :      :      Laptop time UTC      :      :

- 8) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, bypass on, pumps off
- 9) Open all flask stopcocks 2 half turns      Flasks opened by: \_\_\_\_\_
- 10) Re-install splinter shields
- 11) Confirm P upstream, P downstream, prepurge T, and min flush T settings  
       Pupset \_\_\_\_\_ Pdownset \_\_\_\_\_ prepurgeT \_\_\_\_\_ flushT \_\_\_\_\_
- 12) Verify that Vstat2 is reading correctly and no values blinking on screen
- C. 30 minutes before take-off.: Upstream trap and Leak-checking
  - 1) Slowly install new upstream trap with 1/4" spacer      Up trap \_\_\_\_\_
  - 2) Remove rubber DSM computer shield
  - 3) Complete bypass / system leak check
  - 4) Ensure valve box off, both controllers to auto, turn pumps on
  - 5) Verify pressures are controlling and flow is as expected  
       Pup \_\_\_\_\_ Pdown \_\_\_\_\_ Pbypass \_\_\_\_\_ Flow \_\_\_\_\_
  - 6) Pump breaker off

II. In flight

- A. Immediately after take-off      Take-off Time UTC \_\_\_\_ : \_\_\_\_ : \_\_\_\_
  - 1) Turn pump breaker on
  - 2) Verify pressures/flows agree with previous values from II.C.  
       Pup \_\_\_\_\_ Pdown \_\_\_\_\_ Pbypass \_\_\_\_\_ Flow \_\_\_\_\_
  - 3) Turn valve box on
  - 4) Verify that Vstat2, CO<sub>2</sub>, and H<sub>2</sub>O are all reading correctly and no values  
       blinking on screen. If sampling schedule allows, let CO<sub>2</sub> and H<sub>2</sub>O stabilize
  - 5) Start pre-purge      UTC \_\_\_\_ : \_\_\_\_ : \_\_\_\_
- B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate  
 sampling time, 17 seconds after desired altitude, and record values in chart below

Pos	Flow (V)	End Time	GGALTF	Profile #	Notes
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

- 1) After sampling flask 16, close flasks 1-16      UTC \_\_\_\_ : \_\_\_\_



Pos	Flow(V)	End Time	GGALTF	Profile #	Notes
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					

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

UTC \_\_\_ : \_\_\_

III. At the end of the sampling

1) Turn valve box breaker off

UTC \_\_\_ : \_\_\_

2) Turn Pumps breaker off

3) Download flask sampling data to laptop

4) Transfer \*.tab file and \*.txt file to pen drive

5) Turn Mains breaker off

6) Turn 28V breaker off

IV. Post-flight

1) Remove traps

2) Plug holes in dewar lid

3) Empty beads from upstream trap into 'wet' bead container to dry

4) Empty beads from downstream trap into 'used' bead container to dry

V. Day after flight

1) Unload flasks. Box #1: \_\_\_\_\_ Box #2 \_\_\_\_\_