BOREALIS WEATHER CHECK
AND
FLIGHT PREDICTIONS

Flight Number BOR______________  Flight Date ___/___/___

By: ___________________________  Date: ______________  Time: _____________ hrs. Zulu

Launch Site: ________________  High Altitude Wind Direction:_______

High Altitude Wind Speed: ______________________kts

Launch Site Forecast:
Temp: _________ °F  High/Low: _________/________ °F
Winds: ___/_____ mph  Clouds: __________________

Balloon Flight:
Rise Rate: ________________ ft/min
Burst Altitude: ________________ ft
Descent Rate: ________________ ft/min

Landings Site Bearing: ________________ degrees

Latitude: ________________ degrees
Longitude: ________________ degrees

Estimated Flight Duration: ________________ minutes

Landing Site Range: ________________ miles

Landing Site Forecast:
Temp: _________ °F  High/Low: _________/________ °F
Winds: ___/_____ mph  Clouds: __________________

Landing Site Estimated Terrain:
______________________________________________________________________________
_________________________________________________________________

Predicted Roads: _____________________________________________________________
__________________________________________________________________________
BOREALIS FLIGHT ACTUAL

Flight Number BOR____________

By: ____________________________ Date: ____________________________

Launch Site Conditions:
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Balloon Flight:

Rise Rate (average): ________________ ft/min
Burst Altitude (Last GPS coordinate): ________________ ft
Descent Rate (average): ________________ ft/min

Landings Site Bearing: ________________ degrees

  Latitude: ________________ degrees
  Longitude: ________________ degrees

Estimated Flight Duration: ________________ minutes

Landing Site Range: ________________ miles

Landing Site Weather Conditions:
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Landing Site Terrain:
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
BOREALIS NOTAM FILING SHEET  Flight Number BOR___________

NOTAM Filing Date  ___/___/___

“Hi Ball” (High Altitude Balloon)

“Under 12 lbs.”

Launch Location  _________________________

(Coordinates if not an airport)  __________ Latitude  __________ Longitude

Flight Date  ___/___/___

Launch Time (Zulu)  __________ hrs. Zulu

Flight Duration (hrs.)  __________ hrs.

Estimated Landing Time (Zulu)  __________ hrs. Zulu

Estimated Maximum Altitude  __________ ft.

Estimated Direction of Travel  __________

Estimated Landing Distance  __________ miles

Contact Name  _________________________

Contact Phone Number  _________________________

Filer Name  _________________________

Filer Phone Number  _________________________

Special Directions From Air Traffic Control:
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

NOTAM Confirm #:  _________________________
BOREALIS AIR TRAFFIC CONTROL
CONTACT SHEET AND DIRECTIONS

Contact Phone Numbers:

<table>
<thead>
<tr>
<th>NOTAM:</th>
<th>Great Falls Flight Service</th>
<th>800-437-1629</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt Lake City Air Control: (Regional Airspace Control)</td>
<td>801-320-2560</td>
<td></td>
</tr>
<tr>
<td>Doug Ferguson (Manager): Big Timber Airport</td>
<td>406-932-4389</td>
<td></td>
</tr>
<tr>
<td>Home Number</td>
<td>406-932-4025</td>
<td></td>
</tr>
<tr>
<td>Will Morris (Manager): Harlowton Airstrip</td>
<td>406-632-4545</td>
<td></td>
</tr>
<tr>
<td>Control Tower Billings: (Airspace Contact)</td>
<td>406-245-9271</td>
<td></td>
</tr>
<tr>
<td>Helena Regional Airport</td>
<td>406-442-2821</td>
<td></td>
</tr>
<tr>
<td>Great Falls International Airport</td>
<td>406-727-3404</td>
<td></td>
</tr>
<tr>
<td>Missoula International Airport</td>
<td>406-728-4381</td>
<td></td>
</tr>
<tr>
<td>Miles City Airport</td>
<td>406-232-1021</td>
<td></td>
</tr>
</tbody>
</table>

Launch Day Procedures For Contacting FAA Controllers:

___ 1. Call Local ATC If any changes to plan filed with NOTAM.

___ 2. Call Local ATC immediately after launch.
   *Inform of successful launch or if mission is scrubbed.

___ 3. Call Local ATC at Burst.
   *Give location relative to Local Control Tower at Airport.
   *Give Altitude of Burst.

___ 4. Call Local ATC if still in their airspace at 13000ft.
   *Depending on the familiarity of the controllers, they may call you first
   *Give location relative to Local Control Tower at Airport.
   *Make sure they have contact phone number.
   *May call for continuous updates until landing.

___ 5. Call Local ATC upon GPS indicated landing.
   *Inform ATC the payloads have landed.
   *Give location relative to Local Control Tower at Airport.
   *Thank the ATC controllers for their assistance.
BOREALIS Flight Director Checklist
Flight Number BOR____________

Preflight Planning

___Weather Checks Completed
___Balloon Track Prediction Okay
___Launch Site Confirmed
___Vehicle Rental
___Chase Team Personnel Totals
___Gas Cylinder Transport Arranged
___NOTAM Filed

Preflight Systems

___Gas Fill Team
    ___Balloon Available
    ___Full Helium Cylinders***QTY___
    ___Equipment Ready
    ___Flight Crew Available

___Imaging/Cameras
    ___Cameras Functioning
    ___Film/Memory Available
    ___ALL Batteries Charged
    ___Flight Crew Available

___Communications
    ___Radios Functioning
    ___Laptop Functioning
    ___Batteries Charged
    ___Power System Ready
    ___Flight Crew Available

___Tower/Hardware
    ___All Flight Boxes in Good Condition
    ___Connection Hardware in Good Condition
    ___Tower in Good Condition
    ___Flight Crew Available

___Payload
    ___Experiment in Working Order
    ___Experiment Data Collection Working
    ___Flight Crew Available

___CPU

    ___CPU Functioning Properly
    ___Data Collection Stream Resolved
    ___Flight Crew Available

___Mission Approval From Project Director
Gas and Balloon Checklist – ver. 1.02, 6/1/01

1. Before Leaving
   a. Stack and Parachute weight: ___________________ lbs
   b. Desired Lift (a + 2lbs): ____________________ lbs
   c. Check gas level in cylinders to be used.
   d. Place equipment in Transport Automobile.
      i. Ground Cloth
      ii. Weights for ground cloth
      iii. Handling gloves
      iv. Kneepads
      v. Gas
      vi. Regulator
      vii. Hose and Filler Assembly
      viii. Fish scale
      ix. Safety Goggles
      x. Tool Kit
      xi. Balloon

2. At Launch Site
   a. Place Ground Cloth on ground with no sharp objects (weight down corners and put down knee pads).
   b. Attach regulator to cylinder #1.
   c. Make sure regulator output closed (full CCW).
   d. Note Initial pressure of Cylinder #1: _______________ psi
   e. Put on handling gloves.
   f. Place balloon on Ground Cloth, inspect for damages.
   g. Tape Lift Gauge loop to Filler Assembly.
   h. Place balloon Nozzle over Filler Assembly.
   i. Clamp or Tape balloon Nozzle onto Filler Assembly.
   j. One person should be holding the balloon Nozzle, one person operating the regulator, one – two people guarding the balloon.
k. Begin inflation (use regulator to begin slowly and increase fill rate as balloon takes shape).
l. When cylinder #1 reaches ~100 psi close regulator output.
m. Record cylinder #1 pressure: _____________ psi
n. Pinch off balloon Nozzle.
o. Shut off cylinder #1 valve.
p. Move regulator to cylinder #2.
q. Open cylinder #2 valve.
r. Record cylinder #2 initial pressure: _______________ psi
s. Open Regulator.
t. Release Pinch on balloon nozzle, continue inflation.
u. When appropriate connect fish scale to loop.
v. Carefully let go of balloon nozzle while someone holds fish scale.
w. Take several readings and roughly average in your head.
x. When desired lift achieved, close regulator.
y. Record final pressure of cylinder #2: _____________ psi
z. Close cylinder.

aa. Optional, throw catch over top of Balloon for security.
bb. Tape load loop to balloon Nozzle with small piece of tape.
cc. Pinch off balloon Nozzle.

dd. Twist balloon Nozzle

e. Duct Tape balloon Nozzle.

3. Notify Launch Tower Team that you are ready for connection to payload.
Power/Communications Pre-Flight Checklist

__C) Connect flight GPS antenna to GPS unit (before power-up)

__C) Connect flight GPS to flight TH-D7
    P) Connect battery pack to comm. board

__P) Connect battery pack to camera/timer supply
    C) Connect flight TH-D7 to flight antenna

__C) Power on both flight and ground TH-D7
    P) Power on Camera (camera switch)

__C) Set flight TH-D7 to communicate with flight GPS
    P) Shut off camera flash with menu

__C) Set flight TH-D7 to transmit APRS on 144.390 MHz (beacon mode)
    P) Start shut-off timer count

__C) Turn off flight TH-D7 auto shut-off (menu 1-2-2)
    P) Strap camera down

__C) Check for reception of APRS packets with ground TH-D7
    P) Verify other scientific payload power up

__C) Confirm APRS packet GPS coordinate functioning properly with on site handheld GPS

__C) Lockout keypad on flight TH-D7 (hold “f” key for 1 second)

__C) Secure TH-D7 with Velcro straps (2)

__P) Attach camera module

__P) Verify camera module secure

__C) Ensure GPS antennae is secure on inside panel

__C) Fill capsule with Styrofoam peanuts

__C) Place lid on capsule and place GPS antenna in pouch

__C) Close and secure Nylon casing

__C) Perform second check of APRS on TH-D7

__P&C) Inform flight of “Launch Ready Hold”
__P) Switch camera to picture mode once every 4 minutes (switch on outside panel)

__P) Stand by until FLIGHT confirms ready for launch

__P) Start camera picture cadence (switch)

__P) Stand by for first picture

__P&C) Crew move to “non-interfering positions”

__C) Final check for reception of APRS packets

__P&C) Inform FLIGHT “Go for Launch”

__P) Team lead assist in tower separation

__C) Start logging APRS packets on laptop
Checklist for Cosmic Ray Monitoring on a BOREALIS flight:

Terms:
- HP 200LX: The small blue-gray palm PC
- RM-70: Small beige box with a geiger counter mounted on the top
- RM-70 to 200LX cable: Short black cable with a phone connector on one end and special 200LX connector on the other.
- 200LX to PC cable: Long black cable with a special 200LX connector on one end and serial connector on the other.

At least one week before launch: (for first time users)

☐ Acquaint yourself with the monitoring software on the HP 200LX and BOREALIS Lab PC by using the commands listed under “Near launch time.”
☐ Acquaint yourself with the format of the ASCII files output by the monitoring software. A sample output file is attached along with instructions on how to read it.
☐ Write some code that will read the ASCII files and make a few plots. You may need help with this.
☐ Practice transferring files back and forth between the 200LX and BOREALIS Lab PC by using the commands listed under “Within a few days after launch.”
☐ Make sure that you have an account on a public computer somewhere that you can FTP files to. If you are affiliated with the Physics department, speak to Jeremy Gay (jgay@physics.montana.edu) if you aren’t sure.
☐ Buy two AA batteries or find two UNUSED AA batteries.
☐ Buy/find a usable chemical hand warmer pack.

At least one day before launch:

☐ Grab the gray foam pad labeled “7” from the BOREALIS lab (it will be somewhere near the BOREALIS launch tower) and place zip ties into the correct holes to secure the 200LX, RM-70, and RM-70 to 200LX cable. You can tie down the RM-70 and cable, but don’t tie down the 200LX right away. Use the attached diagram as a guide. You may have to use several zip ties for one loop.

At least a few hours before launch (at MSU):

☐ Place the chemical hand warmer pack, foam pad, 200LX, RM-70 and RM-70 to 200LX cable in one of the payload modules and assist the BOREALIS crew with a mass measurement.
Near launch time (at launch site):

- Replace the batteries in the 200LX with the two new batteries you purchased/acquired a week ago or so.
- Connect the 200LX to the RM70.
- Turn on the 200LX. If a DOS prompt shows up, ignore the next six steps.
- If an appointment book announcement pops up, press ENTER to say OK.
- Press the blue &... (MORE) key.
- Press the dark blue MENU key.
- Press ENTER to open the Application menu.
- Type t to Terminate All
- Press ENTER to say OK
- After the DOS prompt comes up, change your directory to C:\AWARE. Help on a few basic DOS commands is attached.
- Type aw-srad and press ENTER to launch the radiation monitoring software.
- Arrow over to Capture and press ENTER.
- Press ENTER again to select Display Current Input.
- Specify the file name. It should follow the form: C:\AWARE\MM-DD-YY.dat, where MM-DD-YY is the current month, day and year. Press ENTER to confirm.
- In the message box, type the number of the current balloon flight. It should follow the form: Data for balloon flight BORYYMMF, where YYMMF stands for year, month, and flight number (A, B, C, etc.). Press ENTER to confirm.
- Make sure that the data logger is taking data from the RM-70 every ten seconds. If not, start over and try again.
- Close the viewscreen on the 200LX; the data logger will continue to run even with the viewscreen closed.
- Firmly secure the 200LX using the zip ties you’ve already placed in the foam pad.
- Place the foam pad with its secured components into the payload module. Cover the equipment with a layer of peanuts and place the activated chemical hand warmer on top. (If the hand warmer isn’t too hot, the layer of peanuts isn’t necessary.) Fill the remaining space with packing peanuts. Secure the payload module with the assistance of tower.
- Inform flight that you are ready.
Immediately after retrieval:

☐ Open the payload module and get out the foam pad with attached components.
☐ Cut the zip-ties holding the LX200 and open the viewscreen.
☐ If the viewscreen is so cold that it appears black, gently and SLOWLY warm the 200LX until the screen clears.
☐ Press ESC, then press F2 to terminate data taking.
☐ Press ESC to exit the Capture Data window.
☐ Arrow over to Quit, press ENTER. Select YES to confirm.

Within a few days after launch:

☐ Cut all the zip-ties on the foam pad and retrieve the equipment. Return equipment to appropriate locations.
☐ Connect the 200LX to BOREALIS Lab PC using the 200LX to PC cable.
☐ On the 200LX, press the button with a file folder symbol on it, labeled FILER. This button will not work if you are in DOS mode. To exit DOS mode, type 200 at the DOS prompt and press ENTER.
☐ Go to BOREALIS Lab PC and open a DOS prompt (a quick-launch button is set up next to the start button on the start bar).
☐ In DOS, change your directory to C:\cpack200.
☐ Type app200 to launch the file transfer program.
☐ Press the Enter key to select FILER.
☐ Press F7 to split the screen.
☐ Press F6 to connect to the 200LX.
☐ In the remote connection screen, use the up and down arrows and the Enter key to change your directory to C:\AWARE on the 200LX. In the local connection screen, use the up and down arrows and the Enter key to change your directory to C:\AWARE on the BOREALIS Lab PC.
☐ In the remote connection screen, select the data file you took by pressing the space bar once the file is highlighted.
☐ Press F3 to move the selected file from the remote (200LX) to local (BOREALIS Lab PC) computer.
☐ Once the file transfer process is complete, press F10 to disconnect the BOREALIS Lab PC from the 200LX.
☐ Press Alt to open the Menu Bar, press ENTER to open File, type x to exit the FILER.
☐ Press Alt to open the Menu Bar, press Enter to open Application, type x to exit the file transfer software.
☐ Disconnect the 200LX and BOREALIS Lab PC, turn off the 200LX.
☐ At the DOS prompt on BOREALIS Lab PC, go to the C:\Aware directory.
☐ Type aw-srad.
☐ Press Enter to open the Display window.
☐ Arrow down to Make ASCII Spreadsheet File and press Enter.
☐ Select your data file and press Enter.
☐ Select Yes to include the data bar.
☐ Enter 1 for the horizontal time compress.
☐ Select Straight Value Points for the Point Display String.
☐ Select No to not add the date and time after every data point.
☐ Tell the software where to put the text file. It should follow the form: C:\Aware\MM-DD-YY.txt, where MM-DD-YY is the date on which you took the data.
☐ Select No to not add an Output File to the bottom.
☐ Select No to not include the Initialization String.
☐ Press Esc to exit the Display window.
☐ Arrow over to Quit, press Enter, select YES.
☐ Exit from the DOS prompt by typing exit at the DOS prompt or by clicking on the X button in the upper right corner of the window.
☐ In Windows, open WS-FTP to transfer files from the BOREALIS Lab PC to the public computer that you have file space on. There is a quick-start button for WS-FTP next to the start button on the start bar.
☐ Change the profile name to your last name, type the name of the server you wish to connect to and click on OK. At the prompts, enter your User ID and password.
☐ Transfer the data and text files to your account on the public computer. You may need help with this.
☐ Delete all data and text files that YOU made on both the 200LX and the BOREALIS Lab PC. You can do it in the 200LX in the filer and on the PC in Windows Explorer. You may need help with this.
☐ Run your programs on the text file you made and make a few plots.
Launch Tower Operations Checklist
Ver1.02, 6/6/01

☐ Locate launch tower on level surface and secure with sand bag
☐ Layout balloon filling station approximately 15 feet or 5 paces away from the launch tower
☐ Connect extension arm to launch tower
☐ Check status of lines connecting the two capsules. Connected? _________ Frayed? __________
☐ Connect antenna and assure antenna is safely tucked into tower (between sides), where no one will step on it.
☐ Connect shroud ring to capsules
☐ Layout parachute and separate lines, then connect lines to shroud ring
☐ Place ring on extension arm and raise it up
☐ Give go to Payload and Communication Teams
☐ Connect parachute to line separator
☐ Lightly attach line separator to ground using a stake
☐ Thread lanyards through the line separator
☐ Connect balloon line to the line separator
☐ Place construction tape along lines so people are more likely to see them on the ground
☐ Wait for go ahead from Flight Commander
☐ Connect to balloon
☐ Obtain four people as lanyard operators
☐ Balloon is now allowed to rise
☐ Activate sonic beacon
☐ Release retaining clips from launch tower
☐ Pull payload free from launch tower
☐ Wait for release command from Flight Commander
☐ RELEASE PAYLOAD when balloon is directly overhead and pulling on the payload