

Project Report Appendices

**The following section contains the appendices as listed in
the Utah 2016 - Great Salt Lake QL1 & QL2 AOIs
Interim Project Report.**

Appendix A

Flight Logs - QL1

| | |
|---------------------------------------|----|
| Sep 3, 2016-B2 (N704MD, SN7161)..... | 2 |
| Sep 4, 2016-A (N704MD, SN7161) | 3 |
| Sep 5, 2016-A (N704MD, SN7161)..... | 5 |
| Sep 6, 2016-A (N704MD, SN7161) | 8 |
| Sep 7, 2016-A (N704MD, SN7161)..... | 9 |
| Sep 8, 2016-A (N704MD, SN7161) | 11 |
| Sep 10, 2016-A (N704MD, SN7161)..... | 13 |
| Sep 11, 2016-A (N704MD, SN7161)..... | 15 |
| Sep 12, 2016-A (N704MD, SN7161) | 18 |
| Sep 13, 2016-A (N704MD, SN7161)..... | 21 |
| Sep 13, 2016-C (N704MD, SN7161) | 22 |
| Sep 14, 2016-A (N704MD, SN7161)..... | 23 |
| Sep 17, 2016-A (N704MD, SN7161)..... | 24 |
| Sep 18, 2016-A (N704MD, SN7161)..... | 26 |
| Sep 19, 2016-A (N704MD, SN7161)..... | 28 |
| Sep 19, 2016-B (N704MD, SN7161) | 30 |
| Sep 24, 2016-A (N704MD, SN7161)..... | 32 |
| Sep 25, 2016-A (N704MD, SN7161)..... | 34 |
| Sep 26, 2016-A (N704MD, SN7161)..... | 36 |
| Sep 27, 2016-A (N704MD, SN7161)..... | 38 |
| Sep 28, 2016-A (N704MD, SN7161)..... | 40 |
| Nov 4, 2016-A (N208NR, SN8227)..... | 42 |

Sep 4, 2016-A (N704MD, SN7161)

Project: Utah

Aircraft: 704MD

Dep Apt: 06D

CORS: Y / N

GPS Units: Y / N

Gd Temp beg: °C End: °C

Date: 9/4/16

Flight Mgmt File: 20160904-150946

Pilot: Wagner

Arr Apt: 06D

Sta 2: Utah16-01

Alt: 761

Scan Freq: 53Hz

Alt AGL: MplA Y / N

SN7161_090416A

Quantum Spatial, Inc

Proj #: 29083

End Hobbs: 1293.5

Dep Time (Lcl): 0923Z

Sta 1: Utah16-01

Alt: 761

Scan Freq: 53Hz

Alt AGL: MplA Y / N

Flight Mgmt File: 20160904-150946

Tech: Iverson

Arr Time (Local): 1852Z

Sta 2: Utah16-02

Alt: 161

Scan Freq: 53Hz

Alt AGL: MplA Y / N

Total Time Aloft: 3:29

Flyovers: Y / N

Sta 1: Utah16-01

Alt: 761

Scan Freq: 53Hz

Alt AGL: MplA Y / N

Altimeter begin: °C End: °C

Max Gspsd: 60%

Power: 60%

Alt: 761

Scan Freq: 53Hz

Alt AGL: MplA Y / N

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

static

Take OFF 06D 0923

Figure 8

cross flight

test strip

cross flight over ground points

FMSL - Utah - 160441

160904 - 160441

1601349

1620904 - 162246

163147

164056

165014

165937

170838

171745

172704

173621

1293.5 Hobbs

AGL + 150 feet

turbulence & cross winds

| Line # | Hdg | Stare (UTC) | End (UTC) | Gd Spd | POOP/s | GPS Altitude | Crab | Turb (0-+) | Notes |
|--------|-----|-------------|-----------|--------|--------|--------------|------|------------|-------|
| 1078 | N | 1604 | 1611 | 105 | 13/1.4 | | | | |
| 1077 | S | 1613 | 1620 | 105 | 14/1.2 | | | | |
| 1076 | N | 1622 | 1629 | 111 | 13/1.3 | | | | |
| 1075 | S | 1631 | 1638 | 107 | 15/1.2 | | | | |
| 1074 | N | 1640 | 1647 | 105 | 15/1.2 | | | | |
| 1073 | S | 1650 | 1657 | 99 | 16/1.2 | | | | |
| 1072 | N | 1659 | 1706 | 105 | 16/1.2 | | | | |
| 1071 | S | 1708 | 1715 | 99 | 17/1.1 | | | | |
| 1070 | N | 1717 | 1724 | 112 | 16/1.2 | | | | |
| 1069 | S | 1727 | 1734 | 98 | 15/1.3 | | | | |
| 1068 | N | 1736 | 1743 | 107 | 16/1.2 | | | | |

Total Proj Lines: 1018 / USB30FD

Line Flowin: 2.8

Line Remain: 1.7

Mob Time: 1.7

Notes: /Ordnance/ UTM12

Sep 5, 2016-A (N704MD, SN7161)

Project: Utah

Aircraft: 704MD

Dep Apt: OGD

CORS: Y / N

GPS Unit: Y / N

Gd Temp beg: °C End: °C

Date: 9/5/2016

Flight Mgmt File: 20160905-145102

Pilot: Wagner

Arr Time (Local): 1532 (Z): 2132

Co-Pilot: Ivetson

Tot Time Aloft: 6:28

Proj #: 29083

Begin Hobbs: 1297.0

End Hobbs: 1303.5

Total: 6.5

Alt: 1504

Arr Apt: OGD

Altimeter begin: °C End: °C

Station 1: Utah16_01

Station 2: UTAH16_02

Station 3: [Blank]

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POOP/s | GPS Altitude | Crab | Turb (0-3) | Alt AGL | Alt AMSL | Pulses in Air | MPIA | Y / N | Pulse Rate | Avg Terr Ht | Max Gddpd | Power | Avg Pt Spacing | PPSM | end: | Storage Name/ID | |
|--------|-----|-------------|-----------|--------|--------|--------------|------|------------|---------|----------|---------------|------|-------|------------|-------------|-----------|-------|----------------|------|------|-----------------|--|
| | | 1457 | | | | | | | | | | | | | | | | | | | | |
| | | 1504 | | | | | | | | | | | | | | | | | | | | |
| | | 1518 | 1521 | | | | | | | | | | | | | | | | | | | |
| UL001 | E | 1528 | 1537 | 108 | 17/1 | | | | | | | | | | | | | | | | | |
| GSLIN | | | | | | | | | | | | | | | | | | | | | | |
| 1062 | N | 1543 | 1550 | 107 | 16/1.1 | | | | | | | | | | | | | | | | | |
| 1061 | S | 1552 | 1559 | 107 | 15/1.1 | | | | | | | | | | | | | | | | | |
| 1060 | N | 1602 | 1609 | 104 | 15/1.1 | | | | | | | | | | | | | | | | | |
| 1059 | S | 1611 | 1607 | 108 | 14/1.2 | | | | | | | | | | | | | | | | | |
| 1058 | N | 1609 | 1627 | 105 | 14/1.3 | | | | | | | | | | | | | | | | | |
| 1057 | S | 1628 | 1635 | 108 | 15/1.3 | | | | | | | | | | | | | | | | | |
| 1056 | N | 1637 | 1644 | 111 | 15/1.3 | | | | | | | | | | | | | | | | | |
| 1055 | S | 1646 | 1653 | 106 | 16/1.3 | | | | | | | | | | | | | | | | | |
| 1054 | N | 1656 | 1702 | 102 | 16/1.3 | | | | | | | | | | | | | | | | | |
| 1053 | S | 1704 | 1710 | 108 | 17/1.2 | | | | | | | | | | | | | | | | | |
| 1052 | N | 1712 | 1718 | 105 | 16/1.2 | | | | | | | | | | | | | | | | | |
| 1051 | S | 1720 | 1726 | 110 | 16/1.2 | | | | | | | | | | | | | | | | | |
| 1050 | N | 1728 | 1734 | 104 | 15/1.4 | | | | | | | | | | | | | | | | | |

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

Static

Takeoff OGD 0904

Figure 8

cross-flight over ground points

160905_154344

160905_154344

155244

160249

161137

160905

162854

163751

164619

165601

170401

171212

172007

172820

+ 100 feet right of line

Total Proj Lines: 39

Lines Flown: 39

Lines Remain: 0

Online Time: 6

Mob Time: 5

Notes: 1018 / USB-3-128GB/sandisk / 10rdnance / UTM 12

Sep 7, 2016-A (N704MD, SN7161)

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

SN7161 090716A
 Date: 9/7/2016
 Lift: A B C D E Pg 1 of 3

Project: Utah
 Flight Mgmt File: 20160907-160402
 Tech: IVERSON

Aircraft: N704MD Begin Hobbs: 1309.4 End Hobbs: 1314.6 Total: 5.2 Pilot: Wagner Co-Pilot:
 Dep Apt: OGD Dep Time (Lcl): 1633 Arr Apt: OGD Arr Time (Local): 1542 (Z): 2142 Tot Time Aloft: 5:09

CORS: Y/N Sta 1: STA 2: UAHL16-06 Sta 1: AI5826
 Flyovers: Y/N IF Y, times: Sta 1) Flyovers: Y/N IF Y, times: Sta 2)

GPS Unit: OGN
 Gd Temp beg: °C End: °C OAT beg: °C End: °C
 Altimeter begin: end:

| LIDAR | Type | ALS70 | Serial # | Alt AGL | Alt APSL | Pulses in Air | MPIA | Y/N | Pulse Rate | Avg Terr Ht | Max GdSpd | Avg Ft Spacing | PPSM | Beg GB | End GB | Tot GB | Storage Name# |
|-------|------|-------|----------|---------|----------|---------------|------|---------|------------|-------------|-----------|----------------|------|--------|--------|--------|---------------|
| | FOV | 40 | 53 Hz | 7161 | 53 Hz | Y/N | 57% | 215 kHz | 57% | | | | | | | | |
| 1012 | E | 1657 | 1704 | 103 | 17/1.2 | | | | | | | | | | | | 1309.4 Hobbs |
| 1013 | W | 1706 | 1713 | 98 | 16/1.2 | | | | | | | | | | | | 1309.4 Hobbs |
| 1014 | E | 1715 | 1722 | 97 | 15/1.4 | | | | | | | | | | | | 1309.4 Hobbs |
| 1015 | W | 1724 | 1731 | 98 | 16/1.2 | | | | | | | | | | | | 1309.4 Hobbs |
| 1016 | E | 1758 | 1805 | 103 | 19/1 | | | | | | | | | | | | 1309.4 Hobbs |
| 1017 | W | 1807 | 1815 | 103 | 18/1.1 | | | | | | | | | | | | 1309.4 Hobbs |
| 1018 | E | 1816 | 1824 | 103 | 18/1.1 | | | | | | | | | | | | 1309.4 Hobbs |
| 1019 | W | 1825 | 1832 | 94 | 17/1.2 | | | | | | | | | | | | 1309.4 Hobbs |
| 1020 | E | 1834 | 1841 | 105 | 17/1.2 | | | | | | | | | | | | 1309.4 Hobbs |
| 1021 | W | 1843 | 1850 | 92 | 17/1.1 | | | | | | | | | | | | 1309.4 Hobbs |
| 1022 | E | 1853 | 1858 | 102 | 18/1.1 | | | | | | | | | | | | 1309.4 Hobbs |
| 1023 | W | 1901 | 1906 | 98 | 17/1.1 | | | | | | | | | | | | 1309.4 Hobbs |

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
 static
 Take OFF OGD 1033
 Figure 8 FMSL - Utah - OSL - W - QL1 - SN7161 rev 1
 test strip UL COI
 160907-165735 9% RL 8/16 water 19%
 170608 13% water 38% 81% 100%
 171501 59% water 100%
 172404 23% water 70% 50% 100%
 Airspace - Access - wait for traffic
 175842 50% water 100%
 180753 14% 47% water 96% 100%
 181651
 182544
 183448
 184327
 185318
 190137

Total Proj Lines: 25 Lines Flown: 25 Online Time: 4 Mob Time: 1.2 Notes: /018/ Sandisk_USB_1281 /Ordnance/ UTM 12

SN7161-090716A

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc



Date: 9/7/2016
Lit: A B C D E Pg 2 of 2

(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: Utah
Flight Mgmt File: 20160907-160402
Proj #: 29083
Pilot: Wagner
Co-Pilot: Iversen

Aircraft: 704mb
Begin Hobbs: 704mb
End Hobbs: 704mb
Total: 704mb
Arr Apt: [blank]
Arr Time (Local): [blank]
Tot Time Aloft: [blank]

Dep Apt: [blank]
Dep Time (Lcl): [blank]
Sta 1: [blank]
Sta 2: [blank]
Flyovers: Y / N If Y, times: Sta1) [blank]
Flyovers: Y / N If Y, times: Sta2) [blank]

CORS: Y / N
GPS Unit: Y / N
Gd Temp beg: [blank] °C End: [blank] °C
OAT beg: [blank] °C End: [blank] °C
Alt ANSL: [blank]
Pulses In Air: [blank]
MplA Y / N: [blank]

Type ALS70
Serial # 7161
Scan Freq: [blank]
FOV: [blank]

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | PDOP/sas | GPS Altitude | Crab | Turb (0..3) | Alt ANSL | Pulses In Air | MplA Y / N | Avg Terr Ht | Max Gddpd | Power | Avg Pt Spacing | PPSM | end: | Storage Name/# | |
|--------|-----|-------------|-----------|--------|----------|--------------|------|-------------|----------|---------------|------------|-------------|-----------|-------|----------------|------|------|----------------|--|
| UL002 | N | 1909 | 1911 | 97 | 16/1.2 | | | | | | | | | | | | | | |
| GS2 | | | | | | | | | | | | | | | | | | | |
| 2119 | N | 1920 | 1923 | 98 | 17/1.2 | | | | | | | | | | | | | | |
| 2120 | S | 1925 | 1929 | 100 | 17/1.2 | | | | | | | | | | | | | | |
| 2123 | N | 1932 | 1937 | 98 | 18/1.2 | | | | | | | | | | | | | | |
| 2122 | S | 1939 | 1945 | 103 | 18/1.2 | | | | | | | | | | | | | | |
| 2121 | N | 1947 | 1952 | 100 | 18/1.2 | | | | | | | | | | | | | | |
| UL001 | E | 1956 | 2003 | 105 | 17/1.3 | | | | | | | | | | | | | | |
| UL003 | E | 2024 | 2028 | 105 | 17/1.2 | | | | | | | | | | | | | | |
| 2065 | N | 2031 | 2033 | 97 | 19/1.1 | | | | | | | | | | | | | | |
| 2064 | S | 2039 | 2042 | 105 | 18/1.1 | | | | | | | | | | | | | | |
| 2063 | N | 2044 | 2048 | 92 | 19/1.1 | | | | | | | | | | | | | | |
| 2062 | S | 2050 | 2054 | 95 | 19/1.1 | | | | | | | | | | | | | | |
| 2061 | N | 2056 | 2059 | 103 | 19/1.2 | | | | | | | | | | | | | | |
| 2060 | S | 2102 | 2106 | 91 | 19/1.1 | | | | | | | | | | | | | | |
| 2059 | N | 2108 | 2112 | 105 | 19/1.1 | | | | | | | | | | | | | | |

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

UL002 N 1909 1911 97 16/1.2
 GS2
 2119 N 1920 1923 98 17/1.2
 2120 S 1925 1929 100 17/1.2
 2123 N 1932 1937 98 18/1.2
 2122 S 1939 1945 103 18/1.2
 2121 N 1947 1952 100 18/1.2
 UL001 E 1956 2003 105 17/1.3
 UL003 E 2024 2028 105 17/1.2
 2065 N 2031 2033 97 19/1.1
 2064 S 2039 2042 105 18/1.1
 2063 N 2044 2048 92 19/1.1
 2062 S 2050 2054 95 19/1.1
 2061 N 2056 2059 103 19/1.2
 2060 S 2102 2106 91 19/1.1
 2059 N 2108 2112 105 19/1.1

cross flight 190908
 = setting on Next Page =
 FMISL - Utah - GS2 - QL2 - SN7161 - rev 1
 - 192028
 192536
 193218
 193958
 194746
 cross flight 195657
 Air traffic on Hold waiting for clearance
 cross flight 202403
 203117
 203921
 204449
 205042
 205622
 210206
 210830

Total Proj Lines: [blank] Lines Flown: [blank] Lines Remain: [blank] Online Time: [blank] Mob Time: [blank] Notes: [blank]

Sep 8, 2016-A (N704MD, SN7161)

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: Utah SN7161 090816A Date: 9/8/2016
(email log daily to flight_log_distribution_list@quantumspatial.com) Pg. 1 of 2

Proj #: 29083 Flight Mgmt File: 20160908-153203

Aircraft: N704MD Begin Hobbs: 1314.6 Total: 4 Pilot: Wagner Co-Pilot: Iverson

Dep Apt: OGD Dep Time (Local): 1954 Arr Time (Local): 1954 Tot Time Aloft: 4:03

CORS: Y/N Sta 1: AY516 Sta 2: UTAH16-07 Flyovers: Y/N If Y, times: Sta 1 Sta2)

GPS Unit: Y/N Sta 1: AY516 Sta 2: UTAH16-07 Flyovers: Y/N If Y, times: Sta 1 Sta2)

Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: end:

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POD/s | GPS Altitude | Crab | Turb (0-+) | FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. | | | |
|--------|-----|-------------|-----------|--------|--------|--------------|------|------------|--------------------------------------------------------------|---------|------|-----|
| | | | | | | | | | Alt AMSL | Alt AGL | MPIA | Y/N |
| | | 1540 | | | | | | | static | | | |
| | | 1551 | | | | | | | Take OFF OGD0951 | | | |
| | | 1605 | 1608 | | | | | | Figure 8 FMS_Utah-ORSL-E-QL1-SN7161- 160908-162326 | | | |
| 1161 | W | 1623 | 1624 | 100 | 16/1.2 | | | | 162619 | | | |
| 1160 | E | 1626 | 1627 | 103 | 15/1.2 | | | | 162927 | | | |
| 1159 | W | 1629 | 1630 | 98 | 16/1.2 | | | | 163309 | | | |
| 1158 | E | 1633 | 1634 | 92 | 16/1.2 | | | | 163649 | | | |
| 1157 | W | 1636 | 1639 | 99 | 16/1.2 | | | | 164202 | | | |
| 1156 | E | 1642 | 1645 | 99 | 16/1.2 | | | | 164659 | | | |
| 1155 | W | 1646 | 1650 | 96 | 16/1.2 | | | | 165238 | | | |
| 1154 | E | 1652 | 1652 | 95 | 17/1.1 | | | | 165813 | | | |
| 1153 | W | 1658 | 1700 | 95 | 17/1.1 | | | | 170354 | | | |
| 1152 | E | 1703 | 1707 | 105 | 14/1.4 | | | | 170959 | | | |
| 1151 | W | 1709 | 1714 | 95 | 15/1.3 | | | | 171655 | | | |
| 1152 | E | 1716 | 1720 | 102 | 15/1.3 | | | | 172814 | | | |
| 1221 | N | 1728 | 1733 | 90 | 16/1.3 | | | | 173535 turbulence | | | |
| 1222 | S | 1735 | 1740 | 105 | 17/1.1 | | | | 174219 turbulence | | | |
| 1223 | N | 1742 | 1747 | 93 | 16/1.2 | | | | eye safe cut off - Refly | | | |

Total Proj Lines: 1018/ Lines Flown: 23 Lines Remains: 1018/ Online Time: 3.7 Mob Time: .3 Notes: ordnance / UTM 12

Sep 10, 2016-A (N704MD, SN7161)

Project: Utah

Flight Mgmt File: 20160910-145840

Date: 09/10/2016

Lift: (A) B C D E Pg 1 of 2

Proj #: 29083

Flight Mgmt File: 20160910-145840

Altitude: 1322.6 End Hobbs: 1328.8 Total: 6.2

Pilot: Wagner

Co-Pilot: Iverson

Dep Apt: OGD

Dep Time (Lcl): 0912Z

Arr Apt: OGD

Arr Time (Local): 1528Z

Tot Time Aloft: 6:16

CORS: Y/N

Sta 1: UTAH16_07

Sta 2: AI5816

Flyovers: Y/N

Altimeter begin: end:

GPS Unit: (Y) N

Sta 1: UTAH16_07

Sta 2: AI5816

Flyovers: Y/N

Altimeter begin: end:

| Type | Serial # | Alt AGL | Alt AMSL | Pulses in Air | MPIA | Y/N | Power | PFSM | Storage Name/Id |
|-------|----------|---------|----------|---------------|------|-----|-------|------|-----------------|
| LIDAR | ALS70 | 7161 | | | 1PIA | | 57% | | |
| FOV | 40 | 53 Hz | | | | | | | |

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | PDOP/sats | GPS Altitude | Crsb | Turb (0..+) | Notes |
|--------|-----|-------------|-----------|--------|-----------|--------------|------|-------------|------------------------------------------|
| | | 1503 | | | | | | | 1322.6 Hobbs |
| | | 1512 | | | | | | | Static |
| | | 1526 | 1529 | | | | | | Take OFF 06D 0912 |
| 65LE | W | 1619 | 1629 | 93 | 16/13 | | | | Figure 8 FMSL-Utah-GSL-E-QL1-SN7161-rev1 |
| 1141 | E | 1630 | 1640 | 106 | 16/13 | | | | 160910 ~ 161944 |
| 1140 | W | 1641 | 1651 | 90 | 17/13 | | | | 163057 |
| 1039 | E | 1656 | 1707 | 102 | 16/14 | | | | 164148 |
| 1226 | N | 1709 | 1714 | 100 | 15/14 | | | | 165650 |
| 1225 | S | 1721 | 1726 | 102 | 16/13 | | | | 170936 |
| 1224 | N | 1727 | 1731 | 102 | 17/12 | | | | 172128 |
| 1220 | S | 1735 | 1742 | 100 | 17/12 | | | | 172758 |
| 1219 | N | 1744 | 1753 | 104 | 18/11 | | | | 173559 |
| 1218 | S | 1758 | 1806 | 97 | 18/11 | | | | 174442 |
| 1200 | E | 1815 | 1818 | 102 | 17/12 | | | | 175839 |
| 1217 | N | 1823 | 1831 | 98 | 17/12 | | | | Cross flight 181519 |
| 1200 | S | 1843 | 1847 | 96 | 18/11 | | | | 182354 |
| 1138 | W | 1852 | 1902 | 98 | 17/12 | | | | Cross flight 184345 |
| 1137 | E | 1904 | 1913 | 97 | 17/11 | | | | 185232 |
| | | | | | | | | | 190430 |

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

10181 / QSI-YJOT /

Total Proj Lines: 20 **Lines Remain:** 20 **Online Time:** 5.2 **Mob Time:** 1 **Notes:** Ordnance **UTM 12**

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email Log daily to flight_Log_distribution_List@quantumspatial.com)

SN7161 09 10 16 A
 Date: 09/10/2016
 Pg 2 of 2

Project: Utah Proj #: 29083 Flight Mgmt File: 20160910-145840

Aircraft: N704MD Begin Hobbs: End Hobbs: Total: Pilot: Wagner Co-Pilot: Tech: Iverson

Dep Apt: OGD Dep Time (Lcl): (Z): Arr Apt: OGD Arr Time (Local): (Z): Tot Time Aloft:

CORS: Y / N Sta 1: Flyovers: Y / N If Y, times: Sta1) Sta2)

GPS Unit: Y / N Sta 1: Flyovers: Y / N If Y, times: Sta1) Sta2)

| Gd Temp beg: | | °C | End: | °C | OAT beg: | °C | End: | °C | Altimeter begin: | end: | Beg CB | End CB | Tot CB | Storage Name/ # |
|--------------|----------|-------------|-----------|---------------|-----------|--------------|---------------|-------------|------------------|-----------|----------------|--------|--------|-----------------------|
| Type | Serial # | Alt AGL | Alt AMSL | Pulses In Air | MPIA | Y / N | Pulses In Air | 1PIA | Avg Terr Ht | Max Gdsdp | Avg Pt Spacing | PPSM | | |
| LIDAR | ALS70 | 7161 | | | MPiA | Y / N | | 1PIA | | | | | | |
| FOV | 40 | 53 Hz | | | | | | | 215 kHz | Power | 57.06 | | | |
| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POOF/Sars | GPS Altitude | Crab | Turb (0..1) | | | | | | |
| 1136 | W | 1918 | 1928 | 103 | 17/1.2 | | | | 191820 | | | | | |
| 1135 | E | 1929 | 1938 | 105 | 18/1.1 | | | | 192931 | | | | | |
| 1134 | W | 1939 | 1949 | 98 | 18/1.1 | | | | 193947 | | | | | |
| 1133 | E | 2022 | 2032 | 99 | 18/1.1 | | | | 202235 | | | | | |
| 1132 | W | 2038 | 2048 | 104 | 19/1.1 | | | | 203847 | | | | | turbulence → 100 feet |
| 1131 | E | 2053 | 2101 | 98 | 19/1.1 | | | | 205323 | | | | | turbulence |
| 1130 | W | 2103 | 2111 | 97 | 19/1.1 | | | | 210300 | | | | | |
| | | 2112 | 2115 | | | | | | Figure 8 | | | | | |
| | | | 2128 | | | | | | Land Obd 1528 | | | | | |
| | | | 2137 | | | | | | Static | | | | | Hobbs |

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

61SLE

Total Proj Lines: Lines Flown: Lines Remain: Online Time: 5.2 Mob Time: Notes: Ordnance UTM 12

Date: 09/ 11 /2016
Lift: B C D E Pg 2 of 3

SN7161 09 11 16A
Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: Utah Proj #: 29083 Flight Mgmt File: 20160911_154628 Tech: Iverson

Aircraft: N704MD Begin Hobbs: End Hobbs: Total: Pilot: Wagner Co-Pilot: Tot Time Aloft:

Dep Apt: OGD Dep Time (Lcl): (Z): Arr Apt: OGD Arr Time (Local): (Z): Flyovers: Y / N If Y, times: Sta1) Sta2)

CORS: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

GPS Unit: Y / N Sta 1: Sta 2:

Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: end:

| Type | ALS70 | Serial # | Alt AGL | Alt AMSL | Avg Terr Ht | Max Gdspd | Avg Pt Spacing | Power PFSM | Range CB | Storage Number |
|-------|-------|----------|---------|------------|-------------|--------------------|----------------|------------|----------|----------------|
| LIDAR | FOV | 40 | 53 HZ | MPIA Y / N | 1PIA | Pulse Rate 215 kHz | 57% | | | |

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POOP/Stars | GPS Altitude | Crab | Turb (0..4) | FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. |
|--------|-----|-------------|-----------|--------|------------|--------------|------|-------------|--------------------------------------------------------------|
| 1124 | W | 1837 | 1843 | 99 | 18/11 | | | | 183702 FM SL-Utah-GSL-E-QL1-SN7161-REV1 |
| 1123 | E | 1845 | 1852 | 103 | 17/11 | | | | 184546 |
| 11004 | N | 1901 | 1903 | 103 | 17/11 | | | | Pink Block cross flight 190119 |
| 1205 | W | 1906 | 1909 | 91 | 17/11 | | | | 190642 |
| 1204 | E | 1911 | 1913 | 98 | 17/12 | | | | 191104 |
| 1203 | W | 1915 | 1918 | 94 | 17/12 | | | | 191531 |
| 1202 | E | 1919 | 1922 | 102 | 18/12 | | | | 191955 |
| 1201 | W | 1924 | 1926 | 96 | 18/12 | | | | 192430 |
| 1122 | S | 1935 | 1936 | 102 | 18/12 | | | | Green Block 193529 |
| 1121 | N | 1940 | 1941 | 105 | 17/13 | | | | 194025 |
| 1120 | S | 1944 | 1945 | 103 | 17/13 | | | | 194420 |
| 11005 | W | 1947 | 1949 | 79 | 17/12 | | | | cross flight 194754 |
| 11006 | E | 1954 | 1959 | 104 | 18/12 | | | | Blue Block cross flight 195443 turbulence |
| 1200 | S | 2004 | 2008 | 93 | 18/11 | | | | 200433 turbulence |
| 1199 | W | 2011 | 2015 | 94 | 19/11 | | | | 201111 turbulence |
| 1198 | S | 2017 | 2023 | 94 | 19/11 | | | | 201731 turbulence |
| 1197 | N | 2025 | 2030 | 97 | 19/11 | | | | 202533 turbulence |

Total Proj Lines: Lines Flown: Lines Remain: Online Time: Mob Time: Notes: Ordnance UTM 12

Sep 12, 2016-A (N704MD, SN7161)

Project: Utah

Aircraft: N704MD

Dep Apt: OGD

CORS: Y / N

GPS Unit: IN

Gd Temp beg: °C End: °C

Date: 09/12/2016

Lift: A B C D E

Flight Mgmt File: 20160912-153515

Tech: Iverson

Tot Time Aloft: 6:59

Sta2:

Sta2:

SN7161 09 12-16 A
Quantum Spatial, Inc
(email: Log daily to flight_Log_distribution_list@quantumspatial.com)

Proj #: 29083

Begin Hobbs: 1335.7

End Hobbs: 1342.1

Total: 6.4

Arr Apt: OGD

Arr Time (Local): 1609 (Z): 2209

Alt: 7161

Alt AMSL: 1342.1

Alt AGL: 1550

Scan Freq: 53 Hz

MPIA: Y / N

Pulses in Air: 1PIA

Max Gdspd: 578

Power: 578

Proj #: 29083

End Hobbs: 1342.1

Total: 6.4

Arr Apt: OGD

Arr Time (Local): 1609 (Z): 2209

Alt: 7161

Alt AMSL: 1342.1

Alt AGL: 1550

Scan Freq: 53 Hz

MPIA: Y / N

Pulses in Air: 1PIA

Max Gdspd: 578

Power: 578

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

1335.7 Hobbs

Total Proj Lines: 10181

Lines Flown: 37

Online Time: 6

Notes: Ordinance

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email: log_daily_to_flight_log_distribution_list@quantumspatial.com)

SN7161 09 12 16 A
 Date: 09/12/2016
 UIC: B C D E Pg. 3 of 3

Project: Utah Flight Mgmt File: 20160912-153515 Tech: Iverson

Aircraft: N704MD End Hobbs: Total: Pilot: Wagner Co-Pilot: Tot Time Aloft:

Dep Apt: OGD Dep Time (Lcl): Arr Apt: OGD Arr Time (Local): (Z): Flyovers: Y / N If Y, times: Sta1) Sta2)

CORS: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

GPS Unit: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

| Gd Temp beg: | °C | End: | °C | OAT beg: | °C | End: | °C | Altimeter begin: | | | | Reg CB | End CB | Tot CB | Storage Name/ID |
|--------------|------------|-----------------|------------|----------|---------------|------|------------|------------------|-------------|-----------|----------------|--------|--------|--------|-----------------|
| | | | | | | | | Alt AMSL | Avg Terr Ht | Max Gdspd | Avg Pt Spacing | | | | |
| LIDAR | Type ALS70 | Serial # 7161 | Alt AGL | Alt AMSL | Pulses In Air | 1PIA | Pulse Rate | 215 KHZ | Power | 57% | | | | | |
| | FOV 40 | Scan Freq 53 Hz | MPIA Y / N | | | | | | | | | | | | |

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POOP/Stars | GPS Altitude | Crab | Turb (0-3) | Notes |
|--------|-----|-------------|-----------|--------|------------|--------------|------|------------|----------------------------------------|
| 1023 | N | 1734 | 1737 | 96 | 16/1.2 | | | T | 173407 FMSL-Utah-GSL-E-SN7161-rev1 |
| 1022 | S | 1739 | 1742 | 101 | 18/1.1 | | | | 173925 |
| 1021 | N | 1744 | 1748 | 95 | 18/1.2 | | | | 174451 |
| 1020 | S | 1750 | 1756 | 103 | 18/1.2 | | | | 175037 |
| 41003 | | | | | | | | | Go to Blue Block 60139 Junk |
| 41004 | W | 1801 | 1805 | 92 | 17/1.3 | | | T | Blue Block 180139 cross flight on |
| 1184 | S | 1812 | 1821 | 101 | 17/1.3 | | | T | 181225 |
| 1183 | N | 1823 | 1831 | 87 | 17/1.2 | | | T | 182307 → 100 Turbulence on |
| 1182 | S | 1835 | 1843 | 99 | 17/1.1 | | | T | 183510 → 70 ALL LINES |
| 1181 | N | 1845 | 1854 | 93 | 17/1.1 | | | T | 184548 T = Turbulance |
| 1180 | S | 1859 | 1907 | 97 | 17/1.1 | | | T | 185921 |
| 1179 | N | 1910 | 1918 | 105 | 17/1.1 | | | T | 191020 |
| 1178 | S | 1921 | 1929 | 102 | 17/1.2 | | | T | 192122 → 150 + + 100 ↑ |
| 1177 | N | 1932 | 1940 | 97 | 17/1.2 | | | T | 193222 |
| 1176 | S | 1943 | 1951 | 104 | 17/1.3 | | | T | 194306 |
| 1175 | N | 1953 | 2002 | 87 | 18/1.2 | | | T | 195338 Go to Brown Block |

Total Proj Lines: Lines Flown: Lines Remain: Online Time: Mob Time: Notes: Ordnance UTM 12

GSL E

Date: 09/12/2016
Pg 3 of 3

SN7161 091216A
Quantum Spatial, Inc
(email: Log daily to flight_log_distribution_list@quantumspatial.com)

Project: Utah Proj #: 29083 Flight Mgmt File: 20160912-153515 Tech: Iverson

Aircraft: N704MD Begin Hobbs: End Hobbs: Total: Pilot: Wagner Co-Pilot: Tot Time Aloft:

Dep Apt: OGD Dep Time (Lcl): (Z): Air Apt: OGD Arr Time (Local): (Z): Flyovers: Y / N If Y, times: Sta1) Sta2)

CORS: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

GPS Unit: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

| Line # | Type | Serial # | Start (UTC) | End (UTC) | Gd Spd | FOOPI/Sats | GPS Altitude | Crab | Turb (0-3) | Altimeter begin: | | | Storage Name/ # |
|--------|------|----------|-------------|-----------|--------|------------|--------------|------|------------|------------------|-----------|----------------|-----------------|
| | | | | | | | | | | Alt AMSL | Max Gdspd | Avg Pt Spacing | |
| 1019 | N | 2009 | 2015 | 98 | 18/11 | | | | | | | | |
| 1018 | S | 2017 | 2024 | 105 | 19/11 | | | | | | | | |
| 1017 | N | 2026 | 2033 | 87 | 19/11 | | | | | | | | |
| 1016 | S | 2035 | 2042 | 99 | 14/11 | | | | | | | | |
| 1015 | N | 2045 | 2054 | 86 | 19/11 | | | | | | | | |
| 1014 | S | 2055 | 2103 | 99 | 20/11 | | | | | | | | |
| 1013 | N | 2105 | 2113 | 95 | 19/11 | | | | | | | | |
| 1012 | S | 2115 | 2122 | 94 | 19/11 | | | | | | | | |
| 1011 | N | 2124 | 2132 | 100 | 19/11 | | | | | | | | |
| 1010 | S | 2134 | 2141 | 97 | 17/11 | | | | | | | | |
| 1009 | N | 2143 | 2151 | 87 | 18/11 | | | | | | | | |
| 1008 | S | 2154 | 2200 | 100 | 20/9 | | | | | | | | |
| | | 2201 | 2203 | | | | | | | | | | |
| | | 2209 | | | | | | | | | | | |
| | | 2218 | | | | | | | | | | | |

615LE

Brown Block FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
 200910 FMST - Utah - 65L - E - QL1 - SN7161 - rev.1
 201751 T = Turbulence
 202644
 203547
 204524
 205549
 210533
 211514 → + 133 OFF
 212445
 213434 → + 65
 214357
 215431
 Figure 8
 Land Ord 1609
 Static
 1342.1 Hobbs

Total Proj Lines: Lines Flown: Lines Remain: Online Time: Mob Time: Notes: UTM 12

Sep 13, 2016-A (N704MD, SN7161)

Project: Utah

Project #: 29083

Flight Mgmt File: 20160913-160105

Date: 09/13/2016

Lift: (A) B C D E Pg 1 of 3

SN7161 09/13/16A

Quantum Spatial, Inc

(email log daily to flight_log_distribution_list@quantumspatial.com)

Aircraft: N704MD

Begin Hobbs: 1342.1

Total: 6

Pilot: Wagner

Co-Pilot: Iverson

Dep Apt: OGD

Dep Time (Lcl): 1019 (Z) 1619

Arr Apt: OGD

Arr Time (Local): 1653 (Z) 2154 + 3:05

Tot Time Aloft: 2:54 + 3:05

CORS: Y/N Sta 1: UTAH16-09 Sta 2: UTAH16-10

Flyovers: Y/N (10) If Y, times: Sta 1) 1913 Sta 2) Total 5:59

GPS Unit: (1) N If Y, times: Sta 1) 1913 Sta 2) Total 5:59

Gd Temp beg: °C End: °C OAT beg: °C End: °C

Altimeter begin: end:

Storage Name#

| Type | FOV | Serial # | Scan Freq | Alt AGL | Alt AMSL | Pulses In Air | MpiA Y/N | PPIA | Pulse Rate | Power | Max Gdspd | Avg Pt Spacing | PPSM | Avg Terr Ht | end: | | |
|-------|-----|----------|-----------|---------|----------|---------------|----------|------|------------|-------|-----------|----------------|------|-------------|-----------|----------------|------|
| | | | | | | | | | | | | | | | Max Gdspd | Avg Pt Spacing | PPSM |
| LIDAR | 40 | 7161 | 53 Hz | | | | | | 215 kHz | 57% | | | | | | | |

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POOP# Sats | GPS Altitude | Cnab | Turb (0-4) | FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. |
|-----------------|-----|-------------|-----------|--------|------------|--------------|------|------------|--------------------------------------------------------------|
| GSLE | | 1612 | | | | | | | Static |
| | | 1619 | | | | | | | Take OFF OGD 1019 |
| | | 1624 | 1626 | | | | | | Figure 8 FMSL-Utah-GSL-E-QL1-SN7161-rev1 |
| U001 | W | 1630 | 1632 | 105 | 17/1.2 | | | | cross flight brown 160913-162956 |
| U002 | E | 1641 | 1643 | 90 | 16/1.2 | | | | cross flight Blue 164103 |
| 1174 | S | 1649 | 1657 | 102 | 15/1.3 | | | | 164947 Blue Block |
| 1173 | N | 1659 | 1707 | 103 | 15/1.3 | | | | 165935 |
| GSLE | | | | | | | | | back to Brown Block |
| 1007 | S | 1714 | 1721 | 98 | 18/1.1 | | | | 171435 |
| 1006 | N | 1723 | 1729 | 103 | 17/1.1 | | | | 172313 |
| 1005 | S | 1731 | 1738 | 105 | 19/1.1 | | | | 173156 |
| 1004 | N | 1739 | 1746 | 105 | 17/1.1 | | | | 173959 |
| 1003 | S | 1748 | 1754 | 103 | 17/1.2 | | | | 174825 |
| 1002 | N | 1756 | 1801 | 105 | 17/1.2 | | | | 175607 |
| 1001 | | | | | | | | | System crash |
| | | | | | | | | | Reboot |
| | | | | | | | | | taking a very long time to shut down |
| | | | | | | | | | cut off Power Reboot |

Total Proj Lines: 1016 / QSI-TKZ1

Lines Flown: 18

Lines Remain: 5

Online Time: 5

Mob Time: 1

Notes: Ordinance

UTM 12

Sep 13, 2016-C (N704MD, SN7161)

Date: 09/13/2016
Lift: A B C D E Pg. 3 of 3

SN7161 091316 B
Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email: log.daily.to.flight_log_distribution_list@quantumspatial.com)

Project: Utah Proj #: 29083 Flight Mgmt File: 20160913-201606 Tech: Iverson

Aircraft: N704MD Begin Hobbs: 1345.0 End Hobbs: Total: Pilot: Wagner Co-Pilot: Iverson

Dep Apt: OGD Dep Time (Lcl): 1438 (Z): 2038 Arr Apt: OGD Arr Time (Local): 1713 (Z): 2343 Tot Time Aloft: 3:05

CORS: Y/N Sta 1: Sta 2: Flyovers: Y/N IF Y, times: Sta1) Sta2)

GPS Unit: Y/N Sta 1: Sta 2: Flyovers: Y/N IF Y, times: Sta1) Sta2)

| Gd Temp beg: | Type | Serial # | °C | End: | °C | OAT beg: | °C | Alt AGL | Alt AMSL | Pulses In Air | 1PIA | Pulse Rate | Altimeter begin: | | | Storage Name/ # | | | | |
|--------------|------|-------------|-----------|--------|-----------|--------------|------|------------|--------------------------------------------------------------|---------------|------|------------|------------------|-----------|----------------|-----------------|--|--|--|--------------|
| | | | | | | | | | | | | | Avg Terr Ht | Max Gdspd | Avg Pt Spacing | | | | | |
| LIDAR | | | | | | | | | | | | | beg CB | End CB | Tot CB | | | | | |
| | FOV | 40° | | | | | | | | | | 57.96 | | | | | | | | |
| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POOP/sats | GPS Altitude | Crab | Turb (0-3) | FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. | | | | | | | | | | | |
| | | 2022 | | | | | | | Static | | | | | | | | | | | |
| | | 2038 | | | | | | | Take OFF OGD FMSL-Utah-OSL-E-QL1-SN7161- Figure 8 1438 | | | | | | | | | | | 1345.0 Hobbs |
| 65LE | | 2043 | 2047 | | | | | | | | | | | | | | | | | |
| | | 2049 | 2052 | 100 | 18/1.1 | | | | Crossflight - Brown 160913-204909 Brown Block | | | | | | | | | | | |
| | | 2056 | 2101 | 102 | 18/1.1 | | | | 205620 | | | | | | | | | | | |
| | | 2104 | 2110 | 105 | 19/1 | | | | 210436 | | | | | | | | | | | |
| | | 2112 | | 96 | 19/1 | | | | 211239 | | | | | | | | | | | |
| | | 2203 | 2205 | 105 | 16/1.4 | | | | Cross flight Blue 220314 T = Turbulence | | | | | | | | | | | |
| | | 2211 | 2219 | 91 | 16/1.2 | | | T | 221134 → +134' | | | | | | | | | | | |
| | | 2221 | 2229 | 96 | 17/1.2 | | | | 222150 | | | | | | | | | | | |
| | | 2231 | 2240 | 101 | 17/1.2 | | | | 223158 | | | | | | | | | | | |
| | | 2241 | 2249 | 101 | 16/1.4 | | | T | 224157 | | | | | | | | | | | |
| | | 2251 | 2300 | 105 | 16/1.3 | | | | 225159 | | | | | | | | | | | |
| | | 2335 | 2338 | | | | | | Figure 8 | | | | | | | | | | | |
| | | 2343 | | | | | | | Land OGD 1543 | | | | | | | | | | | 2350 static |
| | | | | | | | | | Land OGD 1543 | | | | | | | | | | | 1348.1 Hobbs |

Total Proj Lines: 1015 / 1051-TKZ1 / Ordinance UTM 12

Sep 14, 2016-A (N704MD, SN7161)

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

SN7161 09/14/16 A
 Date: 09/14/2016
 Lift: A B C D E Pg 2 of 2

Project: Utah
 Flight Mgmt File: 20160914-154427

Aircraft: N704MD
 Pilot: Wagner
 Tech: Iverson

Dep Apt: OGD
 Arr Apt: OGD
 Arr Time (Local): (Z):
 Total: 29083
 End Hobbs:

CORS: Y / N Sta 1: Flyovers: Y / N IF Y, times: Sta1) Sta2)
 GPS Unit: Y / N Sta 1: Flyovers: Y / N IF Y, times: Sta1) Sta2)

Gd Temp beg: °C End: °C OAT beg: °C End: °C
 Altimeter begin: end:
 Avg Pt Spacing
 Power 57%

| Line # | Type | Serial # | Alt AGL | Alt AMSL | Pulses In Air | Altitude | GPS Altitude | Crab | Turb (0-1) | Notes |
|--------|------|----------|---------|----------|---------------|----------|--------------|------|------------|-------------------------------------------|
| 1167 | E | 1752 | 98 | 1811.1 | | | | | | Blue Block FMSL-Utah-6SLE-QL1-SN7161-REV1 |
| 1168 | S | 1758 | 91 | 1711.2 | | | | | | cross flight Blue 175015 |
| 1169 | N | 1808 | 101 | 1711.2 | | | | | | T = Turbulence |
| 1170 | S | 1817 | 92 | 1811.1 | | | | | | 180827 |
| 1171 | N | 1826 | 98 | 1811.1 | | | | | | 181740 |
| 1172 | S | 1833 | 100 | 1711.2 | | | | | | 182657 |
| 1173 | N | 1840 | 102 | 1711.2 | | | | | | 183331 |
| 1174 | | 1842 | | | | | | | | 184049 |
| 1175 | | 1855 | | | | | | | | Figure 8 |
| 1176 | | 1903 | | | | | | | | Land OGD 1255 |
| | | | | | | | | | | static |
| | | | | | | | | | | 1351.1 Hobbs |

Total Proj Lines: 1015 / ASI - USB1 /

Lines Flown: / ASI - USB1 /

Lines Remain: / ASI - USB1 /

Online Time: Ordinance

Mob Time: UTM 12

Notes:

Sep 17, 2016-A (N704MD, SN7161)

| | | |
|---------------------------------|-------------------------|--------------------------------------|
| Date: 9/17/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|-----------------------|----------|----------|
| Wheels Up | 10:25:00 AM | | | |
| Wheels Down | 4:36:00 PM | | | |
| Begin Hobbs | 11356.6 | | | |
| End Hobbs | 11362.2 | | | |
| On-line Hobbs: 5.1 | | Mob Hobbs: 0.5 | | |

We got busy to the north chipping away at various blocks from the three flightplans. Into the afternoon, we finally received clearance to acquire the last lines near SLC but would have to jump in for 20 minutes, then jump out, then come back in because of various departure patterns from the ground.

I tried to manual fire a cross line on a block we had wrapped up to the north but did not cross over because we rushed down to the SLC airspace to grab the last five lines down there. I received the "ALS did not record" error message which resulted in the record button, and two other major buttons on the bottom panel of the display disappeared. I tried troubleshooting various ways and ultimately did a shutdown in the air. The sensor was not shutting down either, it froze as it was exiting the Leica program. Upon restarting I received a message saying, "GNSS-IMU is in course align status, position accuracy is reduced" which basically translates to: your attitude, position, and velocity are not being read by the satellites. We stayed in base range for more than ten minutes, performing s-turns and various maneuvers with no results for green lights on the GNSS-IMU status. The lights turned green but the error warning persisted and when we got online to finish the last three lines, the guidance line was all sorts of inaccurate. I called the flight.

There seems to be extra coverage in the north showing the trajectory of some maneuvers. We were unable to cross line the southern-most line set and the northern-most line set.

Flt Mgmt File:

Lines Flown:

GSLW 1169-1161
GSL 2209-2203
GSLE 1119-1109
GSL 2057-2055

Sep 18, 2016-A (N704MD, SN7161)

| | | |
|----------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/18/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_E_QL1_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|---------------------|----------|----------|
| Wheels Up | 10:15:00 AM | | | |
| Wheels Down | 4:15:00 PM | | | |
| Begin Hobbs | 11362.2 | | | |
| End Hobbs | 11368.4 | | | |
| On-line Hobbs: 5.2 | | Mob Hobbs: 1 | | |

Notes

The West to east lines on GSLE 1108-1085 had a strong tail wind thus undulations in altitude and fluctuations in speed, but nothing that made us too fast or out of a reasonable altitude range.

Flt Mgmt File: FMSL_Utah_GSL_E_QL1_SN7161_rev1

Lines Flown:

GSLE 1108-1085

Sep 19, 2016-A (N704MD, SN7161)

| | | |
|----------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/19/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_E_QL1_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|-----------------------|----------|----------|
| Wheels Up | 9:35:00 AM | 11:20:00 AM | | |
| Wheels Down | 11:00:00 AM | 3:10:00 PM | | |
| Begin Hobbs | 11368.4 | | | |
| End Hobbs | 11373.6 | 11373.6 | | |
| On-line Hobbs: 4.1 | | Mob Hobbs: 1.1 | | |

Notes

Sensors failed again after 7 lines or so. We performed a static restart in Brigham City. We picked up the block in the south and decided to continue to the bottom to attempt to complete as much as possible. The thermals off of the salt flats were causing roll and pitch exceedences like crazy. We tried switching the the QL2 flightplan but it was still jsut as bad.

Flt Mgmt File: FMSL_Utah_GSL_E_QL1_SN7161_rev1

Lines Flown:

GSLE 1031-1037 F1

GSLE 1037-1045, 1066-1071

Sep 19, 2016-B (N704MD, SN7161)

| | | |
|----------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/19/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_E_QL1_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|-----------------------|----------|----------|
| Wheels Up | 9:35:00 AM | 11:20:00 AM | | |
| Wheels Down | 11:00:00 AM | 3:10:00 PM | | |
| Begin Hobbs | 11368.4 | | | |
| End Hobbs | 11373.6 | 11373.6 | | |
| On-line Hobbs: 4.1 | | Mob Hobbs: 1.1 | | |

Notes

Sensors failed again after 7 lines or so. We performed a static restart in Brigham City. We picked up the block in the south and decided to continue to the bottom to attempt to complete as much as possible. The thermals off of the salt flats were causing roll and pitch exceedences like crazy. We tried switching the the QL2 flightplan but it was still jsut as bad.

Flt Mgmt File: FMSL_Utah_GSL_E_QL1_SN7161_rev1

Lines Flown:

GSLE 1031-1037 F1

GSLE 1037-1045, 1066-1071

Sep 24, 2016-A (N704MD, SN7161)

| | | |
|---------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/24/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_Bear_QL1_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|-----------------------|----------|----------|
| Wheels Up | 12:15:00 PM | | | |
| Wheels Down | 1:15:00 PM | | | |
| Begin Hobbs | 11384.3 | | | |
| End Hobbs | 11385.3 | | | |
| On-line Hobbs: 0.5 | | Mob Hobbs: 0.5 | | |

Notes

Cloudy in the AM. We waited at the FBO for several hours for the clouds to dissipate. The block to the north actually had the ceilings get lower than they had been when we left, while the block to the south was cloudy the whole time. We were able to grab the east side arm (Lines 043-038) while we were up there.

Flt Mgmt File: FMSL_Utah_Bear_QL1_SN7161_rev1

Lines Flown:

043-038

Sep 25, 2016-A (N704MD, SN7161)

| | | |
|----------------------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/25/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_QL1_SN7161_cut_for_mountain_turns | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 8:55:00 AM | | | |
| Wheels Down | 3:15:00 PM | | | |
| Begin Hobbs | 11385.3 | | | |
| End Hobbs | 11391.6 | | | |
| On-line Hobbs: 5.5 | | Mob Hobbs: 0.8 | | |

Notes

Full flight today. Tackled and completed the Bear River blocks. Was given an "ALS datalogger error" warning in the beginning, but remedied the issue by tightening cables. Today's conditions were exceptionally calm and smooth and sunny and happy and boring and finally a full flight of FMSL acquisition with no problems.

Flt Mgmt File: FMSL_Utah_QL1_SN7161_cut_for_mountain_turns

Lines Flown:

023-037
001-022

Sep 26, 2016-A (N704MD, SN7161)

| | | |
|---------------------------------|-------------------------|--------------------------------------|
| Date: 9/26/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: EQL | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 9:00:00 AM | | | |
| Wheels Down | 3:05:00 PM | | | |
| Begin Hobbs | 11391.6 | | | |
| End Hobbs | 11397.6 | | | |
| On-line Hobbs: 5.5 | | Mob Hobbs: 0.5 | | |

Notes

Perfect conditions for acquisition.

Flt Mgmt File: EQL

Lines Flown:

GSLE1072-1084

Sep 27, 2016-A (N704MD, SN7161)

| | | |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------|
| Date: 9/27/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_W_QL1_SN7161_rev1 FMSL_Utah_GSL_Ye_Olde_Railroade FMSL_Utah_GSL_E_QL1_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Drew Johnston |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 9:24:00 AM | | | |
| Wheels Down | 1:20:00 PM | | | |
| Begin Hobbs | 11397.6 | | | |
| End Hobbs | 11401.5 | | | |
| On-line Hobbs: 2.5 | | Mob Hobbs: 1.4 | | |

Notes

Juggled 4 flightplans between two blocks of reflies, the railroad across the lake, and moving E-W in the QL2 lines. We experienced lag again on startup when deleting old plans from internal memory, and again when switching through plans in flight. We flew over CORS Station P086 for W_QL1 reflly lines 1063-1065. We landed early as EP was experiencing pain and stiffness towards the end of the flight.

Flt Mgmt File: FMSL_Utah_GSL_W_QL1_SN7161_rev1

Lines Flown:

W_QL1: 1063-1065 reflies

Flt Mgmt File: FMSL_Utah_GSL_Ye_Olde_Railroade

Lines Flown:

RR: 101-103

Flt Mgmt File: FMSL_Utah_GSL_E_QL1_SN7161_rev1

Lines Flown:

E_QL_1: 1091-1093

Sep 28, 2016-A (N704MD, SN7161)

| | | |
|----------------------------------------------------------|-------------------------|---------------------------------------|
| Date: 9/28/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_W_QL1_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Drew Johnston |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 8:55:00 AM | | | |
| Wheels Down | 3:07:00 PM | | | |
| Begin Hobbs | 11401.5 | | | |
| End Hobbs | 11407.7 | | | |
| On-line Hobbs: 5.6 | | Mob Hobbs: 0.6 | | |

Notes

Solid day with no sensor issues.

Flt Mgmt File: FMSL_Utah_GSL_W_QL1_SN7161_rev1

Lines Flown:

GSLW 1158-1160
GSLW 1136-1152
GSLW 1094-1114

Nov 4, 2016-A (N208NR, SN8227)

| | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 11/3/2016 | Aircraft: N208NR | Sensor: 8227 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FAGL_GSL_W_QL1_2PiA_SN8227_40FOV_8ppsm_1550m_1 Unplanned-20161104141921_1 FAGL_GSL_W_QL1_2PiA_SN8227_40FOV_8ppsm_1550m_2 Unplanned-20161104165040_2 | | |
| Pilot: Travis Peden | | Sensor Operator: Aaron Mallon |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|-----------------------|------------|-------------------|----------|----------|
| Wheels Up | 9:10:00 AM | | | |
| Wheels Down | 3:35:00 PM | | | |
| Begin Hobbs | 4387.7 | | | |
| End Hobbs | 4394.1 | | | |
| On-line Hobbs: | | Mob Hobbs: | | |

Notes

Today we were out at the airport ready to take off at 0630 but the deicing trucks broke down so we were not able to take off until 0910. We then flew to the Forge area and completed the remaining lines as well as some reflies. After that we flew back to the Utah Lake area and completed the remaining lines in that block. We eventually had wheels down in Ogden UT and are currently based there.

Flt Mgmt File: FAGL_GSL_W_QL1_2PiA_SN8227_40FOV_8ppsm_1550m_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|---------|------------|-----------|-------------|------------|----------|-------------|
| GSL1057 | 2753.545 m | 14:55:11 | 7.35472162 | 2737.288 m | 14:55:53 | 7.45483692 |
| GSL1058 | 2753.429 m | 14:57:14 | 7.67508255 | 2744.624 m | 15:00:48 | 8.30890121 |
| GSL1059 | 2759.364 m | 15:02:26 | 8.57721705 | 2741.937 m | 15:06:14 | 9.11821999 |
| GSL1060 | 2749.583 m | 15:07:37 | 9.34122424 | 2745.127 m | 15:11:38 | 10.04349164 |
| GSL1061 | 2728.039 m | 15:12:56 | 10.25248161 | 2722.205 m | 15:17:04 | 10.83243759 |
| GSL1062 | 2718.398 m | 15:20:40 | 11.44548071 | 2730.162 m | 15:21:39 | 11.61348195 |
| GSL1063 | 2717.048 m | 15:23:08 | 11.84503587 | 2731.615 m | 15:24:01 | 11.96702737 |
| GSL1064 | 2758.992 m | 15:24:59 | 12.12043962 | 2770.405 m | 15:25:43 | 12.24439276 |
| GSL1065 | 2735.142 m | 15:26:51 | 12.42010315 | 2725.737 m | 15:27:31 | 12.51162206 |
| GSL1066 | 2735.241 m | 15:28:55 | 12.72867508 | 2739.442 m | 15:29:32 | 12.83161572 |
| GSL1052 | 2757.502 m | 15:31:23 | 13.11325273 | 2731.714 m | 15:32:36 | 13.28148207 |
| GSL1053 | 2704.987 m | 15:33:53 | 13.47859460 | 2742.214 m | 15:35:08 | 13.68187808 |
| GSL1054 | 2691.824 m | 15:36:28 | 13.88490113 | 2728.180 m | 15:37:40 | 14.04939585 |
| GSL1055 | 2759.773 m | 15:38:45 | 14.21690954 | 2769.581 m | 15:39:41 | 14.36690461 |
| GSL1056 | 2747.033 m | 15:40:58 | 14.55961417 | 2753.183 m | 15:41:38 | 14.65002620 |
| GSL1051 | 2723.917 m | 15:47:11 | 15.31389892 | 2698.405 m | 15:47:57 | 15.40373323 |
| GSL1050 | 2752.529 m | 15:49:52 | 15.66039079 | 2772.875 m | 15:51:33 | 15.95037315 |
| GSL1049 | 2771.050 m | 15:52:47 | 16.13009009 | 2763.305 m | 15:55:04 | 16.39737033 |
| GSL1048 | 2742.707 m | 15:56:08 | 16.55226851 | 2745.205 m | 15:58:24 | 16.93427216 |
| GSL1047 | 2721.839 m | 15:59:47 | 17.13584543 | 2723.542 m | 16:02:21 | 17.43243528 |
| GSL1046 | 2691.572 m | 16:03:24 | 17.58204543 | 2736.452 m | 16:06:40 | 18.12188111 |
| GSL1045 | 2719.874 m | 16:07:56 | 18.29812848 | 2736.631 m | 16:11:09 | 18.65522244 |
| GSL1044 | 2746.554 m | 16:12:05 | 18.78713790 | 2767.246 m | 16:15:16 | 19.29550166 |

Flt Mgmt File: Unplanned-20161104141921_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|-------|------------|-----------|-------------|------------|----------|-------------|
| UL002 | 2740.580 m | 16:19:11 | 19.78654830 | 2732.045 m | 16:20:45 | 19.96173084 |

Flt Mgmt File: FAGL_GSL_W_QL1_2PiA_SN8227_40FOV_8ppsm_1550m_2

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|---------|------------|-----------|-------------|------------|----------|-------------|
| GSL1067 | 2721.927 m | 17:05:26 | 25.76256401 | 2699.075 m | 17:06:54 | 25.88637207 |
| GSL1068 | 2669.441 m | 17:08:20 | 26.03399773 | 2758.694 m | 17:10:36 | 26.31944722 |
| GSL1069 | 2788.414 m | 17:13:00 | 26.58829030 | 2698.542 m | 17:16:21 | 26.85540326 |
| GSL1070 | 2715.533 m | 17:17:31 | 26.97017000 | 2747.587 m | 17:21:10 | 27.40077148 |
| GSL1071 | 2736.419 m | 17:22:15 | 27.50248509 | 2733.502 m | 17:25:27 | 27.74242435 |
| GSL1072 | 2752.121 m | 17:29:05 | 28.12222776 | 2749.877 m | 17:29:49 | 28.20321714 |
| GSL1006 | 2747.053 m | 17:35:55 | 28.66325033 | 2722.922 m | 17:39:32 | 28.90126262 |
| GSL1007 | 2727.435 m | 17:40:36 | 28.98741450 | 2731.682 m | 17:44:27 | 29.37423664 |
| GSL1008 | 2714.361 m | 17:45:49 | 29.48360328 | 2744.494 m | 17:49:50 | 29.72045139 |
| GSL1009 | 2745.288 m | 17:50:56 | 29.80120150 | 2734.777 m | 17:55:16 | 30.19401115 |
| GSL1010 | 2687.368 m | 17:56:51 | 30.30623033 | 2736.711 m | 18:01:19 | 30.53635947 |
| GSL1011 | 2746.235 m | 18:02:35 | 30.61752421 | 2820.563 m | 18:07:14 | 30.98863261 |
| GSL1012 | 2771.736 m | 18:08:41 | 31.07654751 | 2709.192 m | 18:13:31 | 31.28363317 |
| GSL1013 | 2729.959 m | 18:14:50 | 31.35285786 | 2710.719 m | 18:20:08 | 31.71033127 |
| GSL1014 | 2725.036 m | 18:21:22 | 31.76793307 | 2726.696 m | 18:26:47 | 31.94982644 |
| GSL1015 | 2686.792 m | 18:28:22 | 32.01589607 | 2729.890 m | 18:35:08 | 32.37079423 |
| GSL1016 | 2702.729 m | 18:37:16 | 32.45475280 | 2684.739 m | 18:45:02 | 32.61584795 |
| GSL1017 | 2711.804 m | 18:46:18 | 32.64808465 | 2735.979 m | 18:54:08 | 32.90402182 |
| GSL1018 | 2691.864 m | 18:55:26 | 32.92408328 | 2744.729 m | 19:03:17 | 32.97700785 |
| GSL1019 | 2729.960 m | 19:04:24 | 32.98554550 | 2738.484 m | 19:12:12 | 33.08765018 |
| GSL1020 | 2742.954 m | 19:15:45 | 33.07100268 | 2697.380 m | 19:20:57 | 33.02916560 |
| GSL1021 | 2681.175 m | 19:22:15 | 33.01826199 | 2762.068 m | 19:27:39 | 32.99054553 |
| GSL1022 | 2749.631 m | 19:28:30 | 32.97574481 | 2718.264 m | 19:33:29 | 32.88656242 |
| GSL1023 | 2743.170 m | 19:34:35 | 32.86397413 | 2716.532 m | 19:39:22 | 32.77738226 |
| GSL1024 | 2743.396 m | 19:40:33 | 32.74529073 | 2755.886 m | 19:44:49 | 32.63097218 |
| GSL1025 | 2788.210 m | 19:45:48 | 32.60004321 | 2716.259 m | 19:49:51 | 32.47947623 |
| GSL1026 | 2724.726 m | 19:50:53 | 32.44174157 | 2728.537 m | 19:54:43 | 32.30993479 |
| GSL1027 | 2733.956 m | 19:55:42 | 32.27010558 | 2784.140 m | 19:59:26 | 32.12054159 |
| GSL1028 | 2782.522 m | 20:00:18 | 32.08091023 | 2739.184 m | 20:03:48 | 31.93673309 |
| GSL1029 | 2726.642 m | 20:04:45 | 31.89019878 | 2733.179 m | 20:08:08 | 31.72325952 |
| GSL1030 | 2742.715 m | 20:08:57 | 31.67962158 | 2720.323 m | 20:12:07 | 31.52977961 |
| GSL1031 | 2710.308 m | 20:13:02 | 31.47792023 | 2769.940 m | 20:16:05 | 31.30211686 |
| GSL1032 | 2731.575 m | 20:16:54 | 31.25282403 | 2763.832 m | 20:19:48 | 31.09944723 |
| GSL1033 | 2699.111 m | 20:20:45 | 31.03970747 | 2722.140 m | 20:23:39 | 30.85063591 |
| GSL1034 | 2734.865 m | 20:24:49 | 30.77732220 | 2787.664 m | 20:26:58 | 30.65248210 |
| GSL1035 | 2761.161 m | 20:27:54 | 30.58808295 | 2761.845 m | 20:29:52 | 30.44713018 |

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|---------|------------|-----------|-------------|------------|----------|-------------|
| GSL1036 | 2764.198 m | 20:30:43 | 30.38644021 | 2799.711 m | 20:32:32 | 30.27403923 |
| GSL1037 | 2722.684 m | 20:33:20 | 30.21435275 | 2765.106 m | 20:35:05 | 30.08005698 |
| GSL1038 | 2732.391 m | 20:35:55 | 30.01701214 | 2791.460 m | 20:37:40 | 29.90132612 |
| GSL1039 | 2751.708 m | 20:38:33 | 29.83220116 | 2748.540 m | 20:40:00 | 29.71379760 |
| GSL1040 | 2754.840 m | 20:40:56 | 29.64021696 | 2774.313 m | 20:42:14 | 29.55125354 |
| GSL1041 | 2737.991 m | 20:43:06 | 29.48039062 | 2724.862 m | 20:44:17 | 29.37884198 |
| GSL1042 | 2722.257 m | 20:45:05 | 29.31311108 | 2794.665 m | 20:46:08 | 29.23829635 |
| GSL1043 | 2767.196 m | 20:46:59 | 29.16546720 | 2799.601 m | 20:47:44 | 29.09891114 |
| GSL1005 | 2792.115 m | 20:50:39 | 28.86288058 | 2759.126 m | 20:51:43 | 28.80559743 |
| GSL1004 | 2751.025 m | 20:52:47 | 28.71741992 | 2686.113 m | 20:55:26 | 28.40852703 |
| GSL1003 | 2688.093 m | 20:56:25 | 28.32415399 | 2765.271 m | 20:59:08 | 28.16416974 |
| GSL1002 | 2738.615 m | 20:59:58 | 28.09004533 | 2721.529 m | 21:02:36 | 27.76790314 |
| GSL1001 | 2736.233 m | 21:03:33 | 27.68311576 | 2776.681 m | 21:05:29 | 27.56181683 |

Flt Mgmt File: Unplanned-20161104165040_2

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|-------|------------|-----------|-------------|------------|----------|-------------|
| UL001 | 2745.045 m | 21:08:09 | 27.29349764 | 2684.805 m | 21:09:29 | 27.17622000 |
| UL002 | 2630.989 m | 21:12:13 | 26.91850549 | 2795.841 m | 21:14:30 | 26.75551182 |

Appendix B

Flight Logs - QL2

| | |
|---------------------------------------|----|
| Sep 3, 2016-A (N704MD, SN7161)..... | 2 |
| Sep 3, 2016-B1 (N704MD, SN7161) | 3 |
| Sep 6, 2016-A (N704MD, SN7161) | 4 |
| Sep 7, 2016-A (N704MD, SN7161)..... | 6 |
| Sep 9, 2016-A (N704MD, SN7161) | 8 |
| Sep 14, 2016-A (N704MD, SN7161)..... | 10 |
| Sep 16, 2016-A (N704MD, SN7161)..... | 11 |
| Sep 16, 2016-B (N704MD, SN7161) | 13 |
| Sep 17, 2016-A (N704MD, SN7161) | 15 |
| Sep 18, 2016-A (N704MD, SN7161)..... | 17 |
| Sep 26, 2016-A (N704MD, SN7161) | 19 |
| Sep 27, 2016-A (N704MD, SN7161) | 21 |
| Sep 28, 2016-A (N704MD, SN7161) | 23 |
| Oct 4, 2016-A (N22GE, SN7161) | 24 |
| Oct 4, 2016-B (N22GE, SN7161)..... | 26 |
| Oct 5, 2016-A (N22GE, SN7161) | 28 |
| Nov 4, 2016-A (N208NR, SN8227)..... | 30 |
| Nov 6, 2016-A (N704MD, SN8121)..... | 32 |
| Nov 6, 2016-B (N704MD, SN8121) | 34 |
| Nov 30, 2016-A (N208NR, SN8146)..... | 36 |

Sep 3, 2016-A (N704MD, SN7161)

Project: Utah

Aircraft: N704MD

Dep Apt: 0GND

CORS: Y/N

GPS Unit: Y/N

Gd Temp beg: °C End: °C

Date: 09/03/2016

Lift: B C D E

Tech: Iverson

Co-Pilot: Wagner

Arr Time (Local): 1542 (Z): 2142

Tot Time Aloft: 6:11

Proj #: 29083

Flights Mgmt File:

Begin Hobbs: 1287.4

End Hobbs: 1293.5

Total: 6.1

Arr Apt: 0GND

Alt: 7161

Scan Freq: 43 Hz

Serial #: 7161

Scan Prio: 40

Altitude: 170 kHz

Power: 90 %

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | PPPP/sats | GPS Altitude | Crab | Turb (0-4) | FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. |
|--------|-----|-------------|-----------|--------|-----------|--------------|------|------------|--------------------------------------------------------------|
| | | 1519 | | | | | | | Static 0919 |
| | | 1531 | | | | | | | Take OFF 06:00 0931 |
| 615L | | 1543 | 1547 | | | | | | figure 8 |
| 2038 S | | 1551 | 1554 | | | | | | FMSL - Utah - GSL - QL2 - SN 7161 160903-155 |
| 2037 N | | 1556 | 1558 | | 14/1.1 | | | | 155613 +70 |
| 2036 S | | 1601 | 1604 | | 13/1.2 | | | | 160133 160135 |
| 2035 N | | 1606 | 1610 | 109 | 13/1.2 | | | | 160652 30 ktn Tailwind |
| 2034 S | | 1609 | 1618 | 97 | 13/1.2 | | | | 160903-161317 |
| 2033 N | | 1620 | 1625 | 111 | 12/1.4 | | | | 162026 |
| 2032 S | | 1627 | 1634 | 98 | 12/1.4 | | | | 162749 13/1.3 |
| 2031 N | | 1635 | 1641 | 113 | 13/1.3 | | | | 163551 |
| 2030 S | | 1643 | 1649 | 104 | 14/1.2 | | | | 164338 |
| 2029 N | | 1652 | 1658 | 110 | 15/1.2 | | | | 165227 |
| 2028 S | | 1700 | 1707 | 94 | 15/1.3 | | | | 170049 104 |
| 2027 N | | | | | | | | | data logger Error |
| | | | | | | | | | Reboot system |

Total Proj Lines: 1018 / USB30FD /

Lines Flown: 30

Lines Remain: 988

Online Time: 5.7

Mob Time: .4

Notes: / Ordnance / UTM12

Sep 3, 2016-B1 (N704MD, SN7161)

SN7161-0903160A

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: Utah **Proj #:** 29083 **Flight Mgmt File:**

Aircraft: N704MD **Begin Hobbs:** **End Hobbs:** **Total:** **Pilot:** Wagner **Co-Pilot:** **Tech:** Iverson

Dep Apt: **Dep Time (Lcl):** **(Z):** **Arr Apt:** **Arr Time (Local):** **(Z):** **Tot Time Aloft:**

CORS: Y / N **Sta 1:** **Sta 2:** **Flyovers:** Y / N **If Y, times: Sta 1** **Sta 2**

GPS Unit: Y / N **Sta 1:** **Sta 2:** **Flyovers:** Y / N **If Y, times: Sta 1** **Sta 2**

Gd Temp beg: °C **End:** °C **OAT beg:** °C **End:** °C **Altimeter beg:** **end:**

Date: 09/03/2016

Lift: (A) B C D E Pg. 2 of 3

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POD/r/sats | GPS Altitude | Crab | Turb (0..+) | Type | Serial # | Scan Freq | Alt AGL | Alt AMSL | Pulses In Air | MplA | Y / N | Pulse Rate | AvG Terr Ht | Max Gs/ps | Avg Pk Spacing | Power PPSM | Storage Name/s | | | | |
|---------|-----|-------------|-----------|--------|------------|--------------|------|-------------|------|----------|-----------|---------|----------|---------------|------|-------|------------|-------------|-----------|----------------|------------|----------------|--------|--------|--|--|
| | | | | | | | | | | | | | | | | | | | | | | Req GB | End GB | Tot GB | | |
| 65L | | 1719 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2027 N | | 1731 | 1734 | | | | | | | | | | | | | | | | | | | | | | | |
| 2026 S | | 1744 | 1750 | 109 | 15/13 | | | | | | | | | | | | | | | | | | | | | |
| | | 1753 | | 93 | 16/11 | | | | | | | | | | | | | | | | | | | | | |
| 65L | | 1812 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2027 N | | 1823 | 1827 | | | | | | | | | | | | | | | | | | | | | | | |
| 2026 S | | 1832 | 1838 | 109 | 18/11 | | | | | | | | | | | | | | | | | | | | | |
| 2025 N | | 1841 | 1847 | 96 | 17/12 | | | | | | | | | | | | | | | | | | | | | |
| UL001 W | | 1849 | 1855 | 115 | 17/12 | | | | | | | | | | | | | | | | | | | | | |
| | | 1902 | 1909 | 102 | 18/1.1 | | | | | | | | | | | | | | | | | | | | | |

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

Static 1119 FMSL - Utah - 65L-QL2 - SN7161

Figure 8

160903-174415

175315 system Error off Abort

system Eratic - Reboot

Static

Figure 8

160903-183221 } green Swath Lines

184101 } not showing on

184932 } Trac GUI

Cross Flight 190205

Total Proj Lines:

Lines Flown:

Lines Remain:

Online Time:

Mob Time:

Notes:

Sep 7, 2016-A (N704MD, SN7161)

SN7161-090716A

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: Utah **Proj #:** 29083 **Date:** 9/7/2016
Ut: B C D E **Flight Mgmt File:** 20160907-16040Z **Pg 2 of 3**

Aircraft: 704MD **Begin Hobbs:** **End Hobbs:** **Total:** **Pilot:** Wagner **Co-Pilot:** **Tech:** Iverson

Dep Apt: 6 **Arr Apt:** **Arr Time (Local):** (Z): **Tot Time Aloft:**

CORS: Y / N **Sta 1:** **Flyovers:** Y / N **If Y, times: Sta 1** **Sta 2)**

GPS Unit: Y / N **Sta 1:** **Flyovers:** Y / N **If Y, times: Sta 1** **Sta 2)**

Gd Temp beg: °C **End:** °C **OAT beg:** °C **End:** °C **Altimeter begin:** **end:**

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | PPPP/Rate | GPS Altitude | Crab | Turb (0..4) | Alt AGL | Alt AMSL | Pulses In Air | Avg Terr Ht | Max Gdspd | Power | PFSM | Avg Pt Spacing | Storage Name/ # | | |
|--------|-----|-------------|-----------|--------|-----------|--------------|------|-------------|---------|----------|---------------|-------------|-----------|-------|------|----------------|-----------------|--------|--------|
| | | | | | | | | | | | | | | | | | Bag GB | End GB | Tot GB |
| UL002 | N | 1909 | 1911 | 97 | 16/1.2 | | | | | | | | | | | | | | |
| GS2 | | | | | | | | | | | | | | | | | | | |
| 2119 | N | 1920 | 1923 | 98 | 17/1.2 | | | | | | | | | | | | | | |
| 2120 | S | 1925 | 1929 | 100 | 17/1.2 | | | | | | | | | | | | | | |
| 2123 | N | 1932 | 1937 | 98 | 18/1.2 | | | | | | | | | | | | | | |
| 2122 | S | 1939 | 1945 | 103 | 18/1.2 | | | | | | | | | | | | | | |
| 2121 | N | 1947 | 1952 | 100 | 18/1.2 | | | | | | | | | | | | | | |
| UL001 | E | 1956 | 2003 | 105 | 17/1.3 | | | | | | | | | | | | | | |
| UL003 | E | 2024 | 2028 | 105 | 17/1.2 | | | | | | | | | | | | | | |
| 2065 | N | 2031 | 2033 | 97 | 19/1.1 | | | | | | | | | | | | | | |
| 2064 | S | 2039 | 2042 | 105 | 18/1.1 | | | | | | | | | | | | | | |
| 2063 | N | 2044 | 2048 | 92 | 19/1.1 | | | | | | | | | | | | | | |
| 2062 | S | 2050 | 2054 | 95 | 19/1.1 | | | | | | | | | | | | | | |
| 2061 | N | 2056 | 2059 | 103 | 19/1.2 | | | | | | | | | | | | | | |
| 2060 | S | 2102 | 2106 | 91 | 19/1.1 | | | | | | | | | | | | | | |
| 2059 | N | 2108 | 2112 | 105 | 19/1.1 | | | | | | | | | | | | | | |

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

cross flight 190908
 = setting on Next Page =
 FMSL - Utah - GS2 - QL2 - SN7161 - rev 1
 - 192028
 192536
 193218
 193958
 194746
 cross flight 195657
 Air traffic on Hold waiting for clearance
 cross flight 202403
 203117
 203921
 204449
 205042
 205622
 210206
 210830

Total Proj Lines: **Lines Flown:** **Lines Remain:** **Online Time:** **Mob Time:** **Notes:**

Sep 9, 2016-A (N704MD, SN7161)

Project: Utah **Proj #:** 29083 **Flight Mgmt File:** 20160909-194208

Aircraft: N704MD **Begin Hobbs:** 1318.6 **End Hobbs:** 1322.6 **Total:** 4 **Pilot:** Wagner **Co-Pilot:** Iverson

Dep Apt: OGD **Dep Time (Lcl):** 1355 **Arr Apt:** OGD **Arr Time (Local):** 1750 **(Z):** 2350 **Tot Time Aloft:** 3:55

CORS: Y / N **Sta 1:** **Sta 2:** **Flyovers:** Y / N **if Y, times: Sta1)** **Sta2)**

GPS Unit: AN **Sta 1:** UTAH6-03 **Sta 2:** UTAH6-04 **Flyovers:** Y / N **if Y, times: Sta1)** **Sta2)**

Date: 09/09/2016

Page 1 of 2

| Line # | Hdg | Start(UTC) | End(UTC) | Gd Spd | POOP/sats | GPS Altitude | Crab | Turb | Alt AGL | Alt AMSL | Pulses in Air | 1PIA | Pulse Rate | Max Gdspd | Power | Avg Pt Spacing | PPSM | Altimeter begin: | | | Storage Name# |
|--------------------------------------------------------------|------|-----------------|-----------|--------------|-----------|--------------|---------------|-----------|------------|-----------|---------------|----------------|------------|-----------|-------|----------------|--------|------------------|--------|--------|---------------|
| | | | | | | | | | | | | | | | | | | °C | °C | End: | |
| LIDAR | Type | ALS70 | Serial # | 7161 | Alt AGL | Alt AMSL | Pulses in Air | 1PIA | Pulse Rate | Max Gdspd | Power | Avg Pt Spacing | PPSM | | | | Leg CB | End CB | Tot CB | | |
| | FOV | 40 | Scan Freq | 41 HZ | MPIA | Y / <u>N</u> | | | | | 88% | | | | | | | | | | |
| FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. | | | | | | | | | | | | | | | | | | | | | |
| | | 1947 | | | | | | | | | | | | | | | | | | 1318.6 | Hobbs |
| | | 1955 | | | | | | | | | | | | | | | | | | | |
| | | 2009 | 2013 | | | | | | | | | | | | | | | | | | |
| | | 2017 | 2025 | 100 | 18/1.1 | | | | | | | | | | | | | | | | |
| | | 2028 | 2038 | 105 | 19/1.1 | | | | | | | | | | | | | | | | |
| | | 2040 | 2051 | 105 | 19/1.1 | | | | | | | | | | | | | | | | |
| | | 2053 | 2104 | 112 | 19/1.1 | | | | | | | | | | | | | | | | |
| | | 2106 | 2117 | 101 | 20/1 | | | | | | | | | | | | | | | | |
| | | 2119 | 2130 | 102 | 19/1.1 | | | | | | | | | | | | | | | | |
| | | 2132 | 2134 | 95 | 19/1 | | | | | | | | | | | | | | | | |
| | | 2149 | 2157 | 104 | 18/1.1 | | | | | | | | | | | | | | | | |
| | | 2159 | 2207 | 99 | 19/1 | | | | | | | | | | | | | | | | |
| | | 2209 | 2215 | 105 | 18/1 | | | | | | | | | | | | | | | | |
| | | 2217 | 2223 | 105 | 17/1.1 | | | | | | | | | | | | | | | | |
| | | 2225 | 2230 | 105 | 16/1.2 | | | | | | | | | | | | | | | | |
| | | 2232 | 2236 | 96 | 17/1.2 | | | | | | | | | | | | | | | | |
| | | 2238 | 2242 | 98 | 17/1.2 | | | | | | | | | | | | | | | | |
| Total Proj Lines: | | 1018/ | | Lines Flown: | | 3.5 | | Mob Time: | | 3.5 | | Notes: | | Ordnance | | UTM 12 | | | | | |

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
 (email Log daily to flight_log_distribution_list@quantumspatial.com)

SN7161 09 09 16 A
 Quantum Spatial, Inc

Date: 09/09 /2016
 Lft: B C D E Pg. 2 of 2

Project: Utah Flight Mgmt File: 20160909_194208 Tech: Iverson

Aircraft: N704MD Begin Hobbs: End Hobbs: Total: Pilot: Wagner Co-Pilot: Tot Time Aloft:

Dep Apt: OGD Dep Time (Lcl): [Z] Arr Apt: OGD Arr Time (Local): [Z] Flyovers: Y / N If Y, times: Sta 1 Sta 2

CORS: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta 1 Sta 2

GPS Unit: Y / N Sta 1: Sta 2:

Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: end:

| Type | Serial # | Alt AGL | Alt AMSL | Pulses In Air | 1PIA | Pulse Rate | Max Gdspd | Avg Pt Spacing | Power | PPSM | Bag GB | End GB | Tot GB | Storage Name/ID |
|-------|----------|---------|------------|---------------|------|------------|-----------|----------------|-------|------|--------|--------|--------|-----------------|
| LIDAR | ALS70 | 7161 | | | | 1PIA | | | 88% | | | | | |
| FOV | 40 | 41Hz | MPIA Y / N | | | | | | | | | | | |

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POD/°s | GPS Altitude | Crab | Turb (0..1) | FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. |
|--------|-----|-------------|-----------|--------|--------|--------------|------|-------------|--------------------------------------------------------------|
| 2067 | N | 2244 | 2247 | 104 | 17/1.2 | | | | 224420 |
| 2066 | S | 2249 | 2251 | 97 | 16/1.4 | | | | 224926 |
| UL001 | E | 2254 | 2300 | 92 | 16/1.4 | | | | cross flight 225438 |
| 2024 | S | 2304 | 2309 | 95 | 16/1.4 | | | | 230417 |
| 2023 | N | 2311 | 2316 | 101 | 16/1.3 | | | | 231136 |
| 2022 | S | 2319 | 2323 | 106 | 16/1.2 | | | | 231904 |
| 2021 | N | 2325 | 2329 | 101 | 17/1.1 | | | | 232531 |
| UL002 | E | 2331 | 2334 | 99 | 18/1 | | | | cross flight 233143 |
| | | 2335 | 2338 | | | | | | Figure 8 |
| | | | | | | | | | Land 060 1750 |
| | | | | | | | | | static |
| | | | | | | | | | 1322.6 Hobbs |

Total Proj Lines: Lines Flown: Lines Remain: Online Time: Mob Time: Notes: Ordnance UTM 12

Sep 14, 2016-A (N704MD, SN7161)

SN7161 09 14 16 A
Quantum Spatial, Inc
(email Log daily to flight_log_distribution_list@quantumspatial.com)

Date: 09/14/2016
 Page 2 of 2

Project: Utah
 Flight Mgmt File: 20160914-154427

Aircraft: N704MD Begin Hobbs: 1348.1 End Hobbs: 1351.1 Total: 3 Pilot: Wagner Co-Pilot: Iverson
 Tech: Iverson

Dep Apt: OGD Dep Time (Lcl): 956 (Z): 1556 Arr Apt: OGD Arr Time (Local): 1255 (Z): 1855 Tot Time Aloft: 2:59

CORS: Y/N Sta 1: STA 2: UTAH16-08 Sta 2: UTAH16-09 Flyovers: Y/N If Y, times: Sta1) Sta2)
 Flyovers: Y/10 If Y, times: Sta1) Sta2)

GPS Unit: 7161 Serial # 7161 Alt AMSL Pulses In Air 1PIA
 OAT beg: °C End: °C OAT beg: °C End: °C

Altimeter begin: end:
 Max Gddpd Power 88%
 Avg Pt Spacing PFSM
 Pulse Rate 160KHZ

| Line # | Hdg | Start (UTC) | End (UTC) | Gd Spd | POOP/Sats | GPS Altitude | Crab | Turb (0-4) | FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc. |
|--------|-----|-------------|-----------|--------|-----------|--------------|------|------------|--------------------------------------------------------------|
| | | 1550 | | | | | | | 1348.1 Hobbs |
| | | 1556 | | | | | | | static |
| | | 1605 | | | | | | | Take off OGD 956 |
| | | 1612 | | | | | | | Figure 8 |
| 65L | | 1617 | 91 | 15/13 | | | | | 160914-161232 cross flight's Red Block |
| 2216 | W | 1621 | 1625 | 104 | 15/14 | | | | 160914-161232 FMSL-Utah-6SL-QL2-SN7161-rev 1 |
| 2215 | E | 1627 | 1631 | 92 | 17/12 | | | | 162129 |
| 2214 | W | 1633 | 1637 | 94 | 16/12 | | | | 162712 |
| 2213 | E | 1639 | 1644 | 96 | 15/13 | | | | 163307 |
| 2212 | W | 1645 | 1649 | 88 | 16/13 | | | | 163931 |
| 2211 | E | 1651 | 1655 | 85 | 15/15 | | | | 164530 |
| 2210 | W | 1657 | 1701 | 102 | 16/14 | | | | 165147 |
| | | | | | | | | | 165756 |
| | | | | | | | | | Red Block Complete! |
| | | | | | | | | | ATC on Hold for Airspace |
| | | | | | | | | | waiting permission to fly on Blue |

Total Proj Lines: 13
 Lines Flown: 1015/1051-WSBY

Online Time: 2.7
 Mob Time: Ordinance

Notes: UTM 12

Sep 16, 2016-A (N704MD, SN7161)

| | | |
|--------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/16/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|-----------------------|----------|----------|
| Wheels Up | 11:16:00 AM | 1:25:00 PM | | |
| Wheels Down | 12:11:00 PM | 6:00:00 PM | | |
| Begin Hobbs | | 11352 | | |
| End Hobbs | 11352 | 11356.6 | | |
| On-line Hobbs: 5.1 | | Mob Hobbs: 0.5 | | |

Notes

MN moved the one base south which delayed us an hour for wheels up until just after 11:00am. We had prepared a very clear plan for ATC the night before, so they were ready for us. At about that exact same time, the sensor crapped out on me. The message read "ALS did not start recording" and the shutter lens button and two other buttons disappeared off the bottom display of the monitor. I attempted to end the line, switch flightplans, and various other troubleshooting efforts which proved to be futile. We landed the plane, static'd, and shut down. EP checked with Sheboygan and Jeremy to confirm if it was ok to fly. We were given the greenlight and lifted again. We experienced no other issues with the sensor for the rest of the afternoon.

Flt Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1

Lines Flown:

F1-GSL2015-2017

Sep 16, 2016-B (N704MD, SN7161)

| | | |
|--------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/16/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|-----------------------|----------|----------|
| Wheels Up | 11:16:00 AM | 1:25:00 PM | | |
| Wheels Down | 12:11:00 PM | 6:00:00 PM | | |
| Begin Hobbs | | 11352 | | |
| End Hobbs | 11352 | 11356.6 | | |
| On-line Hobbs: 5.1 | | Mob Hobbs: 0.5 | | |

Notes

MN moved the one base south which delayed us an hour for wheels up until just after 11:00am. We had prepared a very clear plan for ATC the night before, so they were ready for us. At about that exact same time, the sensor crapped out on me. The message read "ALS did not start recording" and the shutter lens button and two other buttons disappeared off the bottom display of the monitor. I attempted to end the line, switch flightplans, and various other troubleshooting efforts which proved to be futile. We landed the plane, static'd, and shut down. EP checked with Sheboygan and Jeremy to confirm if it was ok to fly. We were given the greenlight and lifted again. We experienced no other issues with the sensor for the rest of the afternoon.

Flt Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1

Lines Flown:

F2-GSL2017-2020, 2039-2052

Sep 17, 2016-A (N704MD, SN7161)

| | | |
|---------------------------------|-------------------------|--------------------------------------|
| Date: 9/17/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|-----------------------|----------|----------|
| Wheels Up | 10:25:00 AM | | | |
| Wheels Down | 4:36:00 PM | | | |
| Begin Hobbs | 11356.6 | | | |
| End Hobbs | 11362.2 | | | |
| On-line Hobbs: 5.1 | | Mob Hobbs: 0.5 | | |

Notes

We got busy to the north chipping away at various blocks from the three flightplans. Into the afternoon, we finally received clearance to acquire the last lines near SLC but would have to jump in for 20 minutes, then jump out, then come back in because of various departure patterns from the ground.

I tried to manual fire a cross line on a block we had wrapped up to the north but did not cross over because we rushed down to the SLC airspace to grab the last five lines down there. I received the "ALS did not record" error message which resulted in the record button, and two other major buttons on the bottom panel of the display disappeared. I tried troubleshooting various ways and ultimately did a shutdown in the air. The sensor was not shutting down either, it froze as it was exiting the Leica program. Upon restarting I received a message saying, "GNSS-IMU is in course align status, position accuracy is reduced" which basically translates to: your attitude, position, and velocity are not being read by the satellites. We stayed in base range for more than ten minutes, performing s-turns and various maneuvers with no results for green lights on the GNSS-IMU status. The lights turned green but the error warning persisted and when we got online to finish the last three lines, the guidance line was all sorts of inaccurate. I called the flight.

There seems to be extra coverage in the north showing the trajectory of some maneuvers. We were unable to cross line the southern-most line set and the northern-most line set.

Flt Mgmt File:**Lines Flown:**

GSLW 1169-1161
GSL 2209-2203
GSLE 1119-1109
GSL 2057-2055

Sep 18, 2016-A (N704MD, SN7161)

| | | |
|--------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/18/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|-------------|---------------------|----------|----------|
| Wheels Up | 10:15:00 AM | | | |
| Wheels Down | 4:15:00 PM | | | |
| Begin Hobbs | 11362.2 | | | |
| End Hobbs | 11368.4 | | | |
| On-line Hobbs: 5.2 | | Mob Hobbs: 1 | | |

Notes

The West to east lines on GSLE 1108-1085 had a strong tail wind thus undulations in altitude and fluctuations in speed, but nothing that made us too fast or out of a reasonable altitude range.

Flt Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1

Lines Flown:

GSL 2053-2057

Sep 26, 2016-A (N704MD, SN7161)

| | | |
|---------------------------------|-------------------------|--------------------------------------|
| Date: 9/26/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: QL2 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 9:00:00 AM | | | |
| Wheels Down | 3:05:00 PM | | | |
| Begin Hobbs | 11391.6 | | | |
| End Hobbs | 11397.6 | | | |
| On-line Hobbs: 2.5 | | Mob Hobbs: 0.5 | | |

Notes

Perfect conditions for acquisition.

Flt Mgmt File: QL2

Lines Flown:

GSL2118-2100

Sep 27, 2016-A (N704MD, SN7161)

| | | |
|--------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 9/27/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1 | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 9:24:00 AM | | | |
| Wheels Down | 1:20:00 PM | | | |
| Begin Hobbs | 11397.6 | | | |
| End Hobbs | 11401.5 | | | |
| On-line Hobbs: 2.5 | | Mob Hobbs: 1.4 | | |

Notes

Juggled 4 flightplans between two blocks of reflies, the railroad across the lake, and moving E-W in the QL2 lines. We experienced lag again on startup when deleting old plans from internal memory, and again when switching through plans in flight. We flew over CORS Station P086 for W_QL1 reflly lines 1063-1065. We landed early as EP was experiencing pain and stiffness towards the end of the flight.

Flt Mgmt File: FMSL_Utah_GSL_QL2_SN7161_rev1

Lines Flown:

QL2: 2099-2094

Sep 28, 2016-A (N704MD, SN7161)

| | | |
|---------------------------------|-------------------------|--------------------------------------|
| Date: 9/28/2016 | Aircraft: N704MD | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: | | |
| Pilot: Eric Petersen | | Sensor Operator: Ian Romansky |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|-----------------------|------------|-------------------|----------|----------|
| Wheels Up | 8:55:00 AM | | | |
| Wheels Down | 3:07:00 PM | | | |
| Begin Hobbs | 11401.5 | | | |
| End Hobbs | 11407.7 | | | |
| On-line Hobbs: | | Mob Hobbs: | | |

Notes

Solid day with no sensor issues.

Oct 4, 2016-A (N22GE, SN7161)

| | | |
|--------------------------------------------------------|------------------------|-----------------------------------|
| Date: 10/4/2016 | Aircraft: N22GE | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_QL2_SN7161_22GE | | |
| Pilot: Cam Stevenson | | Sensor Operator: Mike Aust |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|----------------------------|-------------|------------------------|----------|----------|
| Wheels Up | 9:00:00 AM | 1:35:00 PM | | |
| Wheels Down | 12:45:00 AM | 3:40:00 AM | | |
| Begin Hobbs | 8863.8 | 8867.4 | | |
| End Hobbs | 8867.4 | 8869.3 | | |
| On-line Hobbs: 3.75 | | Mob Hobbs: 1.75 | | |

Notes

cal flight and project are under same folder for lift A, 2 different IPAS sessions.
 I'll work on quicklook apps for tomorrows collection.

Flt Mgmt File: FMSL_Utah_GSL_QL2_SN7161_22GE

Lines Flown:

2049-2059

Oct 4, 2016-B (N22GE, SN7161)

| | | |
|--------------------------------------------------------|------------------------|-----------------------------------|
| Date: 10/4/2016 | Aircraft: N22GE | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_Utah_GSL_QL2_SN7161_22GE | | |
| Pilot: Cam Stevenson | | Sensor Operator: Mike Aust |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|----------------------------|-------------|------------------------|----------|----------|
| Wheels Up | 9:00:00 AM | 1:35:00 PM | | |
| Wheels Down | 12:45:00 AM | 3:40:00 AM | | |
| Begin Hobbs | 8863.8 | 8867.4 | | |
| End Hobbs | 8867.4 | 8869.3 | | |
| On-line Hobbs: 3.75 | | Mob Hobbs: 1.75 | | |

Notes

cal flight and project are under same folder for lift A, 2 different IPAS sessions.
 I'll work on quicklook apps for tomorrows collection.

Flt Mgmt File: FMSL_Utah_GSL_QL2_SN7161_22GE

Lines Flown:

2072-2080

Oct 5, 2016-A (N22GE, SN7161)

| | | |
|-----------------------------------------------------------|------------------------|-----------------------------------|
| Date: 10/5/2016 | Aircraft: N22GE | Sensor: 7161 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: Utah LiDAR 2016 SN7161 N22GE QL2 | | |
| Pilot: Ted Radtke | | Sensor Operator: Mike Aust |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|----------------------------|-------------|------------------------|----------|----------|
| Wheels Up | 10:28:00 AM | | | |
| Wheels Down | 12:47:00 PM | | | |
| Begin Hobbs | 8869.3 | | | |
| End Hobbs | 8871.4 | | | |
| On-line Hobbs: 1.25 | | Mob Hobbs: 0.75 | | |

Notes

Able to collect lines 2071-2060 before being weathered out. INS2KML and .csv uploaded to operator uploads

Flt Mgmt File: Utah LiDAR 2016 SN7161 N22GE QL2

Lines Flown:

2060-2071

Nov 4, 2016-A (N208NR, SN8227)

| | | |
|----------------------------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 11/4/2016 | Aircraft: N208NR | Sensor: 8227 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_GSL_QL2_8227_1 Unplanned-20161104162105_1 | | |
| Pilot: Travis Peden | | Sensor Operator: Aaron Mallon |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|---------------------|----------|----------|
| Wheels Up | 8:30:00 AM | | | |
| Wheels Down | 3:40:00 PM | | | |
| Begin Hobbs | 4394.1 | | | |
| End Hobbs | 4401.3 | | | |
| On-line Hobbs: 6.2 | | Mob Hobbs: 1 | | |

Notes

Today we had wheels up at 0830 and targeted the QL1 and QL2 blocks. We completed the QL1 block and flew six lines from the QL2 block.

Flt Mgmt File: FMSL_GSL_QL2_8227_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|--------|------------|-----------|-------------|------------|----------|-------------|
| QL2006 | 3057.326 m | 16:24:39 | 20.46633405 | 3163.818 m | 16:28:34 | 21.09844466 |
| QL2005 | 3146.958 m | 16:29:38 | 21.23246485 | 3123.442 m | 16:33:05 | 21.54386957 |
| QL2004 | 3108.811 m | 16:34:15 | 21.70899383 | 3192.416 m | 16:37:10 | 22.17509881 |
| QL2003 | 3165.711 m | 16:38:11 | 22.29170292 | 3159.854 m | 16:40:36 | 22.49585636 |
| QL2002 | 3139.436 m | 16:41:36 | 22.62463792 | 3156.649 m | 16:43:39 | 22.94277983 |
| QL2001 | 3165.239 m | 16:44:47 | 23.06045565 | 3170.893 m | 16:46:06 | 23.16777933 |

Flt Mgmt File: Unplanned-20161104162105_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|-------|------------|-----------|-------------|------------|----------|-------------|
| UL001 | 3129.028 m | 16:47:56 | 23.40980955 | 3027.514 m | 16:50:23 | 23.66228518 |

Nov 6, 2016-A (N704MD, SN8121)

| | | |
|------------------------------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 11/6/2016 | Aircraft: N704MD | Sensor: 8121 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: Utah_GSL_QL2_SN8121_1 Unplanned-20161106201125_1 | | |
| Pilot: Travis Peden | | Sensor Operator: Aaron Mallon |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 1:20:00 PM | | | |
| Wheels Down | 7:05:00 PM | | | |
| Begin Hobbs | 11530.6 | | | |
| End Hobbs | 11536.3 | | | |
| On-line Hobbs: 5.3 | | Mob Hobbs: 0.4 | | |

Notes

Today TP and I waited for 704MD to arrive in Ogden so we could use 704MD to target the remaining lines in GSL_QL2. We had wheels up at 1320 and completed GSL_QL2.

Flt Mgmt File: Utah_GSL_QL2_SN8121_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|------|------------|-----------|-------------|------------|----------|-------------|
| 22 | 3098.401 m | 20:48:22 | 28.14769119 | 3076.889 m | 20:51:59 | 27.95512480 |
| 021 | 3059.683 m | 20:53:39 | 27.83020695 | 3044.175 m | 20:57:27 | 27.39271718 |
| 020 | 3036.600 m | 20:58:33 | 27.30342428 | 3087.439 m | 21:03:10 | 27.01681010 |
| 019 | 3083.258 m | 21:04:28 | 26.90953220 | 3103.760 m | 21:09:09 | 26.34019187 |
| 018 | 3105.135 m | 21:10:22 | 26.22721736 | 3050.746 m | 21:15:23 | 25.87089731 |
| 017 | 3117.332 m | 21:21:56 | 25.35183792 | 3100.604 m | 21:32:43 | 23.92472238 |
| 016 | 3062.595 m | 21:33:52 | 23.80289571 | 3061.465 m | 21:46:07 | 22.67540129 |
| 015 | 3087.096 m | 21:47:21 | 22.53430947 | 3108.872 m | 21:59:55 | 20.72263737 |
| 014 | 3091.892 m | 22:00:58 | 20.59669584 | 3113.539 m | 22:13:25 | 19.22096416 |
| 013 | 3116.034 m | 22:14:23 | 19.09752336 | 3072.279 m | 22:27:17 | 17.11488297 |
| 012 | 3093.770 m | 22:28:16 | 16.98600731 | 3132.209 m | 22:40:37 | 15.42388299 |
| 011 | 3141.132 m | 22:41:32 | 15.29624024 | 3115.608 m | 22:53:55 | 13.29331026 |
| 010 | 3088.826 m | 22:54:57 | 13.14711316 | 3129.252 m | 23:07:17 | 11.41929195 |
| 028 | 3138.868 m | 23:10:42 | 10.83904679 | 3111.391 m | 23:12:27 | 10.61902574 |
| 029 | 3112.392 m | 23:13:22 | 10.48021382 | 3029.434 m | 23:15:00 | 10.16922260 |
| 030 | 3074.045 m | 23:15:58 | 10.02086434 | 3118.734 m | 23:17:42 | 9.80190636 |
| 031 | 3066.806 m | 23:18:43 | 9.64490196 | 3030.961 m | 23:20:44 | 9.25746152 |
| 032 | 3050.075 m | 23:21:38 | 9.11943371 | 3101.628 m | 23:23:42 | 8.85680658 |
| 033 | 3093.489 m | 23:24:35 | 8.72010124 | 3096.270 m | 23:26:37 | 8.32596094 |
| 009 | 3067.001 m | 23:30:13 | 7.79352083 | 3093.470 m | 23:42:27 | 5.71985031 |
| 008 | 3095.446 m | 23:43:32 | 5.55376946 | 3085.870 m | 23:55:20 | 3.70727600 |
| 007 | 3056.005 m | 23:56:30 | 3.52200186 | 3080.993 m | 00:07:31 | 1.70039987 |

Flt Mgmt File: Unplanned-20161106201125_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|-------|------------|-----------|-------------|------------|----------|-------------|
| UL001 | 3143.369 m | 20:45:55 | 28.31834716 | 3141.798 m | 20:46:11 | 28.29249363 |

Nov 6, 2016-B (N704MD, SN8121)

| | | |
|------------------------------------------------------------------------------|-------------------------|--------------------------------------|
| Date: 11/6/2016 | Aircraft: N704MD | Sensor: 8146 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: Utah_GSL_QL2_SN8121_2 Unplanned-20161107001301_2 | | |
| Pilot: Travis Peden | | Sensor Operator: Aaron Mallon |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 1:20:00 PM | | | |
| Wheels Down | 7:05:00 PM | | | |
| Begin Hobbs | 11530.6 | | | |
| End Hobbs | 11536.3 | | | |
| On-line Hobbs: 5.3 | | Mob Hobbs: 0.4 | | |

Notes

Today TP and I waited for 704MD to arrive in Ogden so we could use 704MD to target the remaining lines in GSL_QL2. We had wheels up at 1320 and completed GSL_QL2.

Flt Mgmt File: Utah_GSL_QL2_SN8121_2

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|------|------------|-----------|--------------|------------|----------|--------------|
| 007 | 3115.799 m | 00:24:44 | -1.37656336 | 3169.492 m | 00:35:52 | -3.47650618 |
| 006 | 3144.440 m | 00:36:57 | -3.66355168 | 3104.122 m | 00:47:28 | -5.56720886 |
| 005 | 3090.525 m | 00:48:26 | -5.73426361 | 3083.732 m | 00:58:08 | -7.48642096 |
| 004 | 3138.362 m | 00:59:09 | -7.66263062 | 3118.874 m | 01:08:39 | -9.41618576 |
| 003 | 3039.446 m | 01:10:05 | -9.66860797 | 3062.011 m | 01:18:36 | -11.20254918 |
| 002 | 3075.520 m | 01:19:47 | -11.41280342 | 3067.459 m | 01:27:45 | -12.91573545 |
| 001 | 3109.811 m | 01:30:43 | -13.44486859 | 3111.669 m | 01:35:24 | -14.28521726 |

Flt Mgmt File: Unplanned-20161107001301_2

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|-------|------------|-----------|--------------|------------|----------|--------------|
| UL001 | 3115.127 m | 01:37:15 | -14.61248344 | 3081.628 m | 01:42:49 | -15.86929353 |

Nov 30, 2016-A (N208NR, SN8146)

| | | |
|--------------------------------------------------------------------------------------|-------------------------|---------------------------------------|
| Date: 11/30/2016 | Aircraft: N208NR | Sensor: 8146 |
| Project: Utah 2016 LiDAR | | Project #: R029083 |
| Flight Mgmt File: FMSL_GSL_Shoreline_QL2_8146_1 Unplanned-20161130210204_1 | | |
| Pilot: Brian Butler | | Sensor Operator: Drew Johnston |

| | Flight 1 | Flight 2 | Flight 3 | Flight 4 |
|---------------------------|------------|-----------------------|----------|----------|
| Wheels Up | 1:11:00 PM | | | |
| Wheels Down | 2:36:00 PM | | | |
| Begin Hobbs | 4440.5 | | | |
| End Hobbs | 4441.9 | | | |
| On-line Hobbs: 0.5 | | Mob Hobbs: 0.9 | | |

Notes

CORS P121. We waited several hours for clouds to open up, but we got a shot and acquired the lines with no serious hiccups. The OC60 display did turn upside down with 3 lines left. We continued as advised by Brett, and on the way to KOGD I shut it down and noticed the System cable was loose. I pushed it in, restarted to make sure, and it was fixed.

Flt Mgmt File: FMSL_GSL_Shoreline_QL2_8146_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|------|------------|-----------|-------------|------------|----------|-------------|
| 01 | 3123.668 m | 21:09:31 | 21.73476018 | 3128.278 m | 21:10:31 | 21.63500980 |
| 02 | 3141.613 m | 21:12:05 | 21.50744446 | 3136.686 m | 21:13:14 | 21.42035137 |

Flt Mgmt File: Unplanned-20161130210204_1

| Name | AltStart | TimeStart | SunAngStrt | AltEnd | TimeEnd | SunAngEnd |
|-------|------------|-----------|-------------|------------|----------|-------------|
| UL001 | 3149.432 m | 21:16:04 | 21.14241221 | 3146.698 m | 21:16:51 | 21.09973236 |