Flight No.: B496
Date: 12/1/10
Take Off: 12:56:03Z
Landing: 15:19:26Z
Flight Time: 2h 23m 23s

Campaign: CONSTRAIN
Operating Area: North Atlantic

<table>
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<tr>
<th>POB Position</th>
<th>Name</th>
<th>Institute</th>
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<tr>
<td>1</td>
<td>Captain</td>
<td>Alan Roberts</td>
</tr>
<tr>
<td>2</td>
<td>Co</td>
<td>Ian Ramsay-Rae</td>
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<tr>
<td>3</td>
<td>CCM</td>
<td>Dawn Quinn</td>
</tr>
<tr>
<td>4</td>
<td>Mission Scientist</td>
<td>Paul Field</td>
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<tr>
<td>5</td>
<td>Flight Manager</td>
<td>Alan Woolley</td>
</tr>
<tr>
<td>6</td>
<td>Core Chemistry / AVAPS</td>
<td>Doug Anderson</td>
</tr>
<tr>
<td>7</td>
<td>Core Chemistry / AVAPS training</td>
<td>Angela Dean</td>
</tr>
<tr>
<td>8</td>
<td>Cloud Physics</td>
<td>Martyn Pickering</td>
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<tr>
<td>9</td>
<td>SID 2</td>
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<tr>
<td>10</td>
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<td>Paul Barratt</td>
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<tr>
<td>13</td>
<td>Aries</td>
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<td>14</td>
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<td>15</td>
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</tr>
<tr>
<td>16</td>
<td>Manchester Cloud</td>
<td>James Dorsey</td>
</tr>
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</table>

Log Sheet included
- Flight Folder Front Page
- Flight Summary
- Met Office 0600 UTC Actual Surface analysis (ASXX) chart
- Track Plot (GIN or GPS)
- DFLFliteStar planned track
- Brief
- Mission Scientist 1’s logs
- Mission Scientist 2’s logs
- De-brief
- ViRC chat log
- Flight Manager’s Instrument Status log
- Flight Manager’s Faults/Incidents log
- Pre-flighter log
- Core Chemistry / NOx / TDLAS
- Cloud Physics In Flight
- Cloud Physics Processing
- AVAPS
- PSAP log
- Filters
- Printed Plots
- Screengrabs
- Planning charts or plots
- Images Emailed To BAe146 In Flight

<table>
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<th>Date</th>
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B496 Sortie Brief CONSTRAIN

Snow diffusional growth, aggregation and sedimentation in Cirrus uncinus.

Weather  Ahead of warm frontal region. The air must have high ice supersaturation so that the fallstreaks are persistent.

Sortie location  North west approaches.

Timings

Pre-flight Brief 09:00
Take off: 11:00
Land: 15:30

Sortie summary

Perform a Langrangian descent, drifting with the horizontal wind to repeatedly sample Cirrus uncinus. Descend until snow evaporates. Dropsondes launched before and after the Langrangian descent to determine the thermodynamic structure. The aircraft should not be contrailing during the descent.

Sortie detail

1. Take off 11.00am
2. Transit to operating area, FL200 30-40mins
3. Sample any Mid level Cloud
4. Locating run: Identify Cirrus uncinus generating region
5. Climb above Cirrus Uncinus, or as high as possible within cloud
6. Dropsonde run: Perform straight and level run orientated with mean wind direction,
7. Cloud penetration runs: Perform a descending Langrangian descent, drifting with the horizontal wind to repeatedly sample Cirrus uncinus. The flight path is a race-track where the fallstreak is sampled during one straight. The aircraft descends during the other straight, not during the turns.(Timing look-up table required.) Drift with wind
8. Climb to top and repeat

Instrument requirements
• Lidar operated to identify cloud top height. No varying integration time or changing the display. Lidar reports cloud top height during dropsonde run.
• FWVS must be operated continuously with constant flow rate. The total condensed water content will be small.
• CVI operated continuously in Counter-Flow mode. No varying cut-size or changing to aerosol mode except for the Loiter run which is in aerosol mode.
• Nevzorov zeroed once only when at high level early in flight.
• Cloud physics to report when ice particles are no longer observed during cloud penetrating runs.

Crew List

1. Captain - Al Roberts (Directflight)
2. Co-pilot - Ian Ramsay-Rae (Directflight)
3. CCM - Dawn Quinn (Directflight)
4. Mission Scientist - Paul Field (Met Office)
5. Flight Manager - Alan Woolley (FAAM)
6. Cloud Physics - Martyn Pickering (Met Office)
7. Core Chemistry / AVAPS training - Angela Dean (FAAM)
8. AVAPS - Doug Anderson (FAAM)
9. ARIES - Clare Lee (Met Office)
10. SID - Richard Greenaway (tbc) (University of Hertfordshire)
11. Manchester Cloud - James Dorsey (University of Manchester)
12. CVI - Paul Barrett (Met Office)
13. CVI training - Kirsty McBeath (Met Office)
14. Mission Scientist 2 - Richard Cotton (Met Office)
15. Mini-LIDAR Dave Pollard (Met Office)
16. Mini-LIDAR (Training) – Franco Marenco (Met Office)
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<td><strong>TAKE OFF</strong></td>
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<td>13 03</td>
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<td>13 32</td>
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<td><strong>JUST IN CLEAR P 270/44</strong></td>
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<td>No Bottom of Clouds</td>
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<td>Can still see Sun</td>
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<td>-47°C</td>
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<td>Right turn</td>
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<td>Smoke appears 3000 ft</td>
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<td>Of Cloud above</td>
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<td>Cloud thickening in this area</td>
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<td>2000 ft of CI from fan</td>
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**Mission Scientist’s Log**

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Remarks:
- P 3.3
- 80 Knots
- B/C Visibility
- 6000 P 3.3
- Run 6
- In Clear Air
- Fogs Movement 20°C
- Height of Tires 60
- Clear Below 6/8 Sc to Sea
- 7/8 Ci Airless
- Landon
- Navigating Easy Because of A/C Fusion
## Pre-Flighter's Log

**Date:** 2023-10-01  
**Flight No.:** B 436  
**Pre-Flighter:** STEVE COWAN

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<td>Enter cyl content press</td>
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<td>Core Chemistry</td>
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<td>Cabin</td>
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<td>7</td>
<td>Alt CorCon</td>
<td>All reqd CBs made</td>
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<td>HORACE</td>
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<td>13</td>
<td>Satcom H</td>
<td>Power LED ON</td>
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<td>Nezvoro</td>
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<td>Cameras Pictures</td>
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<td>FWVS</td>
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<td>Deiced Rosemount</td>
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<td>TWC</td>
<td>Fitted &amp; signals checked</td>
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<td>21</td>
<td>GE</td>
<td>Balance checked then back to DP</td>
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<td>23</td>
<td>Satcom C</td>
<td>Checked</td>
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<td>24</td>
<td>Miss. Sol Laptop</td>
<td>Checked Onboard</td>
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<td>25</td>
<td>CNC</td>
<td>Butanol filled</td>
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<td>26</td>
<td>Dry Neph</td>
<td>Power up &amp; Zero Cal</td>
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<tr>
<td>27</td>
<td>PSAP</td>
<td>Pre-flight log actions complete</td>
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<td>28</td>
<td>CGPS</td>
<td>CBs and PC ON</td>
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<tr>
<td>29</td>
<td>3786 CPC</td>
<td>DI Checked / Topped up</td>
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<td>CCN Water</td>
<td>Supply filled / Drain empty</td>
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<td>31</td>
<td>CCN SS cols A &amp; B</td>
<td>Set to manual A0.2, B0.1</td>
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<td>CCN Pressure</td>
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<td>CCN Flow Rates</td>
<td>A &amp; B = 10 ± 0.3</td>
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<td>3786 CPC</td>
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<td>36</td>
<td>Core Chemistry</td>
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### External Checks

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<td>JW</td>
<td>Cleaned &amp; Checked</td>
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<tr>
<td>39</td>
<td>DI Rosemount</td>
<td>Cleaned &amp; Checked</td>
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<td>40</td>
<td>NDI Rosemount</td>
<td>Cleaned &amp; Checked</td>
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<td>41</td>
<td>Nevzorov</td>
<td>Cleaned/windings checked</td>
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<td>42</td>
<td>GE</td>
<td>Cleaned &amp; Checked</td>
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<td>43</td>
<td>Lower BBRs</td>
<td>Domes cleaned/checked</td>
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<td>WAS Bottles</td>
<td>No. fitted and position.</td>
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<td>Camera Windows</td>
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<td>46</td>
<td>Heimann</td>
<td>Lens checked OK</td>
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<td>TWC Cover</td>
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<td>All other covers</td>
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<td>Tools</td>
<td>Check ALL in Toolkit</td>
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<tr>
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### Avalon Checks

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<th>Location</th>
<th>Action</th>
<th>Comments</th>
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<tbody>
<tr>
<td>52</td>
<td>Upper BBRs</td>
<td>Checked &amp; Cleaned</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>ICEX applied</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Turb Probe - Traps emptied, detail contents -a)</td>
<td>Nil b)</td>
<td>1-2 drops c)</td>
</tr>
</tbody>
</table>

Pre-Flighters Log v1.7.xls

---

**Signed:***

Pre-Flighters Log v1.7.xls
## FLIGHT SUMMARY

Flight No B496  
Date: 12/1/10  
Project: CONSTRAIN  
Location: Prestwick

<table>
<thead>
<tr>
<th>Start Time</th>
<th>End Time</th>
<th>Event</th>
<th>Height (s)</th>
<th>Hdg</th>
<th>Comments</th>
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<tbody>
<tr>
<td>124549</td>
<td>124855</td>
<td>Start-Up</td>
<td>0.24 kft</td>
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<td>prestwick</td>
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<td>125603</td>
<td>taxi</td>
<td>0.23 kft</td>
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<tr>
<td>125603</td>
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<td>asp open</td>
<td>0.24 kft</td>
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<td>131707</td>
<td>132756</td>
<td>T/O</td>
<td>0.22 kft</td>
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<td>132846</td>
<td></td>
<td>mpds lost</td>
<td>24.6 kft</td>
<td>326</td>
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<td>133638</td>
<td>134205</td>
<td>Run 2.1</td>
<td>29.1 - 29.0 kft</td>
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<td>133654</td>
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<td>Sonde 1</td>
<td>29.0 kft</td>
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<td>134436</td>
<td>134941</td>
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<td>29.0 kft</td>
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<td>135151</td>
<td>135710</td>
<td>Profile 3.1</td>
<td>29.1 - 26.6 kft</td>
<td>282</td>
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<td>135933</td>
<td>140437</td>
<td>Run 3.2</td>
<td>26.5 kft</td>
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<td>140709</td>
<td>141231</td>
<td>Profile 3.2</td>
<td>26.6 - 24.0 kft</td>
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<td>141446</td>
<td>141948</td>
<td>Run 3.3</td>
<td>24.0 kft</td>
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<td>142045</td>
<td>142238</td>
<td>Profile 3.3</td>
<td>23.9 - 23.0 kft</td>
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<td>142242</td>
<td>145456</td>
<td>Run 4</td>
<td>23.0 kft</td>
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<tr>
<td>151926</td>
<td></td>
<td>Land</td>
<td>0.30 kft</td>
<td>117</td>
<td>Prestwick</td>
</tr>
</tbody>
</table>


CONSTRAIN
Snow diffusional growth, aggregation and sedimentation in cirrus uncinus.

This was the first flight of the campaign and also served as a shakedown flight for the campaign. As far as the instrumentation is concerned the flight was successful. Unfortunately several aircraft problems meant that the sortie was curtailed.

Take off at 1255 was followed by a climb up to 24 kft. The first run was started close to cloud base at 1317 (R1.1) with 8/8 Ci above and 4/8 Sc below. This run ended at 1327.

Wave clouds were observed during the climb out over the Western Isles.

We then climbed through the cloud to 29kft and dropped a sonde at 1336.

A 5 minute run was carried out at 29kft (-47C, R2.1).

The orientation for the Lagrangian descending racetrack was along a heading of 290 degrees and three 5 minute straight and level legs (R3.1, R3.2, R3.3) and three 5 minute profiles (500 ft/min) (P3.1, P3.2, P3.3) were carried out drifting with the wind. The three levels of the descent were 29kft (-47C), 26.5 kft (-41C) and 24 kft (-36C). During the descent the sun was visible through the cloud and we were close to cloud base. The lidar reported up to 3000 ft of Ci below the aircraft at the western end of the pattern but nothing at the eastern end. The time range of the Lagrangian descent was 1344-1419.

We may have descended too rapidly for crystals of the size observed (less than 1 mm). It may be better to space the levels by 2000ft and perform a 5 min profile at 400 ft/min.

Because of aircraft faults we had to curtail the sortie and return to Prestwick. To complete the science flight a profile from 24kft to 23 kft was performed (P3.3) before a final run at 23kft was started at 1422.

The aircraft landed at 1521.

Paul Field.
**Faults / Incidents Log**

**Flight No. B496**  
**Date: 12 Jan 10**

**Instruments**

1. Nevz TWC no cal data for Deep-cup vane  
2. No Network available at aft core rack laptops/printer  
3. Cables missing from Manchester Cloud rack, no heater operating on CPI  
4. Buck intermittent data – connection problem??  
5. 

**Aircraft**

1. No Training net  
2. No Intercom service down port side  
3. No power in galley  
4. Possible fuel leak noticed as clear fluid seen at oat -30c running over windows at aft of aircraft on rhs.

**Satcom**  
MPDS –  
Satcom H –

**Post Flight - Turb Probe Water Traps**

1. Indicate Amount of Water:  a) Nil  b) 1-2 drops  c) ¼ full or more  d) Ice present  
2. Emptied by:  
3. Dried by:
<table>
<thead>
<tr>
<th>GMT</th>
<th>Sonde No.</th>
<th>Event</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:36:42</td>
<td>1</td>
<td>Launch</td>
<td>314.10 -47.60 92.43 201.60 13.10 1.30 -8.402200 58.340000 8855.60</td>
</tr>
<tr>
<td>13:47:12</td>
<td>1</td>
<td>Splashdown</td>
<td>1003.78 5.98 72.58 84 99.25 17.28 -10.86 -8.513579 58.429297 200.69</td>
</tr>
</tbody>
</table>

Surface alt unknown NOT ticked
Please log fluorescence cell temperature and pressure immediately following calibration. During warm cabin flights, temperature can reach 40°C. During flight levels >FL020, cell pressure will drop (down to 5.9 at FL030).

<table>
<thead>
<tr>
<th>Time</th>
<th>Flight level</th>
<th>Sensitivity (Hz/ppbv)</th>
<th>Background Count (Hz)</th>
<th>Cell Pressure (Torr)</th>
<th>Lamp Temp (°C)</th>
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<tbody>
<tr>
<td>Previous Flight</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>12:58:46</td>
<td>Pre-Flight/Gnd</td>
<td>64.10</td>
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<tr>
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<td>FL221</td>
<td>64.905</td>
<td>34587.20</td>
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<td>15:00:51</td>
<td>FL230</td>
<td>65.594</td>
<td>34455.07</td>
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</tbody>
</table>

Pre-Flight & In-Flight comments/faults report

CO Zero - 12:30:05 - 12:40:10

| CO Monitor averaged zero (either in Hz or ppbv) | 0.4 |
| NOx monitor averaged zero (ppbv)               | 1.15|
| Ozone Monitor averaged zero (ppbv)             | -0.3|

CO Calibrations on automatic repeat? : NO

End pressures:
CO2/AR 160 bar
N2 88 bar
<table>
<thead>
<tr>
<th>DRS time</th>
<th>Flt ptn</th>
<th>Scans</th>
<th>View</th>
<th>Shtr</th>
<th>HBB</th>
<th>CBB</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>12:50:48</td>
<td>transit</td>
<td>closed</td>
<td>710.0</td>
<td>30.9</td>
<td></td>
<td></td>
<td>CAMAR NZ 30s</td>
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<tr>
<td>13:00:59</td>
<td></td>
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<td>open</td>
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<td>30s CH, 30s N, 30s Z</td>
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<tr>
<td>13:16:39</td>
<td>transit slow profile</td>
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<td>60.9</td>
<td>30.6</td>
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<td>CAMAR NZ 30s, bit of twilight due to pilot's 15' chat.</td>
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<tr>
<td>13:17:15</td>
<td>R 1</td>
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<td>2jet continued into n. FL260</td>
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<td>13:31:12</td>
<td>P 8</td>
<td>open</td>
<td>60.9</td>
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<td>CAMAR NZ 30s. in ascent.</td>
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<tr>
<td>13:42:44</td>
<td>Slew turn to right</td>
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<td>FL200 on have script.</td>
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<td>descent</td>
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<td>End P.</td>
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<td>416.8</td>
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<td>14:41:58</td>
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Scans: either "[IGMs]x[co-adds]", or "[stop DRS time]" if in start/stop, or "[macro name]". View: mirror angle.
Range: 320
Tilt: +0.00
Gain: Min
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Dataset 1 (LP708-1 Card #0)

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Gain: Min
Stand-by
Range: 320
Tilt: +0.00
Gain: Min
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WX
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WEATHER
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Dataset1 (LP708-1 Card #0)

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Dataset1 (LP708-1 Card #0)

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