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*A Project*

Prepared by Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Checked by Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Approved by Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

, Student Manager 2010

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# Testing Details

|  |  |  |  |
| --- | --- | --- | --- |
| Date  27/07/2010 | | Flight Number  01 | |
| Location  Level 11, S Block, QUT | | Season Start Time  1504 | |
| Total Flight Time  20 Minutes | | Season End Time  1630 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.2V | Initial  12.4V | Final  10.5V |
| Initial  12.4V | Final  10.3V | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  2 | | Total Cycles  1 | |
| Repairs  No repairs required | | | |
| Comments  RC test carried out successfully | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  04/08/2010 | | Flight Number  02 | |
| Location  Level 11, S Block, QUT | | Season Start Time  1215 | |
| Total Flight Time  60 Minutes | | Season End Time  1730 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.1V | Initial  12.4V | Final  10.6V |
| Initial  12.4V | Final  10.4V | Initial  12.4V | Final  10.4V |
| Initial  12.4V | Final  10.3V | Initial  12.4V | Final  10.4V |
| Initial  12.4V | Final  10.5V | Initial  12.4V | Final  10.5V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  4 | | Total Cycles  4 | |
| Repairs  No repairs required | | | |
| Comments  Initial gain tuning carried out. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  13/08/2010 | | Flight Number  03 | |
| Location  Level 11, S Block, QUT | | Season Start Time  1344 | |
| Total Flight Time  40 Minutes | | Season End Time  1730 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.2V | Initial  12.4V | Final  10.3V |
| Initial  12.4V | Final  10.2V | Initial  12.4V | Final  10.1V |
| Initial  12.4V | Final  10.4V | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  3 | | Total Cycles  2 | |
| Repairs  No repairs required | | | |
| Comments  Further gain tuning carried out. Stable flight not reached. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  20/08/2010 | | Flight Number  04 | |
| Location  Level 11, S Block, QUT | | Season Start Time  1211 | |
| Total Flight Time  35 Minutes | | Season End Time  1704 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.0V | Initial  12.4V | Final  10.7V |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.6V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  2 | | Total Cycles  2 | |
| Repairs  No repairs required | | | |
| Comments  Further gain tuning carried out. Stable flight not reached, bungee cord adds too much oscillation into system. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  27/08/2010 | | Flight Number  05 | |
| Location  Level 11, S Block, QUT | | Season Start Time  1301 | |
| Total Flight Time  25 Minutes | | Season End Time  1514 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.9V |
| Initial  12.4V | Final  10.6V | Initial  12.4V | Final  10.8V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  2 | | Total Cycles  2 | |
| Repairs  No repairs required | | | |
| Comments  Further gain tuning carried out. Tests carried out in test rig. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  03/09/2010 | | Flight Number  06 | |
| Location  Level 11, S Block, QUT | | Season Start Time  1211 | |
| Total Flight Time  40 Minutes | | Season End Time  1618 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.9V |
| Initial  12.4V | Final  10.6V | Initial  12.4V | Final  10.8V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  10.7V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  3 | | Total Cycles  3 | |
| Repairs  Acrylic centre plates swapped for fibreglass plates. | | | |
| Comments  Further gain tuning carried out. Test rig sustained damage. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  08/09/2010 | | Flight Number  07 | |
| Location  ARCAA | | Season Start Time  1412 | |
| Total Flight Time  30 Minutes | | Season End Time  1708 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.9V |
| Initial  12.4V | Final  10.6V | Initial  12.4V | Final  10.8V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  2 | | Total Cycles  2 | |
| Repairs  No repairs required | | | |
| Comments  Initial Vicon test. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  10/09/2010 | | Flight Number  08 | |
| Location  ARCAA | | Season Start Time  1130 | |
| Total Flight Time  70 Minutes | | Season End Time  1714 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.9V |
| Initial  12.4V | Final  10.6V | Initial  12.4V | Final  10.8V |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.6V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  11.1V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  4 | | Total Cycles  4 | |
| Repairs  Electronics tray cracked and requires replacing | | | |
| Comments  Further Vicon testing. Vicon doesn’t provide attitude information in body frame. Altitude hold achieved. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  15/09/2010 | | Flight Number  09 | |
| Location  ARCAA | | Season Start Time  1408 | |
| Total Flight Time  40 Minutes | | Season End Time  1700 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.7V | Initial  12.4V | Final  10.8V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  10.5V |
| Initial  12.4V | Final  10.6V | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  3 | | Total Cycles  2 | |
| Repairs  No repairs required | | | |
| Comments  Attitude information read from Vicon. Further altitude test carried out. Attitude hold not successful. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  17/09/2010 | | Flight Number  10 | |
| Location  Michael Hamilton’s House | | Season Start Time  1225 | |
| Total Flight Time  50 Minutes | | Season End Time  1823 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.7V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  10.5V |
| Initial  12.4V | Final  10.6V | Initial  12.4V | Final  10.4V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  3 | | Total Cycles  3 | |
| Repairs  Electronics tray cracked and required repair. | | | |
| Comments  Partial attitude hold achieved. Behaviour still very slow and unpredictable. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  22/09/2010 | | Flight Number  11 | |
| Location  Michael Hamilton’s House | | Season Start Time  1223 | |
| Total Flight Time  20 Minutes | | Season End Time  1712 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.7V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  10.5V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  2 | | Total Cycles  2 | |
| Repairs  No repairs required. | | | |
| Comments  Further gain tuning on attitude gains | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  24/09/2010 | | Flight Number  12 | |
| Location  Michael Hamilton’s House | | Season Start Time  1238 | |
| Total Flight Time  30 Minutes | | Season End Time  1806 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.7V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  10.5V |
| Initial  12.4V | Final  10.6V | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  3 | | Total Cycles  2 | |
| Repairs  No repairs required. | | | |
| Comments  Attitude hold not working, need to try new approach. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  08/10/2010 | | Flight Number  13 | |
| Location  Tim’s House | | Season Start Time  1155 | |
| Total Flight Time  30 Minutes | | Season End Time  1816 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.7V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  10.5V |
| Initial  12.4V | Final  10.6V | Initial  12.4V | Final  11.0V |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  3 | | Total Cycles  3 | |
| Repairs  No repairs required. | | | |
| Comments  Attitude results more promising, need ot further tune gains. | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Date  08/10/2010 | | Flight Number  14 | |
| Location  Tim’s House | | Season Start Time  1158 | |
| Total Flight Time  40 Minutes | | Season End Time  1902 | |
| **Battery 1 Voltage** | | **Battery 2 Voltage** | |
| Initial  12.4V | Final  10.8V | Initial  12.4V | Final  10.7V |
| Initial  12.4V | Final  10.9V | Initial  12.4V | Final  10.5V |
| Initial  12.4V | Final  10.6V | Initial  12.4V | Final  11.0V |
| Initial  12.4V | Final  10.8V | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Initial | Final | Initial | Final |
| Total Cycles  4 | | Total Cycles  3 | |
| Repairs  No repairs required. | | | |
| Comments  Altitude hold with ultrasonic achieved. Attitude hold with IMU also achieved. | | | |

# Conclusions

Table 1 shows a summary of the total battery cycles for each battery as well as the total airframe hours over the course of the project.

Table - Total Battery Cycles and Flight Hours

|  |  |  |
| --- | --- | --- |
| Battery 1 | Battery 2 | Flight Time |
| 40 Cycles | 35 Cycles | 530 Minutes |
|  |  | 8 Hours 50 Minutes |