NCAR Airborne Oxygen Instrument (AO2) Checklist  V. 09.11.11

I. Preflight

A. Day(s) before flight

   - Date = ______
   - 1) Prepare trap with clean glass beads filled to 1 inch from bottom
   - 2) Install trap in dewar
   - 3) Record cylinder pressures (or copy from prev. postflight)
     LS ______  HS ______  CylT1 ______
     LT ______  WT ______
   - 4) Turn on O2 box, start program, and record pressures (or copy from prev. postflight)
     PaWT ___  PaSP ___  PLi840 ___  TMan ___
     UTC = ___ : ___

B. 2-hours before take-off

   - Instrument Operator ________
   - 1) Rack power switch on
   - 2) O2 box Power breaker on
   - 3) Laptop power on
   - 4) Load dry-ice in dewar to within 0.5 inches of lid
   - 5) Record hi-side cylinder pressures and changes overnight (P / Δ)
     LS 20.40 / 22.00 / CylT1 20.41
     LT 47.20 / WT 22.40 /
   - 6) Open green knobs four ¼ turns and re-record pressures and any changes
     LS 22.60 / 22.90 / CylT2 ___ / ___
     LT 47.20 / WT 22.40 /
   - 7) Close cylinder box lid
   - 8) Vnc into into AO2 (192.168.84.138)
   - 9) Start AO2 program by clicking play in higold.vdp
   - 10) Ensure that no USB errors are present in boxes at bottom of screen
   - 11) Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
   - AO2 PC Time 4: 39: 00, Rack laptop time 4: 39: 00
   - 12) Log each hi-side cylinder pressure in software
   - 13) Pump box Power breaker on
   - 14) Cylinder box Power breaker on
   - 15) Record instrument pressures and changes overnight (P / Δ)
     PaWT 85.6 / PaSP 5.0 / PLi840 18.4 / TMan 23 18
   - 16) Pump box Pump 2 breaker on
   - 17) Manual VAC valve open
   - 18) Check that PaCO2 = 330 torr (± 5) and PaO2 = 94 torr (± 1). If not, adjust.
     PaCO2 ___  PaO2 94
   - 19) Click Initialize Cal Flow button
   - 20) Ensure that flow starts through both lines (110 ± 10)
     FLWT (to cell) 6 / 4  FISP (to bypass) 6 / 4
21) Toggle changeover to check flows in other position

22) FlWT (to bypass) \[\underline{\text{off}}\] FlSP (to cell) \[\underline{\text{on}}\] If necessary, adjust HA-3 to match FlWT on bypass and cell to \pm 2 scem

23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr

24) Close cylinder box lid

25) Return to WT selected when done checking regulators

26) Check that PdWT (\pm 0.1), PdSP (\pm 0.1), and PdO2 (\pm 0.01) are controlling

27) Light lamp and ensure that it comes on

28) If necessary, adjust PaO2 to keep signal below 10 V

29) Click Initialize Sample Flow button

30) Pump box Pump 1 breaker on

31) Ensure that Fridge P stabilizes near 805 (\pm 10) torr after 2 min.

32) Snoop trap fittings

33) Pump box Pump 1 breaker off

34) \[\geq\] 10 min. after lamp on record values in first row of table below

35) Enable changeover valve (uncheck disable)

36) \[\geq\] 10 min. after change-over enable, record values in table below

37) Disable changeover

38) If necessary, toggle changeover to get SP to Cell

39) Close WT 248 valve

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<table>
<thead>
<tr>
<th>UTC</th>
<th>Gas</th>
<th>O2</th>
<th>CO2</th>
<th>O2</th>
<th>SPm</th>
<th>WTm</th>
<th>Total</th>
<th>mA</th>
<th>PdO2</th>
<th>PdSP</th>
<th>PdWT</th>
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<td>NA</td>
<td>3.7</td>
<td>4.1</td>
<td>4.6</td>
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<td>1.44</td>
<td>14.9</td>
<td>5.5</td>
<td>7.7</td>
<td>4.1</td>
<td>4.3</td>
</tr>
</tbody>
</table>

37) Disable changeover

38) If necessary, toggle changeover to get SP to Cell

39) Close WT 248 valve

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C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)
2) Enable changeover (uncheck disable)
3) Adjust / record program parameters (nominally set to a, 50, 3, 3, 4)
4) Click Start button on main screen
5) Click Proceed button on control screen
6) Minimize “Verify Run Plan” window
7) Note cryo temperature

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8) Before LT starts (after HS-LS) or upon taxi, Pump box Pump 1 breaker on
9) If ground hold extended 10-20 min., set CalInt to 1 until take-off
10) If ground hold extended > 20 min., go to Manual and run WT until take-off
11) Note time of wheels up

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II. During Flight

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Keep VNC off as much as possible, only connecting when necessary to adjust cals.
III. Postflight

- Note time of wheels down
- Let any calibration cycles finish (up to 5-min on ground and/or 2 gases)
- Click Stop button
- Turn off lamp
- Close SA, WT, SP, and O2 248 valves in software
- Select None in cylinder box control section and uncheck any purges
- Close manual VAC valve
- Pump box Pump 1 breaker off
- Note cryo temperature
- Cylinder box Power breaker off
- Pump box Pump 2 breaker off
- Pump box Power breaker off
- Record pressures for a leak check
- Open cylinder box lid and record cylinder pressures for a leak check
- Close all 4 green valves
- Close cylinder box lid
- Log each hi-side cylinder pressure in software
- Close program and Visual Basic
- Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive
- Shut down AO2 PC
- Shut down laptop
- After green “SP to Cell” light has gone out, O2 box Power breaker off
- Rack power switch off
- Pull trap, jumper quick-connects, and install stopper
- Open trap and remove glass beads

IV. Troubleshooting / procedures

A. Time sync not working: set timeserver IP of timeserver to 192.168.84.1 and click update now. Also, can try 192.168.184.10. Ask tech about any server issues.

B. Other network problems: AO2 IP address = 192.168.84.138, Laptop IP address = 192.168.84.137.

C. O2 signal ~ 50% low and noisy. Turn lamp off and relight, up to 10 times to try to fix. Can also try full power down and back up of instrument.
D. If PaCO2 or PaO2 are incorrect: adjust using Vac and Ambient check boxes, and external tube to attain above-ambient P if necessary.

E. Program crash upon cylinder loading or pressure logging: because of a bad entry in Data/hgcylog.txt, which must be manually edited to fix.

F. USB errors present: stop AO2 program, exit Visual Basic, check cables, and restart; if errors persist, stop AO2 program, exit VB, shut-down windows, power-down instrument, check cables and restart.

G. Sample flow or PaSA low: check/uncheck the Pump Box Enable check box 10 times and check Pump 1 breaker.

H. WT flow low: check/uncheck the Cylinder Box Enable check box 10 times, check VAC valve, and check Pump 2 breaker.

I. Li-840 H2O reading is -1.00. H2O signal needs to be rezeroed. Stop AO2 program. Start Li-840 software, go to calibration tool and click on zero for H2O.

J. Program crash associated with one of the plots. Click debug and comment out offending line with an apostrophe and then click play again (plot will not work for rest of flights).

K. Internet time working? By right-clicking clock, selecting Adjust Date and Time, then selecting Internet Time tab.

L. Lighting lamp: select RF On check box and click “Spark for 2-seconds” button.

M. Copy to laptop: on laptop, open desktop shortcut to AO2 Data, sort files by most recent Date Modified, select YYMMDD*.mr, YYMMDD*.hr, and hgcylog.txt, then copy to desktop folder AO2 Data on Laptop. Copy to pen drive: inset in laptop, copy, unmount, remove.

N. Noise persistently above 10 (e.g. 30) – try lowering PaCO2 and flow.

V. Emergency shut-down

A. Pull all breakers.

B. Close manual VAC valve.
I. Preflight

A. Day(s) before flight

1. Prepare trap with clean glass beads filled to 1 inch from bottom
2. Install trap in dewar
3. Turn on O₂ box, start program, and record pressures
   - PaWT
   - PaSP
   - PLi840
   - TMan
   - UTC = __ : ___
4. Crack and close green valves, then record cylinder pressures
   - LS
   - HS
   - LP
   - WT
   - CyLT2
   - UTC = __ : ___
5. Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)

B. 2-hours before take-off

1. Rack power switch on
2. O₂ box Power breaker on
3. Laptop power on
4. Pump box Power breaker on
5. Pump box Fridge breaker on
6. Load dry-ice in dewar to within 0.5 inches of lid
   - UTC = 16 : 00
7. Record hi-side cylinder pressures and changes overnight (P/Δ)
   - LS 1300
   - LT 400
   - HS 1200
   - WT 160
   - LP 2150
   - CyLT2 24
   - (once inst. on)
8. Open green knobs four ¼ turns and note any pressure changes (P/Δ)
   - LS 1300 / +5
   - LT 1300 / +5
   - HS 1200 / +5
   - WT 160
   - LP 2170 / +20
9. Close cylinder box lid
10. Vnc into into AO2 (192.168.84.138)
11. Start AO2 program by clicking play in higold.vdp
12. Ensure that no USB errors are present in boxes at bottom of screen
13. Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
14. Cylinder box Power breaker on
15. Record instrument pressures and changes overnight (P/Δ)
16. Pump box Pump 2 breaker on
17. Manual VAC valve open
18. Check that PaCO₂ = 330 torr (± 5) and PaO₂ = 90 torr (± 1). If not, adjust.
19. Click Initialize Cal Flow button
20. Ensure that flow starts through both lines (110 ± 10)
   - FWT (to cell) 11
   - FISP (to bypass) 14
21) Toggle changeover to check flows in other position
   FIWT (to bypass) [ ] FIISP (to cell) [ ]
22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm
23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr
24) Close cylinder box lid
25) Return to WT selected when done checking regulators
26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling
27) Light lamp and ensure that it comes on
28) If necessary, adjust PaO2 to keep signal below 9.5 V
29) Open Line Purge cylinder green valve and Line Purge on/off valve
30) Ensure inlet 3-way valve to Line Purge cylinder
31) Click Initialize Sample Flow button
32) Pump box Pump 1 breaker on
33) Ensure that Fridge P stabilizes near 805 (±10) torr after 2 min.
   Fridge P < 801 SA Purge Flow < 0.5
34) Snoop trap fittings
35) >= 10 min. after lamp on record values in first row of table below

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<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPm</th>
<th>WTm</th>
<th>Totm</th>
<th>mΔ</th>
<th>PdO2n</th>
<th>PdSPn</th>
<th>PdWTn</th>
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<td>5.3</td>
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<tr>
<td>nominal</td>
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<td>450</td>
<td>0.7</td>
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<td>±10</td>
<td>±10</td>
<td>±20</td>
<td>0.2</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

36) Enable changeover valve (uncheck disable)
37) >= 10 min. after change-over enable, record values in table above
38) Disable changeover
39) If necessary, toggle changeover to get SP to Cell
40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)
2) Enable changeover (uncheck disable)
3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   Flag a Cal Interval 50 Cal Period 2 LTF 3 WTT 4
4) Click Start button on main screen
5) Note fridge temperature
6) Note cryo temperature
7) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr
8) Immediately before runway, switch 3-way valve to inlet UTC = __:__:
9) Note time of wheels up
10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings

UTC (start) = __ : __ : __

2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings

UTC (start) = __ : __ : __

3) On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down

UTC = __ : __ : __

2) As soon as off runway, request permission and switch inlet 3-way to line purge

Fridge T = °C

Cryo = °C

3) Note fridge temperature

4) Note cryo temperature

5) Click Stop button

6) Close manual VAC valve

7) Close all 4 cal cylinder green valves

8) Close cylinder box lid

9) Wait 5 to 10 minutes after touchdown

10) Close Line Purge green valve and Line Purge on/off valve

11) Cylinder box Power breaker off

12) Pump box Pump 2 breaker off

13) Pump box Pump 1 breaker off

14) Pump box fridge breaker off

15) Pump box Power breaker off

16) Close program and Visual Basic

17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive

18) Shut down AO2 PC

19) Shut down laptop

20) After green “SP to Cell” light has gone out, O2 box Power breaker off

21) Rack power switch off

22) Pull trap, jumper quick-connects, and install stopper

23) Open trap and remove glass beads
NCAR Airborne Oxygen Instrument (AO2) Checklist  V. 10.03.22

I. Preflight

A. Day(s) before flight

Date = 100323

1. Prepare trap with clean glass beads filled to 1 inch from bottom

2. Install trap in dewar

3. Turn on O2 box, start program, and record pressures
   PaWT 83.6 PaSP 77.2 Pli840 24.7 TMan 26.9 UTC = 21:42

4. Crack and close green valves, then record cylinder pressures
   LS 1305 HS 1210 LP 2174 UTC = 21:44

5. Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)

B. 2-hours before take-off

Instrument Operator JDB

1. Rack power switch on

2. O2 box Power breaker on

3. Laptop power on

4. Pump box Power breaker on

5. Pump box Fridge breaker on

6. Load dry-ice in dewar to within 0.5 inches of lid UTC = 21:19

7. Record hi-side cylinder pressures and changes overnight (P / Δ)
   LS 1300 / -5 HS 1205 / -5 LP 2050 / -120 Δ25 / 0.7

8. Open green knobs four ¼ turns and note any pressure changes (P / Δ)
   LS 1210 / -10 HS 125 / +10 LP 2100 / +50

9. Close cylinder box lid

10. Vnc into into AO2 (192.168.84.138)

11. Start AO2 program by clicking play in higold.vdp

12. Ensure that no USB errors are present in boxes at bottom of screen

13. Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
   AO2 PC Time 16:26:20 , Rack laptop time 16:26:23

14. Cylinder box Power breaker on

15. Record instrument pressures and changes overnight (P / Δ)
   PaWT 83.8 PaSP 761 / -19 Pli840 32 / +8 TMan 23 / -3

16. Pump box Pump 2 breaker on

17. Manual VAC valve open

18. Check that PaCO2 = 330 (± 5) and PaO2 = 90 torr (± 1). If not, adjust.
   PaCO2 326 PaO2 90

19. Click Initialize Cal Flow button

20. Ensure that flow starts through both lines (110 ± 10)
   FIWT (to cell) 107  FISP (to bypass) 107
21) Toggle changeover to check flows in other position
   FIWT (to bypass) 1.08  FISP (to cell) 1.08

22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm

23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr

24) Close cylinder box lid

25) Return to WT selected when done checking regulators

26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling

27) Light lamp and ensure that it comes on UTC = 16:43.17:42

28) If necessary, adjust PaO2 to keep signal below 9.5 V O2 signal = 5.5

29) Open Line Purge cylinder green valve and Line Purge on/off valve

30) Ensure inlet 3-way valve to Line Purge cylinder

31) Click Initialize Sample Flow button

32) Pump box Pump 1 breaker on Fridge T = 6.3

33) Ensure that Fridge P stabilizes near 805 (±10) torr after 2 min.

34) Snoop trap fittings 79.5

35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPm</th>
<th>WTM</th>
<th>Totm</th>
<th>mΔ</th>
<th>PdO2n</th>
<th>PdSPn</th>
<th>PdWTn</th>
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<td>±10</td>
<td>±10</td>
<td>±20</td>
<td>0.2</td>
<td>5.0</td>
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</table>

36) Enable changeover valve (uncheck disable) UTC = 16:55

37) >= 10 min. after change-over enable, record values in table above

38) Disable changeover

39) If necessary, toggle changeover to get SP to Cell

40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)

2) Enable changeover (uncheck disable)

3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   Flag 3 Cal Interval 5 Cal Period 2.5 LTF 4

4) Click Start button on main screen UTC = 17:46.33

5) Note fridge temperature Fridge T = -3.6

6) Note cryo temperature Cryo = -3.2

7) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr

8) Immediately before runway, switch 3-way valve to inlet
   UTC = 18:43:40

9) Note time of wheels up UTC = 18:44:43

10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = ___ : ___ : ___ 19:58 =>
2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = ___ : ___ : ___ 19:40 =>
3) On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down UTC = ___ : ___ : ___ 00:46:40
2) As soon as off runway, request permission and switch inlet 3-way to line purge Fridge T = 8.4
3) Note fridge temperature Cryo = 1.6
4) Note cryo temperature
5) Click Stop button
6) Close manual VAC valve
7) Close all 4 cal cylinder green valves
8) Close cylinder box lid
9) Wait 5 to 10 minutes after touchdown
10) Close Line Purge green valve and Line Purge on/off valve
11) Cylinder box Power breaker off
12) Pump box Pump 2 breaker off
13) Pump box Pump 1 breaker off
14) Pump box fridge breaker off
15) Pump box Power breaker off
16) Close program and Visual Basic
17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive
18) Shut down AO2 PC
19) Shut down laptop
20) After green “SP to Cell” light has gone out, O2 box Power breaker off
21) Rack power switch off
22) Pull trap, jumper quick-connects, and install stopper
23) Open trap and remove glass beads
24) Submit data
NCAR Airborne Oxygen Instrument (AO2) Checklist  V. 10.03.22

I. Preflight

A. Day(s) before flight
   1) Prepare trap with clean glass beads filled to 1 inch from bottom.
   2) Install trap in dewar
   3) Turn on O₂ box, start program, and record pressures
      - PaWT 170
      - PaSP 97
      - PLi840 27.5
      - TMan 27.5
      - UTC = 18:49
   4) Crack and close green valves, then record cylinder pressures
      - LS 120
      - HS 120
      - LP 100
      - UTC = 18:53
   5) Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)

B. 2-hours before take-off
   1) Rack power switch on
   2) O₂ box Power breaker on
   3) Laptop power on
   4) Pump box Power breaker on
   5) Pump box Fridge breaker on
   6) Load dry-ice in dewar to within 0.5 inches of lid
   7) Record hi-side cylinder pressures and changes overnight (P / Δ)
      - LS 120 / +20
      - HS 115 / +25
      - LP 160 / -10
   8) Open green knobs four ¼ turns and note any pressure changes (P / Δ)
      - LS 120 / +20
      - HS 115 / +25
      - LP 2050 / +50
      - WT 1395 / -5
   9) Close cylinder box lid
   10) Vnc into into AO2 (192.168.84.138)
   11) Start AO2 program by clicking play in higold.vdp
   12) Ensure that no USB errors are present in boxes at bottom of screen
   13) Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times

AO2 PC Time 16:25:29, Rack laptop time 16:25:31

14) Cylinder box Power breaker on
15) Record instrument pressures and changes overnight (P / Δ)
   - PaWT 992 / -9
   - PaSP 173 / -3
   - PLi840 329 / -4
   - TMan 23 / -4.5

16) Pump box Pump 2 breaker on
17) Manual VAC valve open
18) Check that PaCO2 = 330 torr (±5) and PaO2 = 90 torr (±1). If not, adjust.
   - PaCO2 327
   - PaO2 90.6
19) Click Initialize Cal Flow button
20) Ensure that flow starts through both lines (110 ±10)
    - FIWT (to cell) 107
    - FISP (to bypass) 103

Because of testing inlet

Date = 100325

Instrument Operator JDB
Date 100326  Campaign HIPPO3  Flight EF02 From PANC To PANC

21) Toggle changeover to check flows in other position
   FFWT (to bypass) 16  FISP (to cell) 15

22) If necessary, adjust HA-3 to match FFWT on bypass and cell to ±2 sccm

23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr

24) Close cylinder box lid

25) Return to WT selected when done checking regulators

26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling

27) Light lamp and ensure that it comes on

28) If necessary, adjust PaO2 to keep signal below 9.5 V O2 signal = 8.6

29) Open Line Purge cylinder green valve and Line Purge on/off valve

30) Ensure inlet 3-way valve to Line Purge cylinder

31) Click Initialize Sample Flow button

32) Pump box Pump 1 breaker on

33) Ensure that Fridge P stabilizes near 805 (±10) torr after 2 min.
   Fridge T = 2.07

34) Snoop trap fittings

35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPm</th>
<th>WTm</th>
<th>Totm</th>
<th>mA</th>
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<td>0.9</td>
<td>1.33</td>
<td>NA</td>
<td>NA</td>
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<td>±20</td>
<td>0.2</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

36) Enable changeover valve (uncheck disable)  UTC = 16:50

37) >= 10 min. after change-over enable, record values in table above

38) Disable changeover

39) If necessary, toggle changeover to get SP to Cell

40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)

2) Enable changeover (uncheck disable)

3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)

   Flag a  Cal Interval 50  Cal Period 2  LTf 3  WTF 4

4) Click Start button on main screen

5) Note fridge temperature
   Fridge T = 1.3

6) Note cryo temperature
   Cryo = 4.9

7) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr

8) Immediately before runway, switch 3-way valve to inlet UTC = 17:59:15

9) Note time of wheels up
   UTC = 17:59:50

10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve

   (definitely having sensor issues)
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings
   UTC (start) = 19:09:30 \[\rightarrow\] 19:10:15

2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings
   UTC (start) = 00:02:15 \[\rightarrow\] 00:03:15

3) On final descent, open Line Purge cylinder green valve and on/off valve
   \[\rightarrow\] 01:54

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

\[
\begin{align*}
19:11:30 & \rightarrow 19:12:30 \\
00:02:15 & \rightarrow 00:03:15
\end{align*}
\]

III. Postflight

1) Note time of wheels down
2) As soon as off runway, request permission and switch inlet 3-way to line purge
   UTC = 02:10:15
3) Note fridge temperature
   Fridge T = 1.4
4) Note cryo temperature
   Cryo = 16
5) Click Stop button
6) Close manual VAC valve
7) Close all 4 cal cylinder green valves
8) Close cylinder box lid
9) Wait 5 to 10 minutes after touchdown
10) Close Line Purge green valve and Line Purge on/off valve
11) Cylinder box Power breaker off
12) Pump box Pump 2 breaker off
13) Pump box Pump 1 breaker off
14) Pump box fridge breaker off
15) Pump box Power breaker off
16) Close program and Visual Basic
17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive
18) Shut down AO2 PC
19) Shut down laptop
20) After green "SP to Cell" light has gone out, O2 box Power breaker off
21) Rack power switch off
22) Pull trap, jumper quick-connects, and install stopper
23) Open trap and remove glass beads
NCAR Airborne Oxygen Instrument (AO2) Checklist V. 10.03.22

I. Preflight

A. Day(s) before flight

- Prepare trap with clean glass beads filled to 1 inch from bottom
- Install trap in dewar
- Turn on O$_2$ box, start program, and record pressures
  - PaWT 866 PaSP 793 PLi840 33.1 TMan 2.5 UTC = 12:55
- Crack and close green valves, then record cylinder pressures
  - LS 1230 HS 1149 LP 2000 UTC = 17:58
  - LT 340 WT 1105 CylT2 25
- Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)

B. 2-hours before take-off

- Rack power switch on
- O$_2$ box Power breaker on
- Laptop power on
- Pump box Power breaker on
- Pump box Fridge breaker on
- Load dry-ice in dewar to within 0.5 inches of lid UTC = 16:37
- Record hi-side cylinder pressures and changes overnight (P / $\Delta$)
  - LS 270 / +10 HS 170 / -25 LP 1950 / -10
  - LT 340 / 0 WT 140 / +35 CylT2 0 / 0 (once inst. on)
- Open green knobs four 1/4 turns and note any pressure changes (P / $\Delta$)
  - LS 170 / 0 HS 1123 / 0 LP 2000 / 17
  - LT 408 / +10 WT 140 / 0
- Close cylinder box lid
- Vac into into AO2 (192.168.84.138)
- Start AO2 program by clicking play in higold.vdp
- Ensure that no USB errors are present in boxes at bottom of screen
- Check that NTP time sync is working on AO2 and laptop, >5 min after first sync, record times
- AO2 PC Time 16:41:12, Rack laptop time 16:41:15 (±6 sec)
- Cylinder box Power breaker on
- Record instrument pressures and changes overnight (P / $\Delta$)
  - PaWT 866 / 0 PaSP 765 / -5 PLi840 33.1 / +20 TMan 25.5 / -1.5
- Pump box Pump 2 breaker on
- Manual VAC valve open
- Check that PaCO2 = 330 torr (±5) and PaO2 = 90 torr (±1). If not, adjust.
  - PaCO2 327 PaO2 92
- Click Initialize Cal Flow button
- Ensure that flow starts through both lines (110 ± 10)
  - FIWT (to cell) 109 FISP (to bypass) 104
21) Toggle changeover to check flows in other position
   FIWT (to bypass) 10.6 FISP (to cell) 10.5
22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm
23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr
24) Close cylinder box lid
25) Return to WT-selected when done checking regulators
26) Check that PaWT (±0.1), PaSP (±0.1), and PaO2 (±0.01) are controlling
27) Light lamp and ensure that it comes on
28) If necessary, adjust PaO2 to keep signal below 9.5 V O2 signal = 9.6
29) Open Line Purge cylinder green valve and Line Purge on/off valve
30) Ensure inlet 3-way valve to Line Purge cylinder
31) Click Initialize Sample Flow button
32) Pump box Pump 1 breaker on
33) Ensure that Fridge P stabilizes near 805 (±10) torr after 2 min.
   Fridge P 794 SA Purge Flow 117
34) Snoop trap fittings
35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPm</th>
<th>WTm</th>
<th>Totm</th>
<th>mA</th>
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<th>PdSPn</th>
<th>PdWTn</th>
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<td>0.3</td>
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<td>4.7</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

36) Enable changeover valve (uncheck disable)  
37) >= 10 min. after change-over enable, record values in table above  
38) Disable changeover  
39) If necessary, toggle changeover to get SP to Cell  
40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)  
2) Enable changeover (uncheck disable)  
3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)  
   Flag a Cal Interval 50 Cal Period 2.5 LTF 3 WFT 4
4) Click Start button on main screen  
5) Note fridge temperature  
6) Note cryo temperature  
7) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr  
8) Immediately before runway, switch 3-way valve to inlet UTC = 18:00:25 ~
9) Note time of wheels up  
10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings

2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings

3) On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down

2) As soon as off runway, request permission and switch inlet 3-way to line purge

3) Note fridge temperature

4) Note cryo temperature

5) Click Stop button

6) Close manual VAC valve

7) Close all 4 cal cylinder green valves

8) Close cylinder box lid

9) Wait 5 to 10 minutes after touchdown

10) Close Line Purge green valve and Line Purge on/off valve

11) Cylinder box Power breaker off

12) Pump box Pump 2 breaker off

13) Pump box Pump 1 breaker off

14) Pump box fridge breaker off

15) Pump box Power breaker off

16) Close program and Visual Basic

17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive

18) Shut down AO2 PC

19) Shut down laptop

20) After green “SP to Cell” light has gone out, O2 box Power breaker off

21) Rack power switch off

22) Pull trap, jumper quick-connects, and install stopper

23) Open trap and remove glass beads
Questions for Britt

What was image we sent at beginning of 2001?
NCAR Airborne Oxygen Instrument (AO2) Checklist  V. 10.03.22

I. Preflight

A. Day(s) before flight

1. Prepare trap with clean glass beads filled to 1 inch from bottom
2. Install trap in dewar
3. Turn on O₂ box, start program, and record pressures
   PaWT 3911 PaSP 740 PLi840 27.4 TMan 18.7 UTC = 23:39
4. Crack and close green valves, then record cylinder pressures
   LS 1230 HS 1400 LP 1900 (eq 1300 A) UTC = 23:43
   LT 390 WT 900 CylT2 15
5. Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)

B. 2-hours before take-off

1. Rack power switch on
2. O₂ box Power breaker on
3. Laptop power on
4. Pump box Power breaker on
5. Pump box Fridge breaker on
6. Load dry-ice in dewar to within 0.5 inches of lid
7. Record hi-side cylinder pressures and changes overnight (P / Δ)
   LS 1200 / +10 HS 1160 / -20 LP 950 / +50
   LT 390 / +10 WT 910 / -10 CylT2 (76) (once inst. on)
8. Open green knobs four ¼ turns and note any pressure changes (P / Δ)
   LS 1200 / +10 HS 1160 / +10 LP 950 / +50
   LT 390 / +10 WT 910 / +10
9. Close cylinder box lid
10. Vac into AO2 (192.168.84.138)
11. Start AO2 program by clicking play in higold.vdp
12. Ensure that no USB errors are present in boxes at bottom of screen
13. Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
   AO2 PC Time 18:34:30, Rack laptop time 18:34:32
14. Cylinder box Power breaker on
15. Record instrument pressures and changes overnight (P / Δ)
   PaWT 909 / +10 PaSP 758 / +10 PLi840 405 / +12 TMan 26.7 / +6.8
16. Pump box Pump 2 breaker on
17. Manual VAC valve open
18. Check that PaCO₂ = 330 torr (± 5) and PaO₂ = 90 torr (± 1). If not, adjust.
   PaCO₂ 324 PaO₂ 91
19. Click Initialize Cal Flow button
20. Ensure that flow starts through both lines (110 ± 10)
   FIWT (to cell) 12 FiSP (to bypass) 102
Date 00331  Campaign HIPP03  Flight RPO4  From PUKO  To NEAF

1700 2/23
1370 3/25
1105 3/27
900 3/30

21) Toggle changeover to check flows in other position
22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm
23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr
24) Close cylinder box lid
25) Return to WT selected when done checking regulators
26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling
27) Light lamp and ensure that it comes on
28) If necessary, adjust PdO2 to keep signal below 9.5 V O₂ signal = 9.0
29) Open Line Purge cylinder green valve and Line Purge on/off valve
30) Ensure inlet 3-way valve to Line Purge cylinder
31) Click Initialize Sample Flow button
32) Pump box Pump 1 breaker on
33) Ensure that Fridge P stabilizes near 805 (±10) torr after 2 min. Fridge P = 2.5
34) Snoop trap fittings
35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPn</th>
<th>WTm</th>
<th>Totm</th>
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<td>4.8</td>
<td>5.0</td>
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<tr>
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<td>2.5</td>
<td>±10</td>
<td>±10</td>
<td>±20</td>
<td>±0</td>
<td>0.2</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

36) Enable changeover valve (uncheck disable) UTC = 18:56
37) >= 10 min. after change-over enable, record values in table above
38) Disable changeover
39) If necessary, toggle changeover to get SP to Cell
40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)
2) Enable changeover (uncheck disable)
3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   Flag a  Cal Interval 50  Cal Period 2.5  LTF 3  WTf 4
4) Click Start button on main screen UTC = 19:40:35
5) Note fridge temperature Fridge T = 1.6
6) Note cryo temperature Cryo = 15 (bad sensors)
7) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr
8) Immediately before runway, switch 3-way valve to inlet UTC = 20:09:25
9) Note time of wheels up UTC = 20:09:40
10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYMMDMD_RF##_Notes.txt and add any action items to AO2_TODO_YYYMMDMD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings
   UTC (start) = 20:39:00 < 39:45
   2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings
      UTC (start) = __:__:
   3) On final descent, open Line Purge cylinder green valve and on/off valve
      01:51:30

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down
   UTC = 02:30:25

2) As soon as off runway, request permission and switch inlet 3-way to line purge
   Fridge T = 1.5
   Cryo = 15.7

3) Close cylinder box lid

4) Wait 5 to 10 minutes after touchdown

5) Close Line Purge green valve and Line Purge on/off valve

6) Cylinder box Power breaker off

7) Pump box Pump 2 breaker off

8) Pump box Pump 1 breaker off

9) Pump box fridge breaker off

10) Close program and Visual Basic

11) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive

12) Shut down AO2 PC

13) Shut down laptop

14) After green “SP to Cell” light has gone out, O2 box Power breaker off

15) Rack power switch off

16) Pull trap, jumper quick-connects, and install stopper

17) Open trap and remove glass beads
NCAR Airborne Oxygen Instrument (AO2) Checklist  V. 10.03.22

I. Preflight

A. Day(s) before flight

- Prepare trap with clean glass beads filled to 1 inch from bottom
- Install trap in dewar
- Turn on O₂ box, start program, and record pressures
  - PaWT 853 PaSP 763 PLi840 313 TMAn 23.8 UTC = 23:22
- Crack and close green valves, then record cylinder pressures
  - LS 230 HS 130 LP 1900 UTC = 23:22
  - LT 380 WT 740 CylT2 25
- Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)

B. 2-hours before take-off

- Rack power switch on
- O₂ box Power breaker on
- Laptop power on
- Pump box Power breaker on
- Pump box Fridge breaker on
- Load dry-ice in dewar to within 0.5 inches of lid
- Record hi-side cylinder pressures and changes overnight (P / Δ)
  - LS 1240 / +10 HS 1150 / +20 LP 1660
  - LT 390 / +10 WT 740 / +20 CylT2 ___ / ___ (once inst on)
- Open green knobs four ¼ turns and note any pressure changes (P / Δ)
  - LS 1240 / +20 HS 1150 / +20 LP 960 / +20
  - LT 390 / +20 WT 740 / +20
- Close cylinder box lid
- Vnc into into AO2 (192.168.84.138)
- Start AO2 program by clicking play in higold.vdp
- Ensure that no USB errors are present in boxes at bottom of screen
- Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
- AO2 PC Time 19.08.20, Rack laptop time 19:08:22
- Cylinder box Power breaker on
- Record instrument pressures and changes overnight (P / Δ)
  - PaWT 840 / +5 PaSP 773 / +10 PLi840 425 / +11 TMAn 26 / +2.4
- Pump box Pump 2 breaker on
- Manual VAC valve open
- Check that PaCO2 = 330 torr (± 5) and PaO2 = 90 torr (± 1). If not, adjust.
  - PaCO2 330 PaO2 92
- Click Initialize Cal Flow button
- Ensure that flow starts through both lines (110 ± 10)
  - FIWT (to cell) 110 FISP (to bypass) 106
21) Toggle changeover to check flows in other position
   FIWT (to bypass) \textcolor{red}{117} FLSP (to cell) \textcolor{red}{103}

\checkmark 22) If necessary, adjust HA-3 to match FIWT on bypass and cell to \pm 2 sccm

\checkmark 23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 \pm 5 torr

\checkmark 24) Close cylinder box lid

\checkmark 25) Return to WT selected when done checking regulators

\checkmark 26) Check that PdWT (\pm 0.1), PdSP (\pm 0.1), and PdO2 (\pm 0.01) are controlling

\checkmark 27) Light lamp and ensure that it comes on UTC = \textcolor{red}{21:48}

\checkmark 28) If necessary, adjust PaO2 to keep signal below 9.5 V O2 signal = \textcolor{red}{9.0}

\checkmark 29) Open Line Purge cylinder green valve and Line Purge on/off valve

\checkmark 30) Ensure inlet 3-way valve to Line Purge cylinder

\checkmark 31) Click Initialize Sample Flow button

\checkmark 32) Pump box Pump 1 breaker on Fridge T = \textcolor{red}{3.9}

\checkmark 33) Ensure that Fridge P stabilizes near 805 (\pm 10) torr after 2 min.

\checkmark 34) Snoop trap fittings

\checkmark 35) \geq 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPm</th>
<th>WTm</th>
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<td>\pm 10</td>
<td>0.2</td>
<td>5.0</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

\checkmark 36) Enable changeover valve (uncheck disable) UTC = \textcolor{red}{20:01}

\checkmark 37) \geq 10 min. after change-over enable, record values in table above

\checkmark 38) Disable changeover

\checkmark 39) If necessary, toggle changeover to get SP to Cell

\checkmark 40) Close WT 248 valve

C. 20-min before take-off

\checkmark 1) WT 248 valve to Auto (uncheck close)

\checkmark 2) Enable changeover (uncheck disable)

\checkmark 3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)

\checkmark 4) Click Start button on main screen UTC = \textcolor{red}{20:42:0}

\checkmark 5) Note fridge temperature

\checkmark 6) Note cryo temperature

\checkmark 7) Once on SA, check / adjust line purge regulator to PaSP of 785 \pm 5 torr

\checkmark 8) Immediately before runway, switch 3-way valve to inlet UTC = \textcolor{red}{21:03:20}

\checkmark 9) Note time of wheels up UTC = \textcolor{red}{21:07:03}

\checkmark 10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve

\textit{going to get a bit of dirty air - we've stopped}
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 21:45:30 \( \rightarrow 46:30 \) \( \alpha \)-OK!

2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = \_\_\_\_

3) On final descent, open Line Purge cylinder green valve and on/off valve UTC = 02:33

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down
2) As soon as off runway, request permission and switch inlet 3-way to line purge
3) Note fridge temperature
4) Note cryo temperature
5) Click Stop button
6) Close manual VAC valve
7) Close all 4 cal cylinder green valves
8) Close cylinder box lid
9) Wait 5 to 10 minutes after touchdown
10) Close Line Purge green valve and Line Purge on/off valve
11) Cylinder box Power breaker off
12) Pump box Pump 2 breaker off
13) Pump box Pump 1 breaker off
14) Pump box fridge breaker off
15) Pump-box Power breaker off
16) Close program and Visual Basic
17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive
18) Shut down AO2 PC
19) Shut down laptop
20) After green "SP to Cell" light has gone out, O₂ box Power breaker off
21) Rack power switch off
22) Pull trap, jumper quick-connects, and install stopper
23) Open trap and remove glass beads
NCAR Airborne Oxygen Instrument (AO2) Checklist  V. 10.04.04

I. Preflight

A. Day(s) before flight
   - 1) Prepare trap with clean glass beads filled to 1 inch from bottom
   - 2) Install trap in dewar
   - 3) Power O₂ box, Cylinder box, and laptop/vnc, start program, record pressures
     PaWT145 PaSP 747 PLi840 374 TMan 205 UTC 10:33
   - 4) Crack and close green valves, then record cylinder pressures
     LS 1200 HS 1100 LP 1825
     LT 350 WT 510 CyIT2 25.0
   - 5) Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)
   - 6) Stop program, close Visual Basic, shut down Windows, power down O₂ and Cylinder box, power down laptop and rack

B. 2-hours before take-off
   - 1) Rack power switch on
   - 2) O₂ box Power breaker on
   - 3) Laptop power on
   - 4) Pump box Power breaker on
   - 5) Load dry-ice in dewar to within 0.5 inches of lid
   - 6) Record hi-side cylinder pressures and changes overnight (P / Δ)
     LS 125 / HS 1077 / LP 1809
     LT 320 / WT 17 / CyIT2 / (once inst. on)
   - 7) Open green knobs four ¼ turns and note any pressure changes (P / Δ)
     LS 1200 / HS 1100 / LP 1825
     LT 350 / WT 2185
   - 8) Close cylinder box lid
   - 9) Vnc into into AO2 (192.168.84.138)
   - 10) Start AO2 program by clicking play in higold.vdp
   - 11) Ensure that no USB errors are present in boxes at bottom of screen
   - 12) Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
     AO2 PC Time 20:15:05, Rack laptop time 20:15:00
   - 13) Cylinder box Power breaker on
   - 14) Record instrument pressures and changes overnight (P / Δ)
     PaWT145 PaSP140 PLi84052 TMan 181
   - 15) Pump box Pump 2 breaker on
   - 16) Manual VAC valve open
   - 17) Check that PaCO₂ = 320 torr (± 5) and PaO₂ = 90 torr (± 1). If not, adjust.
     PaCO₂ 329 PaO₂ 90.7
   - 19) Click Initialize Cal Flow button
Date __________ Campaign __________ Flight ______ From ______ To ______

20) Ensure that flow starts through both lines (110 ± 10)
   FIWT (to cell) 103 FISP (to bypass) 93
   } ADJUST PARC
   FL UT 108
   FLSP 106

21) Toggle changeover to check flows in other position
   FIWT (to bypass) 102 FISP (to cell) 97

22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm
23) Check/adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr
24) Close cylinder box lid
25) Return to WT selected when done checking regulators
26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling
27) Light lamp and ensure that it comes on
   UTC = 9:42
   O2 signal = 0.06
28) If necessary, adjust PaO2 to keep signal below 9.5 V
29) Open Line Purge on/off valve
30) Ensure inlet 3-way valve to Line Purge cylinder
31) Click Initialize Sample Flow button
32) Pump box Pump 1 breaker on
33) Ensure that Fridge P stabilizes near 805 (±10) torr after 2 min.
   Fridge P 790 SA Purge Flow 115
34) Snoop trap fittings
35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>Spm</th>
<th>WTM</th>
<th>Totm</th>
<th>mAn</th>
<th>PdO2n</th>
<th>PdSPn</th>
<th>PdWTn</th>
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<td>21:07</td>
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<td>7.3</td>
<td>3.7</td>
<td>NA</td>
<td>NA</td>
<td>-0.5</td>
<td>NA</td>
<td>3.05</td>
<td>5.26</td>
<td>5.26</td>
</tr>
<tr>
<td>21:25</td>
<td>4.9</td>
<td>5.7</td>
<td>3.0</td>
<td>7.9</td>
<td>15</td>
<td>-1.6</td>
<td>22.4</td>
<td>.27</td>
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<tr>
<td></td>
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<td>2.5</td>
<td>±10</td>
<td>±10</td>
<td>±20</td>
<td>20</td>
<td>5.0</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

36) Enable changeover valve (uncheck disable)
37) >= 10 min. after change-over enable, record values in table above
38) Disable changeover
39) If necessary, toggle changeover to get SP to Cell
40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)
2) Enable changeover (uncheck disable)
3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   Flag a Cal Interval 50 Cal Period 2.5 LTF 3 WFT 4
4) Click Start button on main screen
5) Note fridge temperature
   Fridge T = 1.4
6) Note cryo temperature
   Cryo = 185 (sink)
7) Once on SA, check/adjust line purge regulator to PaSP of 785 +/- 5 torr
8) Immediately before runway, switch 3-way valve to inlet
   UTC = 22:08:59
9) Note time of wheels up
   UTC = 22:09:00
10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
11) Shut off for 02:13
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMMDD_RF###_Notes.txt and add any action items to AO2_TODO_YYYYMMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 23:54:38

2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 04:57:37

3) On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down

2) As soon as off runway, request permission and switch inlet 3-way to line purge

3) Note fridge temperature

4) Note cryo temperature

5) Click Stop button

6) Close manual VAC valve

7) Close all 4 cal cylinder green valves

8) Close cylinder box lid

9) Wait 5 to 10 minutes after touchdown

10) Close Line Purge green valve and Line Purge on/off valve

11) Cylinder box Power breaker off

12) Pump box Pump 2 breaker off

13) Pump box Pump 1 breaker off

14) Pump box fridge breaker off

15) Pump box Power breaker off

16) Close program and Visual Basic

17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive

18) Shut down AO2 PC

19) Shut down laptop

20) After green “SP to Cell” light has gone out, O2 box Power breaker off

21) Rack power switch off

22) Pull trap, jumper quick-connects, and install stopper

23) Open trap and remove glass beads

24) ftp YYMMDD*.mr, YYMMDD*.hr, and hgcyllog.txt to catalog.eol.ucar.edu (uname: hippo, pword, h!990, directory ao2raw)
NCAR Airborne Oxygen Instrument (AO2) Checklist

I. Preflight

A. Day(s) before flight
   1) Prepare trap with clean glass beads filled to 1 inch from bottom
   2) Install trap in dewar
   3) Power O₂ box, Cylinder box, and laptop/vnc, start program, record pressures
      PaWT 823 PaSP 120 PLi840 20 3 TMan 9.4 UTC = 9:07
   4) Crack and close green valves, then record cylinder pressures
      LS 10.40 HS 10.40 LP 17.00 UTC = 9:25
      LT 3.50 WT 17.00 CylT2 11.9
   5) Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)
   6) Stop program, close Visual Basic, shut down Windows, power down O₂ and Cylinder box, power down laptop and rack

B. 2-hours before take-off
   1) Rack power switch on
   2) O₂ box Power breaker on
   3) Laptop power on
   4) Pump box Power breaker on
   5) Pump box Fridge breaker on
   6) Load dry-ice in dewar to within 0.5 inches of lid UTC = 20:20
   7) Record hi-side cylinder pressures and changes overnight (P/Δ)
      LS 1.010 / +0 HS 0.1025 / -15 LP 1.700 / +0
      LT 3.500 / +0 WT 17.00 / +0 CylT2 12.7 / +.3 (once inst. on)
   8) Open green knobs four ¼ turns and note any pressure changes (P/Δ)
      LS 1.010 / +0 HS 0.1025 / +0 LP 17.00 / +0
   9) Close cylinder box lid
   10) Vnc into into AO2 (192.168.84.138)
   11) Start AO2 program by clicking play in higold.vdp
   12) Ensure that no USB errors are present in boxes at bottom of screen
   13) Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
      AO2 PC Time 20:06:35, Rack laptop time 20:06:05
   14) Cylinder box Power breaker on
   15) Record instrument pressures and changes overnight (P/Δ)
      PaWT 84.2 PaSP 5.9 +23 PLi840 60 4 +14.7 TMan 18.6 UTC = 8:06.
   16) Pump box Pump 2 breaker on
   17) Manual VAC valve open
   18) Check that PaCO₂ = 325 torr (± 5) and PaO₂ = 98 torr (± 1). If not, adjust.
      PaCO₂ 330 PaO₂ 98
   19) Click Initialize Cal Flow button

Notes

AO₂ crosscheck 180 cal after underway. Binned norm/also and relit camp

AO₂ Quiz 180 cal after underway. Binned norm/also and relit camp

Join #AO₂Meet
Press Ctrl. Set Points for Low Alts stop

controlling 40KFT

Date 100408 Campaign HIPPO3 Flight REP7 From NBOE To NJSTV

20) Ensure that flow starts through both lines (100 ± 10)
   FIWT (to cell) 160 FISP (to bypass) 95
   FIWT (to bypass) 160 FISP (to cell) 78

21) Toggle changeover to check flows in other position

22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm

23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr

24) Close cylinder box lid

25) Return to WT selected when done checking regulators

26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling

27) Light lamp and ensure that it comes on

28) If necessary, adjust PaO2 to keep signal below 9.5 V

29) Open Line Purge on/off valve

30) Ensure inlet 3-way valve to Line Purge cylinder

31) Click Initialize Sample Flow button

32) Pump box Pump 1 breaker on

33) Ensure that Fridge P stabilizes near 795 (± 10) torr after 2 min.

34) Snoop trap fittings

35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPn</th>
<th>WTm</th>
<th>Totm</th>
<th>mA</th>
<th>PdO2n</th>
<th>PdSPn</th>
<th>PdWTn</th>
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<td>1.0</td>
<td>1.75</td>
<td>11</td>
<td>-10</td>
<td>-5</td>
<td>21</td>
<td>26.9</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td>9.1</td>
</tr>
<tr>
<td>nominal vals</td>
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<td>2.5</td>
<td>±10</td>
<td>±10</td>
<td>±10</td>
<td>±20</td>
<td>0.2</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

36) Enable changeover valve (uncheck disable)

37) >= 10 min. after change-over enable, record values in table above

38) Disable changeover

39) If necessary, toggle changeover to get SP to Cell

40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)

2) Enable changeover (uncheck disable)

3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   - Flag 0 Cal Interval 50 Cal Period 7.5 LTF 7 WTf 4
   - UTC = 21:34

4) Click Start button on main screen
   - UTC = 21:34
   - Fridge T = 7.9
   - Cryo = 0.67 1 (Ice)

5) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr

6) Immediately before runway, switch 3-way valve to inlet
   - UTC = 22:04:46

7) Note time of wheels up
   - UTC = 22:04:58

8) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust calcs.

Record flight notes in text file AO2_YYYMMDD_RF##.Notes.txt and add any action items to AO2_TODO_YYYMMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 02:34:00
2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 03:07:30
3) On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping calcs at same altitude on the way up and down above 29 kft, and avoiding any calcs on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down UTC = 04:46
2) As soon as off runway, request permission and switch inlet 3-way to line purge Fridge T = 1.15
3) Note fridge temperature Cryo = 10F
4) Note cryo temperature
5) Click Stop button
6) Close manual VAC valve
7) Close all 4 cal cylinder green valves
8) Close cylinder box lid
9) Wait 5 to 10 minutes after touchdown
10) Close Line Purge green valve and Line Purge on/off valve
11) Cylinder box Power breaker off
12) Pump box Pump 2 breaker off
13) Pump box Pump 1 breaker off
14) Pump box fridge breaker off
15) Pump box Power breaker off
16) Close program and Visual Basic
17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive
18) Shut down AO2 PC
19) Shut down laptop
20) After green “SP to Cell” light has gone out, O2 box Power breaker off
21) Rack power switch off
22) Pull trap, jumper quick-connects, and install stopper
23) Open trap and remove glass beads
24) ftp YYYMMDD*.mr, YYYMMDD*.hr, and hgcylog.txt to catalog.eol.ucar.edu (uname: hippo, pword, hl99o, directory ao2raw)
NCAR Airborne Oxygen Instrument (AO2) Checklist

I. Preflight

A. Day(s) before flight

1) Prepare trap with clean glass beads filled to 1 inch from bottom
   Trap Letters Top/Bottom = A/P

2) Install trap in dewar

3) Power O₃ box, Cylinder box, and laptop/vnc, start program, record pressures
   PaWT 888, PaSP 768, PLi840 57, TMan 26.5
   UTC = 01:00

4) Crack and close green valves, then record cylinder pressures
   LS 1100, HS 1025, LP 1590, 1260
   UTC = 1:23

5) Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)

6) Stop program, close Visual Basic, shut down Windows, power down O₂ and Cylinder box, power down laptop and rack

B. 2-hours before take-off

1) Rack power switch on

2) O₂ box Power breaker on

3) Laptop power on

4) Pump box Power breaker on

5) Pump box Fridge breaker on

6) Load dry-ice in dewar to within 0.5 inches of lid
   UTC = 19:21

7) Record hi-side cylinder pressures and changes overnight (P/Δ)
   LS 1150, HS 1100, LP 1750
   LT 350, WT 1600, CyLT2 23 (once inst. on)

8) Open green knobs four ¼ turns and note any pressure changes (P/Δ)
   LS 1150, HS 1100, LP 1750
   LT 350, WT 1600

9) Close cylinder box lid

10) Vac into into AO2 (192.168.84.138)

11) Start AO2 program by clicking play in higold.vdp

12) Ensure that no USB errors are present in boxes at bottom of screen

13) Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times

AO2 PC Time 19:46:30, Rack laptop time 19:46:49

14) Cylinder box Power breaker on

15) Record instrument pressures and changes overnight (P/Δ)
   PaWT 888, PaSP 768
   PLi840 57, TMan 26.5

16) Pump box Pump 2 breaker on

17) Manual VAC valve open

18) Check that PaCO₂ = 315 torr (± 5) and PaO₂ = 98 torr (± 1). If not, adjust.
   PaCO₂ 324, PaO₂ 98

19) Click Initialize Cal Flow button
20) Ensure that flow starts through both lines (100 ± 10)
   FIWT (to cell) 112 FISP (to bypass) 104
21) Toggle changeover to check flows in other position
   FIWT (to bypass) 113 FISP (to cell) 103
22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm
23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr
24) Close cylinder box lid
25) Return to WT selected when done checking regulators
26) Check that PaWT (±0.1), PaSp (±0.1), and PaO2 (±0.01) are controlling
27) Light lamp and ensure that it comes on
28) If necessary, adjust PaO2 to keep signal below 9.5 V
29) Open Line Purge on/off valve
30) Ensure inlet 3-way valve to Line Purge cylinder
31) Click Initialize Sample Flow button
32) Pump box Pump 1 breaker on
33) Ensure that Fridge P stabilizes near 795 ±10 torr after 2 min.
   Fridge P, SA Purge Flow
34) Snoop trap fittings
35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d (%)</th>
<th>CO2n (%)</th>
<th>O2n (%)</th>
<th>Spm</th>
<th>Wtm</th>
<th>Totm</th>
<th>mAh</th>
<th>PaO2n</th>
<th>PaSPn</th>
<th>PaWTn</th>
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<td>4.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal</td>
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<td>±10</td>
<td>±10</td>
<td>±20</td>
<td>0.2</td>
<td>5.0</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

UTC = 20:03

36) Enable changeover valve (uncheck disable)
37) >= 10 min. after change-over enable, record values in table above
38) Disable changeover
39) If necessary, toggle changeover to get SP to Cell
40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)
2) Enable changeover (uncheck disable)
3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   Flag a Cal Interval 50 Cal Period 2.5 LTF 2.5 TWF a
4) Click Start button on main screen
5) Note fringe temperature
6) Note cryo temperature
7) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr
8) Immediately before runway, switch 3-way valve to inlet
   UTC = 20:05
9) Note time of wheels up
   UTC = 20:07
10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 21:39  
2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 21:17:10  
3) On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down UTC = ___:___:___
2) As soon as off runway, request permission and switch inlet 3-way to line purge Fridge T = ___
3) Note fridge temperature Cryo = ___
4) Note cryo temperature
5) Click Stop button
6) Close manual VAC valve
7) Close all 4 cal cylinder green valves
8) Close cylinder box lid
9) Wait 5 to 10 minutes after touchdown
10) Close Line Purge green valve and Line Purge on/off valve
11) Cylinder box Power breaker off
12) Pump box Pump 2 breaker off
13) Pump box Pump 1 breaker off
14) Pump box fridge breaker off
15) Pump box Power breaker off
16) Close program and Visual Basic
17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive
18) Shut down AO2 PC
19) Shut down laptop
20) After green “SP to Cell” light has gone out, O2 box Power breaker off
21) Rack power switch off
22) Pull trap, jumper quick-connects, and install stopper
23) Open trap and remove glass beads
24) ftp YMMDD*.mr, YMMDD*.hr, and hgeycallog.txt to catalog.eol.ucar.edu (uname: hippo, pword: h1990, directory ao2raw)

Note:

News from drinking our A02 02:50 ~ 03:20
A02 went into oxygen at 02:30
Cold water do not flow after
NCAR Airborne Oxygen Instrument (AO2) Checklist

I. Preflight

A. Day(s) before flight

1) Prepare trap with clean glass beads filled to 1 inch from bottom
2) Install trap in dewar
   Trap Letters Top/Bottom = __________
3) Power O₂ box, Cylinder box, and laptop/vnc, start program, record pressures
   PaWT 85 PaSP 85 PLi840 36 TMan 26 UTC = 20:05
4) Crack and close green valves, then record cylinder pressures
   LS 1125 HS 1050 LP 1752 UTC = 20:10
   LT 350 WT 1450 CyIT2 241.9
5) Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)
6) Stop program, close Visual Basic, shut down Windows, power down O₂ and Cylinder box, power down laptop and rack

B. 2-hours before take-off

1) Rack power switch on
2) O₂ box Power breaker on
3) Laptop power on
4) Pump box Power breaker on
5) Pump box Fridge breaker on
6) Load dry-ice in dewar to within 0.5 inches of lid UTC = 18:15
7) Record hi-side cylinder pressures and changes overnight (P / Δ)
   LS 1101 HS 1051 LP 1750
   LT 335 WT 1450 CyIT2 ______ ______ (once inst. on)
8) Open green knobs four ¼ turns and note any pressure changes (P / Δ)
   LS 1125 HS 1050 LP 1750
   LT 362 WT 1450

9) Close cylinder box lid
10) Vnc into into AO2 (192.168.84.138)
11) Start AO2 program by clicking play in higold.vdp
12) Ensure that no USB errors are present in boxes at bottom of screen
13) Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
   AO2 PC Time : __ : __, Rack laptop time __ : __ : 
14) Cylinder box Power breaker on
15) Record instrument pressures and changes overnight (P / Δ)
   PaWT 827 PaSP 102 PLi840 40 TMan 240
16) Pump box Pump 2 breaker on
17) Manual VAC valve open
18) Check that PaCO₂ = 325 torr (± 5) and PaO₂ = 98 torr (± 1). If not, adjust.
   PaCO₂ 327 PaO₂ 99
19) Click Initialize Cal Flow button
L20) Ensure that flow starts through both lines (100 ± 10)
   FIWT (to cell) 1/1
   FIWT (to bypass) 1/0
   FISP (to cell) 1/0
   FISP (to bypass) 1/0

L21) Toggle changeover to check flows in other position
   FIWT (to bypass) 1/0
   FISP (to cell) 1/0

L22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 scm

L23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 ±/− 5 torr

L24) Close cylinder box lid

L25) Return to WT selected when done checking regulators

L26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling

L27) Light lamp and ensure that it comes on

L28) If necessary, adjust PaO2 to keep signal below 9.5 V

L29) Open Line Purge on/off valve

L30) Ensure inlet 3-way valve to Line Purge cylinder

L31) Click Initialize Sample Flow button

L32) Pump box Pump 1 breaker on

L33) Ensure that Fridge P stabilizes near 795 (±10) torr after 2 min.

L34) Snoop trap fittings

L35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPm</th>
<th>WTm</th>
<th>Ttotm</th>
<th>mA</th>
<th>PdO2n</th>
<th>PdSPn</th>
<th>PdWTn</th>
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<tbody>
<tr>
<td>18:32</td>
<td>NA</td>
<td>1.72</td>
<td>NA</td>
<td>13.6</td>
<td>NA</td>
<td>0.53</td>
<td>4.4</td>
<td>5.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18:50</td>
<td>0.6</td>
<td>2.6</td>
<td>1.2</td>
<td>19</td>
<td>-7.6</td>
<td>28.6</td>
<td>-8.4</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nominal vals</td>
<td>450</td>
<td>0.7</td>
<td>2.5</td>
<td>±10</td>
<td>±10</td>
<td>±10</td>
<td>±20</td>
<td>0.2</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

L36) Enable changeover valve (uncheck disable)

L37) >= 10 min. after change-over enable, record values in table above

L38) Disable changeover

L39) If necessary, toggle changeover to get SP to Cell

L40) Close WT 248 valve

C. 20-min before take-off

L41) WT 248 valve to Auto (uncheck close)

L42) Enable changeover (uncheck disable)

L43) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)

L44) Click Start button on main screen

L45) Note fridge temperature

L46) Note cryo temperature

L47) Once on SA, check / adjust line purge regulator to PaSP of 785 ±/− 5 torr

L48) Immediately before runway, switch 3-way valve to inlet

L49) Note time of wheels up

L50) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYMMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYMMDD_GV.doc

1. At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings

2. At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings

3. On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

Postflight

1. Note time of wheels down

2. As soon as off runway, request permission and switch inlet 3-way to line purge

3. Note fridge temperature

4. Note cryo temperature

5. Click Stop button

6. Close manual VAC valve

7. Close all 4 cal cylinder green valves

8. Close cylinder box lid

9. Wait 5 to 10 minutes after touchdown

10. Close Line Purge green valve and Line Purge on/off valve

11. Cylinder box Power breaker off

12. Pump box Pump 2 breaker off

13. Pump box Pump 1 breaker off

14. Pump box fridge breaker off

15. Pump box Power breaker off

16. Close program and Visual Basic

17. Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive

18. Shut down AO2 PC

19. Shut down laptop

20. After green "SP to Cell" light has gone out, O₂ box Power breaker off

21. Rack power switch off

22. Pull trap, jumper quick-connects, and install stopper

23. Open trap and remove glass beads

24. ftp YYYMMDD*.mr, YYYMMDD*.hr, and hgcyllog.txt to catalog.eol.ucar.edu (uname: hippo, pword, h199o, directory ao2raw)
NCAR Airborne Oxygen Instrument (AO2) Checklist

I. Preflight

A. Day(s) before flight

1. Prepare trap with clean glass beads filled to 1 inch from bottom
2. Install trap in dewar
3. Power O₂ box, Cylinder box, and laptop/vnc, start program, record pressures
   PaWT 830 PaSP 137 PLi840 12 TMan 2c UTC = 21:38
4. Crack and close green valves, then record cylinder pressures
   LS 1275 HS 1000 LP 1350 UTC = 21:38
   LT 325 WT 125 CyIT2 2.4
5. Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)
6. Stop program, close Visual Basic, shut down Windows, power down O₂ and Cylinder box, power down laptop and rack

B. 2-hours before take-off

1. Rack power switch on
2. O₂ box Power breaker on
3. Laptop power on
4. Pump box Power breaker on
5. Pump box Fridge breaker on

6. Load dry-ice in dewar to within 0.5 inches of lid UTC = 14:10
7. Record hi-side cylinder pressures and changes overnight (P / Δ)
   LS 1100 HS 1010 LP 1300
   LT 325 WT 1100 CyIT2 2.5 (once inst. on)
8. Open green knobs four ¼ turns and note any pressure changes (P / Δ)
   LS 1100 HS 1085 LP 1350/50
   LT 325 WT 1150/50
9. Close cylinder box lid
10. Vnc into into AO2 (192.168.84.138)
11. Start AO2 program by clicking play in bigold.vdp
12. Ensure that no USB errors are present in boxes at bottom of screen
13. Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
   AO2 PC Time: 2e:50, Rack laptop time: 4:30:50
14. Cylinder box Power breaker on
15. Record instrument pressures and changes overnight (P / Δ)
   PaWT 927 PaSP 720 PLi840 3 TMan 2j
16. Pump box Pump 2 breaker on
17. Manual VAC valve open
18. Check that PaCO₂ = 315 torr (± 5) and PaO₂ = 98 torr (± 1). If not, adjust.
   PaCO₂ 324 PaO₂ 94
19. Click Initialize Cal Flow button
20) Ensure that flow starts through both lines (100 ± 10)
   FIWT (to cell) 100  FISP (to bypass) 100
21) Toggle changeover to check flows in other position
   FIWT (to bypass) 100  FISP (to cell)
22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm
23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 +/- 5 torr
24) Close cylinder box lid
25) Return to WT selected when done checking regulators
26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling
   Light lamp and ensure that it comes on
   UTC = 16:38
27) If necessary, adjust PaO2 to keep signal below 9.5 V  O2 signal = 7.0 ?
28) Open Line Purge on/off valve
29) Ensure inlet 3-way valve to Line Purge cylinder
30) Click Initialize Sample Flow button
31) Pump box Pump 1 breaker on  Fridge T = 4.01
32) Ensure that Fridge P stabilizes near 795 (±10) torr after 2 min.
   Fridge P = 797 SA Purge Flow 101
33) Snoop trap fittings
34) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPn</th>
<th>WTM</th>
<th>Totm</th>
<th>mA</th>
<th>PdO2n</th>
<th>PdSPn</th>
<th>PdWTn</th>
</tr>
</thead>
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<tr>
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<td>NA</td>
<td>-24</td>
<td>2.2</td>
<td>14</td>
<td>-3</td>
<td>6.5</td>
<td>18.6</td>
<td>51</td>
<td>3.4</td>
<td>9.5</td>
</tr>
</tbody>
</table>

nominal vals 450 0.7 2.5 ±10 ±10 ±10 ±20 0.2 5.0 5.0

35) Enable changeover valve (uncheck disable)  UTC = 16:48
36) >= 10 min. after change-over enable, record values in table above
37) Disable changeover
38) If necessary, toggle changeover to get SP to Cell
39) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)
2) Enable changeover (uncheck disable)
3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   Flag a  Cal Interval 50  Cal Period 2.5  LTF 7  WTM 4
4) Click Start button on main screen  UTC = 19:38:10
5) Note fridge temperature  Fridge T = 4.1
6) Note cryo temperature  Cryo = 41
7) Once on SA, check / adjust line purge regulator to PaSP of 785 +/- 5 torr
8) Immediately before runway, switch 3-way valve to inlet UTC = 19:40:10
9) Note time of wheels up  UTC = 19:42:32
10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

- Keep VNC off as much as possible, only connecting when necessary to adjust cals.
- Record flight notes in text file AO2_YYYYMMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMMDD_GV.doc

1. At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = 19:10:00
2. At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = __:__:
3. On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1. Note time of wheels down
2. As soon as off runway, request permission and switch inlet 3-way to line purge
3. Note fridge temperature
4. Note cryo temperature
5. Click Stop button
6. Close manual VAC valve
7. Close all 4 cal cylinder green valves
8. Close cylinder box lid
9. Wait 5 to 10 minutes after touchdown
10. Close Line Purge green valve and Line Purge on/off valve
11. Cylinder box Power breaker off
12. Pump box Pump 2 breaker off
13. Pump box Pump 1 breaker off...
14. Pump box fridge breaker off
15. Pump box Power breaker off
16. Close program and Visual Basic
17. Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive
18. Shut down AO2 PC
19. Shut down laptop
20. After green "SP to Cell" light has gone out, O2 box Power breaker off
21. Rack power switch off
22. Pull trap, jumper quick-connects, and install stopper
23. Open trap and remove glass beads
24. ftp YYYYMMDD*.mr, YYYYMMDD*.hr, and hgcyllog.txt to catalog.sol.ucar.edu (uname: hippo, pword, h!99o, directory ao2raw)
NCAR Airborne Oxygen Instrument (AO2) Checklist  V. 10.04.07

I. Preflight

A. Day(s) before flight

1) Prepare trap with clean glass beads filled to 1 inch from bottom
2) Install trap in dewar Trap Letters Top/Bottom = H / D
3) Power O₂ box, Cylinder box, and laptop/vnc, start program, record pressures PaWT ___ PaSP ___ PLi840 ___ TMan ___ UTC = ___ ___
4) Crack and close green valves, then record cylinder pressures
   LS 1625 HS 975 LP ___ UTC = ___ ___
   LT 300 WT 900 CylT2 ___
5) Log each hi-side cylinder pressure in software (pressures must be logged at least once between flights)
6) Stop program, close Visual Basic, shut down Windows, power down O₂ and Cylinder box, power down laptop and rack

B. 2-hours before take-off

Instrument Operator: Sherrif

1) Rack power switch on
2) O₂ box Power breaker on
3) Laptop power on
4) Pump box Power breaker on
5) Pump box Fridge breaker on
6) Load dry-ice in dewar to within 0.5 inches of lid UTC = 16:30
7) Record hi-side cylinder pressures and changes overnight (P / Δ)
   LS 1080 / HS 1000 / LP 1600 / LT 300 / WT 900 / CylT2 ___ / ___ (once inst. on)
8) Open green knobs four ¼ turns and note any pressure changes (P / Δ)
   LS 1080 / HS 1000 / LP 1600 / LT 300 / WT 900 /
9) Close cylinder box lid
10) Vnc into into AO2 (192.168.84.138)
11) Start AO2 program by clicking play in bigold.vdp
12) Ensure that no USB errors are present in boxes at bottom of screen
13) Check that NTP time sync is working on AO2 and laptop, >5-min after first sync, record times
   AO2 PC Time: 16:43 51, Rack laptop time: 16:43 51
14) Cylinder box Power breaker on
15) Record instrument pressures and changes overnight (P / Δ)
   PaWT 641 / PaSP 80 / PLi840 31 / TMan 21 /
16) Pump box Pump 2 breaker on
17) Manual VAC valve open
18) Check that PaCO₂ = 325 torr (± 5) and PaO₂ = 98 torr (± 1). If not, adjust.
   PaCO₂ 325 PaO₂ 97
19) Click Initialize Cal Flow button
Date 16 NOV 10 Campaign RF 11

20) Ensure that flow starts through both lines (100 ± 10) 
   FIWT (to cell) 100
   FISP (to bypass) 100

21) Toggle changeover to check flows in other position 
   FIWT (to bypass) 100
   FISP (to cell) 100

22) If necessary, adjust HA-3 to match FIWT on bypass and cell to ±2 sccm

23) Check / adjust regulator pressures for all 4 gases to PaSP of 785 ± 5 torr

24) Close cylinder box lid

25) Return to WT selected when done checking regulators

26) Check that PdWT (±0.1), PdSP (±0.1), and PdO2 (±0.01) are controlling

27) Light lamp and ensure that it comes on 
   UTC = 16:20

28) If necessary, adjust PaO2 to keep signal below 9.5 V
   O2 signal = 7.1

29) Open Line Purge on/off valve

30) Ensure inlet 3-way valve to Line Purge cylinder

31) Click Initialize Sample Flow button

32) Pump box Pump 1 breaker on 
   Fridge T = 9.6

33) Ensure that Fridge P stabilizes near 795 (±10) torr after 2 min. 
   Fridge P = 790 SA Purge Flow 100

34) Snoop trap fittings

35) >= 10 min. after lamp on record values in first row of table below

<table>
<thead>
<tr>
<th>UTC</th>
<th>O2d</th>
<th>CO2n</th>
<th>O2n</th>
<th>SPn</th>
<th>WmTm</th>
<th>Totm</th>
<th>mA</th>
<th>PdO2n</th>
<th>PdSPn</th>
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<td>16:58:15</td>
<td>1.5</td>
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<td>-2.5</td>
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<td>-2.6</td>
<td>3.3</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

nominal vals: 450, 0.7, 2.5, ±10, ±10, ±20, 0.2, 5.0, 5.0

36) Enable changeover valve (uncheck disable) 
   UTC = 16:46

37) >= 10 min. after change-over enable, record values in table above

38) Disable changeover

39) If necessary, toggle changeover to get SP to Cell

40) Close WT 248 valve

C. 20-min before take-off

1) WT 248 valve to Auto (uncheck close)

2) Enable changeover (uncheck disable)

3) Adjust / record program parameters (nominally set to a, 50, 2.5, 3, 4)
   Flag 50 Cal Interval 2.5 Cal Period 2.5 LTF 3 WFT 4

4) Click Start button on main screen 
   UTC = 17:36:20

5) Note fridge temperature 
   Fridge T = 7.4

6) Note cryo temperature 
   Cryo = 12.1C

7) Once on SA, check / adjust line purge regulator to PaSP of 785 ± 5 torr

8) Immediately before runway, switch 3-way valve to inlet UTC = 17:55:15

9) Note time of wheels up 
   UTC = 17:55:32

10) Close Inlet Purge cylinder green valve and Inlet Purge on/off valve
II. During Flight

Keep VNC off as much as possible, only connecting when necessary to adjust cals.

Record flight notes in text file AO2_YYYYMDD_RF##_Notes.txt and add any action items to AO2_TODO_YYYYMDD_GV.doc

1) At high point of first ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = __:__:

2) At high point of last ascent, while sampling air, conduct 30-second breath test on inlet fittings UTC (start) = __:__:

3) On final descent, open Line Purge cylinder green valve and on/off valve

Adjust cal schedule as necessary with a goal of sampling at least some portion of every level low and high leg, avoiding overlapping cals at same altitude on the way up and down above 29 kft, and avoiding any cals on northernmost and southernmost profile (keeping in mind 45 second inlet delay):

III. Postflight

1) Note time of wheels down UTC = 02:59

2) As soon as off runway, request permission and switch inlet 3-way to line purge Fridge T = 6.5

3) Note fridge temperature Cryo = 28

4) Note cryo temperature

5) Click Stop button

6) Close manual VAC valve

7) Close all 4 cal cylinder green valves

8) Close cylinder box lid

9) Wait 5 to 10 minutes after touchdown

10) Close Line Purge green valve and Line Purge on/off valve

11) Cylinder box Power breaker off

12) Pump box Pump 2 breaker off

13) Pump box Pump 1 breaker off

14) Pump box fridge breaker off

15) Pump box Power breaker off

16) Close program and Visual Basic

17) Copy data (*.mr, *.hr, *.txt) to laptop and then data and notes, etc. to pen drive

18) Shut down AO2 PC

19) Shut down laptop

20) After green "SP to Cell" light has gone out, O2 box Power breaker off

21) Rack power switch off

22) Pull trap, jumper quick-connects, and install stopper

23) Open trap and remove glass beads

24) ftp YYYYMDD*.mr, YYYYMDD*.hr, and hgcyllog.txt to catalog.eol.ucar.edu (uname: hippo, pword, h1990, directory ao2raw)