

~~ADD~~ "MISSION"

NCAR MEDUSA Checklist

V. 2009.10.20

MISSION: HIPPOTI

FLIGHT: TFO1 LEG: _____

DATE (YYMMDD): 20091020

In Equilibrium:
P_{up} = 615
P_{dn} = 625
P_{hy} = 630
P_{sa} = 605

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091019

- 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
(yymmdd_FT_rf##): _____
- 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

Synflex not attached to flask-s.
Positions 1-3 jumpered; all others disconnected

(see pp 96-100 of MEDUSA II Lab Book)

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.: 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 ____ : ____
- ✓ First trap letter: A Second trap letter: D (1st is upstream of 2nd)
- ✓ 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 pass → ~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.)
- leaktight ✓ 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.

See PP 96-100 in MEDUSA Book

Leak Checking

Byp or Pos #	Time (UTC)	PC1 stat	PC2 stat	Pup	Pdn	Pby	Flow	Comments

10x sampling

- X 19) After leak checking, and with system in bypass, pump OFF, open all flask stopcocks 2 half turns Flasks opened by: _____ Note Issues in Fl. Table _____
- ✓ 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 139 Pdown 400 Pbyass 762 Flow 3150
- ✓ 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 : 14 : 01 Laptop time UTC 19 : 14 : 01
- ✓ 27) On screen 4, clear flask table "clear all"
- ✓ 28) Remove rubber DSM computer shield; stow in beige in-reach tool bag.
- ✓ 29) Leave mains and valve power ON

change lower setpoints established

II. In flight

A. Take-off Time.

~ 20:00

UTC 20 : 21 : 29

B. Immediately after take-off

- ___ 1) Turn pump breaker on (*push*) UTC ___ : ___ : ___
- ___ 2) Verify pressures/flows agree with previous values from II.B.
Pup ___ Pdown ___ Pbyass ___ Flow ___
- ___ 3) >= 1-min later, start pre-purge and note flow voltages UTC ___ : ___ : ___
- ___ 4) Pre-purge end time/Sample 1 Start Time UTC ___ : ___ : ___
- ___ 5) When flasks 1-16 are sampled, remove the splinter shield, and close all valves. Replace splinter shield. UTC ___ : ___ : ___
- ___ 6) When flasks 17-32 are sampled, remove the splinter shield, and close all valves. Replace splinter shield. 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

(before land?)

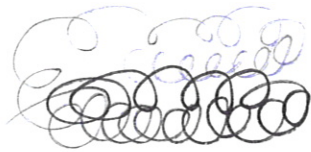
- ✓ 1) Turn Pumps breaker off (*pull*)
- ✓ 2) Turn Mains breaker off (*pull*)
- ___ 3) Turn valve box breaker off (*pull*)
- ___ 4) Turn 28V breaker (on back of rack) off (*pull*)

UTC 20:57 : ___ : ___
UTC ___ : ___ : ___
UTC ___ : ___ : ___
UTC ___ : ___ : ___

all up needed to set?

Plane Power Dripped

no protection for valve box



IV. Post-flight

- 1) Close all flask valves *and downstream* 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

Port	Pre-Purge Flow (V)	Samp. Flow(V)	Sample End Time	PALTF (kft)	MEDCO2	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						

✱ XChat not installed on MEDUSA laptop.
 ✱ Google Earth also, also. Page 1 of 4
 ✱ Rescale MEDFLOW so it doesn't ~~reg~~
 NCAR MEDUSA Checklist V. 2009.10.20

✱ MISSION HIPPO FLIGHT: TFO2 LEG: KBJC-KBJC
 DATE (YYMMDD): 091022

I. Preflight

A. Day(s) before flight Date (YYMMDD) = 091022

- ✓ 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
(yyymmdd_FT_rf##): 091022_FT_TFO2
- ✗ 8) If necessary, download data from previous flight to laptop, and back up on pen drive (yyymmdd_rf##): _____
- ✓ 9) If possible, start **System Leak-Check Procedure**

Changed to the orientation such that all flasks are DIPTUBE OUT

Flask ID Table (View from Front of Box)

13	1002	12	1212	5	1065	4	1283
14	1103	11	1142	6	1222	3	1058
15	1152	10	1315	7	1122	2	1299
16	1089	9	1022	8	1231	1	1039

Flask orientat. however is still same. (i.e. tubes were switched not flasks turned)

158
 WHHAI88

D = disconnected
 J = jumpered

17	1246	24	1163	25	1132	32	1263
18	1135	23	1274	26	1200	31	1329
19	1197	22	1179	27	1256	30	1112
20	1048	21	1036	28	1095	29	1055

← STATIC P OFFSETS
 (System pumps off, PCs open, byp/scmp equilibrated by switching back+forth severaltimes)
 $P_0 = 619$ $P_2 = 629$ $P_3 = 634$
 $P_5 = 611$ $P_{cab} = 6051$

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: Second trap letter: (1st is upstream of 2nd) UTC 15:30
- ✓ 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 pass → ~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.

MOVE
~~THE~~ BOXES ELSEWHERE
 Boxes are @ - PCS

Psa
Leak Checking

Byp or Pos #	Time (UTC)	PC1 stat	PC2 stat	Pup	Pdn	Pby	Flow	Comments
Byp	16:29:00	C	C	350	358	353	0	BEFORE NEW TEST
B	16:30	C	C	350	358	353	0	"
B	16:32:30	C	C	5	145	151	0	NEW TEST
B	16:44	C	C	27	146	152	0	

- ✓ 19) After leak checking, and with system in bypass, pump OFF, open all flask stopcocks 2 half turns Flasks opened by: JDZ Note Issues in Fl. Table X
- ✓ 20) Install Splinter Shields 1-16 only
- ✓ 21) Set P upstream, P downstream, prepurge T, and min flush T
 (Usually 150, 300, 30, 150, other presets reached by toggling plan code)
 Pupset 140 Pdownset 400 prepurgeT 30 flushT 150 => 820 :sk?
- ✓ 22) Turn pump breaker on (*push*) 130 350 3000 (730)
- ✓ 23) Verify pressures are controlling and flow is as expected
 Pup 140 Pdown 400 Pbypass 820 Flow 3300 P_{sa} 730
- 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 17:11:07 Laptop time UTC 17:11:06
- ✓ 27) On screen 4, clear flask table "clear all"
- ✓ 28) Remove rubber DSM computer shield; stow in beige in-reach tool bag.
- ✓ 29) Leave mains and valve power ON

II. In flight

A. Take-off Time.

UTC 17:19:48

B. Immediately after take-off

✓ 1) Turn pump breaker on (*push*)

UTC 17:20:00

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

Pup 139 Pdown 398 Pbypass 809 Flow 3342

✓ 3) = 1-min later, start pre-purge and note flow voltages UTC 17:21:58

✓ 4) Pre-purge end time/Sample 1 Start Time UTC 17:30:56

✓ 5) When flasks 1-16 are sampled, remove the splinter shield, and close all valves. Replace splinter shield. UTC 21:47:→

✗ 6) When flasks 17-32 are sampled, remove the splinter shield, and close all valves. Replace splinter shield. 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

✓ 1) Turn Pumps breaker off (*pull*)

UTC 21:50:

✓ 2) Turn Mains breaker off (*pull*)

UTC 21:56:30

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

UTC 21:48:~

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

UTC 21:57:

100 420 639

22~
 reset
 to fix
 year.
 now
 1 sec
 faster
 than
 AEROS

IV. Post-flight

1-16 only

- ✓ 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: JDB

CLOUDS @
36k ft
from sample
5 →

ADD
Psc
ADD
Pw/Pd

Psc
792 torr →
826 torr →

P1 is not controlling

Port	Pre-Purge Flow (V)	Samp. Flow (V)	Sample End Time	PALTF (kft)	MEDCO2	Notes
1	3600	1500	18:11:53	41	388	90/670
2	3600	1500	18:36:42	41	388	90/670
3	3600	1500	19:23:20	35	388	coming into LAF, steady @ 4k ft
4	"	1500	19:28:39	1800	388	Right @ LAF, nadir
5		1600	19:48	36	388	90/670 AT 36, doing ABABAB
6	3600	3300	19:53:36	36	396	140/400 (396 is P-related, not true)
7	3600	1600	20:03:49	36	388	90/670
8		3500	20:09:40	36	396	140/400
9		1600	20:19:54	36	388	90/670
10		3500	20:25:18	36	396	140/400
11		1700	20:35:20	36	388	90/670
12		3600	20:46:04	36	396	140/400
13		2000	21:13:02	34	388	Climbing/Descending. Took a few res after going
14		3500	21:18:45	34	396	even @ 34, just before desc.
15		2000	21:30:43	10	388	90/670
16		3900	21:47:06	5.6	405	140/400
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						

didn't equilibrate #14 long enough.

~ 17:35

Suddenly P_{up} has problem

P_{down} had before (more or less)

- ✓ 6) Record flask IDs below
- ✓ 7) Record flask IDs into a TEXT file on laptop
(yymmdd_FT_rf##): 091022_FT_TFO2
- X 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

Changed the orientation such that all flasks are DIPTUBE OUT

Flask ID Table (View from Front of Box)

13	1002	12	1212	5	1065	4	1283
14	1103	11	1142	6	1222	3	1058
15	1152	10	1315	7	1122	2	1299
16	1089	9	1022	8	1231	1	1039

Flask orientat. however is still same. (i.e. tubes were switched not flasks turned)

17	1246	24	1163	25	1132	32	1263
18	1135	23	1274	26	1200	31	1329
19	1197	22	1179	27	1256	30	1112
20	1048	21	1036	28	1095	29	1055

D = disconnected
J = jumpered

STATIC P OFFSETS

(System pumps off, PCs open, byp/scmp equilibrated by switching back+forth servitines)

$P_0 = 619$ $P_2 = 629$ $P_3 = 634$
 $P_5 = 611$ $P_{cup} = 6051$
102

Hi Ralph,

These are photocopies from TFO2, 2009-10-22 showing the flask tables for sampled flasks. All 1-16 were oriented diptube-out. Positions 17-32 were either jumpered or disconnected.

JONATHAN

	Flow (V)	Flow	Sample Time End	Altitude	MED CO2	P _{up} / P _{dn} setting (torr), Notes
1	3600	1500	18:11:53	41	388	90/670
2	3600	1500	18:36:42	41	388	90/670
3	3600	1500	19:23:20	3.5	388	coming into LAF, steady @ 41ft
4	"	1500	19:28:35	1800	388	Right @ LAF, nadir
5		1600	19:48 -	36	388	90/670 AT 36, doing ABABAB
6	3600	3300	19:53:36	36	396	140/400 (396 is P-related, not true)
7	3600	1600	20:03:49	36	388	90/670
8		3500	20:09:40	36	396	140/400
9		1600	20:19:54	36	388	90/670
10		3500	20:25:18	36	396	140/400
11		1700	20:35:20	36	388	90/670
12		3600	20:46:04	36	396	140/400
13		2000	21:13:06	34	388	Climbing/Descending. Took a few sec
14		3500	21:18:45	34	396	even @ 34, just before desc.
15		~2000	21:30:43	10	388	90/670
16	↓	3400	21:47:06	5.6	405	140/400
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						

a few sec after pass didn't equilibrate #14 long enough.

P_{up} = 90 P_{dn} = 670 = LOW FLOW 4 HIGH ALT SETTING

P_{up} = 140 P_{dn} = 400 = HIGH FLOW LOW ALT SETTING

MEDCO2 swings are due to P_r @ CO2 sensor changing from 670 to 400 torr. 670 torr readings are more reliable (i.e. ~388 ppmv)

754
54
792 torr →
826 torr →

NCAR MEDUSA Checklist

V. 2009.10.24

Date (YYMMDD): 091031
 MISSION PHASE: PO2 FLIGHT: RF01 From-To: BJC-ANC

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091031

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: (C) Downstream: (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 Box #2
- 6) Record flask IDs below
- 7) Record flask IDs into a ^{excel} text file on laptop (YYMMDD_RF##_Flasks.txt) ^{xls}
- 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

EDIT
If acc, unclear

Flask ID Table (View from Front of Box)

13 1447	12 1445	5 1388	4 1405
14 1279	11 1448	6 1422	3 1439
15 1311	10 1442	7 1444	2 1414
16 1317	9 1425	8 1443	1 1333
17 1246	24 1163	25 1132	32 1263
18 1135	23 1274	26 1200	31 1329
19 1197	22 1179	27 1256	30 1112
20 1048	21 1036	28 1095	29 1055

were plumbed backwards (in tube, out other)
 not closed until following AM

acc. vented to cabin next AM

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

- 1) Load dry ice into dewar 1.0" from lid UTC 13 : 40
- 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 623 / Pdown 631 / Pbypass 633 / Psa 732
- 5) Sync MEDUSA clock with clock on laptop
 MEDUSA time UTC 14 : 30 : 13 Laptop time UTC 14 : 30 : 13
- 6) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, bypass on, pumps off

EDIT
get aeros running
Psa

Aeros
732
?

VLVSET VLVSET VLVSET

- ✓ 7) Open all flask stopcocks 2 half turns Flasks opened by: SRS
- ✓ 8) Re-install splinter shields
- ✓ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset 135 Pdownset 400 prepurgeT 399 flushT 150
- ✓ 10) Verify that Vstat2 is reading correctly and no values blinking on screen

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

- ✓ 1) Complete bypass / system leak check
- ✓ 2) Ensure valve box off, both controllers to auto, turn pumps on
- ✓ 3) Verify pressures are controlling and flow is as expected
 Pup 134 Pdown 400 Pby pass 780 Flow 2850
- ✓ 4) Pump breaker off
- ✓ valve box + heater on

II. In flight

A. Immediately after take-off

Take-off Time UTC 16:20:50

- ✓ 1) Turn pump breaker on (valve box off)
- ✓ 2) Verify pressures/flows agree with previous values from II.C.
 Pup 134 Pdown 399 Pby pass 803 Flow 3000
- ✓ 3) Turn valve box on
- ✓ 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 UTC 16:23:20

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)	Psa (torr)	End Time	GGALTF	Profile #	Notes
1	8.09	792	17:12:11	40	1	
2	8.11	793	17:33:50	40		
3	8.15	794	17:54:28	40	1	Bad prepurge
4	10.09	828	18:06:55	28	1	still recovery run 3 m pp.
5	10.07	826	18:24:13	21	1	
6	10.07	825	18:29:00	19	1	missed target by ~ 1kft
7	10.05	820	18:35:28	10	1	
8	10.03	817	18:47:15	5	1	
9	10.03	818	18:50:11	~3.5	1	low over Edmonton (flask #20 CO ₂ up)
10	10.08	825	19:06:38	28	1	
11	10.11	829	19:26:38	30 28		
12	10.13	830	19:50:23	28	-	near 1' pause
13	10.10	829	20:14:32	28	2	
14	10.05	821	20:17:00	21	2	
15	10.02	832	20:31:55	13	2	missed target by 2kft
16	10.04	825	20:40:09	10	2	

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

UTC 21:25

~350 - 0.05
 ~400 - 0.4

32
 52
 18:12
 15:32

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
17	10.00	959	20:52:24	4.5	2	AEROS down
18	10.00	957	20:58:30	4.5 3	2	low over Watson Lake
19	9.96	973	21:01:20	15	2	
20	9.96	967	21:07:33	28	2	
21	9.93	982	21:13:15	32	2	in Strat. (lower)
22	9.95	988	21:33:47	36	2	
23	7.99	841	21:44:46	43	2	
24	7.98	841	21:51:31	43		
25	7.98	842	21:58:26	43		03 = 900
26	7.81	842	22:04:05	43	3	
27	7.95	838	22:09:59	36	3	
28	9.98	993	22:21:07	20	3	022:11 to 135/400 (missed target by 1 kPa)
29	9.99	983	22:24:25	11	3	(distracted by scenery!)
30			22:29:09	5	3	AEROS down on laptop
31			22:32:33	~3	3	" " "
32	9.98	981	22:35:22	~0.5	3	over A/C

DONE NEXT DAY

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

UTC 18:30 11/1/09

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

ensure flasks closed first] UTC 22:39

Trap T = 40.1
xls file

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: 7 Box #2 108

files off !

(Need new procedures)

MEDUSA leak check procedures

X

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 MEDP1, MEDP2, MEDPBY, MED_PSA 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)

X

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 with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- ___ 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 _____ Finish _____
- ___ 7) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- ___ 8) Address any apparent leaks

EDIT

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 → 5, Pdown → ~175, Pbyypass → ~130
- ✓ 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
- X 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

after

Time (UTC)	Pup	Pdn	Pbyypass	Comments
18:54:00	8	144	149	looks good!
19:56:00	10	144	149	
15:26:00	16	145	150	

AEROS
PSA

NCAR MEDUSA Checklist

V. 2009.10.24

Date (YYMMDD): 091102

MISSION PHASE: ~~HFOZ~~ 2 FLIGHT: RFOZ From-To: ANC-ANC

I. Preflight

A. Day(s) before flight ^{reuse d.s. old} Date (YYMMDD) = 091101

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: C Downstream: B
- 3) Load flasks and connect plumbing. Confirm lines are correctly installed
- 4) Install flask box retaining pins, complete rack book *inspect o-ring seals*
- 5) Record Flask Box Numbers: Box #1 7 Box #2 108
- 6) Record flask IDs below
- 7) Record flask IDs into a text file on laptop (YYMMDD_RF##_Flasks.xls)
- 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 *did a quick leak check - looked good*

Flask ID Table (View from Front of Box)

13	1268	← 1133	5	1398	← 4	1209	
14	1199	1187 1201	6	1286	3	1391	
15	1396	1191	7	1399	2	1161	
16	1165	9	1001	← 8	1060	1	1025
17	1046	24	1288	→ 25	1155	32	1041
18	1026	23	1293	26	1145 1200	31	1070
19	1043	22	1280	27	1362	30	1397
20	1211	→ 21	1088	28	1098	→ 29	1383

was 10001 / relabelled

orange dot?

needs repair but seemed to sample ok

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

- 1) Load dry ice into dewar 1.0" from lid UTC ~~16~~ : 25
- 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 135 / 350 Pdown ___ / ___ Pbypass ___ / ___
- 5) Sync MEDUSA clock with clock on laptop
MEDUSA time UTC 18 : 12 : 00 Laptop time UTC 18 : 12 : 00
- 6) Ensure Box #1 = 1, Box #2 = 1, 6-way = odd, bypass on, pumps off

- ✓ 7) Open all flask stopcocks 2 half turns Flasks opened by: BBS
 - ✓ 8) Re-install splinter shields
 - ✓ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset 135 Pdownset 350 prepurgeT 30 flushT 150
 - ✓ 10) Verify that Vstat2 is reading correctly and no values blinking on screen
- C. 30 minutes before take-off.: Upstream trap and Leak-checking

- ✗ 1) Complete bypass / system leak check
- ✓ 2) Ensure valve box off, both controllers to auto, turn pumps on
- ✓ 3) Verify pressures are controlling and flow is as expected
 Pup 135 Pdown 350 Pbyypass 677 Flow 3000
- ✓ 4) Pump breaker off

? N.V.s not tuned

II. In flight

A. Immediately after take-off

Take-off Time UTC 18:37:50

- ✓ 1) Turn pump breaker on
- ✓ 2) Verify pressures/flows agree with previous values from II.C.
 Pup 135 Pdown 350 Pbyypass — Flow 9.87
- ✓ 3) Turn valve box on
- ✓ 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 UTC 18:43:30

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

delay
45 sec @ 3000 m
1:15 sec @ 1500

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
1	10.04	866	19:26:12	15	1	
2	10.05	862	19:28:55	10.9	1	~2.5 mm flush, should be able to do ~4 kft
3	10.05	869	19:33:15	15	1	spacing, but was a bit late + climbed
4	10.07	869	19:36:54	21	1	@ 3 kft/mm
5	10.11	879	19:47:02	28	1	
6	10.13	882	19:54:26	34	1	
7	10.09	869	20:13:58	26	2	
8	10.03	861	20:17:49	21	2	Asian plume, CO ~ 200
9	10.01	855	20:22:00	15	2	
10	10.01	855	20:26:09	10	2	
11	10.01	855	20:31:17	5	2	
12	10.00	855	20:40:04	1.5	2	
13	9.98	853	20:49:13	0.5	2	low over BRW
14	10.11	875	21:12:58	28	3	
15	10.07	884	21:17:31	21	3	
16	10.04	868	21:21:42	15	3	

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

UTC 22:10

2500
100-1500
mg/kg dry air
in free trop

NEPOS not working - data corresponds to other times

940
940
970
960
979

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
17	9.98	883	21:32:09	0.5	3	75 N
18	10.02	859	22:20:53	0.5	4	80 N
19	10.03	858	22:25:28	5	4	
20	10.02	859	22:32:18	15	4	
21	9.77	976	22:37:19	23	4	
22	9.98	979	22:50:50	28	4	
23	9.99	962	23:31:15	0.5	5	
24	9.99	960	23:37:41	5	5	
25	9.97	966	23:42:12	10	5	
26	9.97	969	23:55:46	15	5	
27	9.98	970	23:50:03	21	5	
28	9.97	978	23:59:40	28	5	
29	10.03	974	0:28:51	36	5	
30	7.57	797	0:58:20	45	5	0:41:30 to 90/620
31	8.17	819	1:10:25	45	-	
32	8.17	829	1:25:00	45	-	

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

UTC 1:30

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 1:41

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: 101 Box #2 102

dpls

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 MEDP1, MEDP2, MEDPBY, MED_PSA 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 with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 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 _____ Finish _____
- 7) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 8) Address any apparent leaks

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
- 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

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.03

Date: 091104 Campaign: H2002 Flight: P03 From-To: ANC-KBA HKO

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091103

✓ 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane

✓ 2) Install new traps Upstream: C Downstream: B

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

✓ 4) Record Flask Box Numbers: Box #1 101 Box #2 102

✓ 5) Install flask box retaining pins

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

✓ 7) Replace cover shields and complete rack book

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

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

✓ 10) If necessary, clear flask table ("clear all") *check flask table clear, if not "clear all"*

✓ 11) Complete flask leak check procedure #1 *END START* UTC 2:25

✓ 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 *START* UTC 3:28

✓ 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed

✓ 14) Record Ps: Pup 10 Pdown 175 Pbypass 176 then all power off

EDT
EDT
EDT

Flask ID Table (View from Front of Box)

13	1154	←	12	1402		5	1045 1405	←	4	1301
14	1216		11	1401		6	1147		3	1094
15	1275		10	1305		7	1149		2	1109
16	1252		9	1339	←	8	1292		1	1266
17	1054		24	1140	→	25	1287		32	1331
18	1113		23	1276		26	1138		31	1160
19	1027		22	1349		27	1178		30	1069
20	1395	→	21	1185		28	1075	→	29	1342

Loose dip tube

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

✓ 1) Load dry ice into dewar 1.0" 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 439 / 429 Pdown 357 / 182 Pbypass 349 / 173

✓ 5) Sync MEDUSA clock with clock on laptop *to +/- 1 sec*

MEDUSA time UTC 17:53:39 Laptop time UTC 5:53:40

Filled last night, topped off @ UTC 16:55

EDT

EDFT
EDFT
EDFT

- ✓ 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = 3, bypass on, pumps off
- ✓ 7) Open all flask stopcocks 2 half turns Flasks opened by: BBS
- 8) Re-install splinter shields complete rackbook
- ✓ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 135 Pdownset 370 prepurgeT 30 flushT 150
- ✓ 10) Verify that VLV2 is reading correctly and no values blinking on screen
- ✓ 11) Note trap temperature trap T 40.1

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

- ✓ 1) Complete bypass / system leak check
- ✓ 2) Valve box off, both controllers to auto, turn pumps on
- ✓ 3) Verify pressures are controlling and flow is as expected
Pup 134 Pdown 370 Pbyass 765 Flow 3000
- ✓ 4) Pump breaker off
- ✓ 5) Valve box on

EDFT already in set,

II. In flight

A. Immediately after take-off

Take-off time UTC 4:07:28

- ✓ 1) Valve box off
- ✓ 2) Turn pump breaker on
- ✓ 3) Valve box on
- ✓ 4) Verify pressures/flows agree with previous values from II.C.
Pup 134 Pdown 369 Pbyass 781 Flow 2900

EDFT

- ✓ 5) Turn valve box on
- ✓ 6) 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
- ✓ 7) Start pre-purge UTC 4:12:33
- ✓ 8) Note trap temperature trap T 38.9 → 39.9

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds 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)

EDFT

EDFT

Pos	Flow (V)	Psa (torr)	End Time	GCALTF	Profile #	Notes
1	10.14	887	21:58:55	40	1	
2	10.11	880	22:08:08	28	1	
3	10.06	869	22:16:08	21	1	
4	10.10	876	22:21:56	15	1	
5	10.11	879	22:27:03	10	1	
6	10.09	875	22:31:01	4	1	
7	10.09	871	22:34:17	28	1	low over CBA
8	10.15	880	22:39:16	28	2	
9	10.12	874	23:41:58	21	2	
10	10.10	874	23:48:54	10	2	
11	10.12	874	23:52:05	5	2	
12	10.10	871	21:55:03	28	2	
13	10.13	879	0:59:32	28	3	
14	10.09	871	1:06:31	19	3	5500 m (1000s had frozen)
15	10.08	885	1:09:44	15	3	
16	10.06	872	1:12:00	10	3	will wait 5 min for next samples (b/c Psa steps b/w boxes)

will wait 5 min for next samples (b/c Psa steps b/w boxes)

- ✓ 1) After sampling flask 16, close flasks 1-16
- ✓ 2) Note trap temperature

UTC 2:00
trap T 40.1

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
17	10.01	948	1:19:18	1	3	waited 6 min after box switch
18	10.03	948	1:23:25	5	3	
19	10.03	975	2:28:31	28	4	
20	10.04	965	2:34:05	21	4	
21	9.99	979	2:37:49	15	4	
22	9.98	981	2:41:01	10	4	
23	9.99	965	2:44:25	5	4	
24	9.93	948	2:47:32	1	4	
25	9.93	957	3:11:17	1	5	
26	9.93	969	3:38:03	5	5	
27	9.95	967	3:38:38	10	5	
28	9.94	973	3:41:27	15	5	
29	9.97	966	3:45:49	21	5	skirt
30	9.98	976	3:53:57	28	5	
31	10.00	966	4:01:02	36	5	to 90/650 @ 4:01:57
32	8.14	841	4:23:20	45	5	

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

UTC 4:28
trap T 40.2

III. At the end of the sampling

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

UTC 4:30

[All others? need to be on ground?]

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

V. Day after flight

- ✓ 1) Transfer beads from downstream trap into upstream trap
- ✓ 2) Unload flasks. Box #1: 104 Box #2: 106

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 MEDP1, MEDP2, MEDPBY, MED_PSA 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 1)
- 12) Valve box on
- 13) Turn bypass on

} weren't on old checksheet

Flask Leak Check Procedure #2:

*✓ pump box off valve box on pump box on → 1
(was on old checksheet)*

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Ps00
- 5) Record times for AEROS matching: Start 00:29:35 Finish 00:45
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

EXIT

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 → ~160, 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 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbypass	Comments
18:37:30	3	161	165	
18:38:30	4	161	165	
18:44:45	9	162	165	

~/stephens/HI PP0

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.03

Date: 091107 Campaign: HERB2 Flight: RPO4 From-To: AK08 - RTR

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091106

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: C Downstream: B
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 109 Box #2 106
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7) Replace cover shields and 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) If necessary, clear flask table ("clear all")
- 11) Complete flask leak check procedure #1 ~ UTC 1:00
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 UTC 18:46 (next day)
- 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 14) Record Ps: Pup 25 Pdown 239 Pbypass 290 then all power off

* BROKEN DIP TUBE

Flask ID Table (View from Front of Box)

13	12	5	4
1215*	1180	1056	1332
14	11	6	3
1304	1271	1437	1162
15	10	7	2
1092	1152	1247	1175
16	9	8	1
1265	1415	1260	1319
17	24	25	32
1241	1061	1392*	1177
18	23	26	31
1233	1038	1037	1126
19	22	27	30
1214	1257	1004	1316
20	21	28	29
1097	1341*	1226	1267

value open in box - no spares, so will try to flush well before sampling

* LOOSE DIP TUBE

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

- 1) Load dry ice into dewar 1.0" from lid UTC 18:28
- 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 479 / +454 Pdown 736 / +497 Pbypass 344 / +54
- 5) Sync MEDUSA clock with clock on laptop
MEDUSA time UTC 19:14:05 Laptop time UTC 7:14:05

- ✓ 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
 - ✓ 7) Open all flask stopcocks 2 half turns Flasks opened by: BBS
 - ✓ 8) Re-install splinter shields
 - ✓ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 135 Pdownset 370 prepurgeT 30 flushT 150
 - ✓ 10) Verify that VLV2 is reading correctly and no values blinking on screen
 - ✓ 11) Note trap temperature trap T 39.9
- C. 30 minutes before take-off.: Upstream trap and Leak-checking
- ✓ 1) Complete bypass / system leak check
 - ✓ 2) Valve box off, both controllers to auto, turn pumps on
 - ✓ 3) Verify pressures are controlling and flow is as expected
Pup 134 Pdown 370 Pby pass 733 Flow 2900
 - ✓ 4) Pump breaker off
 - ✓ 5) Valve box on

EDIT a ready off
EDIT

✓ to bypass
✓ clean all

II. In flight

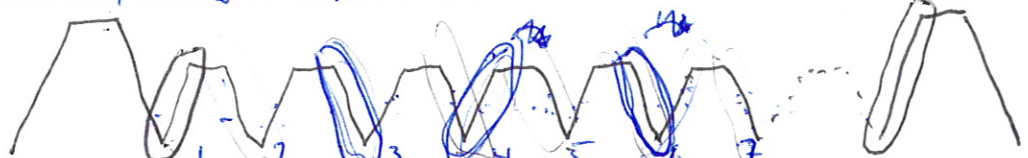
A. Immediately after take-off

Take-off time ~ UTC 20:05:30
(roll ~ 20:05:00)

- ✓ 1) Valve box off
- ✓ 2) Turn pump breaker on
- ✓ 3) Valve box on
- ✓ 4) Verify pressures/flows agree with previous values from II.C.
Pup 134 Pdown 370 Pby pass 709 Flow 3000
- ~~5) Turn valve box on~~
- ✓ 6) 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
- ✓ 7) Start pre-purge ~ UTC 12:12:
- ✓ 8) Note trap temperature trap T 39.7

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds 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 45)

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
1	10.07	879	20:16:45	35	1	flow, Psa, +PI dropped 3 times during flush 640 prob?
2	10.06	872	20:51:11	27	1	
3	10.00	860	20:55:40	21	1	
4	9.85	852	20:22	14	1	
5	9.92	857	20:21:04	8	1	
6	9.92	849	20:06:40	4	1	
7	9.90	843	21:10:09	1	1	
8	9.86	836	21:52:18	1	2	
9	9.83	832	21:55:52	5	2	
10	9.87	839	21:59:18	10	2	
11	9.94	849	22:02:37	15	2	
12	9.97	854	22:06:19	21	2	
13	10.03	865	22:11:28	28	2	
14	9.86	835	23:18:20	1	3	
15	9.85	845	23:21:20	5	3	
16	9.89	845	23:24:57	10	3	will wait ≥ 5 min for next to allow bag charge to equil.



76658

- ✓ 1) After sampling flask 16, close flasks 1-16
 ✓ 2) Note trap temperature

~ UTC 23:45
 trap T 39.9

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
17	9.97	943	23:32:35	21	3	waited ~ 7:30 to allow box change to equil.
18	10.00	944	23:40:15	28	3	
19	9.86	944	00:52:08	1	4	
20	9.88	941	00:56:40	8	4	
21	9.89	962	00:59:36	10	4	
22	9.89	967	01:02:53	15	4	
23	9.92	954	01:07:59	21	4	
24	9.94	954	01:16:41	28	4	
25	9.82	939	02:32:20	1	5	long flush b/c stopcock open in shipment
26	9.81	943	02:36:28	5	5	
27	9.86	957	02:39:16	10	5	
28	9.85	960	02:42:32	15	5	
29	9.90	955	02:47:40	23	5	
30	9.87	961	02:51:57	28	5	
31	9.92	957	02:57:14	36	5	
32	7.89	818	03:10:57	45	5	to 90/650 @ 2:57:45

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

UTC 3:20
 trap T 39.9

III. At the end of the sampling

- left running to try to plug trap
- ✓ 1) Turn valve box breaker off
 ✓ 2) Turn Pumps breaker off
 ✓ 3) Ensure all flask valves closed
 ✓ 4) Turn Mains breaker off
 ✓ 5) Turn 28V breaker off

UTC 4:25

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

V. Day after flight

- ✓ 1) Transfer beads from downstream trap into upstream trap
 ✓ 2) Unload flasks. Box #1: 107 Box #2: 15

MEDUSA leak check procedures

Flask Leak Check Procedure #1: *ok*

- 1) 28 V breaker on, Valve box on, Pump box on *[YES, YES]*
- 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 MEDP1, MEDP2, MEDPBY, MED_PSA on AEROS)
- 9) Save PNGs 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 1) *PS + FS*
- 12) Valve box on
- 13) Turn bypass on

*BP on/off
~ 6 times over
1-min to
pull down
Psa*

Flask Leak Check Procedure #2:

- 1) "Clear All" *(last 3 had \emptyset for P8?)*
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBY recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Psa
- 5) Record times for AEROS matching: Start 18:34:15 Finish 18:44
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

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 \rightarrow 0, Pdown \rightarrow ~170, Pbyypass \rightarrow ~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 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
19:48:10	25	162	169	
19:49:30	26	163	169	
19:53:00	30	163	170	

EDIT

EDIT

EDIT

*30, 31, +32
not incl.*

turned off for night.

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.03

Date: 091109 Campaign: HERPOL Flight: RPO5 From-To: PAR-CHE

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091108

1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane

2) Install new traps Upstream: C Downstream: B

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

4) Record Flask Box Numbers: Box #1 107 Box #2 15

5) Install flask box retaining pins

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

7) Replace cover shields and 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) If necessary, clear flask table ("clear all")

11) Complete flask leak check procedure #1

UTC 28:47

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

UTC 18:59 (next day)

13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed

14) Record Ps: Pup 8 Pdown 262 Pby pass 175 then all power off

Flask ID Table (View from Front of Box)

13	1368	12	1378	5	1366	4	1372
14	1367	11	1379	6	1381	3	1375
15	1371	10	1377	7	1380	2	1374
16	1285	9	1370	8	1290	1	1376

17	1394	24	1389	25	1386	32	1047
18	1302	23	1032	26	1059	31	1390
19	1254	22	1385	27	1184	30	1270
20	1029	21	1300	28	1239	29	1192

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

1) Load dry ice into dewar 1.0" from lid

UTC 18:20

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 502/+473 Pdown 457/+259 Pby pass 465/+290

5) Sync MEDUSA clock with clock on laptop

MEDUSA time UTC 18:41:30 Laptop time UTC 6:41:30

Event

FOIT

says "No leaker?" on it - no spares so will fill anyway

loose diptone - glass chips

chipped threads - (no spares)

Leaks?

✓ mains off/on (just did (check))

- ✓6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓7) Open all flask stopcocks 2 half turns Flasks opened by: BBS
- ✓8) Re-install splinter shields ✓ complete rack book
- ✓9) Confirm P upstream, P downstream, prepurge T and min flush T settings
 Pupset 135 Pdownset 370 prepurge T 60 flush T 150
- ✓10) Verify that VLV2 is reading correctly and no values blinking on screen
- ✓11) Note trap temperature trap T 40.0

trying to get Psa to eqn.

EDIT

EDIT 1 hour?

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

- ✓1) Complete bypass / system leak check
- ✓2) Valve box off, both controllers to auto, turn pumps on
- ✓3) Verify pressures are controlling and flow is as expected
 Pup 135 Pdown 370 Pby pass 726 Flow 2900
- ✓4) Pump breaker off
- ✓5) Valve box on

II. In flight

A. Immediately after take-off

Take-off time UTC 20:18:36

- ✓1) Valve box off
- ✓2) Turn pump breaker on
- ✓3) Valve box on
- ✓4) Verify pressures/flows agree with previous values from II.C.
 Pup 34 Pdown 368 Pby pass 736 Flow 2900
- ✓5) Turn valve box on

- ✓6) 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
- ✓7) Start pre-purge UTC 20:33:33
- ✓8) Note trap temperature trap T 40.0

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds 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 45)

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
1	10.15	884	21:04:40	35	1	flow dipped a few times during flush (e.g. 40 kft)
2	10.05	868	21:11:48	26	1	
3	9.90	857	21:17:58	16	1	
4	9.89	856	21:22:03	10	1	
5	9.97	855	21:26:18	4	1	
6	9.96	852	21:30:25	4	1	
7	9.96	849	22:13:56	1	2	
8	9.98	850	22:17:44	5	2	
9	10.00	855	22:22:34	14	2	
10	10.02	855	22:25:16	15	2	
11	10.03	857	22:28:46	21	2	
12	10.07	869	22:33:52	28	2	
13	9.96	847	22:57:59	1	3	
14	9.98	857	23:03:48	8	3	
15	9.99	868	23:08:33	15	3	
16	10.02	862	23:12:23	21	3	

- 1) After sampling flask 16, close flasks 1-16
 ✓ 2) Note trap temperature

UTC 1:05
 trap T 40.0

Pos	Flow (V)	Psa (torr)	End Time	GGALTF	Profile #	Notes
17						no flask - stopped @ 20:15
18	10.03	944	23:27:06	28	3	wanted as long as poss. for box 2 eqpt. 106
19	9.96	959	23:46:15	1	4	
20	9.97	959	23:50:02	5	4	
21	9.98	975	23:55:57	10	4	Aeros hung (missed 10)
22	9.97	977	00:00:24	21	4	
23	10.00	969	00:08:57	28	4	
24	9.99	955	00:22:31	10	4	
25	9.96	960	00:28:55	1	5	
26	9.94	964	00:32:53	5	5	
27	9.95	965	00:37:56	13	5	
28	9.95	970	00:40:02	17	5	
29	9.98	962	00:47:38	28	5	dealing w/cavities - missed 21
30	9.98	974	01:01:32	36	5	
31	8.09	826	01:13:28	43	5	to 90/650 @ 101:45 03 ~ 400 ppb
32	8.06	831	01:20:18	43	5	03 - 350 ppb

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

UTC 1:25
 trap T 40.0

III. At the end of the sampling

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

UTC 1:28

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

V. Day after flight

- ✓ 1) Transfer beads from downstream trap into upstream trap
 ✓ 2) Unload flasks. Box #1: 13 Box #2: 24 TD3

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 *✓ pulled Psa down*
- 8) Run 20-second prepurge to evacuate all flask downstream tubes
(watch MEDP1, MEDP2, MEDPBY, MED_PSA 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 1)
- 12) Valve box on
- 13) Turn bypass on

pos 28 was not hooked up, pos 17 has chipped threads → imperced

Flask Leak Check Procedure #2:

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Psa
- 5) Record times for AEROS matching: Start 18:43:30 Finish 18:59
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

*Psa is high in Pos 1 + in Pos 32
P flask tubes is als high in Pos 1 + pos 32*

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
- 10) If Pdown and Pbyypass < 2 torr/5 mins, skip to 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
19:17:30	8	156	168	
19:18:30	9	157	168	
19:22:30	12	157	168	

NCAR/SCRIPPS MEDUSA Checklist V. 2009.11.03
 Date: 091113 Campaign: HIPPO2 Flight: RPOG From-To: NZCH-NZCH1

I. Preflight

- A. Day(s) before flight Date (YYMMDD) = 091113 (NZ time)
- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
 - 2) Install new traps Upstream: C Downstream: B
 - 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
 - 4) Record Flask Box Numbers: Box #1 13 Box #2 24
 - 5) Install flask box retaining pins
 - 6) Connect plumbing. Confirm lines are correctly installed with red label up
 - 7) Replace cover shields and 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) If necessary, clear flask table ("clear all")
 - 11) Complete flask leak check procedure #1 UTC ___ : ___
 - 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 UTC ___ : ___
 - 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
 - 14) Record Ps: Pup ___ Pdown ___ Pbypass ___ then all power off

Flask ID Table (View from Front of Box)

13	1278	←	12	1072		5	1258	←	4	1134
14	1096		11	1087		6	1168		3	1137
15	1119		10	1033		7	1286		2	1297
16	1170		9	1158	←	8	1105		1	1006
17	1125		24	1207	→	25	1117		32	1090
18	1028		23	1156		26	1229		31	1298
19	1167		22	1183		27	1164		30	1159
20	1148	→	21	1194		28	1157	→	29	1282

- B. 2-hours before take-off.: Dry ice and Sampler Set-up
- 1) Load dry ice into dewar 1.0" from lid UTC ___ : ___
 - 2) Ensure that MEDUSA valve control key is in place
 - 3) 28 V breaker on, Valve box on, Main breaker on
 - 4) Record P / Δ: Pup ___ / ___ Pdown ___ / ___ Pbypass ___ / ___
 - 5) Sync MEDUSA clock with clock on laptop
 MEDUSA time UTC ___ : ___ : ___ Laptop time UTC ___ : ___ : ___

- ___ 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
 - ___ 7) Open all flask stopcocks 2 half turns Flasks opened by: _____
 - ___ 8) Re-install splinter shields
 - ___ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset ___ Pdownset ___ prepurgeT ___ flushT ___
 - ___ 10) Verify that VLV2 is reading correctly and no values blinking on screen
 - ___ 11) Note trap temperature trap T _____
- C. 30 minutes before take-off.: Upstream trap and Leak-checking
- ___ 1) Complete bypass / system leak check
 - ___ 2) Valve box off, both controllers to auto, turn pumps on
 - ___ 3) Verify pressures are controlling and flow is as expected
 Pup ___ Pdown ___ Pbyypass ___ Flow ___
 - ___ 4) Pump breaker off
 - ___ 5) Valve box on

II. In flight

- A. Immediately after take-off Take-off time UTC ___ : ___ : ___
- ___ 1) Valve box off
 - ___ 2) Turn pump breaker on
 - ___ 3) Valve box on
 - ___ 4) Verify pressures/flows agree with previous values from II.C.
 Pup ___ Pdown ___ Pbyypass ___ Flow ___
 - ___ 5) Turn valve box on
 - ___ 6) 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
 - ___ 7) Start pre-purge UTC ___ : ___ : ___
 - ___ 8) Note trap temperature trap T _____
- B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds 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 45)

Pos	Flow (V)	Psa (torr)	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
 __ 2) Note trap temperature

UTC ___ : ___
 trap T _____

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

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

UTC ___ : ___
 trap T _____

III. At the end of the sampling

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

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

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) 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 MEDP1, MEDP2, MEDPBY, MED_PSA 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 1)
- 12) Valve box on
- 13) Turn bypass on

toggle
sa/by P
until
Psa is
~ 156
03 17 50

Flask Leak Check Procedure #2:

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Ps00
- 5) Record times for AEROS matching: Start _____ Finish _____
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

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 3 minutes, record values again
- 10) If Pdown and Pbyypass < 2 torr/5 mins, skip to 12
- 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
- 12) Return PC1 and PC2 to auto

" < 10 "

XXXXXX

091110
TEST DAY
BEFORE
FLIGHT

Time (UTC)	Pup	Pdn	Pbyypass	Comments
01:17:30	7	158	167	
01:19:30	8	158	167	
01:20:30	9	159	168	

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.11

Date: 091111 Campaign: HIPPOIL Flight: R406 From-To: NZCH NZCH

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091110

- ✓ 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- ✓ 2) Install new traps Upstream: C Downstream: B
- ✓ 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- ✓ 4) Record Flask Box Numbers: Box #1 13 Box #2 24
- ✓ 5) Install flask box retaining pins
- ✓ 6) Connect plumbing. Confirm lines are correctly installed with red label up
- ✓ 7) Replace cover shields and complete rack book ✓
- ✓ 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF#.xls)
- ✓ 9) If necessary, download data from previous flight to laptop and pen drive
- ✓ 10) Check that flask table is clear. If not, "clear all"
- ✓ 11) Complete flask leak check procedure #1 Start UTC 03:17
- ✓ 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 19:43
- ✓ 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- ✓ 14) Record Ps: Pup 4 Pdown 161 Pbybass 165 then all power off

O-Ring half sealed

Flask ID Table (View from Front of Box)

Broken

13	1278	12	1072	5	1258	4	1134
14	1096	11	1087	6	1168	3	1137
15	1119	10	1033	7	1236	2	1297
16	1170	9	1158	8	1105	1	1006
17	1125	24	1207	25	1117	32	1090
18	1028	23	1156	26	1229	31	1298
19	1167	22	1183	27	1164	30	1159
20	1148	21	1194	28	1157	29	1282

Syntex fitting was loose

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

- ✓ 1) Load dry ice into dewar 1.0" from lid UTC 18:10
- ✓ 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 4601 Pdown 7701 Pbybass 411 /
- ✓ 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 20:17:20 Laptop time UTC 20:17:20

- ✓ 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 7) Open all flask stopcocks 2 half turns Flasks opened by: JDB 17-32 BS 1-16
- ✓ 8) Re-install splinter shields and complete rack book
- ✓ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset 130 Pdownset 370 prepurgeT 60 flushT 150
- ✓ 10) Verify that no values are blinking on screen
- ✓ 11) Note trap temperature trap T 40
- ✓ 12) Complete bypass / system leak check Done already
- ✓ 13) Ensure valve box off and both controllers to auto
- ✓ 14) Turn pumps on
- ✓ 15) Verify pressures are controlling and flow is as expected
 Pup 129 Pdown 370 Pbyass 712 Flow 2800
- ✓ 16) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 17) Pump breaker off
- ✓ 18) Valve box on

* 21:12:19 - DSM completely stuck -
Rebooting entire system

II. In flight

A. Immediately after take-off

Take-off time UTC 21:12:36

- ✓ 1) Valve box off
- ✓ 2) Turn pump breaker on
- ✓ 3) Valve box on
- ✓ 4) Verify pressures/flows agree with previous values from I.I.C.
 Pup 130 Pdown 369 Pbyass ? Flow 2700

5) 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 cannot get verify - AELOS is down

- ✓ 6) Start pre-purge UTC 21:13:~
- ✓ 7) Note trap temperature trap T 39.7 (adjusting)

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds 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)
 \hookrightarrow SAWES ARE OFF level @ 1000 has been ~ 1.6-1.7kft

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
1	9.87	938	21:59:00	27.2	1	Due to longer CO ₂ purge couldn't get full
2	9.85	934	22:03:32	20.6	1	
3	9.84	931	22:08:26	13.0	1	
4	9.84	930	22:11:03	9.1	1	
5	9.83	931	22:13:56	5.0	1	coming into clouds @ beginning
6	9.85	933	22:17:43	1.4	1	
7	9.86	931	23:01:50	1.6	2	
8	9.86	932	23:04:52	5.4	2	clouds
9	9.87	933	23:08:09	10.	2	
10	9.87	931	23:11:38	15.6	2	
11	9.87	933	23:15:30	21.5	2	
12	9.87	933	23:24:43	27.9	2	
13	9.85	931	23:43:38	1.7	3	light clouds
14	9.86	931	23:47:47	7.6	3	light clouds
15	9.84	940	23:50:26	11.3	3	
16	9.85	935	23:54:53	16.6	3	

41 → 1 profile

* Very calm seas today

- ✓ 1) After sampling flask 16, close flasks 1-16 (no whitecaps at all around) UTC 00:00
- ✓ 2) Note trap temperature trap T 40.3 (adjusting)

= 11 130/370

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
17	9.86	917	0:58:02	21.2	3	
18	9.86	911	0:05:12	27.9	3	
19	9.84	939	0:49:10	27.9	4	
20	9.84	930	0:58:52	18.0	4	
21	9.82	947	0:57:36	13.8	4	
22	9.82	948	0:02:20	9.5	4	
23	9.84	934	0:05:28	5.1	4	coming into clouds
24	9.84	937	0:11:01	2.0	4/5	over ice (pictures...) just started to come back up
25	9.84	940	0:13:51	6.5	5	
26	9.84	942	0:16:34	10.5	5	
27	9.83	941	0:26:03	21.9	5/6	only made it to 22 - had to descend to sea final dip in
28	9.81	945	0:33:21	15.0	6	
29	9.82	936	0:36:17	10.1	6	
30	9.81	942	0:39:47	5.0	6	low cloud base
31	9.83	932	0:43:05	1.4	6	
32	9.84	946	0:43:35	43	6??	was going to save for CHODER but just sampling @ 90/670.

90/670

- 7.96 ✓ 823
- ✓ 3) After sampling flask 32, close flasks 17-32 UTC 04:36
- ✓ 4) Note trap temperature trap T 40.1 (adjusting)

III. At the end of the sampling

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

UTC 04:37

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 - left in dewar

V. Day after flight

- ___ 1) Transfer beads from downstream trap into upstream trap
- ___ 2) Unload flasks. Box #1: 111 Box #2: 115

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) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 9) Run 20-second prepurge to evacuate all flask downstream tubes
- 10) Save PNG of AEROS Ps, Flows, and Stats to laptop
- 11) Valve box off
- 12) Close Pdn, turn pumps off (will leave in position 1)
- 13) Valve box on
- 14) Turn bypass on

Flask Leak Check Procedure #2:

$P_s @ \text{time of start} =$	$P_p \ 463$	$P_d \ 770$	$P_b \ 441$
	$P_{sa} \ 450$		

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Ps
- 5) Record times for AEROS matching: Start 19:52 Finish 20:07
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

turn system off and on to reset purge.

Bypass / System Leak Check Procedure

add "Clear all"

- 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 ~ 10, Pdown ~160, Pbyypass ~160
- 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 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
20:15:00	4	161	165	
20:20:00	~9?	162?	167?	

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.11

Date: 20091114 Campaign: MIPPO2 Flight: RFO7 From-To: NECH - AGCH
Honiara
Solomon Islands

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091112 (091114 local)

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: (1) Downstream: (3)
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 111 Box #2 115
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7) Replace cover shields and complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF#.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 22:27:10 →
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 19:53 22:41
- 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 14) Record Ps: Pup ___ Pdown ___ Pbypass ___ then all power off

replace fitting on Pos 20

Did not do since connector was on day of flight

Flask ID Table (View from Front of Box)

13	1008	12	1120	5	1253	4	1016
14	1198	11	1127	6	1144	3	1232
15	1067	10	1139	7	1181	2	1099
16	1227	9	1238	8	1242	1	1019
17	1217	24	1169	25	1223	32	1400
18	1234	23	1153	26	1287	31	1124
19	1146	22	1289	27	1255	30	1225
20	1303	21	1121	28	1007	29	1012

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

- 1) Load dry ice into dewar 1.0" from lid UTC 19:00
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup 40 (X) Pdown 50 (X) Pbypass 55 (X) see note above by 13)
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 19:52:03 Laptop time UTC 19:52:02

- 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 7) Open all flask stopcocks 2 half turns Flasks opened by: JDR
- 8) Re-install splinter shields and complete rack book
- 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupse 130 Pdownset 370 prepurgeT 60 flushT 150
- 10) Verify that no values are blinking on screen
- 11) Note trap temperature trap T 40
- 12) Complete bypass / system leak check
- 13) Ensure valve box off and both controllers to auto
- 14) Turn pumps on
- 15) Verify pressures are controlling and flow is as expected
 Pup 129 Pdown 371 Pbyypass 710 Flow 2900
- 16) If necessary, "Clear All" (after being sure data from last flight copied)
- 17) Pump breaker off
- 18) Valve box on

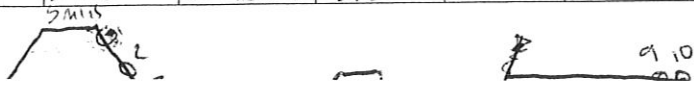
II. In flight

A. Immediately after take-off Take-off time UTC 20 : 11 : 10

- 1) Valve box off
- 2) Turn pump breaker on
- 3) Valve box on
- 4) Verify pressures/flows agree with previous values from II.C.
 Pup 130 Pdown 370 Pbyypass Flow 2900
- 5) 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
- 6) Start pre-purge UTC 21 : 14 : 36
- 7) Note trap temperature trap T 40.2

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
1	9.92	947	21:50:54	39	1	
2	9.91	940	21:54:36	33	1	
3	9.89	936	21:58:22	28	1	
4	9.85	932	22:02:55	21	1	
5	9.84	932	22:07:59	13.3	1	
6	9.84	930	22:11:03	9.2	1	
7	9.83	926	22:14:16	4.0	1	
8	9.82	925	22:17:00	1.2	1	
9	9.87	931	00:08:56	28	2	APPROACH TO WALLONGONG
10	9.87	935	00:15:27	28	2	
11	9.86	929	00:23:19	20.6	2	
12	9.83	923	00:27:46	13.9	2	
13	9.80	918	00:30:33	9.7	2	
14	9.80	920	00:33:59	4.6	2	
15	9.75	915	00:42:50	600ft	2/3	ASCENT OUT OF WALL
16	9.77	918	00:46:08	5.5	3	



- 1) After sampling flask 16, close flasks 1-16
- 2) Note trap temperature

UTC 12:48
 trap T 39.7 (adjusting)

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
17	9.81	902	005051	12	3	Ascent from WOLLONGONG CONT.
18	9.82	904	005334	17	3	
19	9.82	930	005635	21.6	3	
20	9.83	925	01:01:35	29.44	3	
21	9.82	942	01:07:36	37.44	3	
22	9.84	950	01:11:36	40	3	
23	9.83	957	02:25:20	28	4	
24	9.81	925	0242:09	18.6	4	late - arranging for my rental car to be picked up.
25	9.79	929	0246:40	12	4	
26	9.78	929	0249:22	8.6	4	
27	9.74	925	0252:05	4.7	4	
28	9.71	927	0255:16	1	4	
29	9.8	910	03:39:15	1	5	
30	9.7	909	0346:46	15	5	
31	9.78	919	0359:04	28	5	
32	9.8	930	04:13:37	41	5	03:55 restart

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

UTC 04:14
 trap T 40
 walk laptop

III. At the end of the sampling

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

UTC 04:20 ish?

IV. Post-flight

- 1) Remove traps
- 2) Plug holes in dewar lid *Actually, placed new trap in place of old instead of plugging*
- 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

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 109 Box #2: 18

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) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- ✓ 9) Run 20-second prepurge to evacuate all flask downstream tubes 22:27:10
- ✓ 10) Save PNG of AEROS Ps, Flows, and Stats to laptop
- ✓ 11) Valve box off
- ✓ 12) Close Pdn, turn pumps off (will leave in position 1)
- ✓ 13) Valve box on
- ✓ 14) Turn bypass on

22:22:00 4 161 167

Flask Leak Check Procedure #2:

- ✓ 1) "Clear All" 22:
- ✓ 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- ✓ 3) Adjust prepurge time to 20 seconds
- ✓ 4) Run 20-second prepurge to check all flask downstream tube Ps 19:53:25
- ✓ 5) Record times for AEROS matching: Start 19:53:25 Finish 20:08
- ✓ 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- ✓ 7) Address any apparent leaks (slight leak on 28 addressed)

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 ~ 10, Pdown ~160, Pbyypass ~160
- ✓ 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. Leak rate is fine
- ✗ 9) After 5 minutes, record values again
- ✗ 10) If Pdown and Pbyypass < 2 torr/5 mins, skip to 12
- ✗ 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
- ✓ 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
22:22:00	4	161	167	
22:23:00	5	161	167	

20:16:00 5 159 163

20:17:00 6 159 163

★ DO INLET LEAK CHECK
THEN TIGHTEN 1/4 TURN

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.11

Date: 091116 Campaign: HIPPO2 Flight: RF08 From-To: AG64-PHKO

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091115

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: C Downstream: B
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 109 Box #2 ~~109~~ 18
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7) Replace cover shields and 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" ist 2nd
- 11) Complete flask leak check procedure #1 Start UTC 22:35:19 23:01:3
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 23:48
- 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 14) Record Ps: Pup 9 Pdown 163 Pbypass 169 then all power off

Flask
1224,
1248
1310
1291
were open during shipment.
we do NOT HAVE ENOUGH SPARES, SO WE MUST USE THEM
Flask was open during shipment.

Flask ID Table (View from Front of Box)

13	12	5	4
1310	1023	1272	1082
14	11	6	3
1245	1248	1015	1005
15	10	7	2
1291	1237	1249	1224
16	9	8	1
1210	1003	1110	1131
17	24	25	32
1129	1354	1350	1353
18	23	26	31
13563	1365	1361	1363
19	22	27	30
1351	1382	1357	1364
20	21	28	29
1078	1360	1355	1358

CLOSED AFTER SHOWED LEAKS IN PREWURGE

JUMPED

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

- 1) Load dry ice into dewar 1.0" from lid UTC 19:50
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup 501 Pdown 558 Pbypass 564
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
MEDUSA time UTC 21:36:01 Laptop time UTC 21:36:01

Flask
1356
Originally pos 18,
now in pos 32
was broke while attaching

AT EQUILB, PC1,2 OPEN

* Prepurge T changed to 150 to purge out flasks that were open during shipping and because we won't be dipping for 2 hrs

20ft 6096 m
15 4572
12 3657
6 1829
5 1524
1 304.8

- ✓ 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 7) Open all flask stopcocks 2 half turns Flasks opened by: JD B
- 8) Re-install splinter shields and complete rack book
- ✓ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 130 Pdownset 370 prepurge T 60 flush T 150
- ✓ 10) Verify that no values are blinking on screen 150 trap T 40.0
- ✓ 11) Note trap temperature
- ✓ 12) Complete bypass / system leak check
- ✓ 13) Ensure valve box off and both controllers to auto
- ✓ 14) Turn pumps on
- ✓ 15) Verify pressures are controlling and flow is as expected
Pup 129 Pdown 370 Pbyypass 695 Flow 2600
- ✓ 16) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 17) Pump breaker off
- ✓ 18) Valve box on

~~320~~
150
32
300
4500
4800
~~150~~
32
60
60
1920
1920

II. In flight

A. Immediately after take-off

Take-off time UTC 23:00:00

- ✓ 1) Valve box off
- ✓ 2) Turn pump breaker on
- ✓ 3) Valve box on
- ✓ 4) Verify pressures/flows agree with previous values from II.C.
Pup 130 Pdown 370 Pbyypass 655 Flow 2700

32
4800
1920
2880

✓ 5) 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

60 | 2880

- ✓ 6) Start pre-purge UTC 23:03:35
- ✓ 7) Note trap temperature trap T 39.1 (controlling)

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
1	9.89	949	00:46:42	40.6	0	
2	9.90	946	01:06:44	40.6	0	
3	9.93	950	01:50:??	40.6	1	
4	9.85	935	01:58:20	28	1	PALTF went down (DSM fail?) (also 0)
5	9.82	933	02:05:05	22	1	
6	9.81	930	02:10:44	15	1	
7	9.80	925	02:15:09	7.3	1	
8	9.81	925	02:17:50	350	1	
9	9.8	923	02:21:03	1.0	1	
10	9.74	915	03:05:06	1.0	2	
11	9.72	910	03:09:10	5.7	2	
12	9.72	909	03:12:29	10.5	2	
13	9.76	917	03:15:45	15.5	2	
14	9.78	922	03:19:02	22.4	2	3:20:02 22.4 accid
15	9.80	933	03:25:51	28	2	
16	9.70	910	03:48:33	01	3	

hit menu button, not sample

Start breath. 00 33 30

MENCOZ 307

INLET LEAK TEST

- ✓1) After sampling flask 16, close flasks 1-16
 ✓2) Note trap temperature

UTC 03: 49
 trap T 40.3 (controlling)

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
17	9.60	865	043206	1.0	4	
18	9.59	857	043600	5.5	4	
19	9.66	910	043923	10.8	4	
20	9.73	911	044226	15.6	4	
21	9.73	931	044646	21.8	4	
22	9.76	938	045419	28	4	
23	9.68	903	051537	1	5	Just after sunset high center
24	9.67	901	052049	8.9	5	spacing out for 2 profiles
25	9.69	917	052519	15.6	5	surface as before
26	9.73	924	052925	21.7	5	
27	9.76	929	053728	28	5/6	
28	9.74	933	054414	20.2	6	
29	9.72	917	054829	14	6	
30	9.70	920	055125	9.5	6	
31	9.70	905	055450	4.2	6	
32	9.68	906	055903	1	6	JUMPED - PANN

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

UTC 06: 10
 trap T 40

III. At the end of the sampling

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

UTC 06: 07 ish

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

V. Day after flight

- ✓1) Transfer beads from downstream trap into upstream trap
 ✓2) Unload flasks. Box #1: 110 Box #2 112

MEDUSA leak check procedures

Flask Leak Check Procedure #1:

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

- 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) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 9) Run 20-second prepurge to evacuate all flask downstream tubes
- 10) Save PNG of AEROS Ps, Flows, and Stats to laptop
- 11) Valve box off
- 12) Close Pdn, turn pumps off (will leave in position 1)
- 13) Valve box on
- 14) Turn bypass on

Flask Leak Check Procedure #2:

30 179 182

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Ps
- 5) Record times for AEROS matching: Start 23:48:00 Finish 23:51:00
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

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 ~ 10, Pdown ~160, Pbyypass ~160
- 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 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
22:30:30	8	157	164	DAD BEFORE GENERAL CHECK
22:31:30	11	158	164	
22:32:30	12	158	164	

21:46:30 12 161 168 DAD of
 21:47:30 13 161 168

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.11

Date: 091119 Campaign: HIPPO2 Flight: RF09 From-To: PHKO-PANC

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091117

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: ? Downstream: D
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 110 Box #2 112
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7) Replace cover shields and complete rack book
- 8) Record flask IDs into an Excel file on laptop (MED_YYMMDD_RF#.xls)
- 9) If necessary, download data from previous flight to laptop and pen drive
- 10) Check that flask table is clear. If not, "clear all"
- 11) Complete flask leak check procedure #1 Start UTC 22:57 → 23:12
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 23:57 → 00:
- 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 14) Record Ps: Pup 11 Pdown 162 Pbypass 168 then all power off

Trap
Temp: 52.2
@ 23:58

NOTE: pos
32 was pulled down for almost an hour while I shipped off boxes.

Flask ID Table (View from Front of Box)

13	1014	12	1030	5	1064	4	1073
14	1040	11	1107	6	1079	3	1403
15	1040 1393	10	1136	7	1206	2	1188
16	1336	9	1281	8	1219	1	1208
17	1182	24	1340	25	1130	32	JUMPED
18	1273	23	1123	26	1264	31	1118
19	1042	22	1052	27	1051	30	1151
20	1085	21	1196	28	1010	29	1166

BROWN

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

- 1) Load dry ice into dewar 1.0" from lid UTC 18:46
- 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 6231 Pdown 6281 Pbypass 6361
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec

MEDUSA time UTC 19:05:00 Laptop time UTC 19:05:00

- ✓ 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- ✓ 7) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- 8) Re-install splinter shields and complete rack book
- ✓ 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset 130 Pdownset 370 prepurge T 60 flush T 150
- ✓ 10) Verify that no values are blinking on screen
- ✓ 11) Note trap temperature trap T 40
- ✓ 12) Complete bypass / system leak check
- ✓ 13) Ensure valve box off and both controllers to auto
- ✓ 14) Turn pumps on
- ✓ 15) Verify pressures are controlling and flow is as expected
 Pup 130 Pdown 370 Pbyypass 715 Flow 2700
- ✓ 16) If necessary, "Clear All" (after being sure data from last flight copied)
- ✓ 17) Pump breaker off
- ✓ 18) Valve box on

II. In flight

A. Immediately after take-off

Take-off time UTC 20 : 08 : 10

- ✓ 1) Valve box off
- ✓ 2) Turn pump breaker on
- ✓ 3) Valve box on
- ✓ 4) Verify pressures/flows agree with previous values from II.C.
 Pup 129 Pdown 369 Pbyypass 699 Flow 2040
- ✓ 5) 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

- ✓ 6) Start pre-purge
- ✓ 7) Note trap temperature

UTC 20 : 14 : 16
 trap T 39.4 (controlling)

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds after desired altitude at 3 SLPM (1:15 at 1.8 SLPM), and record values in chart below (nominal kft = 1, 5, 10, 15, 21, 28, 36, and 46)

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
1	9.7	908	21:19:27	1	1	
2	9.62	890	21:23:15	5.7	1	
3	9.65	899	21:26:39	10.8	1	
4	9.74	914	21:30:03	16	1	
5	9.78	927	21:34:59	23.1	1	
6	9.80	928	21:41:46	28	1	
7	9.77	923	22:26:37	28	2	
8	9.78	920	22:32:11	19.6	2	
9	9.77	915	22:35:54	14.3	2	
10	9.75	913	22:40:19	7.7	2	
11	9.74	911	22:43:29	2.7	2	
12	9.74	911	22:46:44	1.0	2	
13	9.80	922	23:10:05	28	3	
14	9.80	921	23:14:22	21.8	3	
15	9.74	921	23:24:26	7.1	3	
16	9.74	916	23:27:06	3	3	

- 1) After sampling flask 16, close flasks 1-16
- 2) Note trap temperature

UTC 23:23
 trap T 39.9 (controlling)

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
17	9.72	888	23:29:48	1	3	
18	9.66	874	00:14:14	1	4	
19	9.69	908	00:17:54	5.8	4	
20	9.68	895	00:21:12	10.6	4	
21	9.75	933	00:25:27	17	4	
22	9.77	937	00:28:42	21.1	4	
23	9.81	928	00:36:08	28	4	
24	9.67	900	01:01:00	6.5	5	
25	9.80	932	01:17:52	28	6	
26	9.78	933	01:25:32	20.2	6	
27	9.73	922	01:29:38	14.1	6	
28	9.75	934	01:32:54	9.3	6	
29	9.71	914	01:36:35	4.1	6	clouds
30	9.70	925	01:40:12	1	6	
31	9.83	929	02:04:42	36	6/7	
32						

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

UTC 02:10
 trap T 40

III. At the end of the sampling

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

UTC 02:10

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

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) 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) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 9) Run 20-second prepurge to evacuate all flask downstream tubes
- 10) Save PNG of AEROS Ps, Flows, and Stats to laptop
- 11) Valve box off
- 12) Close Pdn, turn pumps off (will leave in position 1)
- 13) Valve box on
- 14) Turn bypass on

Flask Leak Check Procedure #2:

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Ps
- 5) Record times for AEROS matching: Start 235732 Finish _____
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

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 ~ 10, Pdown ~160, Pbyypass ~160
- 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 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
19 08 30	11	162	169	
19 10 30	12	162	169	

Captain ~~1~~ 1
 resolution

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.11

Date: 091121 Campaign: Hippo2 Flight: RF10 From-To: PANC-PANC

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091120

- 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 #1 117 Box #2 108
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7) Replace cover shields and 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 20:06
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 20:58
- 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 14) Record Ps: Pup 11 Pdown 166 Pbypass 167 then all power off

Trap Temp =
 56.0 @
 21:00 on
 20091120
 when restarted so, forgot to: set PP to 20secs - 30secs inst

Flask ID Table (View from Front of Box)

13	1231	12	1222	5	1299	4	1039
14	1002	11	1089	6	1122	3	1065
15	1283	10	1058	7	1142	2	1022
16	1315	9	1329	8	1132	1	1212
17	1447	24	1246	25	1112	32	1095 → 1048
18	1388	23	1197	26	1200	31	1274
19	1425	22	1179	27	1135	30	1256
20	1333	21	1055	28	1036	29	1095

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

- 1) Load dry ice into dewar 1.0" from lid UTC 16:45
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup 466 Pdown 539 Pbypass 531
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
 MEDUSA time UTC 17:31:05 Laptop time UTC 17:31:05

- 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 7) Open all flask stopcocks 2 half turns Flasks opened by: JDB
- 8) Re-install splinter shields and complete rack book
- 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
Pupset 180 Pdownset 370 prepurge T 60 flush T 150
- 10) Verify that no values are blinking on screen
- 11) Note trap temperature trap T 39.9 (controlling)
- 12) Complete bypass / system leak check
- 13) Ensure valve box off and both controllers to auto
- 14) Turn pumps on
- 15) Verify pressures are controlling and flow is as expected
Pup 130 Pdown 370 Pbybypass 667 Flow 2600
- 16) If necessary, "Clear All" (after being sure data from last flight copied)
- 17) Pump breaker off
- 18) Valve box on

II. In flight

A. Immediately after take-off

Take-off time UTC 19:08:10

- 1) Valve box off
- 2) Turn pump breaker on
- 3) Valve box on
- 4) Verify pressures/flows agree with previous values from II.C.
Pup 129 Pdown 369 Pbybypass 721 Flow 2870
- 5) 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
- 6) Start pre-purge UTC 19:11:57
- 7) Note trap temperature (controlling) trap T 39.0

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds 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)

RFOZ Time ← RFOZ Alt

This is the equivalent time on RFOZ given that RFOZ took off 30 mins early

*Pos 26 -
change pre-purge to 20 secs to get samples @ Fairbanks
using low ppchs.

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
1	9.83	932	19:48:45	1	1	19:46 1.5 FAIRBANKS
2	9.82	927	19:52:00	8.2	1	19:48 9
3	9.83	926	19:54:54	12.4	1	20:03 15
4	9.82	926	19:57:30	16.4	1	20:06 21
5	9.82	928	20:01:17	22	1	20:07 28
6	9.82	929	20:06:00	28.8	1	20:24 34
7	9.82	927	20:10:42	34.6	1	20:43 26
8	9.79	912	21:13:40	500 500 2	2	20:47 21
9	9.79	919	21:17:56	5.9	2	20:52 15
10	9.77	918	21:21:20	10.9	2	20:56 10
11	9.78	919	21:24:46	16.2	2	21:01 5
12	9.78	921	21:28:40	22	2	21:00 1.5
13	9.83	929	21:36:46	28	2	21:09 0.5
14	9.80	924	21:59:06	500+1	3	21:22 28 dark over sea ice
15	9.79	931	22:03:32	5.9	3	21:27 21
16	9.80	926	22:06:47	10.9	3	21:31 15

equivalent time into RFO2 (i.e. RFO2 + 20 mins)

- ✓ 1) After sampling flask 16, close flasks 1-16
- ✓ 2) Note trap temperature

UTC 22:10
trap T 40.1 (controlling)

RFO2 time RFO2 Alt

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes		
17	9.82	909	22:10:16	16.3	3	22:02	0.5	
18	9.83	906	22:14:54	22.2	3	22:50	0.5	
19	9.82	932	22:20:44	28	3	22:55	5	
20	9.79	919	23:25:44	500.4	4	23:02	15	snowstorm
21	9.76	937	23:31:11	6.2	4	23:07	23	turning back S w/ ice
22	9.77	938	23:34:16	11.0	4	23:20	28	
23	9.82	926	23:37:43	16.5	4	00:01	0.5	
24	9.83	928	23:40:04	24	4	00:07	5	climb rate changed w/o notice
25	9.84	938	23:44:38	33.5	4	00:12	10	climbing steeply
26	9.84	942	23:49:55	38	4	00:15	15	
27	9.84	944	23:52:39	41	4	00:20	21	
28	7.85	818	00:21:17	45	-	00:29	28	changed to 90/650 23:53:40
29	7.89	813	00:28:57	45	-	00:57	36	of BP - 1400 rph
30	7.97	821	01:04:20	45	-	01:26	45	high ^{est} ozone low PVA air
31	7.91	811	01:24:05	45	-	01:30	45	just as high-O ₂ air is dropping down
32	7.91	810	01:33:10	45	-	01:55	45	

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

UTC 01:35
trap T TD

III. At the end of the sampling

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

UTC 01:50 ?
02:10 ?

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

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
- 2) Unload flasks. Box #1: 9 Box #2: 116

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 20:06:17
- 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) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 9) Run 20-second prepurge to evacuate all flask downstream tubes
- 10) Save PNG of AEROS Ps, Flows, and Stats to laptop
- 11) Valve box off
- 12) Close Pdn, turn pumps off (will leave in position 1)
- 13) Valve box on
- 14) Turn bypass on

Flask Leak Check Procedure #2:

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Ps
- 5) Record times for AEROS matching: Start 205840 Finish 2119
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png)
- 7) Address any apparent leaks

0
35
200
197

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 ~ 10, Pdown ~160, Pbyypass ~160
- 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 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
200452	10	160	162	
200552	10	160	163	

DAQ BEFORE

DAQ OF

17:32:30 8 164 164

NCAR/SCRIPPS MEDUSA Checklist

V. 2009.11.11

Date: 091122 Campaign: Hippo 2 Flight: RF11 From-To: PANCO → VBJC

Some steps have been skipped/performed only once not twice to accommodate lack of maintenance staff.

I. Preflight

A. Day(s) before flight

Date (YYMMDD) = 091121

- 1) Prepare new traps w/ clean beads filled to 3" below edge and bring to plane
- 2) Install new traps Upstream: 7 Downstream: 13
- 3) Load flasks, confirm old and record new flask IDs, and inspect o-rings
- 4) Record Flask Box Numbers: Box #1 9 Box #2 116
- 5) Install flask box retaining pins
- 6) Connect plumbing. Confirm lines are correctly installed with red label up
- 7) Replace cover shields and 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 16:12:34 → 16:28
- 12) Wait as long as possible, 1-hour preferred, then complete flask leak check procedure #2 Start UTC 17:29:55 9:16:169
⊙ 16:50
38 239 170
⊙ 17:21
- 13) Pull bypass pressure down (PC1 closed), then pumps off and PC2 closed
- 14) Record Ps: Pup ___ Pdown ___ Pbypass ___ then all power off

Flask ID Table (View from Front of Box)

13 1435 ←	12 1449	5 1446 ←	4 1441
14 1436	11 1413	6 1440	3 1420
15 1430	10 1438	7 1418	2 1427
16 1419 ↓	9 1428 ←	8 1432	1 1411
17 1408	24 1431 →	25 1404	32 1407
18 1417	23 1416	26 1434	31 1423
19 1412	22 1409	27 1429	30 1204
20 1426 →	21 1424	28 1423	29 1421

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

- 1) Load dry ice into dewar 1.0" from lid UTC 17:00
- 2) Ensure that MEDUSA valve control key is in place
- 3) 28 V breaker on, Valve box on, Main breaker on
- 4) Record P / Δ: Pup ___ / ___ Pdown ___ / ___ Pbypass ___ / ___
- 5) Sync MEDUSA clock with clock on laptop +/- 1 sec
 MEDUSA time UTC 17:23:03 Laptop time UTC 17:23:03

- 6) Ensure VLV1 = 1, VLV2 = 1, VLV3 = odd, bypass on, pumps off
- 7) Open all flask stopcocks 2 half turns Flasks opened by: DD
- 8) Re-install splinter shields and complete rack book
- 9) Confirm P upstream, P downstream, prepurge T, and min flush T settings
 Pupset 60 Pdownset 370 prepurge T 60 flush T 150
- 10) Verify that no values are blinking on screen
- 11) Note trap temperature trap T 39.5 (controlling)
- 12) Complete bypass / system leak check
- 13) Ensure valve box off and both controllers to auto
- 14) Turn pumps on
- 15) Verify pressures are controlling and flow is as expected
 Pup 130 Pdown 370 Pby pass 682 Flow 2740
- 16) If necessary, "Clear All" (after being sure data from last flight copied)
- 17) Pump breaker off
- 18) Valve box on

II. In flight

A. Immediately after take-off

Take-off time

UTC 18:38:55

- 1) Valve box off
- 2) Turn pump breaker on
- 3) Valve box on
- 4) Verify pressures/flows agree with previous values from II.C.
 Pup 130 Pdown 370 Pby pass 755 Flow 3100

5) 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

- 6) Start pre-purge
- 7) Note trap temperature

UTC 18:44:30

trap T 38.2 (controlling)

B. Once pre-purge is finished, samples are ready to be taken. Wait until appropriate sampling time, 45 seconds 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)

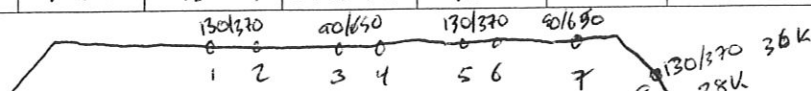
Coordinating w/ Fred to try

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes to sample roughly @ same time
1	9.87	944	19:41:17	41	-	Starting intercomp O ₂ = 140 @ = 359
2	9.88	943	19:46:00	41	-	O ₂ = 130 @ = 360 OK CO = 50 ppb
3	7.92	823	19:56:55	41	-	19:48:02 switch to 90/650 O ₂ = 142 @ = 359.5 CO = 50
4	7.97	825	20:02:25	41	-	O ₂ = 150 @ = 360.5 CO = 50 → 130/370 @ 20:03:30
5	9.90	948	20:14:03	41	-	O ₂ = 180 @ = 358.5 CO = 48 coord. w/ Fred's glass tk.
6	9.86	942	20:18:43	41	1	O ₂ = 75 @ = 357 CO = 52 20:19:35 → 90/650
7	7.93	842	20:27:48	41	1	O ₂ = 60 @ = 359 CO = 52 20:29:15 → 130/370 for
8	9.87	840	20:33:17	34.4	1	O ₂ = 0 @ =
9	9.87	939	20:38:27	27.0	1	
10	9.87	938	20:43:07	20.0	1	coord. w/ Fred GF
11	9.86	937	20:46:51	14.0	1	
12	9.85	933	20:56:02	10.0	1	delay @ 130ft, held alt. CLOUDS Held @ 100ft
13	9.82	930	21:03:09	3.4	1	
14	9.78	922	21:05:45	1.4	2/1	just as we were coming up. low clouds
15	9.80	938	21:10:52	10.9	2	steep ascent mixed shift
16	9.82	936	21:13:44	16	2	

1530
SCCM

descent
just by
Fred's
glass
flask

41kft



- 1) After sampling flask 16, close flasks 1-16
 ✓ 2) Note trap temperature

UTC 21:20
 trap T 39.9 (controlling)

Pos	Flow (V)	Psa (torr)	End Time	PALTF	Profile #	Notes
17	9.87	924	21:17:50	22.5	2	
18	9.87	919	21:22:20	29.3	2	
19	9.81	938	21:26:24	35.2	2	
20	9.85	940	21:32:32	41	2	
21	9.86	956	21:39:30	41	-	
22	8.1	823	21:49:40	41	-	21:41:40 → 90/650 FreqWci no more GFs
23	7.9	822	21:55:00	41	-	21:55:10 → 130/370
24	9.74	917	22:01:02	41	-	
25	9.86	952	22:08:26	41	-	22:08:57 → 90/650
26	7.91	822	22:17:00	41	-	
27	7.93	820	22:22:20	41	-	22:23:08 → 130/370
28	9.83	961	22:27:06	41	-	
29	9.88	954	22:30:27	41	-	22:31:10 → 90/650
30	7.89	817	22:39:44	41	-	
31	7.92	813	22:46:49	41	-	
32	7.90	818	22:52:01	41	-	

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

UTC 22:55
 trap T 40

III. At the end of the sampling

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

UTC 22:55 ~

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

V. Day after flight

- 1) Transfer beads from downstream trap into upstream trap
 2) Unload flasks. Box #1: 1 Box #2: 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) Toggle between bypass on/off 6 times over 1-min to pull PSA down to < 200
- 9) Run 20-second prepurge to evacuate all flask downstream tubes
- 10) Save PNG of AEROS Ps, Flows, and Stats to laptop
- 11) Valve box off
- 12) Close Pdn, turn pumps off (will leave in position 1)
- 13) Valve box on
- 14) Turn bypass on

~~16:11:30~~

16:12:34

Flask Leak Check Procedure #2:

- 1) "Clear All"
- 2) Ensure AEROS is running with MEDP1, MEDP2, MED_Psa, MEDPBYP recording
- 3) Adjust prepurge time to 20 seconds
- 4) Run 20-second prepurge to check all flask downstream tube Ps
- 5) Record times for AEROS matching: Start 1729:35 Finish 1730:00
- 6) Save PNG of AEROS Ps and Stats to laptop (YYMMDD_RF##_Leakcheck2.png) off.
- 7) Address any apparent leaks

acc started
w/ bypass key
starting again.**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 ~ 10, Pdown ~ 160, Pbyypass ~ 160
- 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 12
- 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
- 12) Return PC1 and PC2 to auto

Time (UTC)	Pup	Pdn	Pbyypass	Comments
16 07 00	6	159	161	
16 09 00	8	160	162	
16 11 00	10	161	162	