

# **飛航事故調查報告**

**ASC-AOR-07-12-001**

**中華民國 95 年 7 月 14 日  
遠東航空公司 EF066 班機  
MD-83 型機  
國籍標誌及登記號碼 B-28031  
於台北/松山機場落地時右主輪曾偏出跑道**

**行政院飛航安全委員會  
AVIATION SAFETY COUNCIL**

**中華民國 96 年 12 月**



依據中華民國飛航事故調查法及國際民航公約第 13 號附約，本調查報告僅供改善飛航安全之用。

### 中華民國飛航事故調查法第五條：

飛安會對飛航事故之調查，旨在避免類似飛航事故之再發生，不以處分或追究責任為目的。

### 國際民航公約第十三號附約第三章第 3.1 節規定：

*The sole objective of the investigation of an accident or incident shall be the prevention of accidents and incidents. It is not the purpose of this activity to apportion blame or liability.* (失事或重大意外事件調查之唯一目的為防止失事或重大意外事件，分攤責任或追究責任並非調查作業之目的。)

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## 摘要報告

民國 95 年 7 月 14 日，遠東航空股份有限公司（以下簡稱遠東）EF 066 班機，機型 MD-83，國籍標誌及登記號碼 B-28031，由花蓮機場飛抵台北/松山國際機場（以下簡稱松山機場），實施 10 號跑道 ILS 進場，台北時間 1915 時落地。該機落地後檢查發現，右起落架纏有雜草，依據現場勘查結果，於距 10 跑道頭約 1,950 呎處有一偏出跑道南側之輪胎軌跡，並於約 3,600 呎處重行進入跑道。該機由 CM-1 擔任操控駕駛員（Pilot Flying, PF），CM-2 擔任監控駕駛員（Pilot Monitoring, PM），機載共 57 人均安。

本會依據「飛航事故調查法」及參照國際民航公約第 13 號附約（Annex 13 to the Convention on International Civil Aviation），為負責獨立調查發生於我國境內之民用航空器飛航事故之政府機關，於本事故發生後立即展開調查作業。受邀參與本次調查之機關（構）包括：交通部民用航空局及遠東航空股份有限公司。

本會依「飛航事故調查法」、「民用及公務航空器調查作業處理規則」及「飛航事故調查標準作業程序」完整執行調查作業及相關程序，於 96 年 4 月 11 日發布本事故調查事實資料報告，同時展開分析作業。於 96 年 10 月 29 日舉行「分析結果說明會」，聽取參與調查相關機關（構）對調查分析內容之意見。綜整相關意見後，於 96 年 10 月 30 日將「調查報告草案」密送相關機關（構），請其提供意見。經專案調查小組參採相關機關（構）之回覆意見，匯整本調查報告草案之內容後，於 96 年 12 月 25 日提請本會第 107 次委員會議審核通過，並於 96 年 12 月 31 日依法對外發布。

本調查報告格式係參照國際民航公約第 13 號附約之規定撰寫，唯有以下不同處：

第三章「結論」部分：為彰顯改善飛安之宗旨，依「飛航事故調查法」第五

條避免類似事故再發生，不以處分或追究責任為目的之調查精神，本會第 74 次委員會議決議，不再直接陳述「事故可能肇因及間接因素」，而以「調查發現」代之，並將其分為 3 類，即：「與可能肇因相關之調查發現」，「與風險相關之調查發現」以及「其他調查發現」。

第四章「飛安改善建議」部分：除對有關機關提出改善建議外，本會並將各參與機關提出之已實施或實施中之安全措施納入調查報告。此做法與澳大利亞運輸安全局（Australia Transportation Safety Bureau, ATSB）及加拿大運輸安全委員會（Transportation Safety Board Canada, TSB）等先進國家相同，亦符合第 13 號附約之原則，本會認為此舉更能達成改善飛航安全之目的。

本會依據分析資料提出以下之調查發現及改善建議。

## 調查發現

### 與可能肇因有關之調查發現

此類調查發現係屬已經顯示或幾乎可以確定為與本次事故發生有關之重要因素。其中包括：不安全作為、不安全狀況或造成本次事故之安全缺失等。

1. 該機於夜間落地前，因雨勢增大，影響駕駛員對外視線，僅跑道邊燈供參考，致於該機繼續向右偏移時，未能及時發現並修正，於該機著陸後約 6 秒鐘，右主輪偏出跑道，肇致本次事故。(2.2.5)

### 與風險有關之調查發現

此類調查發現係涉及飛航安全之風險因素，包括未直接導致本次事故發生之不安全作為、不安全條件及組織與整體性之安全缺失等，以及雖與本次事故無直接關連但對促進飛安有益之事項。

1. 該機於進場落地前，遭遇向東移動且接近松山機場，寬度約 1.5 公里的強

對流區，落地前後風向風速穩定，但觸地前遭遇大陣雨影響其能見度。

(2.4.1)

2. 駕駛員若發現變大之雨勢可能影響落地安全，應立即實施迷失進場程序，避免事故之發生。(2.2.4)
3. 遠東航務手冊第 8.9.13 節所述之『...失去有效跑道目視參考物...』，執行時不易具體評量。(2.2.4)
4. 松山機場 10 號跑道邊燈間距符合「民用機場設計暨運作規範」中第 I 類精確進場跑道建議設置跑道中心線燈之條件。(2.5)

### 其他調查發現

此類調查發現係屬具有促進飛航安全、解決爭議或澄清疑慮之作用者。其中部份調查結果為大眾所關切，且見於國際調查報告之標準格式中，以作為資料分享、安全警示、教育及改善飛航安全之用。

1. 該機駕駛員持有之證照及任務派遣，符合民航法規要求。(2.1)
2. 事故前 72 小時內之作息正常，無證據顯示事故發生時曾受生理、心理、藥物或酒精之影響。(2.1)
3. 該機進場落地情況，符合遠東航務手冊所列「穩定進場」、「下降低於 DA/MDA 條件」、「標準操作程序」有關落地等之要求。(2.2)
4. 該機主輪著陸後約 6 秒，右主輪滑出道面（空速 106 趼/時），約 10 秒後重回道面（空速 61 趼/時）。(2.2.3.3)

### 飛安改善建議

### 致交通部民用航空局

1. 未來松山機場整建跑道時考量增設跑道中心線燈，以提高低能見度進場時駕駛員之目視參考。(ASC-ASR-07-12-001)

**致遠東航空公司**

1. 要求駕駛員若發現跑道能見度驟降，可能影響落地安全，應立即實施迷失進場程序。(ASC-ASR-07-12-002)
2. 重新審視航務手冊第 8.9.13 節實施迷失進場時機之用語。  
(ASC-ASR-07-12-003)

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## 英文縮寫對照表

|       |   |             |
|-------|---|-------------|
| AFM   | Airplane Flight Manual                    | 飛航手冊        |
| AIP   | Aeronautical Information Publication      | 台北飛航情報區飛航指南 |
| ATIS  | Automatic Terminal Information Service    | 終端資料自動廣播服務  |
| AWOS  | Automated Weather Observation Systems     | 自動天氣觀測系統    |
| CVR   | Cockpit Voice Recorder                    | 座艙語音記錄器     |
| EPR   | Engine Pressure Ratio                     | 發動機壓力比      |
| FCOM  | Flight Crew Operation Manual              | 飛航組員操作手冊    |
| FDR   | Flight Data Recorder                      | 飛航資料記錄器     |
| FDAU  | Flight Data Accquisition Unit             | 飛航資料擷取系統    |
| FOD   | Foreign Object Damage                     | 外物損傷        |
| FOM   | Flight Operation Manual                   | 航務手冊        |
| GPWS  | Ground Proximity Warning System           | 地面接近警示系統    |
| GS    | Glide Slope                               | 下滑道         |
| ICAO  | International Civil Aviation Organization | 國際民航組織      |
| ILS   | Instrument Landing System                 | 儀器降落系統      |
| LDA   | Localizer Directional Aid                 | 左右定位輔助台     |
| LLWAS | Low Level Wind Shear Alert System         | 低空風切警告系統    |
| LOC   | Localizer                                 | 左右定位台       |
| M.A.C | Mean Aerodynamic Chord                    | 平均氣動力弦      |
| MDA   | Minimun Decision Altitude                 | 最低下降高度      |
| NOTAM | Notices to Airman                         | 飛航公告        |
| PF    | Pilot Flying                              | 操控駕駛員       |
| PM    | Pilot Monitoring                          | 監控駕駛員       |
| RWY   | Runway                                    | 跑道          |
| SSFDR | Solid State Flight Data Recorder          | 固態式飛航資料記錄器  |

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# 第一章 事實資料

## 1.1 飛航經過

民國 95 年 7 月 14 日，遠東航空股份有限公司（以下簡稱遠東）EF 066 班機，機型 MD-83，國籍標誌及登記號碼 B-28031，由花蓮機場飛抵台北/松山國際機場（以下簡稱松山機場），實施 10 號跑道 ILS 進場，台北時間 1915 時<sup>1</sup>落地。該機落地後檢查發現，右起落架纏有雜草，依據現場勘查結果，於距 10 跑道頭約 1,950呎處有一偏出跑道南側之輪胎軌跡，並於約 3,600呎處重行進入跑道。該機由 CM-1<sup>2</sup>擔任操控駕駛員（Pilot Flying, PF），CM-2<sup>3</sup>擔任監控駕駛員（Pilot Monitoring, PM），機載共 57 人均安。

## 1.2 人員傷害

該機載有駕駛員 2 人，客艙組員 4 人，乘客 51 人，合計 57 人，人員無傷亡，人員傷亡如表 1.2-1。

表 1.2-1 人員傷亡表

| 傷亡情形      | 組員  | 乘客   | 其他  | 總計   |
|-----------|-----|------|-----|------|
| 死 亡       | 0   | 0    | 0   | 0    |
| 重 傷       | 0   | 0    | 0   | 0    |
| 輕 傷 / 無 傷 | 0/6 | 0/51 | 0/0 | 0/57 |
| 總 計       | 6   | 51   | 0   | 57   |

## 1.3 損害情況

### 1.3.1 航空器

落地後檢查發現，右主起落架及輪艙區域有大量雜草附著如圖 1.3-1，右內側

<sup>1</sup> 本報告時間均係台北本地時間，採 24 小時制。

<sup>2</sup> 在左座，係本班機機長。

<sup>3</sup> 在右座，係副駕駛員。

襟翼下方有一長約 3/4 吋之刮傷，其餘結構無損傷。



圖 1.3-1 右起落架附著雜草情況

後續檢查發現，右主輪輪胎（No.3 及 No.4）有多處傷痕，No.3 主輪上一傷痕處露出帆布層。左主輪、鼻輪、反推力系統、煞車與防滑系統皆無異常發現。

### 1.3.2 跑道邊燈

檢視事故現場發現，該機右主輪地面滑行軌跡通過距 10 號跑道頭 2,050呎、2,150呎、3,030呎、3,130呎及 3,230呎等 5 盞跑道邊燈處，該 5 盞跑道邊燈之殘骸如圖 1.3-2。



圖 1.3-2 跑道邊燈損害

### 1.3.3 量測資料

事故現場勘查結果：於 10 跑道右側（千呎牌 2 至 3 區段）發現該機右主輪偏出跑道之地面軌跡，如圖 1.3-3 及圖 1.3-4。

依據事故現場量測資料<sup>4</sup>，右主輪外側距 10 號跑道頭約 1,950 呎處偏出跑道右側道面，約 1,650 呎後（即 3,600 呎處）重返跑道，偏出之最大距離約 15 呎，如圖 1.3-5 所示，圖 1.3-6 為滑出區域放大圖。

<sup>4</sup> 事故現場量測係使用差分衛星定位系統（Differential GPS），定位精度優於 1 公尺。

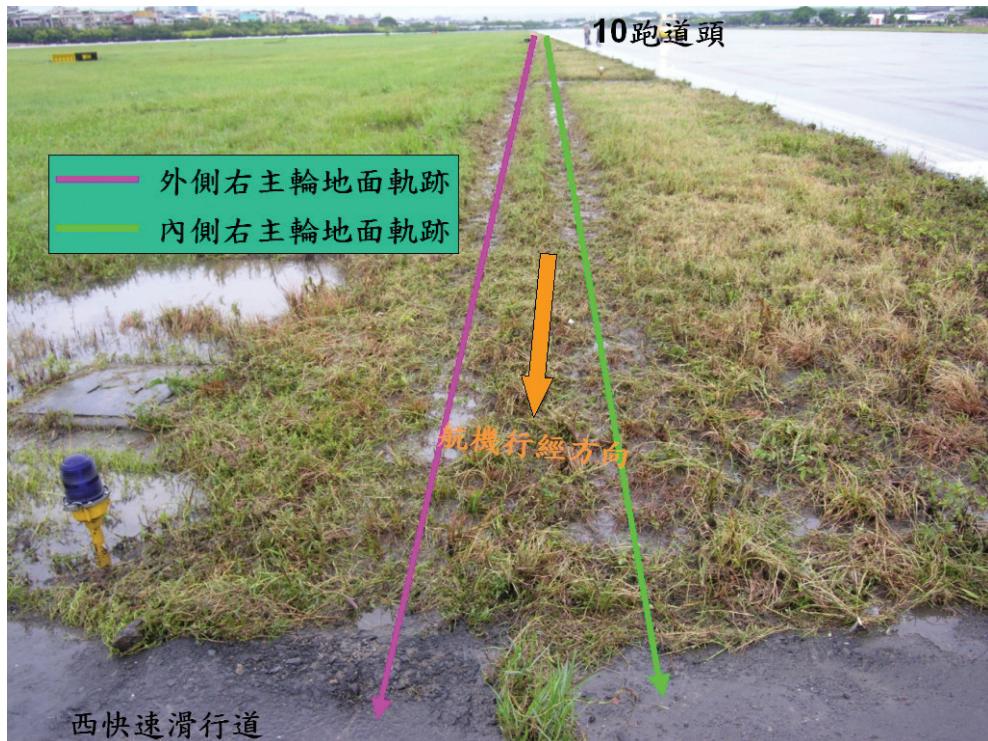


圖 1.3-3 事故機地面軌跡（10 跑道頭至西快速滑行道區段）

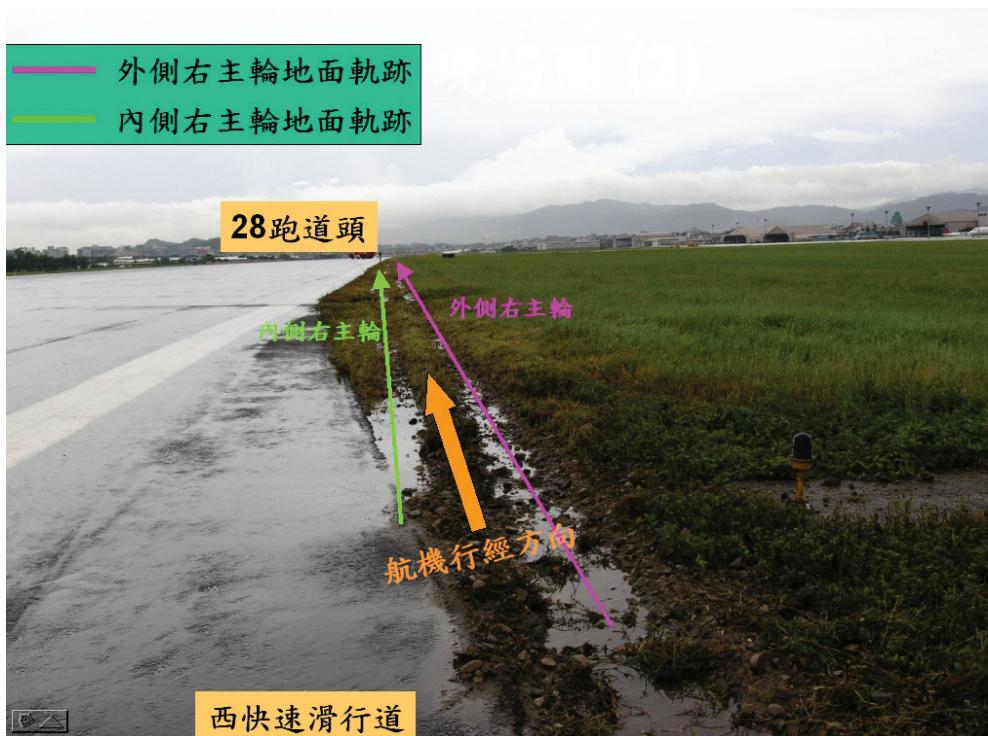


圖 1.3-4 事故機地面軌跡（西快速滑行道至千呎牌 3 區段）



圖 1.3-5 現場量測地面軌跡與衛星地圖之套疊圖

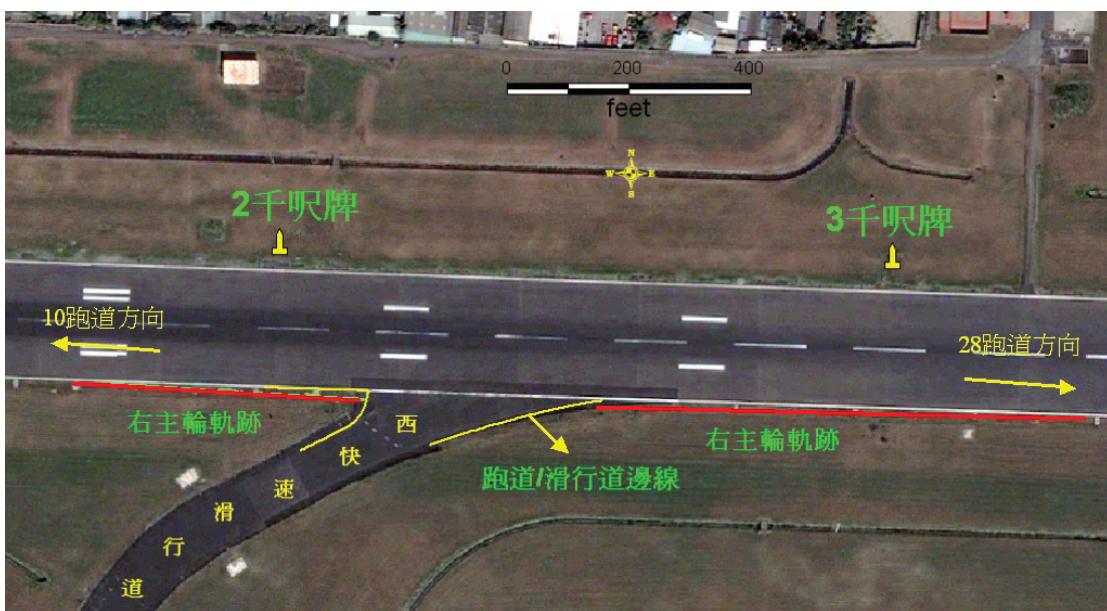


圖 1.3-6 現場量測地面軌跡與衛星地圖之套疊放大圖

## 1.4 人員資料

### 1.4.1 駕駛員經歷

#### 1.4.1.1 CM-1

中華民國籍，曾任軍事駕駛員，軍事飛航時間 3,329:25 小時。民國 85 年 10 月進入遠東，擔任 MD-80s 型機副駕駛員，民國 94 年 6 月晉升為 MD-80s 型機正駕駛員。MD-80s 型機飛航時間 6,998:51 小時，總飛航時間 10,328:16 小時。

#### 1.4.1.2 CM-2

中華民國籍，係自訓駕駛員，初始訓練飛航時間 250:12 小時。民國 85 年 10 月進入遠東，87 年 8 月晉升為 MD-80s 型機第二副駕駛員，89 年 6 月晉升為 MD-80s 型機副駕駛員。MD-80s 型機飛航時間 5,464:27 小時，總飛航時間 5,714:39 小時。

#### 1.4.1.3 基本資料

駕駛員基本資料如表 1.4-1。

表 1.4-1 駕駛員基本資料表

| 項目           | CM-1                       | CM-2                       |
|--------------|----------------------------|----------------------------|
| 性別           | 男                          | 男                          |
| 事故發生時年齡(歲)   | 54                         | 36                         |
| 進入公司日期       | 85 年 10 月 01 日             | 85 年 10 月 02 日             |
| 執業證書種類       | ATPL – AEROPLANE<br>101960 | ATPL – AEROPLANE<br>102516 |
| 檢定證項目        | MD-80s                     | MD-80s F/O                 |
| 終止日期         | 99 年 02 月 01 日             | 99 年 06 月 24 日             |
| 體格檢查種類       | 甲類駕駛員                      | 甲類駕駛員                      |
| 終止日期         | 95 年 07 月 31 日             | 95 年 09 月 30 日             |
| 最近一次飛航檢定     | 95 年 05 月 20 日             | 95 年 05 月 21 日             |
| 總飛航時間        | 10,328 小時 16 分             | 5,714 小時 39 分              |
| 最近 12 個月飛航時間 | 784 小時 37 分                | 730 小時 35 分                |
| 最近 90 日內飛航時間 | 202 小時 32 分                | 199 小時 28 分                |
| 最近 30 日內飛航時間 | 80 小時 54 分                 | 87 小時 32 分                 |
| 最近 7 日內飛航時間  | 17 小時 37 分                 | 17 小時 00 分                 |
| MD-80s 飛航時間  | 6,998 小時 51 分              | 5,464 小時 27 分              |
| 事故日已飛時間      | 2 小時 16 分                  | 2 小時 16 分                  |
| 事故前休息時間      | 24 小時以上                    | 24 小時以上                    |

## 1.4.2 駕駛員訓練及考驗紀錄

### 1.4.2.1 CM-1

**升等訓練：**民國 93 年 11 月 8 日至 94 年 2 月 1 日實施 MD-80s 型機正駕駛員升等地面學科及模擬機訓練，2 月 2 日模擬機考驗合格。5 月完成航路訓練，考驗合格。

**定期複訓：**CM-1 於本次事故前三年內之定期複訓與檢定，無不正常紀錄。

### 1.4.2.2 CM-2

**定期複訓：**CM-2 三年內之定期複訓與檢定之紀錄，與本次事故無直接相關。

## 1.4.3 駕駛員健康狀況

### 1.4.3.1 CM-1

民航局核發 CM-1 之體格檢查及格證中之「限制」欄註明，該員：「視力需戴眼鏡矯正」。事故當日 2020 時執行之酒精檢測，測定值為零。

### 1.4.3.2 CM-2

民航局核發 CM-2 之體格檢查及格證之「限制」欄無註記事項。事故當日 2021 時執行之酒精檢測，測定值為零。

## 1.4.4 駕駛員事故前 72 小時活動

### 1.4.4.1 CM-1

7月12日：約1045時，到公司報到。1125時起飛，執行松山→小港→松山→小港→松山→小港→松山任務，1945時落地後下班，計已執行6次落地。

7月13日：在家待命，約2200時就寢。

7月14日：起床後在家休息。約1405時，到公司報到。1525時起飛，執行松山→花

蓮→松山→花蓮→松山任務，1915時落地發生本次事故（原訂後續之松山→小港→松山任務取消），計已執行4次落地。

#### 1.4.4.2 CM-2

7月12日：約1340時，到公司報到。1425時起飛，執行松山→豐年→松山→金門→松山任務，1925時落地後下班，計已執行4次落地。

7月13日：在家待命，約2300時就寢。

7月14日：起床後在家休息。約1430時，到公司報到。1525時起飛，執行松山→花蓮→松山→花蓮→松山任務，1915時落地發生本次事故（原訂後續之松山→小港→松山任務取消），計已執行4次落地。

### 1.5 航空器資料

#### 1.5.1 航空器基本資料

事故機基本資料如表 1.5-1 所示：

表 1.5-1 航空器及發動機基本資料表

| 航空器基本資料   |                               |
|-----------|-------------------------------|
| 國籍        | 中華民國                          |
| 國籍標誌及登記號碼 | B-28031                       |
| 所有人       | Airplanes IAL Finance Limited |
| 使用人       | 遠東航空股份有限公司                    |
| 登記證書編號    | 87-702                        |
| 登記證書發證日期  | 民國 87 年 03 月 31 日             |
| 適航證書編號    | 95-03-029                     |
| 適航證書有效期限  | 民國 96 年 02 月 28 日             |
| 飛機總使用時間   | 28,846 小時 03 分                |
| 飛機總落地次數   | 30,314                        |
| 上次週檢種類    | A Check                       |
| 上次週檢完成日期  | 民國 95 年 04 月 28 日             |

|            |   |
|------------|---|
| 上次週檢後使用時間  | 368 小時 18 分                               |
| 上次週檢後落地次數  | 619                                       |
| 機身基本資料     |   |
| 製造廠        | The Boeing Aircraft Company               |
| 型號         | MD-83                                     |
| 序號         | 49950                                     |
| 製造日期       | 1991 年 11 月                               |
| 最大起飛重量     | 160,000 LBS                               |
| 發動機基本資料    |   |
| 製造廠        | Pratt & Whitney USA                       |
| 型別         | JT8D-219 (#1 / #2)                        |
| 序號         | #1 / P726030 ; #2 / P725800               |
| 起飛最大 N1 轉速 | 8,350 rpm                                 |
| 起飛最大 N2 轉速 | 12,550 rpm                                |
| 起飛最大推力     | 21,700 LBS                                |
| 使用總時間      | #1 / 20,745 小時 30 分 ; #2 / 18,520 小時 23 分 |
| 上次週檢種類     | A Check                                   |
| 上次週檢完成日期   | 民國 94 年 04 月 28 日                         |
| 上次週檢後使用時間  | 368 小時 18 分 (#1 / #2)                     |

### 1.5.2 載重與平衡

該機起飛重量依遠東航空經核准之營運規範限制為 143,000 磅，最大落地重量限制為 139,500 磅。最大零油重量限制為 122,000 磅。起飛及落地之重心位置均在許可範圍內，載重及平衡相關資料如表 1.5-2。

表 1.5-2 事故機載重及平衡相關資料表

|      |              |
|------|--------------|
| 零油重量 | 93,970 磅     |
| 起飛油量 | 19,200 磅     |
| 起飛總重 | 113,170 磅    |
| 起飛重心 | 13.7% M.A.C. |
| 航行耗油 | 3,201 磅      |
| 落地重量 | 109,969 磅    |
| 落地重心 | 12.6% M.A.C. |

## 1.6 天氣資料

### 1.6.1 天氣概述

輕度颱風碧利斯（BILIS），7月10日由熱帶性低氣壓增強為輕度颱風，並持續向西北方向移動，朝台灣前進。13日約2220時由宜蘭頭城附近登陸，14日1134時松山機場解除颱風警報，15日減弱為熱帶性低氣壓。

14日1900時紅外線衛星雲圖如圖1.6-1、2000時地面天氣分析圖，如圖1.6-2

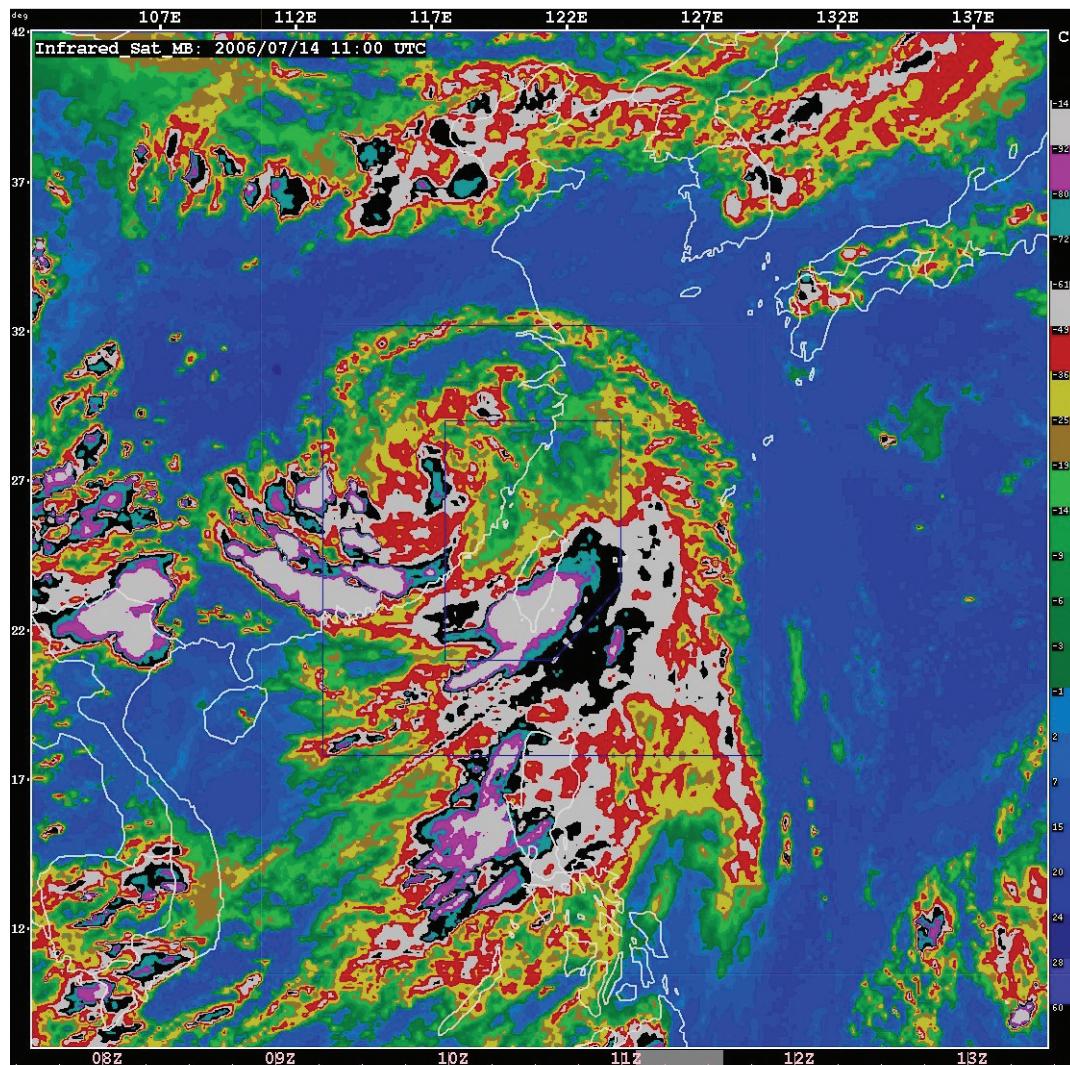


圖 1.6-1 14 日 1900 時紅外線衛星雲圖

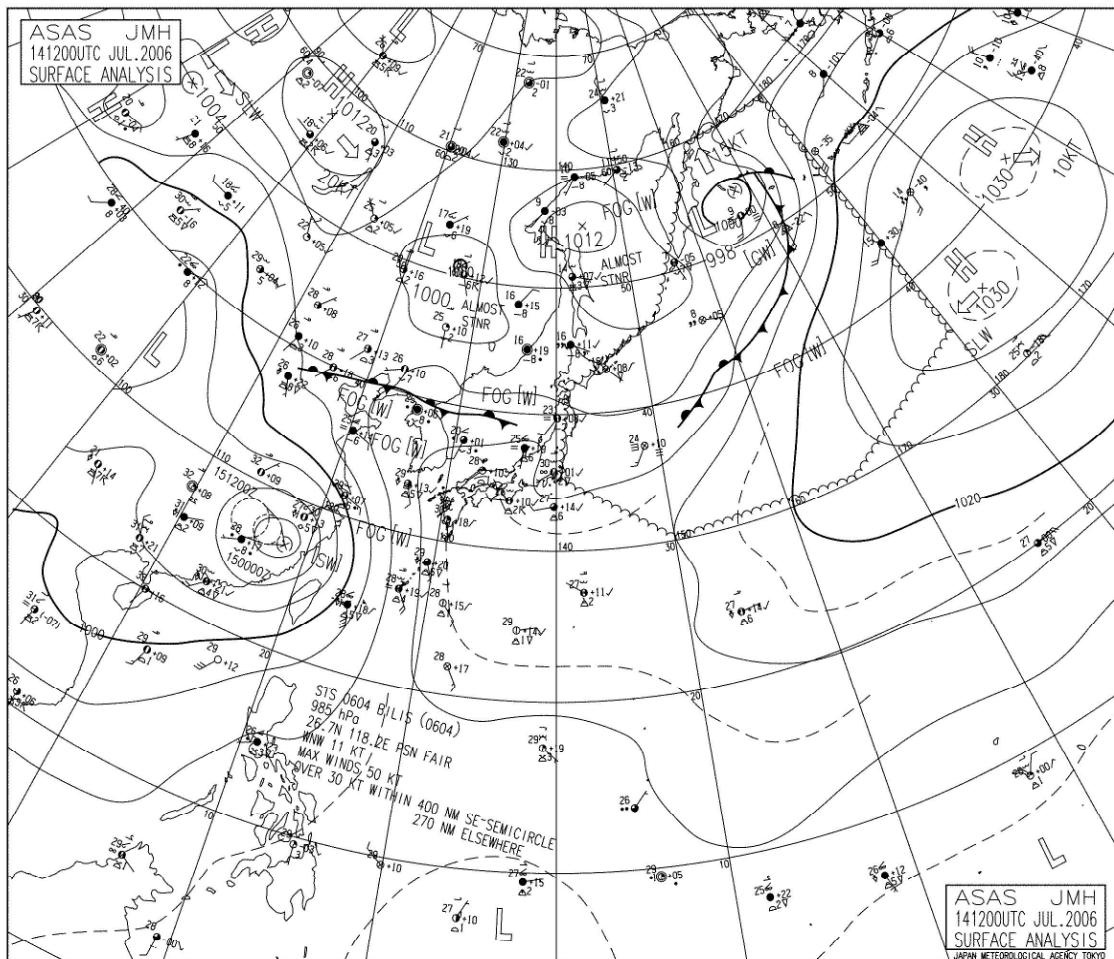


圖 1.6-2 14 日 2000 時地面天氣分析圖

7月14日台北航空氣象中心於1400時發布之低層（地面至10,000呎）顯著危害天氣預測圖如圖1.6-3所示：

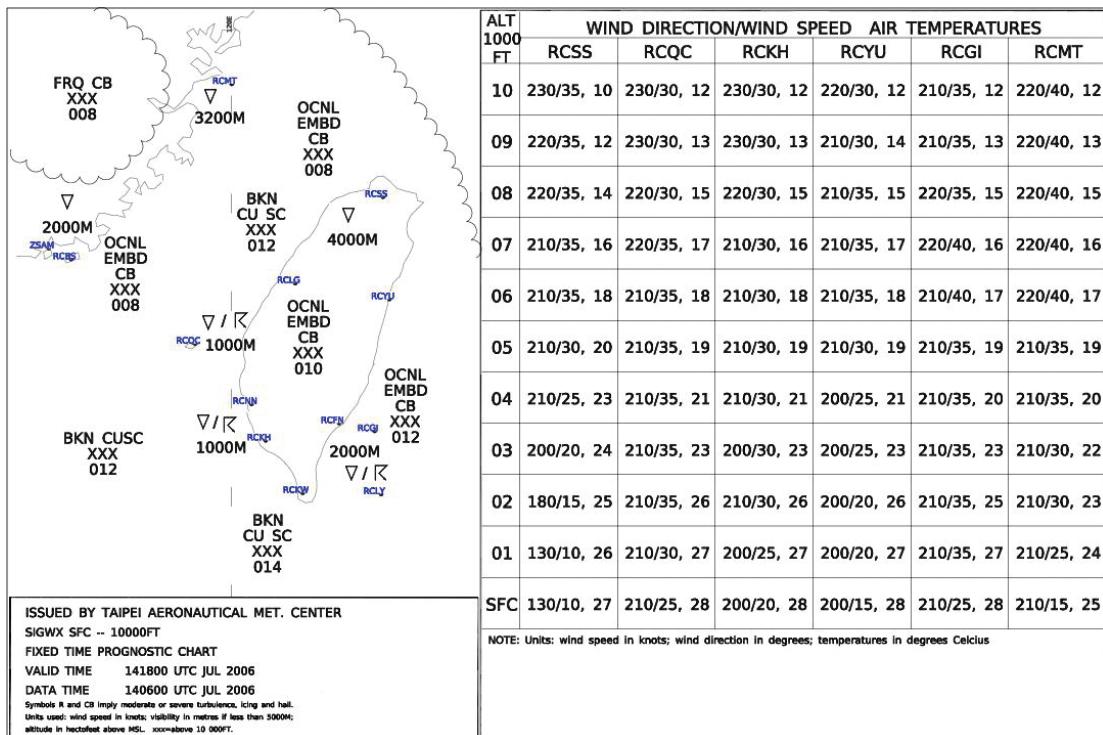


圖 1.6-3 1400 時發布之低層顯著危害天氣預測圖

7月14日1600時發布之松山機場終點機場預報如下：

有效時間 14 日 1700 時至 15 日 0200 時；風向 100°，風速 5 浬/時；能見度 8,000 公尺；天氣現象—雨；稀雲 1,500 呎、裂雲 3,000 呎、裂雲 6,000 呎。暫時性變動：時間 14 日 1700 時至 15 日 0200 時；風向不定，風速 5 浬/時；能見度 5,000 公尺；天氣現象—陣雨；稀雲 100 呎、裂雲 1,800 呎、裂雲 3,000 呎。

## 1.6.2 地面天氣觀測

松山機場地面天氣觀測紀錄：

1900 時：風向 250 度，風速 1 浬/時<sup>5</sup>；能見度 8,000 公尺；小陣雨<sup>6</sup>；稀雲 800

<sup>5</sup> 風向風速資料為 10 分鐘平均值。

<sup>6</sup> Up to 0.10 inch per hour; maximum 0.01 inch in 6 minutes. From scattered drops that, regardless of duration, do not completely wet an exposed surface up to a condition where individual drops are easily seen.

呎、裂雲 2,500 呎、裂雲 6,000 呎；溫度 27°C、露點 25°C；高度表撥定值 992 百帕；趨勢預報—無顯著天氣變化；Remark—QFF 993.2 百帕、降雨量 0.60 公厘。

1909 時：風向不定，風速 3 浬/時；能見度 3,000 公尺；陣雨<sup>7</sup>；稀雲 500 呎、裂雲 2,000 呎、裂雲 3,500 呎；溫度 28°C、露點 25°C；高度表撥定值 993 百帕。

1914 時：風向不定，風速 3 浬/時；能見度 2,000 公尺；大陣雨<sup>8</sup>；稀雲 500 呎、裂雲 2,000 呎、裂雲 3,500 呎；溫度 28°C、露點 25°C；高度表撥定值 993 百帕。

1917 時：風向 020 度，風速 4 浬/時，風向變動範圍 310 度至 090 度；能見度 1,200 公尺；跑道視程—R10/1,700 公尺，趨勢上升；大陣雨；稀雲 500 呎、裂雲 1,200 呎、密雲 3,000 呎；溫度 27°C，露點 25°C；高度表撥定值 993 百帕。

1900-2000 時降雨量 19.0 公厘。

松山機場地面自動觀測系統（Automated Weather Observation Systems, AWOS）及低空風切警報系統（Low Level Wind Shear Alert System, LLWAS）於 1914:30 時至 1915:30 時之風向風速紀錄資料，詳如附錄一與附錄二。

### 1.6.3 風切警訊

松山機場低空風切警報系統於事故前後 1 小時中，僅 1920:20 時至 1921:20 時曾發布低空風切警報，如表 1.6-1。事故前後 1 小時中無航機遭遇低空風切之空中

<sup>7</sup> 0.11 inch to 0.30 inch per hour; more than 0.01 inch to 0.03 inch in 6 minutes. Individual drops are not clearly identifiable; spray is observable just above pavements and other hard surfaces.

<sup>8</sup> More than 0.30 inch per hour; more than 0.03 inch in 6 minutes. Rain seemingly falls in sheets; individual drops are not identifiable; heavy spray to height of several inches is observed over hard surfaces.

報告。

表 1.6-1 松山機場低空風切警告系統發布之風切警告內容

| 時間              | 警告內容   |
|-----------------|--|
| 1920:20-1920:30 | 10 跑道離場，風切警報，跑道上空，風速減量 15 浬。<br>10 跑道進場，風切警報，五邊一浬，風速減量 15 浬。 |
| 1920:40-1921:20 | 10 跑道離場，風切警報，跑道上空，風速減量 15 浬。<br>10 跑道進場，風切警報，跑道上空，風速減量 15 浬。 |

## 1.7 場站資料

### 1.7.1 一般資料

松山機場位於台北市中心東北方 2.6 浬，機場參考點位置位於北緯 25 度 04 分 10 秒，東經 121 度 33 分 06 秒，機場參考代碼 4D。

依據台北飛航情報區飛航指南 (Aeronautical Information Publication, AIP)，松山機場 10 號跑道長度為 2,605 公尺，寬度為 60 公尺，並設置有跑道千呎牌、跑道名稱標線、跑道中心線、跑道邊線標線、跑道頭標線、著陸點標線、著陸區標線、及進場與跑道燈光設備，如表 1.7-1 及圖 1.7-1。10 號跑道之儀器降落設備有左右定位台、滑降台及測距儀。

表 1.7-1 10 號跑道進場及跑道燈光設備

| 進場燈                                    | 跑道頭燈       | 目視進場<br>滑降指示燈<br>(最低眼高)   | 跑道邊燈                                    | 跑道末端燈      | 緩衝區燈               |
|--|------------|---------------------------|---|------------|--------------------|
| SSALR <sup>9</sup><br>長度 720m<br>簡式強光燈 | 綠色<br>無翼排燈 | PAPI<br>左/3 度<br>(65.15呎) | 總長度<br>2,620m<br>間距 60m<br>黃色與白色<br>高亮度 | 紅色<br>無翼排燈 | 160 公尺<br>紅色<br>單向 |

<sup>9</sup> 簡易式高亮度進場燈光系統，配有跑道對正指示燈，屬 FAA 規範。

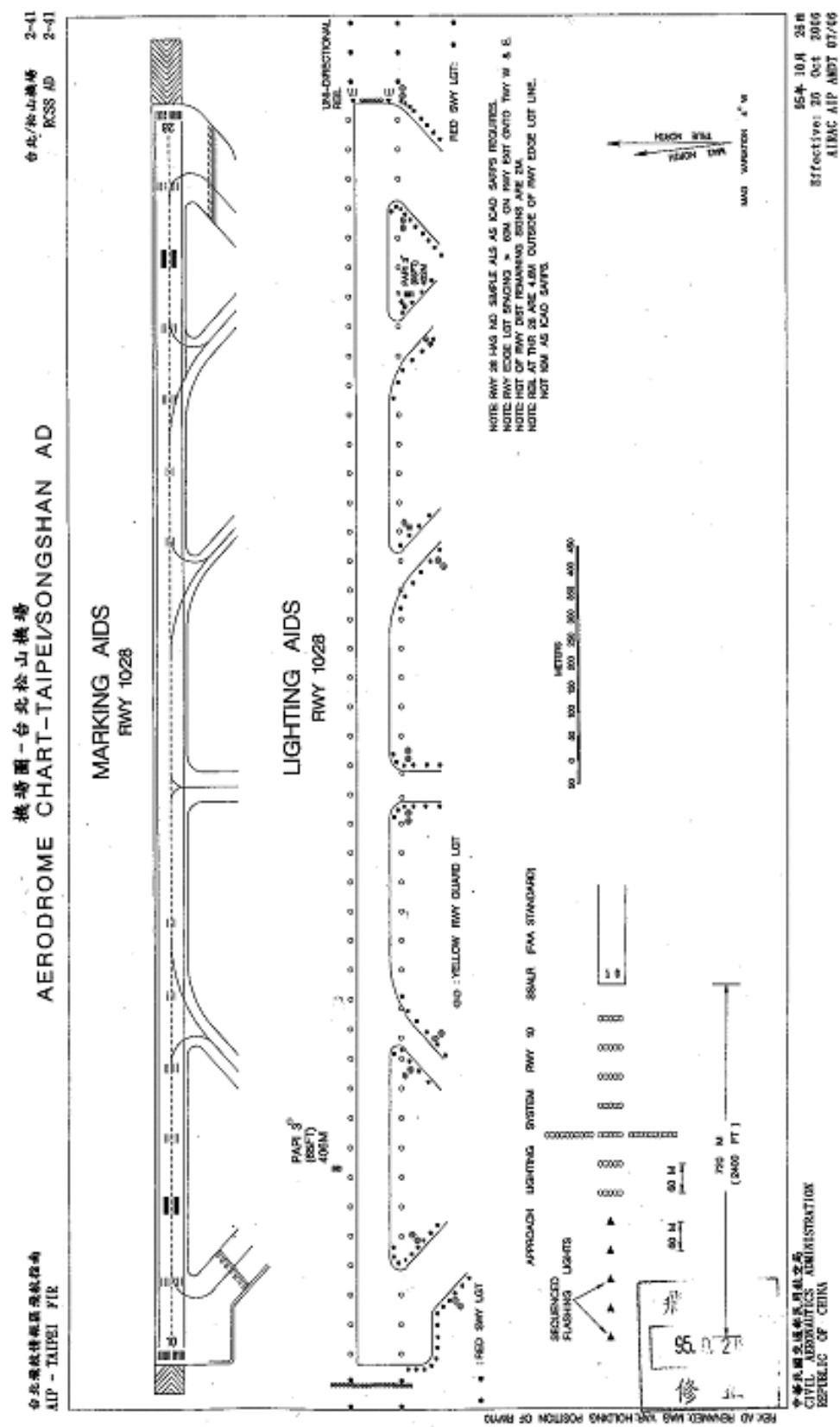


圖 1.7-1 台北/松山機場機場圖

## 1.7.2 飛航公告

事故當日有效且與跑道道面有關之飛航公告（Notices to Airmen，NOTAM）內容如下：

A0638/06---18 MAY 2006

0605180803/0607311600EST

RUNWAY SURFACE BTN 240M TO 700M FROM RWY 10 THRESHOLD MAY BE SLIPPERY WHEN WET, ALL AIRCRAFT CTN ADVISED.

## 1.7.3 機場空側檢查記錄

### 1.7.3.1 助航燈光系統檢查紀錄

民航局飛航服務總台台北裝修區台，每日檢查松山機場助航燈光系統 2 次（0600 時及 1530 時），並填寫「助航燈光系統每日檢查記錄表」。事故當日之記錄表，除註明 0600 時第 1 次巡場發現進場燈 1 燈泡燒壞後換新外，其它檢查項目皆記錄為正常。另事故當日台北裝修區台之機務工作日記，摘要如表 1.7-2。

表 1.7-2 台北裝修區台 95 年 7 月 14 日之機務工作日記摘要

| 時間   | 工作記要  |
|------|---|
| 0600 | 請塔台開啟全部助航燈光做維護檢查  |
| 0615 | 更換進場燈 ALS-1-37 燈泡一只後，其它各項設備使用正常，並告知塔台全部助航燈光各設備燈光全部使用正常。 |
| 1530 | ... 開啟全部助航燈光做維護檢查，各項燈光設備使用正常，並告知塔台全部助航燈光設備全部使用正常。       |
| 2030 | 塔台電話通知有一架遠東航機可能撞到跑道邊燈，請上跑道檢查。                           |
| 2050 | 塔台同意維護車進入跑道檢查，經檢查撞斷跑道邊燈五盞。                              |

### 1.7.3.2 機場狀況檢查記錄

松山機場航務組每日例行檢查機場空側狀況 4 次，亦會視狀況執行不定時檢查，檢查區域包括：跑道、滑行道、勤務道路、停機坪、行李處理場、裝備停放場、環場道、圍牆（籬）、綠地區及排水溝渠等，並填寫「台北國際航空站機場狀況檢

查紀錄」。

事故當日無任何跑道道面積水之紀錄。

#### 1.7.4 跑道摩擦係數檢測

依據民航局提供之機場跑道摩擦係數檢測報告，松山機場於 95 年 6 月 29 日曾執行過 1 次檢測，檢測數據如表 1.7-3。檢測結論如下：

1. 由 100 公尺之平均值可發現，距 10 跑道端 300~600 公尺處中心線兩側之抗滑值已低於最低養護門檻 (0.43)。
2. 依據 FAA 訂定之養護準則，距離 10 號跑道端 210m 至 760m 處，已落入立即養護區，建議可執行相關養護策略用以提升鋪面抗滑能力。

另依據民航局提供之資料，松山機場於 95 年 6 月至 7 月間無任何有關道面改善之工程。

表 1.7-3 松山機場跑道摩擦係數檢測數據

| 28 跑道檢測起點距端部距離：0 公尺 |         |         |         |       |      |      |
|---------------------|---------|---------|---------|-------|------|------|
| 三分區塊檢測成果            |         |         |         |       |      |      |
| 跑道                  | 第一個三分區塊 | 第二個三分區塊 | 第三個三分區塊 | 跑道    |      |      |
| 10                  | 0.54    | 0.74    | 0.76    | 28    |      |      |
|                     | 0.56    | 0.77    | 0.78    |       |      |      |
| 自 10 跑道起算每百公尺檢測結果：  |         |         |         |       |      |      |
| 里程<br>(公尺)          | 中心線右側   |         |         | 中心線左側 |      |      |
|                     | 第一次     | 第二次     | 第三次     | 第一次   | 第二次  | 第三次  |
| 0~100               | 0.81    | 0.74    | 0.78    | 0.70  | 0.78 | 0.74 |
| 100~200             | 0.81    | 0.86    | 0.84    | 0.75  | 0.77 | 0.76 |
| 200~300             | 0.58    | 0.75    | 0.67    | 0.65  | 0.54 | 0.60 |
| 300~400             | 0.34    | 0.40    | 0.37    | 0.38  | 0.32 | 0.35 |
| 400~500             | 0.31    | 0.30    | 0.31    | 0.32  | 0.26 | 0.29 |
| 500~600             | 0.37    | 0.31    | 0.34    | 0.40  | 0.35 | 0.38 |
| 600~700             | 0.52    | 0.42    | 0.47    | 0.51  | 0.48 | 0.50 |
| 700~800             | 0.68    | 0.60    | 0.64    | 0.65  | 0.57 | 0.61 |
| 800~900             | 0.80    | 0.78    | 0.79    | 0.74  | 0.75 | 0.75 |

|           |      |      |      |      |      |      |
|-----------|------|------|------|------|------|------|
| 900～1000  | 0.77 | 0.73 | 0.75 | 0.71 | 0.69 | 0.70 |
| 1000～1100 | 0.79 | 0.75 | 0.77 | 0.73 | 0.72 | 0.73 |
| 1100～1200 | 0.78 | 0.76 | 0.77 | 0.75 | 0.72 | 0.74 |
| 1200～1300 | 0.80 | 0.74 | 0.77 | 0.76 | 0.76 | 0.76 |
| 1300～1400 | 0.79 | 0.73 | 0.76 | 0.78 | 0.74 | 0.76 |
| 1400～1500 | 0.79 | 0.72 | 0.76 | 0.74 | 0.75 | 0.75 |
| 1500～1600 | 0.85 | 0.77 | 0.81 | 0.77 | 0.77 | 0.77 |
| 1600～1700 | 0.83 | 0.77 | 0.80 | 0.77 | 0.75 | 0.76 |
| 1700～1800 | 0.82 | 0.78 | 0.80 | 0.76 | 0.76 | 0.76 |
| 1800～1900 | 0.77 | 0.77 | 0.77 | 0.75 | 0.76 | 0.76 |
| 1900～2000 | 0.78 | 0.76 | 0.77 | 0.78 | 0.72 | 0.75 |
| 2000～2100 | 0.72 | 0.69 | 0.71 | 0.73 | 0.69 | 0.71 |
| 2100～2200 | 0.78 | 0.64 | 0.71 | 0.65 | 0.68 | 0.67 |
| 2200～2300 | 0.85 | 0.73 | 0.79 | 0.73 | 0.76 | 0.75 |
| 2300～2400 | 0.85 | 0.80 | 0.83 | 0.83 | 0.80 | 0.82 |
| 2400～2500 | 0.87 | 0.86 | 0.87 | 0.83 | 0.83 | 0.83 |
| 2500～2600 | 0.85 | 0.79 | 0.82 | 0.80 | 0.77 | 0.79 |

### 1.7.5 跑道橫坡度

民航局提供之松山機場跑道橫坡度量測結果，如表 1.7-4。

表 1.7-4 松山機場跑道橫坡度值

| 里程 (公尺)     | 北側                 | 南側   |
|-------------|--------------------|------|
| 0k (10 跑道頭) | 1.33 <sup>10</sup> | 1.17 |
| 0k+100      | 1.69               | 1.35 |
| 0k+200      | 1.73               | 1.84 |
| 0k+300      | 1.66               | 1.60 |
| 0k+400      | 1.53               | 1.44 |
| 0k+500      | 1.60               | 1.73 |
| 0k+600      | 1.38               | 1.88 |
| 0k+700      | 1.44               | 2.02 |
| 0k+800      | 1.37               | 1.74 |
| 0k+900      | 1.27               | 1.82 |
| 1k+000      | 1.47               | 1.78 |
| 1k+100      | 1.60               | 1.81 |

<sup>10</sup> 單位：%。

|                     |      |      |
|---------------------|------|------|
| 1k+200              | 1.64 | 2.15 |
| 1k+300              | 1.80 | 1.82 |
| 1k+400              | 1.63 | 1.85 |
| 1k+500              | 1.60 | 2.18 |
| 1k+600              | 1.74 | 1.64 |
| 1k+700              | 1.74 | 1.71 |
| 1k+800              | 1.73 | 1.52 |
| 1k+900              | 1.50 | 1.41 |
| 2k+000              | 1.83 | 1.47 |
| 2k+100              | 1.76 | 1.47 |
| 2k+200              | 1.91 | 1.69 |
| 2k+300              | 1.70 | 1.50 |
| 2k+400              | 1.74 | 1.37 |
| 2k+500              | 1.80 | 1.47 |
| 2k+600              | 1.99 | 1.57 |
| 2k+605.353 (28 跑道頭) | 1.66 | 1.35 |

## 1.8 飛航紀錄器

### 1.8.1 座艙語音紀錄器

該機裝置 AlliedSignal 公司之固態式座艙語音紀錄器 (Solid-State Cockpit Voice Recorder，以下簡稱 CVR)，件號及序號分別為 980-6020-001 及 2755。語音資料共 30 分 18 秒，記錄品質良好。

CVR 記錄終止前 30 分鐘 18 秒之錄音抄件如附錄三，抄件時間係以飛航資料紀錄器所記錄之時間參數「GMT」為參考基準，涵蓋範圍包括該機巡航、進場、落地及關車等過程。

### 1.8.2 飛航資料紀錄器

該機裝置 AlliedSignal 公司之固態式飛航資料紀錄器 (Solid-State Flight Data Recorder，以下簡稱 SSFDR)，件號及序號分別為 980-4700-034 及 4251，具 25 小時記錄能力。

事故發生後，本會依據波音公司提供之解讀文件<sup>11</sup>進行解讀，該紀錄器共記錄43項參數，相關參數解讀數據、飛航參數變化情形及記錄之飛航軌跡結果，詳如附錄四。

### 1.8.3 雷達軌跡資料

由民航局台北區管中心（TACC/CAA）提供之次級雷達資料（Secondary Surveillance Radar），其內容包括：時間，航空器座標（RSX、RSY），Mode-C 高度（EALT），航空器地速（Ground Speed）及航跡（Track），詳如附錄五。

## 1.9 其他資料

### 1.9.1 訪談摘要

#### 1.9.1.1 駕駛員訪談

##### 1.9.1.1.1 CM-1

受訪者表示：

ILS 進場，高度約500呎時解除自動駕駛。小雨，能見度約3公里，目視跑道及進場燈。到達決定高度時，保持自動油門，位於跑道延長線上，速度及下降率正常，目視跑道，決定落地。風擋雨刷選擇在「最大」位置，功能正常。最後進場過程中，看不見跑道中心線，係以跑道邊燈為參考依據。

落地前感覺一切都正常。落地時，能見度約為2公里，正常放下鼻輪並減速（Reverse 於 Idle 位置），約5至10秒後，突然一陣大雨，無法明確辨識與跑道之相關位置。約幾秒後，用舵微微向左修正。大約滾行至跑道一半時，能見度又突然變得清楚，正常滾行脫離跑道。

滑回關車後，實施360度檢查時，發現右邊主輪滾軸捲了很多乾草。隨後通報塔台。

##### 1.9.1.1.2 CM-2

<sup>11</sup> 解讀文件【MD-83 DFDR Parameter Reduction Data, BUN: 80J401-500】

受訪者表示：

進場時，高度約1,500呎目視跑道，同時告知正駕駛員。塔台給予落地許可，高度約600呎時自動駕駛解除，進場姿態穩定。

由決定高度至落地前有點下雨。夜間下雨情況，跑道中心線看不清楚，參考跑道邊燈及進場燈光系統，感覺航機有點偏右，惟確定航機在落地前均位在左右兩排跑道邊燈之內，經提醒正駕駛員後，繼續進場。落地前感覺航機仍然偏右，再度提醒正駕駛員也都有進行修正。

落地後雨勢曾一度變大，影響能見度，但過程中能目視跑道邊燈。航機著陸時仍位於跑道上，滾行一段時間後右偏，但不能確定是否有偏出跑道。

飛航相關手冊中規定監控駕駛員在最後進場階段之職責，大致上包括：監控儀表，協助操控駕駛員注意速度、航向、高度、跑道等資訊，以及能見度、風向、風速是否超限。決定高度時，監控駕駛員之標準呼叫為「stable」或「unstable」，操控駕駛員則需回應「landing」或「go around」。事故當次飛行監控駕駛員曾呼叫「stable」，操控駕駛員則回應「landing」。

## 1.9.2 航務手冊摘要

|                                     |                                   |           |
|-------------------------------------|-----------------------------------|-----------|
| 航務手冊<br>FLIGHT OPERATIONS<br>MANUAL | 遠東航空<br>FAR EASTERN AIR TRANSPORT | PAGE 8-35 |
|-------------------------------------|-----------------------------------|-----------|

B. 飛航能見度不低於儀器進場程序中之最低落地限度時。

C. 能夠目視下列參考物之一時：

- Approach Light System.(但不得下降超過 100 ft AGL，除非能夠目視 RED TERMINATING BARS OR RED SIDE ROW BARS)
- Threshold
- Threshold Marking
- Threshold Lights
- Runway End Identifier Lights
- Visual Approach Slope Indicator
- Touchdown Zone or Touchdown Zone Markings
- Touchdown Zone Lights
- Runway or Runway Markings
- Runway Lights

8.9.13 實施迷失進場時機：

- 未達 FOM 8.9.10 之穩定進場條件時。
- 通過外信標台或最後進場點後至 DA 或 MAP 之前，如裝備失效且未能目視跑道時。
- 到達 DA 或 MAP，未能目視跑道或有效參考物時。
- 低於 DA 或通過 MAP 後，因能見度驟然降低而失去有效跑道目視參考物，或跑道上有異物妨害落地安全時。
- 駕駛員判斷飛機不能安全降落於著陸區內時。
- ATC 告知重飛時。

|                                     |                                   |           |
|-------------------------------------|-----------------------------------|-----------|
| 航務手冊<br>FLIGHT OPERATIONS<br>MANUAL | 遠東航空<br>FAR EASTERN AIR TRANSPORT | PAGE 8-36 |
|-------------------------------------|-----------------------------------|-----------|

#### 8.9.14 迷失進場程序：

- PF 執行重飛時，PM 應儘早告知航管迷失進場程序之執行及原因。
- 除非航管另有指示，否則應遵照儀器進場圖中之迷失進場程序執行。
- 若在到達 MAP 或 DA 之前執行迷失進場時，應繼續飛向 MAP，待到達 MAP 且高度高於 MDA 或 DA 後，再執行迷失進場程序。

#### 8.9.15 重飛注意事項：

- 如因天氣因素第一次重飛後，得申請待命俟情況穩定後，再申請進場許可，但以一次為限。
- 隨時檢查油量，依規定及早返回原起飛機場或轉降備降機場。

### 8.10 落地：

落地時根據 ATIS / ATC 指示，做 QNH 高度表撥定值設定。

#### 8.10.1 落地風速限制：(請參閱 FOM 5.6.2/5.6.3)

最大頂風 50 裏，最大順風 10 裏，最大側風：乾跑道 30 裏，溼滑跑道 25 裏，Slush、Dry snow、Standing water 15 裏。若在計劃階段(含起飛前之簽放)不考慮陣風因素，但在實際進場時，機長應將陣風列入風速限制。

#### 8.10.2 跑道狀況：

機場跑道或滑行道上有異物、積雪或積水時，必須小心滑行並向航管單位報告。在起飛或落地時，應注意跑道兩側之設施、車輛或動物等，確實與跑道保持安全之隔離。

#### 8.10.3 跑道之使用：

落地著陸區之定義為距進場端跑道頭(Threshold)至 3000呎之間或距進場端跑道三分之一的區域，以小者為準。

於進場落地時，應計畫於進場端跑道頭 500 呎至 1500 呎之間落地；若預判落地時無法於著陸區觸地，則必須實施重飛。

Rev.21 May.31, 2006

#### 8.10.4 濕滑、積冰雪跑道落地：(請參閱 FOM 第五章)

##### 8.10.4.1 操作要領：

- 應實施有感落地並儘可能降落於中心線上。
- 落地後應確認減速板(Spoiler)是否已自動作用，否則應立即以手動操作。
- 勿使用氣動力減速，應儘快放下鼻輪，以增加主輪負荷及方向穩定性。
- 落地後應儘早使用反推力以幫助減速。
- 不以鼻輪轉向(Tiller)作方向之修正。

##### 8.10.4.2 反推力及側風：

在大側風及跑道濕滑的狀況下，使用反推力可能更容易造成飛機偏側，此時應將反推力放回至 Idle，使用副翼、方向舵及煞車，將飛機修正至跑道中心線，當飛機修正回到中心線後再重新使用煞車及反推力。

##### 8.10.4.3 脫離跑道時機：

當飛機於濕滑跑道落地後，未減至安全速度之前，不得脫離跑道，並需注意越接近遠端跑道頭時，地面上的摩擦力會因地面輪胎橡膠及油漬的沉積而減少，因此應儘早使用剎車減速。

#### 8.10.5 最大落地重量(Maximum Landing Weight)：

##### 8.10.5.1 起飛後回航：

最大落地重量應參照各機種手冊之限制，若在起飛後，有立即回航落地之必要時，需注意落地總重不得超過最大落地重量，若有必要，以待命耗油方式使飛機減至最大落地重量以下後，再返回落地。

##### 8.10.5.2 預計落地重量：

當飛機到達目的地前，因航路中順風及其他減少航行路線之條件，使預計落地總重超過最大落地重量時，應選擇待命耗油，以減少落地總重至低於最大落地重量。

## 第二章 分析

### 2.1 概述

該機駕駛員持有之證照及任務派遣，符合民航法規要求；事故前 72 小時內之作息正常，無證據顯示事故發生時曾受生理、心理、藥物或酒精之影響。

### 2.2 飛航操作

本節分別按穩定進場、下降低於 DA/MDA 條件、落地狀況、迷失進場時機等分析如下。

#### 2.2.1 穩定進場

遠東航務手冊第 8.9.10.1 節對穩定進場之定義為：

『飛機在穩定進場過程中，當飛機通過 1500呎 (AFE) 高度，應保持穩定的空速、下降率、進場航道及下滑道，並放妥落地外型與完成落地前檢查程序。』

比對與檢視該機 FDR 及 CVR 資料，發現該機自完成落地前檢查程序後，至下降進場到達無線電高度 50 呎間之空速、下降率、進場航道及下滑道等紀錄，均符合上述手冊「穩定進場」之要求。

#### 2.2.2 下降低於 DA/MDA 條件

遠東航務手冊第 8.9.12 節對下降低於 DA/MDA 條件為：

『除非符合下列條件，否則駕駛員不得下降高度低於 DA 或 MDA：

- A. 飛機能以正常之下降率及正常之操控，降落於預計降落跑道之著陸區內時。
- B. 飛航能見度不低於儀器進場程序中之最低落地限度時。
- C. 能夠目視下列參考物之一時：

- *Approach Light System.* (但不得下降超過 100 ft AGL，除非能夠目視 RED TERMINATING BARS OR RED SIDE ROW BARS)
- *Threshold*
- *Threshold Marking*
- *Threshold Lights*
- *Runway End Identifier Lights*
- *Visual Approach Slope Indicator*
- *Touchdown Zone or Touchdown Zone Markings*
- *Touchdown Zone Lights*
- *Runway or Runway Markings*
- *Runway Lights* ↴

依駕駛員訪談紀錄：『ILS 進場，夜間下雨情況，到達決定高度時，位於跑道延長線上，速度及下降率正常，目視跑道，決定落地。』及比對相關之 FDR 參數紀錄顯示，該機在決定高度<sup>12</sup>時之速度及下降率正常，符合上述手冊要求之「下降低於 DA/MDA 條件」。

### 2.2.3 落地狀況

該機落地階段姿態與軌跡有關之 FDR 參數紀錄如表 2.2-1。

<sup>12</sup> 按：松山機場 10 跑道進場之決定高度係 200呎。

表 2.2-1 落地階段姿態與軌跡有關參數表

| FDR 參數紀錄                          |                       |           |         |                       |                        | 計算值 <sup>13</sup>      |
|-----------------------------------|-----------------------|-----------|---------|-----------------------|------------------------|------------------------|
| 時間 <sup>14</sup><br>分:秒           | 高度 <sup>15</sup><br>呎 | 空速<br>浬/時 | 航向<br>度 | 坡度 <sup>16</sup><br>度 | 方向舵 <sup>17</sup><br>度 | 偏移量 <sup>18</sup><br>呎 |
| 14:44                             | 85.8                  | 130       | 097     | 0.0                   | -0.5                   | -0.8                   |
| 14:45                             | 80.1                  | 128       | 097     | 0.4                   | 0.5                    | 4.6                    |
| 14:46                             | 63.6                  | 128       | 098     | 1.8                   | -3.5                   | 10                     |
| 14:47                             | 50.6                  | 128       | 098     | 1.8                   | 0.0                    | 15                     |
| 14:48                             | 41.0                  | 128       | 098     | 1.3                   | -3.1                   | 21                     |
| 14:49                             | 33.3                  | 127       | 099     | 0.9                   | -4.3                   | 29                     |
| 14:50                             | 25.6                  | 127       | 098     | 1.3                   | 4.0                    | 36                     |
| 14:51                             | 19.6                  | 126       | 099     | 2.2                   | -2.0                   | 42                     |
| 14:52                             | 13.1                  | 124       | 099     | 0.4                   | -0.8                   | 43                     |
| 14:53                             | 7.9                   | 122       | 099     | 1.3                   | -3.8                   | 48                     |
| 14:54                             | 2.2                   | 120       | 100     | 3.6                   | -13.5                  | 55                     |
| 附註：14:54.8，主輪著陸                   |                       |           |         |                       |                        |                        |
| 14:55                             | 1.0                   | 118       | 099     | 1.3                   | -23.0                  | 60                     |
| 14:56                             | 0.6                   | 116       | 096     | -2.2                  | -23.1                  | 67                     |
| 14:57                             | -1.0                  | 115       | 090     | -1.8                  | -13.2                  | 71                     |
| 14:58                             | (略)                   | 115       | 086     | -1.3                  | -4.3                   | 78                     |
| 附註：14:58，Spoiler 展開；14:58.03，鼻輪著陸 |                       |           |         |                       |                        |                        |
| 14:59                             | (略)                   | 114       | 082     | 2.2                   | -3.0                   | 85                     |
| 15:00                             | (略)                   | 110       | 082     | 1.3                   | -25.1                  | 90                     |
| 附註：15:00.63，偏出跑道                  |                       |           |         |                       |                        |                        |
| 15:01                             | (略)                   | 106       | 085     | 0.0                   | -24.0                  | 94                     |
| 附註：15:01，右反推力器展開；15:02，左反推力器展開    |                       |           |         |                       |                        |                        |
| 15:02                             | (略)                   | 102       | 089     | 0.9                   | -23.5                  | 108                    |
| 15:03                             | (略)                   | 98        | 092     | 1.8                   | -23.0                  | 105                    |
| 15:04                             | (略)                   | 93        | 093     | 2.2                   | -24.3                  | 109                    |
| 15:05                             | (略)                   | 87        | 094     | 2.2                   | -24.3                  | 113                    |
| 15:06                             | (略)                   | 81        | 093     | 2.2                   | -24.8                  | 118                    |

<sup>13</sup> 依 VOR 水平偏移紀錄計算。<sup>14</sup> 本時間係指台北時間事故當日自 1900 時至 1959 時間之分:秒。<sup>15</sup> 係指無線電高度。<sup>16</sup> 正值係指右坡度之角度。<sup>17</sup> 正值係指方向舵操縱面之向右角度。<sup>18</sup> 正值係指由跑道中心線向右之垂直偏移量。

|                 |     |    |     |     |       |     |
|-----------------|-----|----|-----|-----|-------|-----|
| 15:07           | (略) | 74 | 091 | 2.2 | -24.8 | 115 |
| 15:08           | (略) | 72 | 088 | 1.8 | 1.0   | 110 |
| 15:09           | (略) | 68 | 084 | 2.7 | 2.8   | 106 |
| 15:10           | (略) | 66 | 081 | 2.2 | 12.7  | 90  |
| 附註：15:10.5，滑進跑道 |     |    |     |     |       |     |
| 15:11           | (略) | 61 | 081 | 0.9 | 7.9   | 67  |
| 15:12           | (略) | 57 | 082 | 1.3 | -1.5  | 48  |
| 15:13           | (略) | 52 | 084 | 0.4 | -1.0  | 21  |

針對落地之標準操作程序、天氣狀況及姿態與軌跡分別分析如下。

### 2.2.3.1 落地標準操作程序

遠東航務手冊第 8.10 節對落地標準操作程序內容包括：「落地風速限制，跑道狀況，跑道之使用，濕滑、積冰雪跑道落地，最大落地重量，落地滾行，自動落地政策，落地後脫離跑道，滑行及結束飛行」等節。經檢視 FDR 參數紀錄，未發現該機落地操作有不符合手冊中「落地風速限制，跑道狀況，跑道之使用，濕滑、積冰雪跑道落地，最大落地重量」等節之規定及限制；依表 2.2-1 可知該機落地時，減速板（Spoiler）展開時機正常；兩發動機反推力器展開時機，符合手冊第 8.10.6 節對落地滾行之要求；有關「自動落地政策，落地後脫離跑道，滑行及結束飛行」等節所述事項與本次事故無關。

上述分析顯示，該機落地操作符合航務手冊要求之標準操作程序。

### 2.2.3.2 天氣狀況

輕度颱風碧利斯，7 月 13 日夜由宜蘭頭城附近登陸；14 日 1134 時，松山機場解除颱風警報。

本次事故前後，松山機場地面天氣觀測紀錄如下：

1. 1900 時：風向 250 度，風速 1 漪/時；能見度 8,000 公尺；小陣雨；稀雲 800 呎、裂雲 2,500 呎、裂雲 6,000 呎。

2. 1909 時：風向不定，風速 3 浬/時；能見度 3,000 公尺；陣雨；稀雲 500 呎、裂雲 2,000 呎、裂雲 3,500 呎。
3. 1914 時：風向不定，風速 3 浬/時；能見度 2,000 公尺；大陣雨；稀雲 500 呎、裂雲 2,000 呎、裂雲 3,500 呎。
4. 1917 時：風向 020 度，風速 4 浬/時，風向變動範圍 310 度至 090 度；能見度 1,200 公尺；跑道視程—R10/1,700 公尺，趨勢上升；大陣雨；稀雲 500 呎、裂雲 1,200 呎、密雲 3,000 呎。

上述天氣情況符合遠東航務手冊第 8.8.1 節儀器進場程序及機場最低飛航限度、第 8.10.1 節落地風速限制等之要求。

上述 1900 時至 1917 時等 4 次天氣觀測紀錄顯示：能見度、雨勢及雲底高度等之天氣變化情況顯著，於 1915 時前後 2 分鐘之天氣變化較大，尤以變動範圍由西北風（左順側風）至東風（頂風）之不定風向，較不穩定。該機 FDR 無風向、風速等參數紀錄，故無航空器當場實際遭遇之風向/風速資料供佐證分析。

駕駛員受訪時表示：落地時，能見度約 2 公里，落地後雨勢曾變大，影響能見度，無法看清跑道中心線，僅參考跑道邊燈，不易明確辨識與跑道之相關位置；大約滾行至跑道一半時，能見度又突然變得清楚。

綜合本節所述顯示：該機在夜間落地前，遭遇突然變大之雨勢，致能見度降低，駕駛員未能看清跑道中心線，僅參考跑道邊燈，不易明確辨識與跑道兩側之相對位置。

### 2.2.3.3 落地操作與軌跡

表 2.2-1 顯示：1914:50 時，航跡向右偏移超過 30 呎以上；1914:54.8 時，主輪著陸；1914:58 時，減速板展開，同時鼻輪著陸；1915:00.63 時，右主輪偏出跑道；1915:10.5 時，滑進跑道。

自該機飛航軌跡由跑道中心線向右偏移超過 30 呎以上後約 1 秒鐘，即 1914:51 時，駕駛員使用左舵修正，仍不足以改正該機之右偏趨勢，其航跡仍然繼續向右偏移，致於主輪著陸後約 6 秒鐘，右主輪偏出跑道達約 10 秒鐘，之後滑回跑道內。

#### 2.2.4 迷失進場時機

遠東航務手冊第 8.9.13 節實施迷失進場時機第 4 項敘述：『低於 DA 或通過 MAP 後，因能見度驟然降低而失去有效跑道目視參考物，或跑道上有異物妨害落地安全時。』

事故當時，因雨勢增大而減低能見度，對落地主要目視參考物（跑道邊燈）之影響程度，不易具體評量是否已達到『失去有效跑道目視參考物』。但駕駛員在落地前若已發現變大之雨勢可能影響落地安全，而實施迷失進場程序，或許能避免本次事故之發生。

#### 2.2.5 小結

綜合第 2.2 節所述，該機於夜間落地前，因雨勢增大，使能見度降低，致駕駛員未能看清跑道中心線（按：松山機場跑道無著陸區燈及跑道中心線燈等目視助航設施），僅參考跑道邊燈，該機繼續向右偏移時，未能及時發現並修正，於該機著陸後約 6 秒鐘，右主輪偏出跑道，肇致本次事故。

### 2.3 飛航軌跡分析

#### 2.3.1 飛航軌跡計算

FDR 資料顯示該機於進場階段無線電高度（RALT）2,000 呎降至 100 呎期間，該機之左右定位台（LOC DEV1）之最大偏差<sup>19</sup>介於+0.16dot（RALT 353 呎）至-0.17 dot（RALT 103 呎），平均值為-0.02 dot。1914:47 時至 1915:02 時期間，左右定位台偏差呈現右偏（-0.16dot 至-1.07dot）。套疊該機進場階段至著陸期間重要 CVR

<sup>19</sup> 左右定位偏差（Localizer Deviation）：正值表示該機位於跑道中心線之左側，負值表示該機位於跑道中心線之右側。

抄件部份內容及 FDR 參數如圖 2.3-1。

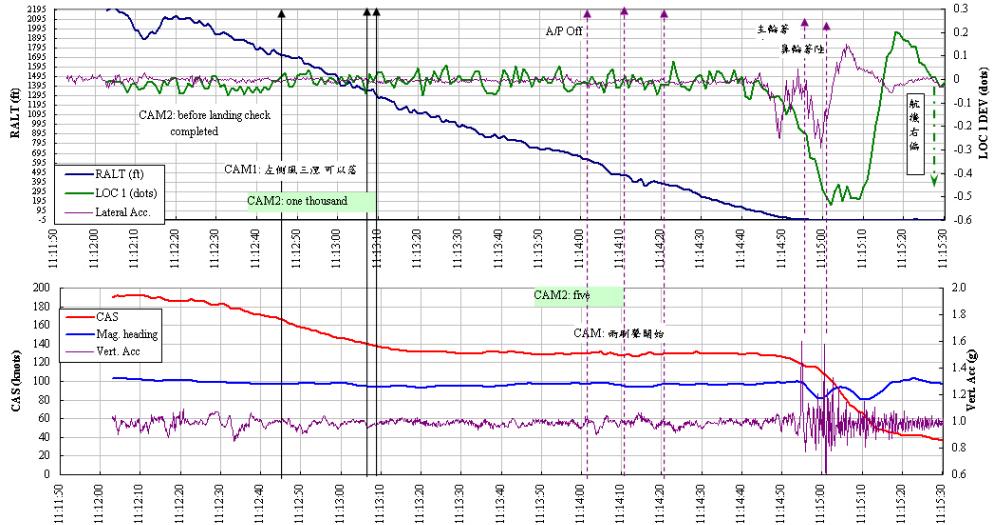


圖 2.3-1 飛航資料及 CVR 部份抄件<sup>20</sup>（進場至著陸滾行期間）

該機之飛航軌跡計算係依據次級雷達資料及 FDR 資料，如圖 2.3-2。該機於 1914:44 時至 1915:01 時右主輪偏出跑道詳圖 2.3-3。

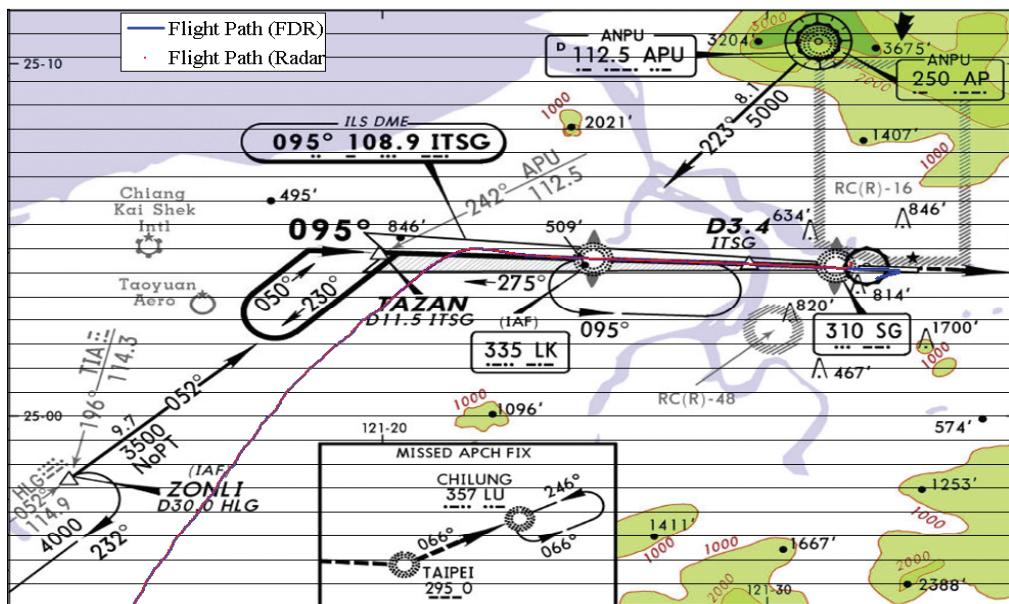


圖 2.3-2 雷達軌跡及飛航軌跡（進場至著陸滾行期間）

20 圖 2.3-1 時間為 FDR 紀錄之 UTC 時間。

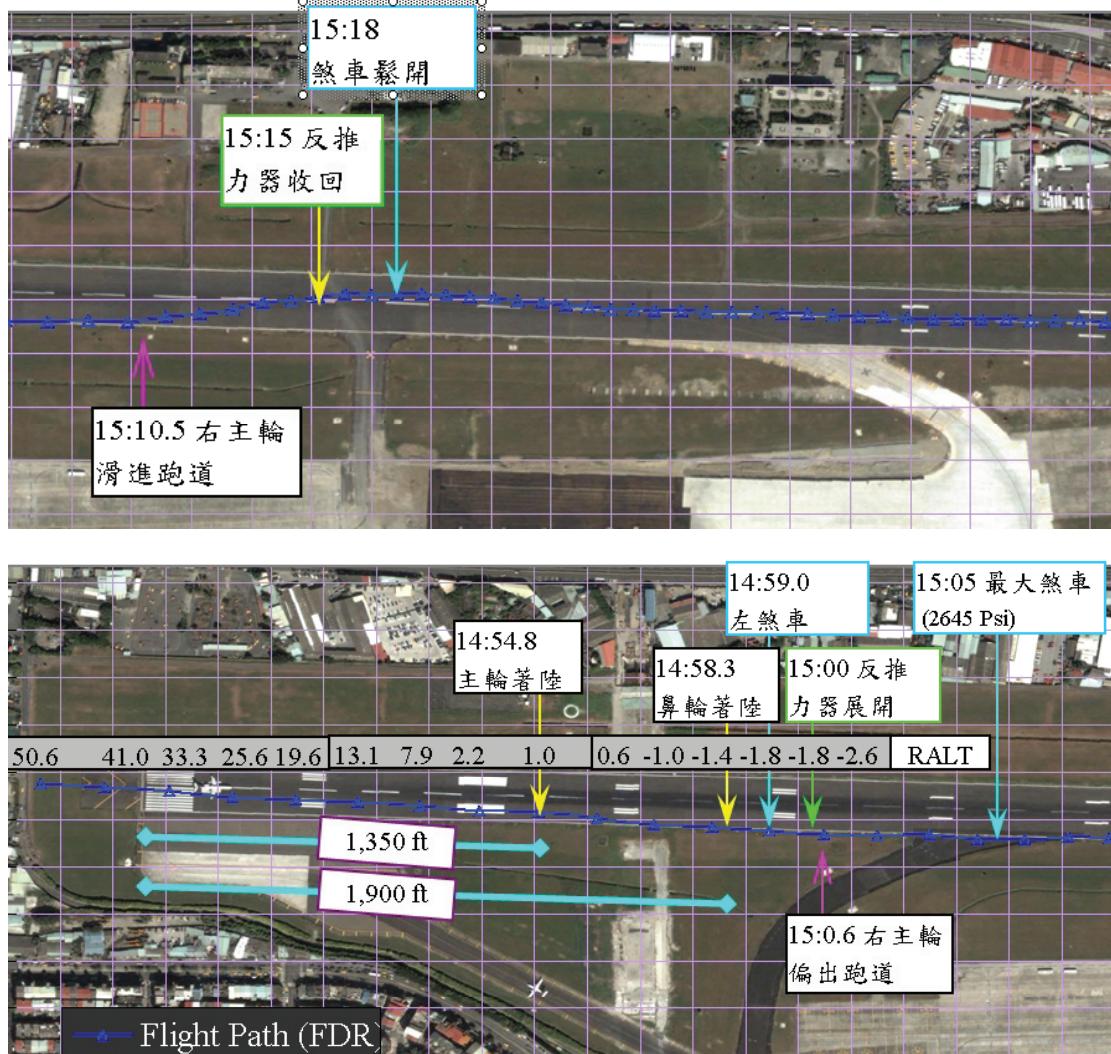


圖 2.3-3 50呎以下之飛航軌跡及著陸點與偏出道面圖

### 2.3.2 著陸點及滑出跑道之時間與位置

該機於 1914:01 時解除自動駕駛，空速 130 涅/時，RALT 約為 632 呎，磁航向 097 度。該機於 1914:54.8 時，空速 120 涅/時，RALT 約為 2 呎，磁航向 100 度，垂直加速度為 1.597 g，研判此為主輪著陸時間。於 1914:58.3 時，依據『Air/Ground Switch』參數由 Air 轉換成 Ground，空速 115 涅/時，RALT 約為 -1 呎，磁航向 086 度，垂直加速度為 1.597 g，研判此為鼻輪著陸時間。依據地面量測軌跡及 FDR 資料，1915:00.6 時（鼻輪落地後 2 秒），垂直加速度最大值為 1.581g，研判為右主輪

偏出跑道時間。1915:10.5 時（鼻輪落地後 12 秒，垂直加速度最大值為  $1.149g$ ），研判為右主輪重回跑道時間，相關標示詳如圖 2.3-1 及圖 2.3-3。

依據次級雷達軌跡及 FDR 資料之飛航軌跡，顯示該機於 1914:32 時通過中信標台（RALT 223.8 呎，空速 130 趟/時，磁航向 096 度）。該機著陸期間之飛航資料與距 10 號跑道相對關係綜整如下：

1. 1914:48.67 時通過 10 號跑道頭，RALT 41 呎<sup>21</sup>，航跡位於跑道中心線右側約 21 呎，磁航向 098 度，左右定位台偏差為 -0.156 dot；
2. 1914:54.8 時主輪著陸，距 10 號跑道頭 1,350 呎，航跡位於 10 號跑道中心線右側約 55 呎，磁航向 100 度，左右定位台偏差為 -0.414 dot；
3. 1914:58.3 時鼻輪著陸，距 10 號跑道頭 1,900 呎，航跡位於 10 號跑道中心線右側約 78 呎，磁航向 086 度，左右定位台偏差為 -0.68 dot。

依地面量測軌跡與飛航軌跡比對後發現，該機主輪著陸後約 6 秒，該機右主輪偏出道面（空速 106 趟/時），偏出約 10 秒後重回道面（空速 61 趟/時）。

## 2.4 天氣分析

中央氣象局都卜勒氣象雷達資料顯示，事故前後，輕度颱風碧利斯的外圍環流中，有一南北向狹長之對流區，東西向寬度約 1.5 公里，其回波強度最大約 45-50dBZ<sup>22</sup>，由西南向東北通過松山機場上空。

### 2.4.1 能見度

依據松山機場之地面觀測及訪談資料，1908 時雨勢開始變大，大雨由西向東接近松山機場，10 跑道頭能見度由 1900 時之 8,000 公尺（小陣雨），逐漸下降至

<sup>21</sup> RALT 紀錄位元為第 44 項， $(44-1)/64=0.67$  秒

<sup>22</sup> 此回波強度之對流系統降雨量約為 1.1 英吋/時。

1909 時 3,000 公尺（陣雨）、1914 時 2,000 公尺（大陣雨）、1917 時 1,200 公尺（大陣雨）；雲幕高由 2,500 呎逐漸下降至 1,200 呎。1923 時雨勢減小（陣雨），能見度 3,200 公尺、雲幕高 1,800 呎，之後天氣狀況持續好轉。

依據 CVR 抄件及頻譜分析區域麥克風 (CAM) 之語音紀錄，顯示 1912:20 時，距松山機場 10 跑道頭約 5.8 浬，無線電高度約 2,116 呎，CAM2 提及：「跑道頭那邊好像在下雨」；1913:14 時，CAM1 提及：「跑道上好像還下雨喲」。1914:16 時，CAM1 提及：「再大一點 等一下再前面一點 把我雨刷都打開」，4 秒後（距松機場 10 跑道頭約 0.9 浬），雨刷啓動，約 8 秒後，雨刷啓動至最大。該機雨刷置於最大位置直至著陸停止後關閉。

依據駕駛員訪談，高度約 500 呎遭遇小雨，能見度約 3 公里，目視跑道及進場燈。落地時，能見度約為 2 公里，約 5 至 10 秒後，突然一陣大雨，無法明確辨識與跑道之相關位置。大約滾行至跑道一半時，能見度又突然變得清楚，正常滾行脫離跑道。

事故時，氣象台觀測之能見度為 2,000 公尺，但因該機係直接穿越對流降水區，落地前遭遇大陣雨而降低其能見度。

## 2.4.2 風場

### 2.4.2.1 地面觀測資料分析

依據松山機場 10 跑道頭風向風速儀 (AWOS) 紀錄資料顯示，1911:47 時以前，風向為北北西，風速約 3 浬/時；1911:47 時至 1912:08 時，風向由北北西轉為北北東，風速約 3 浬/時；1912:09 時至 1913:09 時期間，風向由北北東轉為東北，風速約 3 浬/時；1913:10 時至 1915:00 時期間，風向由東北轉為正東，風速約 4 至 6 浬/時。該機主輪著陸前、後 30 秒內，風向為 070 至 090 度、風速為 4 至 6 浬/時。

1915:24 時之後，風向皆於 060-100 度之間，但風速逐漸增大。1915:24 時至 1918:53 時，風速 7-10 浬/時、1918:54 時至 1922:44 時，風速 8 浬/時至 12 浬/時、

1922:45 時至 1924:00 時，風速 11 浬/時至 16 浬/時，隨後風速逐漸緩和。

表 2.4-1 為 10 跑道頭及部份低空風切警告系統 (LLWAS) 於 1914:00 時至 1915:30 時之風向風速儀觀測資料，圖 2.4-1 為風向風速儀之衛星地圖位置及觀測資料平均值示意圖。10 跑道頭西側受對流系統影響，風向為東風，風速約 9 浬；10 跑道頭東側受對流系統逐漸接近之影響，風向為西北風轉北風，風速約 3 浬。該機落地前，左右側風約 1 浬/時至 2 浬/時。

表 2.4-1 10 跑道頭及部份低空風切警告系統風向風速儀觀測資料<sup>23</sup>及側風分量<sup>24</sup>

|         | 10<br>跑道頭    | LLWAS<br>CF  | LLWAS<br>02  | LLWAS<br>03 | LLWAS<br>04  | LLWAS<br>05  | LLWAS<br>08  | LLWAS<br>09  | LLWAS<br>10  | LLWAS<br>11  |
|---------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1914:00 | 060/05<br>-3 | 350/02<br>-2 | 092/07<br>-1 | 101/10<br>1 | 352/03<br>-3 | 293/03<br>-1 | 100/10<br>1  | 112/08<br>2  | 301/04<br>-2 | 326/01<br>-1 |
| 1914:10 | 060/05<br>-3 | 354/01<br>-1 | 091/06<br>-1 | 100/09<br>1 | 007/02<br>-2 | 293/03<br>-1 | 085/10<br>-2 | 106/09<br>1  | 313/04<br>-2 | 332/01<br>-1 |
| 1914:20 | 060/05<br>-3 | 358/01<br>-1 | 091/06<br>-1 | 100/09<br>1 | 007/02<br>-2 | 293/03<br>-1 | 085/10<br>-2 | 106/09<br>1  | 313/04<br>-2 | 332/01<br>-1 |
| 1914:30 | 070/05<br>-2 | 001/01<br>-1 | 090/06<br>-1 | 101/09<br>1 | 358/03<br>-3 | 293/02<br>-1 | 103/10<br>1  | 091/08<br>-1 | 311/02<br>-1 | 329/02<br>-2 |
| 1914:40 | 080/05<br>-1 | 003/01<br>-1 | 116/06<br>2  | 100/09<br>1 | 019/03<br>-3 | 298/03<br>-1 | 097/09<br>0  | 098/10<br>0  | 294/02<br>-1 | 329/02<br>-2 |
| 1914:50 | 090/05<br>-1 | 004/01<br>-1 | 078/05<br>-2 | 098/09<br>0 | 029/03<br>-3 | 294/02<br>-1 | 093/09<br>-1 | 101/08<br>1  | 307/02<br>-1 | 329/03<br>-2 |
| 1915:00 | 080/05<br>-1 | 006/01<br>-1 | 092/07<br>-1 | 098/10<br>0 | 035/02<br>-2 | 298/03<br>-1 | 088/08<br>-1 | 114/08<br>2  | 309/02<br>-1 | 328/03<br>-2 |
| 1915:10 | 090/06<br>-1 | 008/01<br>-1 | 098/09<br>0  | 099/10<br>0 | 062/02<br>-1 | 298/03<br>-1 | 097/07<br>0  | 073/09<br>-4 | 342/01<br>-1 | 321/04<br>-3 |
| 1915:20 | 080/06<br>-1 | 009/02<br>-2 | 100/08<br>0  | 100/10<br>1 | 062/02<br>-1 | 303/03<br>-1 | 096/08<br>0  | 106/09<br>1  | 339/01<br>-1 | 322/04<br>-3 |
| 1915:30 | 080/08<br>-2 | 012/02<br>-2 | 101/09<br>1  | 099/10<br>0 | 066/02<br>-1 | 297/03<br>-1 | 104/09<br>1  | 091/09<br>-1 | 341/00<br>0  | 327/04<br>-3 |

<sup>23</sup> 除 LLWAS CF 為 5 秒鐘平均，其他為瞬時資料

<sup>24</sup> 側風分量數值，右側風為正值。



圖 2.4-1 風向風速儀位置及觀測資料平均值示意圖

松山機場低空風切警告系統於 1920:20 時至 1921:20 時發布跑道上空及五邊一浬之低空風切警告。

#### 2.4.2.2 飛航資料分析

該機 FDR 無紀錄地速、風向、風速等參數。為分析該機著陸前之飛航軌跡及風向、風速等變化，應用航空器之動態方程式，整合雷達資料及飛航資料以估測理論<sup>25</sup>計算未紀錄參數<sup>26</sup>，計算結果詳如圖 2.4-2。

分析結果顯示，該機 RALT 2,038 呎至 1,082 呎期間（1912:28 時至 1913:23 時）遭遇尾風，平均風向及風速分別為 271 度、12.4 浬/時。於 1913:24 時至 1913:25 時，風向由 271 度變化至 092 度，亦即該機遭遇之風向由尾風轉換成頂風，此時該機距離松山機場 10 跑道約 3 浬。

該機 RALT 於 1,000 呎以下至著陸期間遭遇之風向穩定，其變化範圍約於 092 度至 094 度間，平均值為 092 度；此期間平均風速 6.5 浬/時，說明如下：

1. 1913:31 時至 1914:11 時（RALT 1,000 呎至 405 呎），風速變化介於 3 浬/時至 6 浬/時，左側風介於 0.5 浬/時至 1 浬/時；
2. 1914:12 時至 1914:24 時（RALT 449 呎至 348 呎），風速由 1.3 浬/時增至 11 浬/時，左側風介於 0.2 浬/時至 1.9 浬/時；
3. 1914:25 時至 1915:00 時（RALT 332 呎至該機右主輪滑出跑道），風速變化介於 11 浬/時至 3 浬/時，左側風介於 0.5 浬/時至 1.9 浬/時。該機於高度 50 呎至主輪著陸期間，風速由 6.6 浬/時增加至 8.7 浬/時，左側風約為 1.5 浬/

<sup>25</sup> 擴展式卡爾曼濾波器(Extended Kalman Filter, EKF)

<sup>26</sup> 依據雷達資料之地速及航跡角，與 FDR 紀錄之氣壓高度、空速、俯仰角、滾轉角、航向、總溫、三軸加速度等參數，進行航空器之動態匹配分析 (Kinematics Consistence Analysis)，將 FDR 紀錄之資料，透過飛行力學之 6 自由度非線性運動方程式，計算航空器之地速(Ground Speed)、偏流角(Drift Angle)、攻角(Angle of Attack) 及飛航軌跡。本計算方法，僅假設漂移角等於 Beta Angle。計算過程為將空速與地速分別轉換至機軸座標之三個分量( $u_i, v_i, w_i$ ) 及( $u_a, v_a, w_a$ )，以計算風場於機軸座標之分量變化。

時。

### 2.4.3 小結

綜上所述，該機於進場落地前，遭遇向東移動且接近松山機場，寬度約 1.5 公里的強對流區，約 1,000 呎高度時風向由尾風變為頂風，落地前後風向風速穩定，但遭遇大陣雨影響其能見度。隨後松山機場受此對流系統影響，於該機落地後 5 分鐘發布低空風切警告。

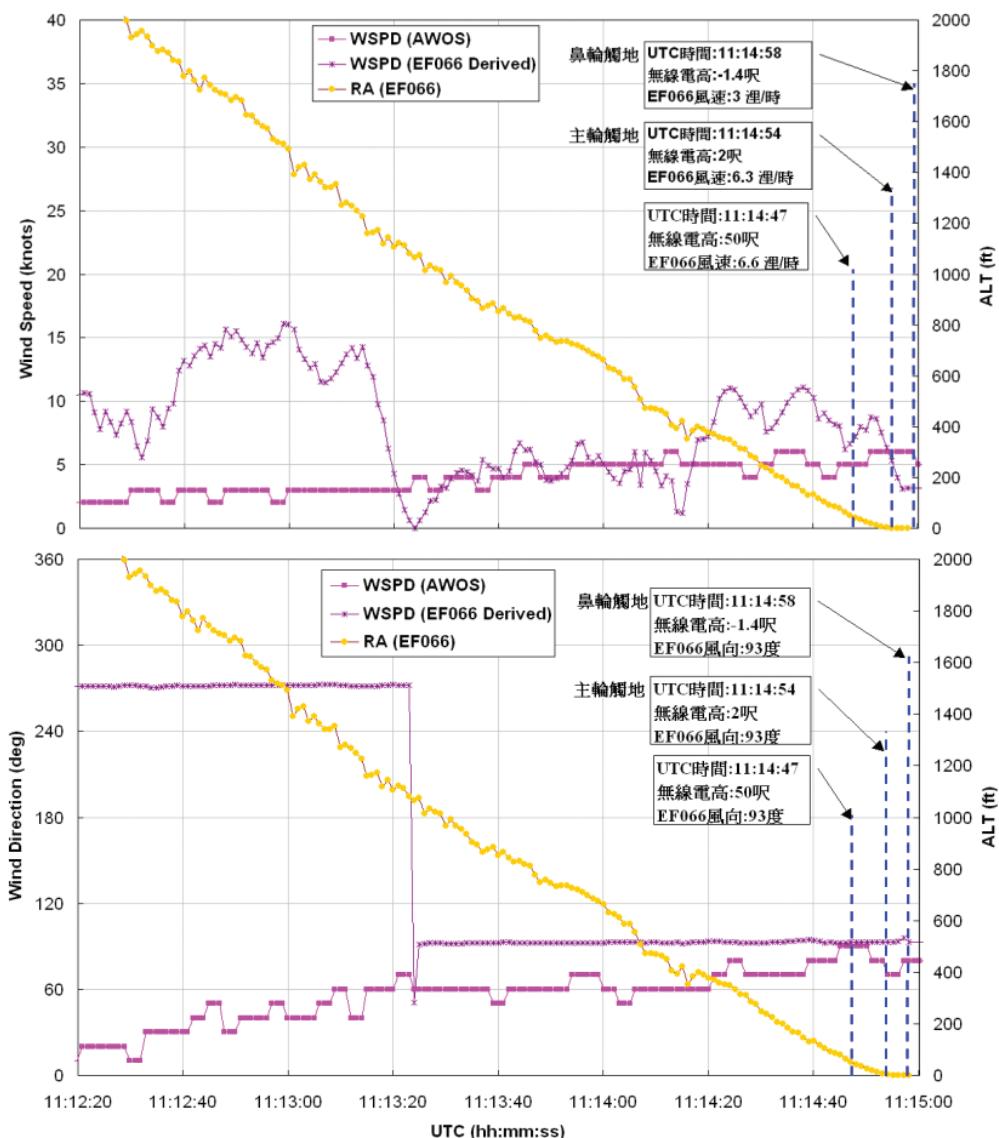


圖 2.4-2 AWOS 風場紀錄及 EF 066 班機計算之風場比較圖

## 2.5 跑道燈光設置

依據「台北飛航情報區飛航指南」，松山機場 10 號跑道係屬第 I 類精確進場跑道，設有跑道邊燈，間距為 60 公尺，無跑道中心線燈。

「民用機場設計暨運作規範」第 5.3.12.1 節規定：第 II 類或 III 類精確進場跑道應設置跑道中心線燈。另該規範第 5.3.12.2 節建議：第 I 類精確進場跑道上應設置跑道中心線燈，特別是當跑道係供高速著陸飛機使用或當跑道邊燈之間距大於 50 公尺時。

松山機場依規範可不設置跑道中心線燈，惟其跑道邊燈間距為 60 公尺，大於 50 公尺，未來整建時可參考該規範建議，增設跑道中心線燈，或縮短跑道邊燈間距，以提高低能見度進場時駕駛員之目視參考。

本頁空白

## 第三章 結 論

### 3.1 與可能肇因有關之調查發現

- 該機於夜間落地前，因雨勢增大，影響駕駛員對外視線，僅跑道邊燈供參考，致於該機繼續向右偏移時，未能及時發現並修正，於該機著陸後約 6 秒鐘，右主輪偏出跑道，肇致本次事故。(2.2.5)

### 3.2 與風險有關之調查發現

- 該機於進場落地前，遭遇向東移動且接近松山機場，寬度約 1.5 公里的強對流區，落地前後風向風速穩定，但觸地前遭遇大陣雨影響其能見度。(2.4.1)
- 駕駛員若發現變大之雨勢可能影響落地安全，應立即實施迷失進場程序，避免事故之發生。(2.2.4)
- 遠東航務手冊第 8.9.13 節所述之『...失去有效跑道目視參考物...』，執行時不易具體評量。(2.2.4)
- 松山機場 10 號跑道邊燈間距符合「民用機場設計暨運作規範」中第 I 類精確進場跑道建議設置跑道中心線燈之條件。(2.5)

### 3.3 其它調查發現

- 該機駕駛員持有之證照及任務派遣，符合民航法規要求。(2.1)
- 事故前 72 小時內之作息正常，無證據顯示事故發生時曾受生理、心理、藥物或酒精之影響。(2.1)
- 該機進場落地情況，符合遠東航務手冊所列「穩定進場」、「下降低於 DA/MDA 條件」、「標準操作程序」有關落地等之要求。(2.2)
- 該機主輪著陸後約 6 秒，右主輪滑出道面（空速 106 洩/時），約 10 秒後重回道

面（空速 61 肉/時）。(2.2.3.3)

## 第四章 飛安改善建議

本章中，4.1 節為依據本調查之結果而提出之飛安改善建議。各相關機關（構）於調查過程中已完成或進行中之改善措施，列於 4.2 節，惟本會並未對其所提列之飛安改善措施進行驗證，故相關之飛安改善建議仍列於 4.1 節中。

### 4.1 改善建議

#### 致交通部民航局

1. 未來松山機場整建跑道時考量增設跑道中心線燈，以提高低能見度進場時駕駛員之目視參考。(ASC-ASR-07-12-001)

#### 致遠東航空公司

1. 要求駕駛員若發現跑道能見度驟降，可能影響落地安全，應立即實施迷失進場程序。(ASC-ASR-07-12-002)
2. 重新審視航務手冊第 8.9.13 節實施迷失進場時機之用語。(ASC-ASR-07-12-003)

### 4.2 已完成或進行中之改善措施

1. 民用航空局於 96 年 11 月 15 日回覆：本局將於未來整建松山機場跑道時，考量規劃增設跑道中心線燈，提高低能見度進場時，駕駛員作目視之參考；另請遠東航空公司針對本案即刻增（修）訂相關手冊並加強應變能力之訓練，以增強飛安。
2. 遠東航空於 96 年 11 月 30 日回覆：航務處發布航務備忘錄 06-OM-CPO-009 重申惡劣天候操作事項及 06-OM-CPO-010 落地操作事項，公告飛航駕駛員周知。
3. 遠東航空於 96 年 11 月 30 日回覆：該公司航務處已進行改善措施，將航務手冊第 8.9.10 實施迷失進場時機，新增註記「能見度驟降」係指：預測（判）觸

地時能見度低於600公尺或目視少於6個連續跑道邊燈時謂之。

## 附錄一 10 號跑道頭風向風速儀觀測資料

松山機場地面自動觀測系統之 10 號跑道頭風向風速儀 (TDZ 附近, 高度 10m)  
於 1114:30-1115:30 UTC 觀測資料：

|                    |                    |
|--------------------|--------------------|
| S1: 每 1 秒的風速       | D1: 每 1 秒的風向       |
| S6: 每 2 分鐘的平均風速    | D6: 每 2 分鐘的平均風向    |
| S15: 每 10 分鐘的平均風速  | D15: 每 10 分鐘的平均風向  |
| Sx15: 每 10 分鐘的最大風速 | Dx15: 每 10 分鐘的最大風向 |
| Sn15: 每 10 分鐘的最小風速 | Dn15: 每 10 分鐘的最小風向 |

11:14:30,S1=05,S6=04,S15=03,D1=070,D6=050,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:31,S1=05,S6=04,S15=03,D1=070,D6=050,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:32,S1=05,S6=04,S15=03,D1=070,D6=050,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:33,S1=06,S6=04,S15=03,D1=070,D6=050,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:34,S1=06,S6=04,S15=03,D1=070,D6=050,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:35,S1=06,S6=04,S15=03,D1=070,D6=050,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:36,S1=06,S6=04,S15=03,D1=070,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:37,S1=06,S6=04,S15=03,D1=070,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:38,S1=06,S6=04,S15=03,D1=070,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:39,S1=05,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:40,S1=05,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:41,S1=05,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:42,S1=04,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:43,S1=04,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:44,S1=04,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=080,Dn15=290  
 11:14:45,S1=05,S6=04,S15=03,D1=090,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:46,S1=05,S6=04,S15=03,D1=090,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:47,S1=05,S6=04,S15=03,D1=090,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:48,S1=05,S6=04,S15=03,D1=090,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:49,S1=05,S6=04,S15=03,D1=090,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:50,S1=05,S6=04,S15=03,D1=090,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:51,S1=06,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:52,S1=06,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290  
 11:14:53,S1=06,S6=04,S15=03,D1=080,D6=060,D15=350,Sx15=06,Sn15=01,Dx15=090,Dn15=290



## 附錄二 RCSS LLWAS RAW DATA

**RCSS LLWAS RAW DATA 2006/7/14**  
**1 1 1 4 : 3 0 - 1 1 1 5 : 3 0 U T C**

L,WAWS09,10Sec,D,2004,10,18,11,50,0,11.000000,9,  
     站號, 10 秒,風向,年,月,日,時,分,秒,風向,系統碼  
 L,WAWS09,10Sec,Dav,2004,10,18,11,50,0,11.000000,9,  
     站號, 10 秒,平均風向,年,月,日,時,分,秒,風向,系統碼  
 L,WAWS09,10Sec,S,2004,10,18,11,50,0,8.000000,9,  
     站號, 10 秒,風速,年,月,日,時,分,秒,風向,系統碼  
 L,WAWS09,10Sec,Sav,2004,10,18,11,50,0,8.000000,9,  
     站號, 10 秒,平均風速,年,月,日,時,分,秒,風向,系統碼

L,WAWS01,10Sec,D,2006,7,14,11,14,30,0.958333,0,  
 L,WAWS01,10Sec,S,2006,7,14,11,14,30,1.291667,0,  
 L,WAWS01,10Sec,D,2006,7,14,11,14,30,87.000000,9,  
 L,WAWS01,10Sec,Sav,2006,7,14,11,14,30,9.000000,9,  
 L,WAWS01,10Sec,Dav,2006,7,14,11,14,30,88.000000,9,  
 L,WAWS01,10Sec,S,2006,7,14,11,14,30,9.000000,9,  
 L,WAWS01,10Sec,Status,2006,7,14,11,14,30,32.000000,9,  
 L,WAWS02,10Sec,D,2006,7,14,11,14,30,90.000000,9,  
 L,WAWS02,10Sec,Sav,2006,7,14,11,14,30,7.000000,9,  
 L,WAWS02,10Sec,Dav,2006,7,14,11,14,30,91.000000,9,  
 L,WAWS02,10Sec,S,2006,7,14,11,14,30,6.000000,9,  
 L,WAWS02,10Sec,Status,2006,7,14,11,14,30,32.000000,9,  
 L,WAWS03,10Sec,D,2006,7,14,11,14,30,101.000000,9,  
 L,WAWS03,10Sec,Sav,2006,7,14,11,14,30,9.000000,9,  
 L,WAWS03,10Sec,Dav,2006,7,14,11,14,30,101.000000,9,  
 L,WAWS03,10Sec,S,2006,7,14,11,14,30,9.000000,9,  
 L,WAWS03,10Sec,Status,2006,7,14,11,14,30,32.000000,9,  
 L,WAWS04,10Sec,D,2006,7,14,11,14,30,358.000000,9,  
 L,WAWS04,10Sec,Sav,2006,7,14,11,14,30,3.000000,9,  
 L,WAWS04,10Sec,Dav,2006,7,14,11,14,30,359.000000,9,  
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| SUNGSHAN AIRPORT FINAL GPS COORDINATES |                |                 |
|--|----------------|-----------------|
| SITE                                   | LATITUDE       | LONGITUDE       |
| WAWS CF                                | N 25° 04. 262' | E 121° 33. 146' |
| WAWS 01                                | N 25° 03. 440' | E121° 30. 032'  |
| WAWS 02                                | N 25° 04. 858' | E121° 31. 011'  |
| WAWS 03                                | N25° 04. 568'  | E121° 31. 867'  |
| WAWS 04                                | N25° 04. 496'  | E121° 33. 134'  |
| WAWS 05                                | N25° 04. 427'  | E121° 34. 226'  |
| WAWS 06                                | N25° 04. 697'  | E121° 35. 224'  |
| WAWS 07                                | N25° 04. 755'  | E121° 30. 079'  |
| WAWS 08                                | N25° 03. 825'  | E121° 30. 887'  |
| WAWS 09                                | N25° 03. 780'  | E121° 31. 807'  |
| WAWS 10                                | N25° 03. 724'  | E121° 33. 139'  |
| WAWS 11                                | N25° 03. 717'  | E121° 34. 266'  |
| WAWS 12                                | N25° 03. 409'  | E121° 35. 332'  |

### 附錄三 事故機座艙語音紀錄器抄件

代號說明：

CM-2：副駕駛員之無線電通話

CAM：座艙語音麥克風

CAM1：正駕駛員自 CAM 之發話

CAM2：副駕駛員自 CAM 之發話

ATN：空服組員之發話

PA：客艙廣播

APP\_H：花蓮近場管制台

APP：台北近場管制台

TWR：松山塔台

GC：松山塔台地面管制席

ATIS：終端資料自動廣播服務

SOC\_FAT：遠東聯合管制中心

SOC\_TNA：復興聯合管制中心

SOC\_MDA：華信聯合管制中心

GND：機坪地面人員

---：無法辨識之來源

...：無法辨識之發話

\*：與操作無關之發話

( )：非發話之特殊聲響說明

GE 514, EF 121, GE 029, B7 829, KA 9875, GE 5113, AE 747 為其它班機代號

| FDR<br>GMT<br>Time | Source | Contents  |
|--------------------|--------|---|
| 10:55:58           | ATIS   | sungshan airport information delta one zero tree eight zulu expect i-l-s approach runway one zero in use runway one zero wet wind tree one zero at zero two visibility eight kilometers light rain shower cloud few four hundred feet scatter |
| 10:56:17           | CAM1   | 還不錯嘛 八千啊  |
| 10:56:25           | CAM1   | 各位女士各位先生晚安 這是機長向您作航路報告 首先歡迎各位搭乘遠東航空公司零六六班次 從花蓮到台北 現在飛行高度一萬一千英尺 飛行速度每小時六百五十公里 預計晚上七點二十可以到達台北松山機場 台北天氣陰天下雨 地面溫度二十七度 航路上由於颱風環流影響 所以氣流不好 我們沒辦法提供各位的服務 為了大家的安全 希望各位諒解 謝謝您的合作 (中文 英文)   |
| 10:57:00           | APP_H  | far eastern zero six six contact taipei approach one one niner point seven good day   |
| 10:57:05           | CM-2   | one one niner seven far eastern zero six six good day   |
| 10:57:12           | CM-2   | taipei approach far eastern zero six six one one thousand   |
| 10:57:16           | APP    | (無線電干擾聲響)   |
| 10:57:25           | CM-2   | taipei approach far eastern zero six six one one thousand   |
| 10:57:29           | APP    | far eastern zero six six taipei approach ident read you five by five how do you read me   |
| 10:57:33           | CM-2   | now loud and clear far eastern zero six six   |
| 10:57:37           | GE 514 | (GE514 與 APP 間對話)   |
| 10:57:43           | CAM1   | landing briefing same as before   |
| 10:57:44           | APP    | (GE514 與 APP 間對話)   |
| 10:57:45           | CAM    | (APP 端電話聲響)   |
| 10:57:45           | CAM1   | 兩百... i-l-s 兩六四 備降場一樣回花蓮  |
| 10:57:51           | GE 514 | (GE514 與 APP 間對話)   |
| 10:57:56           | CAM1   | i have controlled thank you sir   |
| 10:57:57           | APP    | (EF121 與 APP 間對話)   |
| 10:57:59           | CAM2   | you have controlled sir   |
| 10:58:00           | CAM1   | 一萬一   |
| 10:58:01           | EF 121 | (EF121 與 APP 間對話)   |
| 10:58:06           | CAM2   | 颱風天啊 高度表撥定值忘記撥 不是很慘嗎  |
| 10:58:09           | CAM1   | 很慘啊 就是違規啦   |
| 10:58:11           | CAM2   | 啊   |

| FDR<br>GMT<br>Time | Source | Contents  |
|--------------------|--------|---|
| 10:58:11           | CAM1   | 對呀 一定違規呀  |
| 10:58:14           | CAM2   | fuel balance  |
| 10:58:16           | CAM1   | 平常就忘了就算了 颱風天忘了 * 就差很多啊  |
| 10:58:20           | CAM2   | 對呀  |
| 10:58:21           | CAM1   | 起碼差三百呎以上  |
| 10:58:44           | CAM1   | 平常忘了 他們發現不出來 噢 颱風天忘了 * 一定會被抓到   |
| 10:58:51           | CAM1   | 什麼時候不 不忘 颱風天忘了就糗  |
| 10:59:05           | APP    | taipei approach broadcasting taipei q-n-h now niner niner one sungshan information echo   |
| 10:59:11           | CAM1   | niner niner one ...   |
| 10:59:12           | CM-2   | confirmed niner niner one far eastern zero six six  |
| 10:59:15           | APP    | far eastern zero six six affirmative now q-n-h niner niner one information echo   |
| 10:59:21           | CAM1   | niner niner one   |
| 10:59:21           | CM-2   | niner niner one copy far eastern zero six six   |
| 10:59:25           | CAM1   | 反而 * 又會降低咧 通常一直往上高才對呀   |
| 10:59:25           | APP    | (GE514 與 APP 間對話)   |
| 10:59:31           | GE 514 | (GE514 與 APP 間對話)   |
| 10:59:38           | APP    | far eastern zero six six traffic at your one clock two zero miles south east bound a-t-r leaving niner thousand for one zero thousand |
| 10:59:46           | CM-2   | far eastern zero six six looking and maintain one ... one thousand  |
| 10:59:51           | APP    | (GE029 與 APP 間對話)   |
| 10:59:59           | CAM1   | 出來了   |
| 11:00:00           | GE 029 | (GE029 與 APP 間對話)   |
| 11:00:07           | CAM1   | ...   |
| 11:00:15           | CAM2   | ...   |
| 11:00:32           | CAM2   | 哈 哈 哈 呵 呵 呵   |
| 11:00:33           | CAM1   | * 頽慘了   |
| 11:00:38           | CAM1   | 會暈船的人 那個時候就暈  |
| 11:01:03           | CAM1   | 有一次我們就這樣 在高雄回來 颱風天 一顛 * 三百呎耶 當場掉三百呎 在那個中壢...  |
| 11:01:12           | GE 029 | (GE029 與 APP 間對話)   |

| FDR<br>GMT<br>Time | Source | Contents  |
|--------------------|--------|---|
| 11:01:17           | APP    | (GE029 與 APP 間對話)   |
| 11:01:21           | GE 029 | (GE029 與 APP 間對話)   |
| 11:01:22           | CAM1   | 他也不會 航管還好 知道颱風天 他都不問你原因   |
| 11:01:26           | CAM1   | 因爲* 飛著飛著 咚 只是開 爬回去了 自己會爬回去了   |
| 11:01:37           | APP    | far eastern zero six six zero traffic is no factor descend and maintain seven thousand            |
| 11:01:42           | CM-2   | descend and maintain seven thousand far eastern zero six six                                      |
| 11:01:47           | CAM2   | seven thousand  |
| 11:01:49           | CAM1   | * 洞六洞啊 聽他講的   |
| 11:01:53           | CAM    | (安全帶警示聲)  |
| 11:01:58           | CAM1   | confirmed cancel speed restriction  |
| 11:02:00           | CM-2   | taipei approach far eastern zero six six any speed control required                               |
| 11:02:05           | APP    | far eastern zero six six complied with speed restriction you are number tree in approach sequence |
| 11:02:11           | CM-2   | complied with speed restriction far eastern zero six six  |
| 11:02:20           | CAM1   | descend approach check sir  |
| 11:02:21           | CAM2   | pressurization  |
| 11:02:22           | CAM1   | set   |
| 11:02:23           | CAM2   | engine sync   |
| 11:02:23           | CAM1   | off   |
| 11:02:23           | CAM2   | fuel pumps  |
| 11:02:24           | CAM    | (單聲警示聲)   |
| 11:02:24           | APP    | (B7-984 與 APP 間對話)  |
| 11:02:24           | CAM1   | six on  |
| 11:02:25           | CAM2   | seat belt   |
| 11:02:26           | CAM1   | on  |
| 11:02:26           | CAM2   | hydraulic pumps   |
| 11:02:27           | CAM1   | hi on   |
| 11:02:27           | CAM2   | landing data  |
| 11:02:28           | B7 984 | (B7-984 與 APP 間對話)  |
| 11:02:28           | CAM1   | set cross check   |
| 11:02:28           | CAM2   | landing briefing  |
| 11:02:29           | CAM1   | complete sir  |

| FDR<br>GMT<br>Time | Source  | Contents   |
|--------------------|---------|--|
| 11:02:30           | CAM2    | complete   |
| 11:02:31           | CAM1    | thank you sir  |
| 11:02:36           | APP     | far eastern zero six six flight heading two seven zero vector to runway one zero final approach course |
| 11:02:44           | CM-2    | flight heading two seven zero far eastern zero six six   |
| 11:02:46           | CAM1    | heading select set heading two seven zero  |
| 11:02:48           | CAM2    | check  |
| 11:02:52           | CAM     | (疑似水平安定面微調聲響)  |
| 11:03:01           | CAM     | (疑似水平安定面微調聲響)  |
| 11:03:49           | APP     | (GE029 與 APP 間對話)  |
| 11:03:58           | GE 029  | (GE029 與 APP 間對話)  |
| 11:04:05           | ATN     | 各位貴賓 我是客艙長 * ... 空服人員無法 無法為您進行冷飲服務 造成不便 我們深感抱歉 我們將在於落地後 機門... (中文 英文)                                  |
| 11:04:07           | ---     | ...  |
| 11:04:16           | B7 829  | (B7-829 與 APP 間對話)   |
| 11:04:22           | APP     | (B7-829 與 APP 間對話)   |
| 11:04:31           | B7 829  | (B7-829 與 APP 間對話)   |
| 11:04:44           | KA 9875 | ...  |
| 11:05:19           | CAM2    | 這邊又好了  |
| 11:05:20           | CAM1    | 嘿  |
| 11:05:21           | CAM2    | 嘍  |
| 11:05:21           | B7 829  | (B7-829 與 APP 間對話)   |
| 11:05:24           | APP     | (B7-829 與 APP 間對話)   |
| 11:05:29           | B7 829  | (B7-829 與 APP 間對話)   |
| 11:05:31           | CAM1    | 晴空萬里   |
| 11:05:39           | CAM     | (高度表警示聲響)  |
| 11:05:43           | APP     | far eastern zero six six descend and maintain four thousand  |
| 11:05:47           | CM-2    | descend and maintain four thousand far eastern zero six six  |
| 11:05:50           | CAM1    | four thousand set and armed  |
| 11:05:51           | CAM2    | check  |
| 11:05:58           | CAM2    | 颱風過後 空氣變好  |
| 11:06:01           | CAM1    | 嗯 哈哈哈 整個台灣上空像洗了一遍一樣  |
| 11:06:06           | CAM2    | ...  |

| FDR<br>GMT<br>Time | Source  | Contents  |
|--------------------|---------|---|
| 11:06:06           | CAM1    | ...   |
| 11:06:07           | CAM2    | ...   |
| 11:06:10           | ---     | 兩五五   |
| 11:06:31           | B7 829  | (B7-829 與 APP 間對話)  |
| 11:06:34           | APP     | (B7-829 與 APP 間對話)  |
| 11:06:35           | B7 829  | ...   |
| 11:06:37           | B7 829  | (B7-829 與 APP 間對話)  |
| 11:06:41           | KA 9875 | ...   |
| 11:06:46           | ---     | ...   |
| 11:06:49           | ---     | ...   |
| 11:06:53           | B7 829  | (B7-829 與 APP 間對話)  |
| 11:06:54           | ---     | ...   |
| 11:06:55           | ---     | ...   |
| 11:06:56           | APP     | (B7-829 與 APP 間對話)  |
| 11:06:56           | ---     | ...   |
| 11:06:57           | ---     | ...   |
| 11:06:59           | B7 829  | (B7-829 與 APP 間對話)  |
| 11:07:00           | ---     | 兩五五   |
| 11:07:06           | ---     | i...  |
| 11:07:27           | GE 514  | (GE514 與 APP 間對話)   |
| 11:07:31           | APP     | (GE514 與 APP 間對話)   |
| 11:07:35           | GE 514  | (GE514 與 APP 間對話)   |
| 11:07:38           | APP     | far eastern zero six six turn right heading zero four zero descend and maintain tree thousand |
| 11:07:43           | CM-2    | heading zero four zero descend and maintain tree thousand far eastern zero six six            |
| 11:07:49           | CAM1    | set heading zero four zero set and armed tree thousand  |
| 11:07:50           | GE 5113 | (GE5113 與 APP 間對話)  |
| 11:07:52           | CAM     | (疑似水平安定面微調聲響)   |
| 11:07:56           | APP     | (GE5113 與 APP 間對話)  |
| 11:08:04           | GE 5113 | (GE5113 與 APP 間對話)  |
| 11:08:19           | CAM     | (安全帶警示聲)  |
| 11:08:28           | CAM     | (疑似水平安定面微調聲響)   |

| FDR<br>GMT<br>Time | Source  | Contents  |
|--------------------|---------|---|
| 11:08:30           | ATN     | 各位貴賓 幾分鐘可以在台北降落 請各位將椅背扶正餐桌收回安全帶扣好 麻煩您將旁邊遮陽板完全拉開 謝謝 (中文 英文)  |
| 11:08:37           | CAM2    | 啊 龍岡  |
| 11:08:50           | CAM2    | ...   |
| 11:09:03           | ATN     | 各位貴賓 我們即將為您調暗客艙內的燈光以維護航機降落時的安全 各位閱讀燈在您座位上方黃色按鈕 謝謝 (中文 英文)   |
| 11:09:06           | CAM     | (高度表警示聲響)   |
| 11:09:23           | APP     | (GE5113 與 APP 間對話)  |
| 11:09:28           | GE 5113 | (GE5113 與 APP 間對話)  |
| 11:09:52           | APP     | far eastern zero six six turn right heading zero five zero descend and maintain two thousand eight hundred  |
| 11:09:58           | CM-2    | heading zero five zero two thousand eight hundred far eastern zero six six  |
| 11:10:02           | CAM1    | zero five zero slats extended sir   |
| 11:10:07           | CM-2    | 遠東洞六六五分鐘  |
| 11:10:15           | SOC_FAT | 洞六六教官晚安 落地九號 bay 九號 happy landing   |
| 11:10:18           | CM-2    | 九號 謝謝   |
| 11:10:31           | AE 747  | (AE747 與 APP 間對話)   |
| 11:10:36           | APP     | (AE747 與 APP 間對話)   |
| 11:10:39           | CAM     | (疑似水平安定面微調聲響)   |
| 11:10:43           | AE 747  | (AE747 與 APP 間對話)   |
| 11:10:48           | CAM2    | approach 催著我們   |
| 11:10:49           | APP     | far eastern zero six six four miles from outer marker turn right heading zero seven zero maintain two thousand eight hundred until established localizer cleared i-l-s runway one zero approach |
| 11:10:59           | CM-2    | heading zero seven zero until established maintain two thousand eight hundred cleared i-l-s approach far eastern zero six six   |
| 11:11:06           | APP     | (AE747 與 APP 間對話)   |
| 11:11:06           | CAM1    | set heading zero seven zero armed localizer   |
| 11:11:11           | AE 747  | (AE747 與 APP 間對話)   |
| 11:11:14           | CAM2    | established   |
| 11:11:16           | CAM1    | armed i-l-s   |
| 11:11:16           | CAM     | (疑似水平安定面微調聲響)   |

| FDR<br>GMT<br>Time | Source | Contents   |
|--------------------|--------|--|
| 11:11:17           | CM-2   | taipei approach far eastern zero six six established   |
| 11:11:21           | APP    | far eastern zero six six roger contact sungshan tower one one eight point one good day                                       |
| 11:11:22           | ---    | ...  |
| 11:11:22           | CAM    | (疑似水平安定面微調聲響)  |
| 11:11:25           | CM-2   | contact tower far eastern zero six six good day  |
| 11:11:30           | CM-2   | sungshan tower far eastern zero six six i-l-s inbound niner miles  |
| 11:11:35           | TWR    | far eastern zero six six sungshan tower runway one zero wind tree four zero at tree q-n-h niner niner tree continue approach |
| 11:11:41           | CM-2   | runway one zero q-n-h niner niner tree far eastern zero six six  |
| 11:11:45           | CAM1   | nine nine tree flap fifteen sir  |
| 11:11:47           | CAM2   | flap fifteen   |
| 11:11:56           | CAM    | (起落架警告聲響)  |
| 11:11:56           | CAM    | (疑似水平安定面微調聲響)  |
| 11:12:02           | CAM    | (疑似水平安定面微調聲響)  |
| 11:12:08           | CAM1   | gear down please   |
| 11:12:10           | CAM    | (風阻聲響)   |
| 11:12:17           | TWR    | (GE514 與 TWR 間對話)  |
| 11:12:20           | CAM2   | 跑道頭那邊好像在下雨   |
| 11:12:21           | CAM1   | 嗯  |
| 11:12:22           | GE 514 | (GE514 與 TWR 間對話)  |
| 11:12:25           | CAM1   | flap twenty eight  |
| 11:12:26           | CAM2   | twenty eight   |
| 11:12:29           | CAM1   | before landing check sir   |
| 11:12:30           | CAM2   | ignition   |
| 11:12:31           | CAM1   | bravo  |
| 11:12:31           | CAM2   | t-r-i  |
| 11:12:32           | CAM1   | go around  |
| 11:12:32           | CAM2   | landing gear   |
| 11:12:33           | CAM1   | down tree green  |
| 11:12:33           | CAM2   | spoiler  |
| 11:12:34           | CAM1   | armed  |
| 11:12:34           | CAM2   | break pressure   |
| 11:12:34           | CAM1   | check  |

| FDR<br>GMT<br>Time | Source | Contents  |
|--------------------|--------|---|
| 11:12:35           | CAM2   | flap slats  |
| 11:12:36           | CAM1   | twenty eight land   |
| 11:12:36           | CAM2   | landing light   |
| 11:12:36           | CAM1   | on  |
| 11:12:41           | CAM1   | sir flap forty  |
| 11:12:42           | CAM2   | forty flap  |
| 11:12:46           | CAM2   | before landing check completed  |
| 11:12:47           | CAM1   | thank you sir   |
| 11:13:00           | TWR    | far eastern zero six six runway one zero wind zero one zero at tree cleared to land |
| 11:13:04           | CM-2   | runway one zero cleared to land far eastern zero six six                            |
| 11:13:06           | CAM    | (疑似水平安定面微調聲響)   |
| 11:13:07           | CAM1   | 左側風三浬 可以落地  |
| 11:13:09           | CAM2   | one thousand stable   |
| 11:13:10           | CAM1   | continue  |
| 11:13:11           | CAM2   | continue  |
| 11:13:12           | CAM    | (疑似水平安定面微調聲響)   |
| 11:13:14           | CAM1   | 跑道上好像還下雨喲   |
| 11:13:16           | CAM    | (單聲警示聲)   |
| 11:13:16           | CAM1   | 一樣在下雨   |
| 11:13:19           | CAM1   | 那邊下雨  |
| 11:13:20           | CAM2   | 嗯   |
| 11:13:24           | CAM2   | 那就怕是雨簾 呵呵 呵   |
| 11:13:25           | CAM1   | 對呀  |
| 11:13:28           | CAM1   | 前幾天這邊下那邊好 現在那邊下這邊好  |
| 11:13:28           | CAM    | (疑似水平安定面微調聲響)   |
| 11:13:29           | CAM    | stabilizer motions  |
| 11:13:35           | ---    | ...   |
| 11:13:47           | CAM1   | 還好  |
| 11:13:51           | CAM    | (疑似水平安定面微調聲響)   |
| 11:13:55           | CAM2   | ...   |
| 11:14:01           | CAM1   | autopilot disengaged  |
| 11:14:01           | CAM    | (自動駕駛解除警示聲)   |
| 11:14:02           | CAM2   | autopilot disengaged  |

| FDR<br>GMT<br>Time | Source | Contents              |
|--------------------|--------|-----------------------|
| 11:14:10           | CAM2   | five hundred          |
| 11:14:12           | CAM2   | stable                |
| 11:14:12           | CAM1   | continue              |
| 11:14:13           | CAM2   | continue              |
| 11:14:16           | CAM1   | 再大一點 等一下再前面一點 把我雨刷都打開 |
| 11:14:17           | CAM2   | 對呀                    |
| 11:14:20           | CAM    | (雨刷聲開始)               |
| 11:14:20           | CAM1   | decision one hundred  |
| 11:14:25           | CAM2   | approach minimum      |
| 11:14:27           | CAM1   | check                 |
| 11:14:28           | CAM1   | 放最大                   |
| 11:14:30           | CAM    | minimum               |
| 11:14:30           | CAM2   | yes                   |
| 11:14:30           | CAM1   | landing               |
| 11:14:31           | CAM2   | landing               |
| 11:14:32           | CAM    | (疑似水平安定面微調聲響)         |
| 11:14:43           | CAM2   | one hundred           |
| 11:14:43           | CAM    | one hundred           |
| 11:14:44           | CAM1   | check                 |
| 11:14:48           | CAM    | fifty                 |
| 11:14:49           | CAM    | forty                 |
| 11:14:51           | CAM    | thirty                |
| 11:14:52           | CAM2   | 不讓它沉                  |
| 11:14:52           | CAM    | twenty                |
| 11:14:53           | CAM2   | 停                     |
| 11:14:54           | CAM    | ten                   |
| 11:14:54           | CAM2   | 往左邊修一點                |
| 11:14:58           | CAM    | (疑似 spoiler 手柄移動聲響)   |
| 11:15:00           | CAM    | (異於正常落地滾行聲響)          |
| 11:15:01           | CAM1   | 出去啦 *                 |
| 11:15:03           | CAM2   | 啊 *                   |
| 11:15:10           | CAM1   | *                     |
| 11:15:17           | CAM2   | sixty                 |
| 11:15:21           | CAM1   | 唉                     |

| FDR<br>GMT<br>Time | Source  | Contents   |
|--------------------|---------|--|
| 11:15:22           | CAM2    | 啊 有出去嗎   |
| 11:15:27           | CAM2    | fifty  |
| 11:15:36           | CAM1    | 沒有出去有壓到 壓到...  |
| 11:15:37           | TWR     | far eastern zero six six turn right at the end contact ground one two one point niner good day |
| 11:15:42           | CM-2    | contact ground far eastern zero six six  |
| 11:16:07           | ATN     | 各位貴賓 我們現在已經降落在松山機場 在飛機還沒有完全停止 機長未將緊扣安全帶的指示燈熄滅之前 請您不要 ... 當您打開行李箱時 ... 歡迎您再度搭乘 (中文 英文 台語)       |
| 11:16:17           | CM-2    | sungshan ground far eastern zero six six end of runway taxi to bay niner                       |
| 11:16:22           | GC      | far eastern zero six six sungshan ground taxi to bay niner                                     |
| 11:16:26           | CM-2    | bay niner far eastern zero six six   |
| 11:16:34           | CAM2    | spoiler retracted  |
| 11:16:37           | CAM2    | standby landing check sir  |
| 11:16:38           | CAM1    | yes sir after landing check sir  |
| 11:16:40           | CAM1    | a-p-u start  |
| 11:16:41           | CAM2    | spoiler retracted flap fifteen radar off   |
| 11:16:45           | CAM2    | landing light  |
| 11:16:47           | CAM2    | ignition pitot heat ice protection   |
| 11:16:51           | CAM2    | a-p-u standby  |
| 11:16:54           | CAM2    | a-p-u start sir  |
| 11:16:55           | CAM1    | yes sir  |
| 11:17:42           | CAM2    | a-p-u power available  |
| 11:17:43           | CAM1    | air on hi bleed off  |
| 11:18:37           | CAM1    | flap up slats retracted  |
| 11:18:39           | CAM2    | flap up  |
| 11:18:50           | CAM2    | 九號 sir   |
| 11:18:51           | CAM1    | yes sir  |
| 11:19:10           | GE 5113 | (GE5113 與 SOC_TNA 間對話)   |
| 11:19:17           | SOC_TNA | (GE5113 與 SOC_TNA 間對話)   |
| 11:19:18           | GE 5113 | (GE5113 與 SOC_TNA 間對話)   |
| 11:19:23           | SOC_TNA | (GE5113 與 SOC_TNA 間對話)   |
| 11:19:25           | GE 5113 | (GE5113 與 SOC_TNA 間對話)   |

| FDR<br>GMT<br>Time | Source  | Contents   |
|--------------------|---------|--|
| 11:19:34           | CAM2    | 喔  |
| 11:19:41           | SOC_MDA | 呼叫華信請再講  |
| 11:19:49           | ATIS    | five hundred feet broken one thousand two hundred feet overcast tree thousand feet temperature two seven dew point two five q-n-h zero nine nine tree hecto-pascal caution runway surface between two hundred forty meters and seven hundred meters from runway one zero threshold maybe slippery inform taipei approach or sungshan |
| 11:19:55           | CAM     | (雨刷聲停止)  |
| 11:20:07           | PA      | (開艙門指示聲響)  |
| 11:20:09           | ATN     | (客艙開艙門前檢查程序回報)   |
| 11:20:17           | ---     | *  |
| 11:20:18           | CAM1    | 煞車鬆 謝謝   |
| 11:20:27           | CAM1    | 壓到起落架 或者是 ...  |
| 11:20:31           | GND     | 報告教官   |
| 11:20:32           | CAM     | (疑似鬆手煞車聲響)   |
| 11:20:32           | CAM1    | 煞車鬆謝謝  |
| 11:20:33           | GND     | 喔 這個大燈還沒關喔   |
| 11:20:36           | CAM1    | parking check sir  |
| 11:20:36           | GND     | 謝謝教官   |
| 11:20:37           | CAM2    | parking brake  |
| 11:20:38           | CAM1    | set  |
| 11:20:38           | CAM2    | flap slats   |
| 11:20:39           | CAM1    | up and retracted   |
| 11:20:40           | CAM2    | air condition supply   |
| 11:20:41           | CAM1    | hi bleed off   |
| 11:20:42           | CAM2    | fuel lever   |
| 11:20:43           | CAM1    | off  |
| 11:20:43           | CAM2    | seat belt  |
| 11:20:44           | CAM1    | off  |
| 11:20:44           | CAM2    | fuel pumps   |
| 11:20:45           | CAM1    | on   |
| 11:20:45           | CAM2    | anticollision light  |
| 11:20:46           | CAM1    | off  |
| 11:20:46           | CAM2    | hydraulic pumps  |

| FDR<br>GMT<br>Time     | Source  | Contents            |
|------------------------|---------|---------------------|
| 11:20:47               | CAM1    | high off            |
| 11:20:47               | CAM2    | parking brake       |
| 11:20:48               | CAM1    | release             |
| 11:20:48               | CAM2    | completed sir       |
| 11:20:50               | CAM1    | 下去看看 下去看看           |
| 11:20:58               | CM-2    | 遠東洞六六 么五兩洞 油量么六點洞   |
| 11:21:04               | CAM     | (疑似開駕駛艙門聲響)         |
| 11:21:04               | SOC_MDA | (SOC_MDA 與華信班機之對話)  |
| 11:21:14               | SOC_MDA | (SOC_MDA 與華信班機之對話)  |
| 11:21:20               | SOC_MDA | (SOC_MDA 與華信班機之對話)  |
| 11:21:35               | SOC_MDA | (SOC_MDA 與華信班機之對話)  |
| 11:21:40               | SOC_MDA | (SOC_MDA 與華信班機之對話)  |
| 11:22:01               | SOC_FEA | 遠東洞六六 聯管呼叫          |
| 11:22:06               | CM-2    | 請說                  |
| 11:22:07               | SOC_FEA | 落地時間請再重複一次 剛剛被蓋 蓋掉了 |
| 11:22:11               | CM-2    | 好 么五兩洞 油量么六點洞       |
| 11:22:15               | SOC_FEA | 兩洞 么六點洞 謝謝          |
| 11:22:19               | CM-2    | 謝謝                  |
| 11:22:29               | CAM1    | ...看它沉 ...          |
| 11:22:31 ~<br>11:26:13 | CAM     | (與本次事故無關之人員對話)      |
| 11:26:13               |         | 紀錄器記錄終止             |

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## 附錄四 飛航參數列表及繪圖

### (1) 事故機 SSFDR 飛航參數列表

|    | PARAMETER NAME  |    | PARAMETER NAME                      |
|----|---|----|-------------------------------------|
| 1  | PALT  | 25 | HYDRAULIC PRESS SYSTEM              |
| 2  | AIRSPEED  | 26 | FIRE WARNING ( LEFT / RIGHT ENGINE) |
| 3  | HEADING   | 27 | CABIN PRESSURE WARNING              |
| 4  | PITCH ATTITUDE(1,2)   | 28 | RADIO KEYING (HF-1; HF-2)           |
| 5  | ROLL ATTITUDE (1,2)   | 29 | RADIO KEYING (VHF-1; VHF-2)         |
| 6  | LATERAL ACCELERATION  | 30 | TERRAIN WARN                        |
| 7  | PITCH TRIM POSITION   | 31 | LANDING GEAR (MLG R UP/DOWN)        |
| 8  | ELEVATOR POSITION (R)                                       | 32 | FLIGHT/GROUND ( Nose Landing Gear)  |
| 9  | AILERON POSITION  | 33 | AUTOPILOT MODE                      |
| 10 | RUDDER POSITION   | 34 | N1 (LEFT / RIGHT ENGINE)            |
| 11 | EPR (LEFT / RIGHT ENGINE)                                   | 35 | FUEL FLOW (LEFT / RIGHT ENGINE)     |
| 12 | THRUST REV ENG 1,2  | 36 | MACH NUMBER                         |
| 13 | FLAP POSITION LEFT  | 33 | BRAKE PRESSURE ( LEFT/RIGHTPRESS)   |
| 14 | SLAT POSITION (LA,LB,RA,RB)                                 | 34 | ANGLE OF ATTACK                     |
| 15 | LOCALIZER DEV ( No1 / No2)                                  | 35 | BRAKE PEDAL POS (LEFT /RIGHT PEDAL) |
| 16 | GLIDESLOPE DEV( No1/ No2)                                   | 36 | SLAT DISAGREE                       |
| 17 | VERTICAL ACCELERATION                                       | 37 | SLAT RETRACT                        |
| 18 | TOTAL AIR TEMP  | 38 | STICK PUSHER                        |
| 19 | MARKER BEACON (IM/MM/PM)                                    | 39 | GMT (Hour, Min)                     |
| 20 | RADIO ALT   | 40 | MAX ALLOW AIRSPEED                  |
| 21 | AUTOPILOT ENGAGED   | 41 | EVENT MARKER                        |
| 22 | AUTOPILOT IN USE  | 42 | MASTER WARNING                      |
| 23 | SPOILER/SPEEDBRAKE POSITION<br>LEFT OUTBOARD; RIGHT INBOARD | 43 | Aircraft ID                         |
| 24 | LONGITUDINAL ACCELERATION                                   |    |                                     |

## (2) 事故機 SSFDR 事故期間相關飛航參數列表

| FDR      | FDR   | A/P          | Aileron | Flight /Gnd | Altitude | Angle of Attack | Brake Pedal pos left | Brake Pedal pos right | Brake Pressure Left | Brake Pressure Right | Computed Airspeed |
|----------|-------|--------------|---------|-------------|----------|-----------------|----------------------|-----------------------|---------------------|----------------------|-------------------|
| GMT      | SRN   | Engage (sec) |         | NOSE (deg)  | (feet)   | (deg)           | (deg)                | (deg)                 | (PSIA)              | (PSIA)               | (kts)             |
| 11:12:09 | 93406 | eng          | 2.1     | Air         | 2708     | 20              | 2.3                  | 0                     | 0                   | 0                    | 192               |
| 11:12:10 | 93407 | eng          | 2.2     | Air         | 2687     | 20              | 0.3                  | 0                     | 0                   | 0                    | 192               |
| 11:12:11 | 93408 | eng          | 2.1     | Air         | 2664     | 20              | 2.3                  | 0                     | 0                   | 0                    | 192               |
| 11:12:12 | 93409 | eng          | 2.1     | Air         | 2635     | 20              | 0.4                  | 0                     | 0                   | 0                    | 191               |
| 11:12:13 | 93410 | eng          | 1.8     | Air         | 2610     | 20              | 2.3                  | 0                     | 0                   | 0                    | 189               |
| 11:12:14 | 93411 | eng          | 0.7     | Air         | 2581     | 20              | 0.3                  | 0                     | 0                   | 0                    | 190               |
| 11:12:15 | 93412 | eng          | 1.8     | Air         | 2553     | 20              | 2.3                  | 0                     | 0                   | 0                    | 190               |
| 11:12:16 | 93413 | eng          | 3.3     | Air         | 2530     | 20              | 0.3                  | 0                     | 0                   | 0                    | 188               |
| 11:12:17 | 93414 | eng          | 4.4     | Air         | 2507     | 20              | 2.2                  | 0                     | 0                   | 0                    | 187               |
| 11:12:18 | 93415 | eng          | 2.2     | Air         | 2489     | 20              | 0.3                  | 0                     | 0                   | 0                    | 186               |
| 11:12:19 | 93416 | eng          | 3.1     | Air         | 2462     | 20              | 2.3                  | 0                     | 0                   | 0                    | 186               |
| 11:12:20 | 93417 | eng          | 1.3     | Air         | 2438     | 20              | 0.3                  | 0                     | 0                   | 0                    | 186               |
| 11:12:21 | 93418 | eng          | 3.1     | Air         | 2416     | 20              | 2.3                  | 0                     | 0                   | 0                    | 186               |
| 11:12:22 | 93419 | eng          | 4.9     | Air         | 2395     | 20              | 0.3                  | 0                     | 0                   | 0                    | 187               |
| 11:12:23 | 93420 | eng          | 3.4     | Air         | 2373     | 20              | 2.4                  | 0                     | 0                   | 0                    | 188               |
| 11:12:24 | 93421 | eng          | 3.2     | Air         | 2351     | 20              | 0.4                  | 0                     | 0                   | 0                    | 186               |
| 11:12:25 | 93422 | eng          | 1.6     | Air         | 2334     | 20              | 2.2                  | 0                     | 0                   | 0                    | 186               |
| 11:12:26 | 93423 | eng          | 1.2     | Air         | 2312     | 20              | 0.2                  | 0                     | 0                   | 0                    | 186               |
| 11:12:27 | 93424 | eng          | 1.2     | Air         | 2294     | 20              | 2.4                  | 0                     | 0                   | 0                    | 184               |
| 11:12:28 | 93425 | eng          | 1.9     | Air         | 2274     | 20              | 0.3                  | 0                     | 0                   | 0                    | 182               |
| 11:12:29 | 93426 | eng          | 2.8     | Air         | 2255     | 20              | 2.2                  | 0                     | 0                   | 0                    | 182               |
| 11:12:30 | 93427 | eng          | 3       | Air         | 2236     | 20              | 0.3                  | 0                     | 0                   | 0                    | 183               |
| 11:12:31 | 93428 | eng          | 3.7     | Air         | 2223     | 20              | 2.4                  | 0                     | 0                   | 0                    | 183               |
| 11:12:32 | 93429 | eng          | 2.7     | Air         | 2205     | 20              | 0.2                  | 0                     | 0                   | 0                    | 181               |
| 11:12:33 | 93430 | eng          | 0.5     | Air         | 2191     | 20              | 2.4                  | 0                     | 0                   | 0                    | 178               |
| 11:12:34 | 93431 | eng          | 1.9     | Air         | 2178     | 20              | 0.2                  | 0                     | 0                   | 0                    | 178               |
| 11:12:35 | 93432 | eng          | 1.1     | Air         | 2166     | 20              | 2.3                  | 0                     | 0                   | 0                    | 178               |
| 11:12:36 | 93433 | eng          | -0.2    | Air         | 2147     | 20              | 0.2                  | 0                     | 0                   | 0                    | 176               |
| 11:12:37 | 93434 | eng          | 3.3     | Air         | 2129     | 20              | 2.3                  | 0                     | 0                   | 0                    | 175               |
| 11:12:38 | 93435 | eng          | 2.2     | Air         | 2110     | 20              | 0.2                  | 0                     | 0                   | 0                    | 172               |
| 11:12:39 | 93436 | eng          | 2.1     | Air         | 2094     | 20              | 2.3                  | 0                     | 0                   | 0                    | 171               |
| 11:12:40 | 93437 | eng          | 2.1     | Air         | 2079     | 20              | 0.2                  | 0                     | 0                   | 0                    | 171               |
| 11:12:41 | 93438 | eng          | 1.4     | Air         | 2064     | 20              | 2.3                  | 0                     | 0                   | 0                    | 170               |
| 11:12:42 | 93439 | eng          | 1.6     | Air         | 2050     | 20              | 0.2                  | 0                     | 0                   | 0                    | 169               |

|                |     |      |     |      |    |     |     |     |   |     |
|----------------|-----|------|-----|------|----|-----|-----|-----|---|-----|
| 11:12:43 93440 | eng | 1.8  | Air | 2036 | 20 |     | 2.3 | 0   | 0 | 168 |
| 11:12:44 93441 | eng | 1.8  | Air | 2020 | 20 | 0.2 |     | 0   | 0 | 168 |
| 11:12:45 93442 | eng | 1.6  | Air | 2005 | 20 |     | 2.2 | 0   | 0 | 166 |
| 11:12:46 93443 | eng | 1.9  | Air | 1990 | 20 | 0.3 |     | 0   | 0 | 165 |
| 11:12:47 93444 | eng | 2.2  | Air | 1979 | 20 |     | 2.4 | 0   | 0 | 162 |
| 11:12:48 93445 | eng | 2.5  | Air | 1964 | 20 | 0.3 |     | 0   | 0 | 161 |
| 11:12:49 93446 | eng | 3.3  | Air | 1951 | 20 |     | 2.2 | 0   | 0 | 159 |
| 11:12:50 93447 | eng | 3.2  | Air | 1937 | 20 | 0.3 |     | 0   | 0 | 158 |
| 11:12:51 93448 | eng | 1.3  | Air | 1925 | 20 |     | 2.4 | 0   | 0 | 157 |
| 11:12:52 93449 | eng | 1    | Air | 1910 | 20 | 0.3 |     | 0   | 0 | 156 |
| 11:12:53 93450 | eng | 1.2  | Air | 1894 | 20 |     | 2.3 | 0   | 0 | 154 |
| 11:12:54 93451 | eng | 2.1  | Air | 1879 | 20 | 0.2 |     | 0   | 0 | 154 |
| 11:12:55 93452 | eng | 3.7  | Air | 1862 | 20 |     | 2.2 | 0   | 0 | 152 |
| 11:12:56 93453 | eng | 1.3  | Air | 1849 | 20 | 0.3 |     | 0   | 0 | 151 |
| 11:12:57 93454 | eng | 1.7  | Air | 1834 | 20 |     | 2.3 | 0   | 0 | 150 |
| 11:12:58 93455 | eng | 2.4  | Air | 1822 | 20 | 0.4 |     | 0   | 0 | 148 |
| 11:12:59 93456 | eng | 3.6  | Air | 1808 | 20 |     | 2.4 | 0   | 0 | 147 |
| 11:13:00 93457 | eng | 3.1  | Air | 1796 | 20 | 0.4 |     | 0   | 0 | 146 |
| 11:13:01 93458 | eng | 3.5  | Air | 1782 | 20 |     | 2.4 | 0   | 0 | 146 |
| 11:13:02 93459 | eng | 2.7  | Air | 1768 | 20 | 0.3 |     | 0   | 0 | 145 |
| 11:13:03 93460 | eng | 1.6  | Air | 1755 | 20 |     | 2.3 | 0   | 0 | 144 |
| 11:13:04 93461 | eng | 1.4  | Air | 1742 | 20 | 0.3 |     | 249 | 0 | 142 |
| 11:13:05 93462 | eng | 1.2  | Air | 1729 | 20 |     | 2.3 | 269 | 0 | 142 |
| 11:13:06 93463 | eng | 1.7  | Air | 1716 | 20 | 0.2 |     | 289 | 0 | 141 |
| 11:13:07 93464 | eng | 3.7  | Air | 1705 | 20 |     | 2.3 | 0   | 0 | 140 |
| 11:13:08 93465 | eng | 2.9  | Air | 1694 | 20 | 0.3 |     | 0   | 0 | 139 |
| 11:13:09 93466 | eng | 3.7  | Air | 1683 | 20 |     | 2.2 | 0   | 0 | 138 |
| 11:13:10 93467 | eng | 3.6  | Air | 1670 | 20 | 0.3 |     | 0   | 0 | 137 |
| 11:13:11 93468 | eng | 2.1  | Air | 1658 | 20 |     | 2.2 | 0   | 0 | 136 |
| 11:13:12 93469 | eng | 3.5  | Air | 1645 | 20 | 0.3 |     | 0   | 0 | 136 |
| 11:13:13 93470 | eng | 4.6  | Air | 1633 | 20 |     | 2.4 | 0   | 0 | 134 |
| 11:13:14 93471 | eng | 2.1  | Air | 1621 | 20 | 0.3 |     | 0   | 0 | 134 |
| 11:13:15 93472 | eng | 0.7  | Air | 1610 | 20 |     | 2.2 | 0   | 0 | 133 |
| 11:13:16 93473 | eng | -1.8 | Air | 1600 | 20 | 0.3 |     | 0   | 0 | 133 |
| 11:13:17 93474 | eng | 1.3  | Air | 1589 | 20 |     | 2.3 | 0   | 0 | 132 |
| 11:13:18 93475 | eng | 0.8  | Air | 1581 | 20 | 0.2 |     | 0   | 0 | 132 |
| 11:13:19 93476 | eng | 0.5  | Air | 1571 | 20 |     | 2.3 | 0   | 0 | 132 |
| 11:13:20 93477 | eng | 1.7  | Air | 1563 | 20 | 0.2 |     | 0   | 0 | 132 |
| 11:13:21 93478 | eng | 2.5  | Air | 1555 | 20 |     | 2.2 | 0   | 0 | 132 |
| 11:13:22 93479 | eng | 3.5  | Air | 1546 | 20 | 0.3 |     | 0   | 0 | 132 |
| 11:13:23 93480 | eng | 2    | Air | 1537 | 20 |     | 2.5 | 0   | 0 | 132 |

|                |     |      |     |      |    |     |     |   |   |     |
|----------------|-----|------|-----|------|----|-----|-----|---|---|-----|
| 11:13:24 93481 | eng | 2.3  | Air | 1528 | 20 | 0.3 |     | 0 | 0 | 132 |
| 11:13:25 93482 | eng | 2.2  | Air | 1519 | 20 |     | 2.3 | 0 | 0 | 132 |
| 11:13:26 93483 | eng | 2.5  | Air | 1510 | 20 | 0.2 |     | 0 | 0 | 132 |
| 11:13:27 93484 | eng | 2.6  | Air | 1501 | 20 |     | 2.4 | 0 | 0 | 131 |
| 11:13:28 93485 | eng | 2.5  | Air | 1491 | 20 | 0.2 |     | 0 | 0 | 131 |
| 11:13:29 93486 | eng | 2.6  | Air | 1482 | 20 |     | 2.3 | 0 | 0 | 130 |
| 11:13:30 93487 | eng | 2.7  | Air | 1473 | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:13:31 93488 | eng | 2.5  | Air | 1465 | 20 |     | 2.3 | 0 | 0 | 130 |
| 11:13:32 93489 | eng | 1.3  | Air | 1456 | 20 | 0.2 |     | 0 | 0 | 130 |
| 11:13:33 93490 | eng | 0.9  | Air | 1448 | 20 |     | 2.3 | 0 | 0 | 130 |
| 11:13:34 93491 | eng | 0.5  | Air | 1441 | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:13:35 93492 | eng | 1.5  | Air | 1432 | 20 |     | 2.4 | 0 | 0 | 130 |
| 11:13:36 93493 | eng | 1.5  | Air | 1424 | 20 | 0.3 |     | 0 | 0 | 132 |
| 11:13:37 93494 | eng | 1.2  | Air | 1414 | 20 |     | 2.3 | 0 | 0 | 132 |
| 11:13:38 93495 | eng | 1.1  | Air | 1407 | 20 | 0.4 |     | 0 | 0 | 132 |
| 11:13:39 93496 | eng | 1.6  | Air | 1397 | 20 |     | 2.5 | 0 | 0 | 132 |
| 11:13:40 93497 | eng | 3.2  | Air | 1387 | 20 | 0.3 |     | 0 | 0 | 131 |
| 11:13:41 93498 | eng | 3.7  | Air | 1376 | 20 |     | 2.2 | 0 | 0 | 131 |
| 11:13:42 93499 | eng | 1.7  | Air | 1365 | 20 | 0.2 |     | 0 | 0 | 132 |
| 11:13:43 93500 | eng | -0.9 | Air | 1353 | 20 |     | 2.4 | 0 | 0 | 132 |
| 11:13:44 93501 | eng | -0.4 | Air | 1342 | 20 | 0.4 |     | 0 | 0 | 131 |
| 11:13:45 93502 | eng | 1.4  | Air | 1332 | 20 |     | 2.4 | 0 | 0 | 131 |
| 11:13:46 93503 | eng | 2.5  | Air | 1319 | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:13:47 93504 | eng | 3    | Air | 1309 | 20 |     | 2.3 | 0 | 0 | 130 |
| 11:13:48 93505 | eng | 2.4  | Air | 1296 | 20 | 0.1 |     | 0 | 0 | 129 |
| 11:13:49 93506 | eng | 1.5  | Air | 1286 | 20 |     | 2.4 | 0 | 0 | 129 |
| 11:13:50 93507 | eng | -0.1 | Air | 1274 | 20 | 0.4 |     | 0 | 0 | 129 |
| 11:13:51 93508 | eng | -0.5 | Air | 1264 | 20 |     | 2.4 | 0 | 0 | 129 |
| 11:13:52 93509 | eng | 0.6  | Air | 1253 | 20 | 0.2 |     | 0 | 0 | 129 |
| 11:13:53 93510 | eng | 2.1  | Air | 1241 | 20 |     | 2.4 | 0 | 0 | 129 |
| 11:13:54 93511 | eng | 2    | Air | 1230 | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:13:55 93512 | eng | 1.7  | Air | 1219 | 20 |     | 2.4 | 0 | 0 | 130 |
| 11:13:56 93513 | eng | 2.6  | Air | 1209 | 20 | 0.3 |     | 0 | 0 | 129 |
| 11:13:57 93514 | eng | 1.9  | Air | 1197 | 20 |     | 2.3 | 0 | 0 | 129 |
| 11:13:58 93515 | eng | 1.7  | Air | 1187 | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:13:59 93516 | eng | 3.7  | Air | 1178 | 20 |     | 2.3 | 0 | 0 | 130 |
| 11:14:00 93517 | eng | 0.7  | Air | 1168 | 20 | 0.4 |     | 0 | 0 | 130 |
| 11:14:01 93518 | off | -0.5 | Air | 1155 | 20 |     | 2.3 | 0 | 0 | 130 |
| 11:14:02 93519 | off | 1    | Air | 1146 | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:14:03 93520 | off | 1.2  | Air | 1135 | 20 |     | 2.2 | 0 | 0 | 131 |
| 11:14:04 93521 | off | 3.1  | Air | 1123 | 20 | 0.2 |     | 0 | 0 | 131 |

|                |     |      |     |      |    |     |     |   |   |     |
|----------------|-----|------|-----|------|----|-----|-----|---|---|-----|
| 11:14:05 93522 | off | 3.4  | Air | 1111 | 20 |     | 2.3 | 0 | 0 | 132 |
| 11:14:06 93523 | off | 4.1  | Air | 1098 | 20 | 0.3 |     | 0 | 0 | 129 |
| 11:14:07 93524 | off | 2.2  | Air | 1086 | 20 |     | 2.3 | 0 | 0 | 131 |
| 11:14:08 93525 | off | -2.2 | Air | 1073 | 20 | 0.2 |     | 0 | 0 | 130 |
| 11:14:09 93526 | off | -0.7 | Air | 1060 | 20 |     | 2.4 | 0 | 0 | 129 |
| 11:14:10 93527 | off | 2.8  | Air | 1049 | 20 | 0.3 |     | 0 | 0 | 128 |
| 11:14:11 93528 | off | 1.8  | Air | 1038 | 20 |     | 2.5 | 0 | 0 | 129 |
| 11:14:12 93529 | off | -1.9 | Air | 1026 | 20 | 0.3 |     | 0 | 0 | 129 |
| 11:14:13 93530 | off | -1.5 | Air | 1017 | 20 |     | 2.4 | 0 | 0 | 127 |
| 11:14:14 93531 | off | -3.2 | Air | 1003 | 20 | 0.3 |     | 0 | 0 | 127 |
| 11:14:15 93532 | off | -0.5 | Air | 996  | 20 |     | 2.2 | 0 | 0 | 129 |
| 11:14:16 93533 | off | -0.2 | Air | 988  | 20 | 0.1 |     | 0 | 0 | 130 |
| 11:14:17 93534 | off | 1.1  | Air | 976  | 20 |     | 2.3 | 0 | 0 | 131 |
| 11:14:18 93535 | off | 0    | Air | 965  | 20 | 0.2 |     | 0 | 0 | 130 |
| 11:14:19 93536 | off | 1.2  | Air | 953  | 20 |     | 2.3 | 0 | 0 | 129 |
| 11:14:20 93537 | off | 2.6  | Air | 945  | 20 | 0.1 |     | 0 | 0 | 129 |
| 11:14:21 93538 | off | 2.6  | Air | 935  | 20 |     | 2.4 | 0 | 0 | 130 |
| 11:14:22 93539 | off | 1.8  | Air | 926  | 20 | 0.4 |     | 0 | 0 | 130 |
| 11:14:23 93540 | off | 2.5  | Air | 917  | 20 |     | 2.4 | 0 | 0 | 130 |
| 11:14:24 93541 | off | 2.7  | Air | 909  | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:14:25 93542 | off | -1.7 | Air | 898  | 20 |     | 2.5 | 0 | 0 | 130 |
| 11:14:26 93543 | off | 1.2  | Air | 886  | 20 | 0.4 |     | 0 | 0 | 130 |
| 11:14:27 93544 | off | 1.4  | Air | 874  | 20 |     | 2.4 | 0 | 0 | 130 |
| 11:14:28 93545 | off | 2.9  | Air | 863  | 20 | 0.2 |     | 0 | 0 | 131 |
| 11:14:29 93546 | off | 2.2  | Air | 850  | 20 |     | 2.3 | 0 | 0 | 132 |
| 11:14:30 93547 | off | 1.9  | Air | 835  | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:14:31 93548 | off | 1.7  | Air | 822  | 20 |     | 2.3 | 0 | 0 | 130 |
| 11:14:32 93549 | off | -0.1 | Air | 809  | 20 | 0.3 |     | 0 | 0 | 130 |
| 11:14:33 93550 | off | -0.3 | Air | 795  | 19 |     | 2.1 | 0 | 0 | 130 |
| 11:14:34 93551 | off | 0.3  | Air | 783  | 18 | 0.3 |     | 0 | 0 | 130 |
| 11:14:35 93552 | off | 0.4  | Air | 772  | 18 |     | 2.3 | 0 | 0 | 130 |
| 11:14:36 93553 | off | 1.3  | Air | 759  | 17 | 0.2 |     | 0 | 0 | 130 |
| 11:14:37 93554 | off | 2.9  | Air | 746  | 16 |     | 2.3 | 0 | 0 | 130 |
| 11:14:38 93555 | off | 2.8  | Air | 733  | 16 | 0.2 |     | 0 | 0 | 130 |
| 11:14:39 93556 | off | -0.9 | Air | 724  | 16 |     | 2.3 | 0 | 0 | 130 |
| 11:14:40 93557 | off | 0.3  | Air | 711  | 15 | 0.3 |     | 0 | 0 | 129 |
| 11:14:41 93558 | off | 1.1  | Air | 701  | 15 |     | 2.4 | 0 | 0 | 130 |
| 11:14:42 93559 | off | -1.3 | Air | 689  | 14 | 0.3 |     | 0 | 0 | 130 |
| 11:14:43 93560 | off | 3    | Air | 680  | 13 |     | 2.3 | 0 | 0 | 130 |
| 11:14:44 93561 | off | -3   | Air | 669  | 13 | 0.3 |     | 0 | 0 | 130 |
| 11:14:45 93562 | off | 1.6  | Air | 658  | 13 |     | 2.4 | 0 | 0 | 128 |

|                |     |      |     |     |    |      |      |      |     |     |
|----------------|-----|------|-----|-----|----|------|------|------|-----|-----|
| 11:14:46 93563 | off | 4.1  | Air | 647 | 12 | 0.3  |      | 0    | 0   | 128 |
| 11:14:47 93564 | off | 2.1  | Air | 636 | 12 |      | 2.5  | 0    | 0   | 128 |
| 11:14:48 93565 | off | 2.3  | Air | 623 | 11 | 0.4  |      | 0    | 0   | 128 |
| 11:14:49 93566 | off | 1.8  | Air | 611 | 11 |      | 2.3  | 0    | 0   | 127 |
| 11:14:50 93567 | off | 1.3  | Air | 600 | 10 | 0.3  |      | 0    | 0   | 127 |
| 11:14:51 93568 | off | 2    | Air | 586 | 10 |      | 2.5  | 0    | 0   | 126 |
| 11:14:52 93569 | off | -0.5 | Air | 572 | 10 | 0.3  |      | 0    | 0   | 124 |
| 11:14:53 93570 | off | 1.2  | Air | 559 | 10 |      | 2.2  | 0    | 0   | 122 |
| 11:14:54 93571 | off | 2.8  | Air | 544 | 9  | 0.7  |      | 0    | 0   | 120 |
| 11:14:55 93572 | off | 1.5  | Air | 526 | 9  |      | 2.2  | 0    | 0   | 118 |
| 11:14:56 93573 | off | -1.4 | Air | 516 | 9  | 0.5  |      | 0    | 0   | 116 |
| 11:14:57 93574 | off | -0.7 | Air | 523 | 9  |      | 2.4  | 0    | 0   | 115 |
| 11:14:58 93575 | off | -1.4 | GND | 541 | 9  | 0.7  |      | 0    | 0   | 115 |
| 11:14:59 93576 | off | -0.4 | GND | 549 | 9  |      | 5    | 161  | 0   | 114 |
| 11:15:00 93577 | off | 3.5  | GND | 553 | 9  | 13.3 |      | 1291 | 0   | 110 |
| 11:15:01 93578 | off | 5.8  | GND | 546 | 9  |      | 2.3  | 1491 | 0   | 106 |
| 11:15:02 93579 | off | 8.8  | GND | 545 | 9  | 14.9 |      | 2401 | 0   | 102 |
| 11:15:03 93580 | off | 10.7 | GND | 541 | 9  |      | 2.6  | 2127 | 0   | 98  |
| 11:15:04 93581 | off | 11.7 | GND | 531 | 9  | 16.1 |      | 2489 | 0   | 93  |
| 11:15:05 93582 | off | 12.1 | GND | 531 | 9  |      | 2.5  | 2645 | 0   | 87  |
| 11:15:06 93583 | off | 12.2 | GND | 532 | 9  | 15.6 |      | 2323 | 0   | 81  |
| 11:15:07 93584 | off | 11.4 | GND | 533 | 9  |      | 2.7  | 1922 | 0   | 74  |
| 11:15:08 93585 | off | 4.8  | GND | 543 | 9  | 8.2  |      | 592  | 127 | 72  |
| 11:15:09 93586 | off | 2.3  | GND | 551 | 9  |      | 13.1 | 156  | 648 | 68  |
| 11:15:10 93587 | off | 1.6  | GND | 552 | 9  | 10.2 |      | 29   | 737 | 66  |
| 11:15:11 93588 | off | 1.4  | GND | 553 | 9  |      | 12.7 | 78   | 721 | 61  |
| 11:15:12 93589 | off | 1.3  | GND | 556 | 9  | 5.7  |      | 83   | 651 | 57  |
| 11:15:13 93590 | off | 1.3  | GND | 556 | 9  |      | 11.8 | 303  | 777 | 52  |
| 11:15:14 93591 | off | 1.3  | GND | 556 | 9  | 5.3  |      | 34   | 870 | 49  |
| 11:15:15 93592 | off | 1.3  | GND | 566 | 9  |      | 12.7 | 24   | 747 | 48  |
| 11:15:16 93593 | off | 1.5  | GND | 569 | 9  | 6.8  |      | 88   | 0   | 47  |
| 11:15:17 93594 | off | 1.5  | GND | 568 | 9  |      | 10.2 | 93   | 0   | 45  |
| 11:15:18 93595 | off | 1.4  | GND | 569 | 9  | 0.9  |      | 0    | 0   | 45  |
| 11:15:19 93596 | off | 1.4  | GND | 570 | 9  |      | 6.8  | 0    | 0   | 44  |
| 11:15:20 93597 | off | 1.4  | GND | 567 | 9  | 4.6  |      | 0    | 0   | 42  |
| 11:15:21 93598 | off | 1.4  | GND | 569 | 9  |      | 6.7  | 0    | 0   | 42  |
| 11:15:22 93599 | off | 1.4  | GND | 569 | 9  | 5.7  |      | 0    | 0   | 42  |
| 11:15:23 93600 | off | 1.4  | GND | 569 | 9  |      | 4.7  | 5    | 0   | 42  |
| 11:15:24 93601 | off | 1.4  | GND | 569 | 9  | 6.5  |      | 73   | 0   | 42  |
| 11:15:25 93602 | off | 1.4  | GND | 570 | 9  |      | 7.8  | 88   | 0   | 42  |

|                |     |     |     |     |   |     |      |     |    |    |
|----------------|-----|-----|-----|-----|---|-----|------|-----|----|----|
| 11:15:26 93603 | off | 1.4 | GND | 569 | 9 | 4.9 |      | 112 | 51 | 41 |
| 11:15:27 93604 | off | 1.4 | GND | 569 | 9 |     | 6.3  | 64  | 0  | 40 |
| 11:15:28 93605 | off | 1.4 | GND | 567 | 9 | 5.4 |      | 49  | 0  | 38 |
| 11:15:29 93606 | off | 1.4 | GND | 567 | 9 |     | 7.4  | 5   | 0  | 38 |
| 11:15:30 93607 | off | 1.4 | GND | 569 | 9 | 4.7 |      | 0   | 0  | 37 |
| 11:15:31 93608 | off | 1.4 | GND | 570 | 9 |     | 6.8  | 29  | 0  | 38 |
| 11:15:32 93609 | off | 1.4 | GND | 570 | 9 | 5.5 |      | 24  | 0  | 37 |
| 11:15:33 93610 | off | 1.4 | GND | 571 | 9 |     | 9.5  | 0   | 0  | 36 |
| 11:15:34 93611 | off | 1.4 | GND | 571 | 9 | 5.4 |      | 0   | 0  | 34 |
| 11:15:35 93612 | off | 1.3 | GND | 571 | 9 |     | 5.7  | 10  | 0  | 33 |
| 11:15:36 93613 | off | 1.4 | GND | 572 | 9 | 7.4 |      | 78  | 0  | 32 |
| 11:15:37 93614 | off | 1.3 | GND | 573 | 9 |     | 3.4  | 142 | 0  | 32 |
| 11:15:38 93615 | off | 1.4 | GND | 572 | 9 | 6.5 |      | 59  | 0  | 31 |
| 11:15:39 93616 | off | 1.3 | GND | 572 | 9 |     | 3.8  | 0   | 0  | 0  |
| 11:15:40 93617 | off | 1.3 | GND | 574 | 9 | 5.6 |      | 0   | 0  | 30 |
| 11:15:41 93618 | off | 1.4 | GND | 574 | 9 |     | 4.9  | 49  | 0  | 0  |
| 11:15:42 93619 | off | 1.4 | GND | 574 | 9 | 4.5 |      | 161 | 0  | 0  |
| 11:15:43 93620 | off | 1.4 | GND | 574 | 9 |     | 35.7 | 0   | 0  | 0  |

| FDR      | FDR   | EGT   | EGT     | EPR     | EPR   | N1   | N1    | N2   | N2    | Elevator | Elevator |
|----------|-------|-------|---------|---------|-------|------|-------|------|-------|----------|----------|
| GMT      | SRN   | Left  | Right   | Left    | Right | Left | Right | Left | Right | Left     | Right    |
|          |       | (sec) | (deg C) | (deg C) | (%)   | (%)  | (%)   | (%)  | (%)   | (deg)    | (deg)    |
| 11:12:09 | 93406 | 387   | 399     | 1.0     | 1.0   | 29   |       | 57   | -2.4  | -3.3     |          |
| 11:12:10 | 93407 | 388   | 399     | 1.0     | 1.0   | 29   |       | 57   | -2.4  | -3.0     |          |
| 11:12:11 | 93408 | 388   | 400     | 1.0     | 1.0   |      | 29    | 57   | -2.2  | -2.8     |          |
| 11:12:12 | 93409 | 390   | 401     | 1.0     | 1.0   | 29   |       | 57   | -2.1  | -2.9     |          |
| 11:12:13 | 93410 | 391   | 402     | 1.0     | 1.0   |      | 29    | 57   | -2.1  | -2.4     |          |
| 11:12:14 | 93411 | 392   | 403     | 1.0     | 1.0   | 29   |       | 58   | -2.0  | -2.7     |          |
| 11:12:15 | 93412 | 398   | 407     | 1.0     | 1.0   |      | 29    | 58   | -2.2  | -2.7     |          |
| 11:12:16 | 93413 | 414   | 420     | 1.0     | 1.0   | 31   |       | 60   | -1.9  | -2.0     |          |
| 11:12:17 | 93414 | 429   | 433     | 1.0     | 1.0   |      | 31    | 61   | -1.7  | -2.3     |          |
| 11:12:18 | 93415 | 441   | 442     | 1.0     | 1.0   | 34   |       | 65   | -1.3  | -1.7     |          |
| 11:12:19 | 93416 | 449   | 449     | 1.0     | 1.0   |      | 34    | 65   | -1.5  | -2.1     |          |
| 11:12:20 | 93417 | 449   | 454     | 1.0     | 1.0   | 40   |       | 68   | -1.5  | -2.6     |          |
| 11:12:21 | 93418 | 443   | 455     | 1.0     | 1.0   |      | 37    | 68   | -1.8  | -2.4     |          |
| 11:12:22 | 93419 | 436   | 450     | 1.0     | 1.0   | 42   |       | 69   | -1.6  | -2.6     |          |
| 11:12:23 | 93420 | 430   | 442     | 1.0     | 1.0   |      | 39    | 68   | -1.8  | -2.6     |          |
| 11:12:24 | 93421 | 425   | 436     | 1.0     | 1.0   | 42   |       | 69   | -1.6  | -2.3     |          |
| 11:12:25 | 93422 | 419   | 429     | 1.0     | 1.0   |      | 40    | 68   | -1.7  | -2.3     |          |
| 11:12:26 | 93423 | 418   | 426     | 1.0     | 1.0   | 42   |       | 69   | -1.6  | -2.2     |          |
| 11:12:27 | 93424 | 417   | 424     | 1.0     | 1.0   |      | 40    | 69   | -1.6  | -2.2     |          |
| 11:12:28 | 93425 | 416   | 422     | 1.0     | 1.1   | 42   |       | 69   | -1.8  | -2.8     |          |
| 11:12:29 | 93426 | 415   | 420     | 1.0     | 1.0   |      | 40    | 68   | -2.3  | -3.5     |          |
| 11:12:30 | 93427 | 415   | 419     | 1.0     | 1.0   | 42   |       | 69   | -2.7  | -4.1     |          |
| 11:12:31 | 93428 | 414   | 419     | 1.0     | 1.0   |      | 40    | 69   | -3.4  | -4.5     |          |
| 11:12:32 | 93429 | 414   | 418     | 1.0     | 1.0   | 42   |       | 69   | -3.8  | -5.0     |          |
| 11:12:33 | 93430 | 415   | 419     | 1.0     | 1.0   |      | 39    | 67   | -3.8  | -4.8     |          |
| 11:12:34 | 93431 | 415   | 419     | 1.0     | 1.0   | 42   |       | 69   | -3.8  | -4.6     |          |
| 11:12:35 | 93432 | 415   | 419     | 1.0     | 1.0   |      | 39    | 67   | -3.6  | -4.0     |          |
| 11:12:36 | 93433 | 416   | 420     | 1.0     | 1.0   | 42   |       | 69   | -3.0  | -4.0     |          |
| 11:12:37 | 93434 | 415   | 421     | 1.0     | 1.1   |      | 39    | 68   | -2.8  | -3.5     |          |
| 11:12:38 | 93435 | 417   | 421     | 1.1     | 1.1   | 42   |       | 69   | -3.0  | -3.5     |          |
| 11:12:39 | 93436 | 417   | 421     | 1.1     | 1.1   |      | 39    | 67   | -2.9  | -3.5     |          |
| 11:12:40 | 93437 | 418   | 421     | 1.1     | 1.1   | 42   |       | 69   | -3.1  | -3.5     |          |
| 11:12:41 | 93438 | 416   | 422     | 1.1     | 1.1   |      | 39    | 68   | -3.1  | -3.5     |          |
| 11:12:42 | 93439 | 417   | 421     | 1.1     | 1.1   | 42   |       | 69   | -3.0  | -3.5     |          |
| 11:12:43 | 93440 | 415   | 421     | 1.1     | 1.1   |      | 39    | 68   | -2.9  | -3.6     |          |
| 11:12:44 | 93441 | 417   | 420     | 1.1     | 1.1   | 41   |       | 69   | -3.0  | -3.7     |          |
| 11:12:45 | 93442 | 416   | 420     | 1.1     | 1.1   |      | 39    | 68   | -3.3  | -4.0     |          |

|          |       |     |     |     |     |    |    |    |      |      |
|----------|-------|-----|-----|-----|-----|----|----|----|------|------|
| 11:12:46 | 93443 | 417 | 420 | 1.1 | 1.1 | 41 |    | 68 | -3.4 | -4.1 |
| 11:12:47 | 93444 | 418 | 420 | 1.1 | 1.1 |    | 39 | 67 | -3.7 | -4.3 |
| 11:12:48 | 93445 | 418 | 421 | 1.1 | 1.1 | 41 |    | 68 | -3.8 | -4.3 |
| 11:12:49 | 93446 | 417 | 422 | 1.1 | 1.1 |    | 39 | 67 | -3.6 | -4.3 |
| 11:12:50 | 93447 | 418 | 421 | 1.1 | 1.1 | 41 |    | 68 | -3.5 | -4.0 |
| 11:12:51 | 93448 | 419 | 421 | 1.1 | 1.1 |    | 38 | 68 | -3.1 | -3.5 |
| 11:12:52 | 93449 | 418 | 421 | 1.1 | 1.1 | 41 |    | 68 | -2.8 | -3.1 |
| 11:12:53 | 93450 | 418 | 421 | 1.1 | 1.1 |    | 38 | 68 | -2.5 | -2.6 |
| 11:12:54 | 93451 | 418 | 423 | 1.1 | 1.1 | 41 |    | 68 | -2.3 | -2.4 |
| 11:12:55 | 93452 | 418 | 424 | 1.1 | 1.1 |    | 38 | 67 | -2.2 | -2.6 |
| 11:12:56 | 93453 | 420 | 424 | 1.1 | 1.1 | 41 |    | 68 | -2.6 | -2.8 |
| 11:12:57 | 93454 | 420 | 425 | 1.1 | 1.1 |    | 38 | 68 | -2.5 | -2.8 |
| 11:12:58 | 93455 | 419 | 423 | 1.1 | 1.1 | 41 |    | 69 | -2.4 | -2.7 |
| 11:12:59 | 93456 | 420 | 424 | 1.1 | 1.1 |    | 38 | 67 | -2.2 | -2.4 |
| 11:13:00 | 93457 | 419 | 424 | 1.1 | 1.1 | 41 |    | 68 | -1.9 | -2.4 |
| 11:13:01 | 93458 | 420 | 424 | 1.1 | 1.1 |    | 38 | 67 | -2.0 | -2.5 |
| 11:13:02 | 93459 | 420 | 425 | 1.1 | 1.1 | 41 |    | 68 | -2.0 | -2.5 |
| 11:13:03 | 93460 | 420 | 424 | 1.1 | 1.1 |    | 38 | 67 | -2.0 | -2.5 |
| 11:13:04 | 93461 | 422 | 425 | 1.1 | 1.1 | 41 |    | 68 | -2.0 | -2.5 |
| 11:13:05 | 93462 | 421 | 425 | 1.1 | 1.1 |    | 38 | 67 | -2.1 | -2.5 |
| 11:13:06 | 93463 | 422 | 427 | 1.1 | 1.1 | 41 |    | 68 | -2.1 | -2.2 |
| 11:13:07 | 93464 | 422 | 430 | 1.1 | 1.1 |    | 39 | 68 | -1.9 | -1.9 |
| 11:13:08 | 93465 | 422 | 429 | 1.1 | 1.1 | 41 |    | 68 | -1.6 | -1.7 |
| 11:13:09 | 93466 | 423 | 430 | 1.1 | 1.1 |    | 39 | 69 | -1.6 | -1.6 |
| 11:13:10 | 93467 | 425 | 435 | 1.1 | 1.1 | 42 |    | 69 | -1.1 | -1.1 |
| 11:13:11 | 93468 | 430 | 446 | 1.1 | 1.1 |    | 44 | 75 | -0.7 | -0.9 |
| 11:13:12 | 93469 | 440 | 460 | 1.1 | 1.1 | 46 |    | 75 | -1.0 | -1.2 |
| 11:13:13 | 93470 | 447 | 468 | 1.1 | 1.1 |    | 52 | 85 | -0.7 | -0.9 |
| 11:13:14 | 93471 | 449 | 471 | 1.1 | 1.2 | 50 |    | 81 | -0.5 | -1.0 |
| 11:13:15 | 93472 | 453 | 470 | 1.1 | 1.2 |    | 56 | 89 | -0.8 | -1.3 |
| 11:13:16 | 93473 | 458 | 467 | 1.2 | 1.2 | 55 |    | 87 | -1.1 | -1.4 |
| 11:13:17 | 93474 | 462 | 459 | 1.2 | 1.3 |    | 66 | 94 | -1.2 | -1.4 |
| 11:13:18 | 93475 | 465 | 445 | 1.3 | 1.3 | 62 |    | 91 | -1.5 | -2.1 |
| 11:13:19 | 93476 | 452 | 431 | 1.3 | 1.3 |    | 69 | 96 | -2.0 | -2.7 |
| 11:13:20 | 93477 | 436 | 423 | 1.3 | 1.3 | 68 |    | 94 | -2.3 | -2.7 |
| 11:13:21 | 93478 | 425 | 417 | 1.3 | 1.3 |    | 67 | 93 | -2.6 | -3.3 |
| 11:13:22 | 93479 | 415 | 406 | 1.3 | 1.3 | 67 |    | 92 | -2.7 | -3.1 |
| 11:13:23 | 93480 | 409 | 403 | 1.3 | 1.2 |    | 63 | 90 | -2.4 | -3.1 |
| 11:13:24 | 93481 | 402 | 397 | 1.2 | 1.2 | 64 |    | 90 | -2.3 | -2.9 |
| 11:13:25 | 93482 | 402 | 397 | 1.2 | 1.2 |    | 61 | 90 | -2.2 | -2.7 |
| 11:13:26 | 93483 | 401 | 398 | 1.2 | 1.2 | 62 |    | 89 | -2.1 | -2.4 |

|          |       |     |     |     |     |    |    |    |      |      |
|----------|-------|-----|-----|-----|-----|----|----|----|------|------|
| 11:13:27 | 93484 | 400 | 398 | 1.2 | 1.2 |    | 60 | 90 | -2.0 | -2.6 |
| 11:13:28 | 93485 | 399 | 400 | 1.2 | 1.2 | 61 | 89 |    | -2.2 | -2.7 |
| 11:13:29 | 93486 | 400 | 401 | 1.2 | 1.2 |    | 61 | 91 | -2.3 | -2.9 |
| 11:13:30 | 93487 | 401 | 402 | 1.2 | 1.2 | 62 | 89 |    | -2.6 | -3.2 |
| 11:13:31 | 93488 | 401 | 403 | 1.2 | 1.2 |    | 63 | 93 | -2.5 | -3.2 |
| 11:13:32 | 93489 | 403 | 408 | 1.3 | 1.3 | 63 | 90 |    | -2.6 | -3.5 |
| 11:13:33 | 93490 | 405 | 409 | 1.3 | 1.3 |    | 65 | 94 | -2.9 | -3.6 |
| 11:13:34 | 93491 | 408 | 411 | 1.3 | 1.3 | 65 | 92 |    | -2.7 | -3.4 |
| 11:13:35 | 93492 | 410 | 409 | 1.3 | 1.3 |    | 66 | 94 | -2.9 | -3.9 |
| 11:13:36 | 93493 | 412 | 411 | 1.3 | 1.3 | 66 | 92 |    | -3.7 | -4.1 |
| 11:13:37 | 93494 | 410 | 410 | 1.3 | 1.3 |    | 65 | 92 | -3.4 | -4.0 |
| 11:13:38 | 93495 | 407 | 401 | 1.2 | 1.2 | 65 | 90 |    | -3.5 | -4.3 |
| 11:13:39 | 93496 | 400 | 390 | 1.2 | 1.2 |    | 59 | 87 | -3.5 | -3.3 |
| 11:13:40 | 93497 | 392 | 383 | 1.2 | 1.2 | 59 | 87 |    | -3.2 | -3.6 |
| 11:13:41 | 93498 | 388 | 382 | 1.2 | 1.2 |    | 56 | 87 | -2.9 | -2.7 |
| 11:13:42 | 93499 | 388 | 387 | 1.2 | 1.2 | 58 | 86 |    | -2.9 | -3.6 |
| 11:13:43 | 93500 | 392 | 388 | 1.2 | 1.2 |    | 56 | 87 | -3.2 | -3.4 |
| 11:13:44 | 93501 | 391 | 388 | 1.2 | 1.2 | 58 | 87 |    | -2.9 | -3.2 |
| 11:13:45 | 93502 | 391 | 389 | 1.2 | 1.2 |    | 56 | 87 | -2.7 | -3.0 |
| 11:13:46 | 93503 | 390 | 387 | 1.2 | 1.2 | 58 | 86 |    | -2.5 | -2.8 |
| 11:13:47 | 93504 | 389 | 387 | 1.2 | 1.2 |    | 57 | 88 | -2.4 | -2.9 |
| 11:13:48 | 93505 | 389 | 396 | 1.2 | 1.2 | 58 | 87 |    | -2.5 | -2.9 |
| 11:13:49 | 93506 | 393 | 402 | 1.2 | 1.2 |    | 61 | 91 | -2.7 | -3.2 |
| 11:13:50 | 93507 | 396 | 405 | 1.2 | 1.2 | 60 | 89 |    | -2.8 | -3.4 |
| 11:13:51 | 93508 | 401 | 407 | 1.2 | 1.3 |    | 64 | 94 | -3.1 | -3.8 |
| 11:13:52 | 93509 | 403 | 409 | 1.3 | 1.3 | 63 | 91 |    | -2.9 | -3.4 |
| 11:13:53 | 93510 | 405 | 407 | 1.3 | 1.3 |    | 66 | 93 | -2.9 | -3.5 |
| 11:13:54 | 93511 | 405 | 405 | 1.3 | 1.3 | 65 | 92 |    | -2.9 | -3.5 |
| 11:13:55 | 93512 | 408 | 406 | 1.3 | 1.3 |    | 66 | 94 | -3.0 | -3.6 |
| 11:13:56 | 93513 | 408 | 408 | 1.3 | 1.3 | 66 | 92 |    | -3.0 | -3.6 |
| 11:13:57 | 93514 | 407 | 408 | 1.3 | 1.3 |    | 66 | 94 | -3.2 | -4.4 |
| 11:13:58 | 93515 | 405 | 407 | 1.3 | 1.3 | 66 | 92 |    | -3.8 | -4.4 |
| 11:13:59 | 93516 | 406 | 407 | 1.3 | 1.3 |    | 65 | 94 | -3.2 | -3.7 |
| 11:14:00 | 93517 | 407 | 406 | 1.3 | 1.3 | 65 | 91 |    | -2.8 | -4.2 |
| 11:14:01 | 93518 | 405 | 402 | 1.3 | 1.2 |    | 63 | 93 | -3.8 | -4.5 |
| 11:14:02 | 93519 | 404 | 398 | 1.2 | 1.2 | 64 | 90 |    | -4.5 | -5.4 |
| 11:14:03 | 93520 | 401 | 394 | 1.2 | 1.2 |    | 60 | 90 | -4.7 | -4.9 |
| 11:14:04 | 93521 | 398 | 392 | 1.2 | 1.2 | 62 | 88 |    | -2.7 | -3.6 |
| 11:14:05 | 93522 | 394 | 390 | 1.2 | 1.2 |    | 58 | 87 | -2.9 | -3.4 |
| 11:14:06 | 93523 | 391 | 386 | 1.2 | 1.2 | 58 | 86 |    | -2.5 | -3.7 |
| 11:14:07 | 93524 | 387 | 383 | 1.2 | 1.2 |    | 56 | 87 | -3.4 | -5.4 |

|          |       |     |     |     |     |    |    |      |      |
|----------|-------|-----|-----|-----|-----|----|----|------|------|
| 11:14:08 | 93525 | 386 | 386 | 1.2 | 1.2 | 57 | 85 | -3.9 | -3.7 |
| 11:14:09 | 93526 | 390 | 387 | 1.2 | 1.2 | 56 | 87 | -2.6 | -3.0 |
| 11:14:10 | 93527 | 390 | 393 | 1.2 | 1.2 | 57 | 87 | -2.7 | -3.1 |
| 11:14:11 | 93528 | 398 | 408 | 1.2 | 1.2 | 62 | 93 | -2.6 | -3.3 |
| 11:14:12 | 93529 | 405 | 413 | 1.2 | 1.3 | 62 | 90 | -1.9 | -1.6 |
| 11:14:13 | 93530 | 408 | 409 | 1.3 | 1.3 | 65 | 94 | -2.9 | -4.1 |
| 11:14:14 | 93531 | 409 | 411 | 1.3 | 1.3 | 66 | 93 | -3.0 | -3.3 |
| 11:14:15 | 93532 | 419 | 421 | 1.3 | 1.3 | 69 | 96 | -3.9 | -3.8 |
| 11:14:16 | 93533 | 419 | 421 | 1.3 | 1.3 | 69 | 94 | -4.7 | -5.4 |
| 11:14:17 | 93534 | 419 | 420 | 1.3 | 1.3 | 70 | 96 | -4.5 | -4.3 |
| 11:14:18 | 93535 | 416 | 414 | 1.3 | 1.3 | 68 | 93 | -4.1 | -4.3 |
| 11:14:19 | 93536 | 413 | 408 | 1.3 | 1.3 | 66 | 95 | -4.2 | -4.7 |
| 11:14:20 | 93537 | 408 | 407 | 1.3 | 1.3 | 67 | 92 | -4.2 | -4.7 |
| 11:14:21 | 93538 | 411 | 408 | 1.3 | 1.3 | 66 | 94 | -4.5 | -6.1 |
| 11:14:22 | 93539 | 410 | 409 | 1.3 | 1.3 | 66 | 92 | -5.8 | -5.2 |
| 11:14:23 | 93540 | 412 | 408 | 1.3 | 1.3 | 66 | 93 | -4.9 | -4.6 |
| 11:14:24 | 93541 | 412 | 409 | 1.3 | 1.3 | 66 | 93 | -4.2 | -4.7 |
| 11:14:25 | 93542 | 409 | 406 | 1.3 | 1.3 | 64 | 93 | -4.7 | -5.4 |
| 11:14:26 | 93543 | 407 | 403 | 1.2 | 1.2 | 64 | 90 | -5.1 | -5.2 |
| 11:14:27 | 93544 | 403 | 404 | 1.2 | 1.2 | 63 | 93 | -4.8 | -5.0 |
| 11:14:28 | 93545 | 401 | 402 | 1.2 | 1.2 | 63 | 89 | -4.6 | -5.2 |
| 11:14:29 | 93546 | 399 | 396 | 1.2 | 1.2 | 60 | 89 | -4.7 | -4.5 |
| 11:14:30 | 93547 | 395 | 390 | 1.2 | 1.2 | 60 | 87 | -3.7 | -4.0 |
| 11:14:31 | 93548 | 395 | 390 | 1.2 | 1.2 | 58 | 88 | -3.9 | -5.0 |
| 11:14:32 | 93549 | 395 | 391 | 1.2 | 1.2 | 58 | 87 | -4.0 | -4.4 |
| 11:14:33 | 93550 | 395 | 393 | 1.2 | 1.2 | 58 | 90 | -3.8 | -3.8 |
| 11:14:34 | 93551 | 396 | 393 | 1.2 | 1.2 | 58 | 88 | -3.6 | -3.9 |
| 11:14:35 | 93552 | 395 | 394 | 1.2 | 1.2 | 58 | 91 | -4.1 | -4.3 |
| 11:14:36 | 93553 | 398 | 397 | 1.2 | 1.2 | 59 | 88 | -3.5 | -4.7 |
| 11:14:37 | 93554 | 398 | 402 | 1.2 | 1.2 | 61 | 91 | -4.0 | -4.5 |
| 11:14:38 | 93555 | 400 | 405 | 1.2 | 1.2 | 60 | 89 | -3.9 | -4.8 |
| 11:14:39 | 93556 | 402 | 407 | 1.2 | 1.2 | 63 | 93 | -3.6 | -3.8 |
| 11:14:40 | 93557 | 404 | 403 | 1.2 | 1.2 | 63 | 90 | -3.1 | -4.4 |
| 11:14:41 | 93558 | 405 | 406 | 1.3 | 1.3 | 64 | 94 | -4.7 | -4.5 |
| 11:14:42 | 93559 | 407 | 406 | 1.3 | 1.3 | 64 | 91 | -3.9 | -4.6 |
| 11:14:43 | 93560 | 407 | 404 | 1.3 | 1.3 | 64 | 93 | -4.2 | -4.7 |
| 11:14:44 | 93561 | 405 | 403 | 1.3 | 1.3 | 65 | 91 | -3.9 | -3.7 |
| 11:14:45 | 93562 | 405 | 404 | 1.3 | 1.3 | 65 | 95 | -3.4 | -4.3 |
| 11:14:46 | 93563 | 405 | 405 | 1.3 | 1.3 | 65 | 91 | -3.9 | -1.8 |
| 11:14:47 | 93564 | 405 | 404 | 1.3 | 1.3 | 65 | 94 | -2.7 | -3.3 |
| 11:14:48 | 93565 | 408 | 407 | 1.3 | 1.3 | 67 | 93 | -1.9 | -6.2 |

|          |       |     |     |     |     |    |    |    |       |       |
|----------|-------|-----|-----|-----|-----|----|----|----|-------|-------|
| 11:14:49 | 93566 | 410 | 410 | 1.3 | 1.3 |    | 68 | 94 | -2.8  | 1.6   |
| 11:14:50 | 93567 | 410 | 404 | 1.2 | 1.2 | 66 | 87 |    | -2.4  | -4.2  |
| 11:14:51 | 93568 | 383 | 365 | 1.1 | 1.1 |    | 54 | 78 | 4.8   | -1.9  |
| 11:14:52 | 93569 | 354 | 349 | 1.1 | 1.1 | 52 | 76 |    | 1.1   | -4.7  |
| 11:14:53 | 93570 | 356 | 357 | 1.1 | 1.1 |    | 45 | 72 | 11.6  | 7.6   |
| 11:14:54 | 93571 | 368 | 370 | 1.1 | 1.1 | 45 | 70 |    | 11.6  | 2.5   |
| 11:14:55 | 93572 | 378 | 380 | 1.1 | 1.1 |    | 40 | 68 | 0.3   | 1.4   |
| 11:14:56 | 93573 | 388 | 390 | 1.1 | 1.1 | 42 | 69 |    | 0.5   | -3.5  |
| 11:14:57 | 93574 | 396 | 397 | 1.1 | 1.1 |    | 38 | 68 | 2.8   | -2.8  |
| 11:14:58 | 93575 | 401 | 401 | 1.1 | 1.1 | 41 | 69 |    | -9.4  | -8.7  |
| 11:14:59 | 93576 | 405 | 407 | 1.0 | 1.1 |    | 38 | 67 | -10.8 | -7.3  |
| 11:15:00 | 93577 | 409 | 412 | 1.1 | 1.1 | 40 | 68 |    | -6.0  | -5.1  |
| 11:15:01 | 93578 | 410 | 416 | 1.1 | 1.1 |    | 38 | 68 | -4.2  | -4.2  |
| 11:15:02 | 93579 | 412 | 422 | 1.1 | 1.1 | 40 | 67 |    | -2.8  | -4.7  |
| 11:15:03 | 93580 | 415 | 425 | 1.1 | 1.1 |    | 38 | 69 | -2.6  | -4.6  |
| 11:15:04 | 93581 | 429 | 444 | 1.1 | 1.1 | 43 | 71 |    | -3.1  | -5.2  |
| 11:15:05 | 93582 | 451 | 467 | 1.1 | 1.1 |    | 48 | 83 | -4.0  | -6.0  |
| 11:15:06 | 93583 | 459 | 482 | 1.1 | 1.2 | 49 | 79 |    | -4.5  | -5.7  |
| 11:15:07 | 93584 | 458 | 483 | 1.2 | 1.2 |    | 56 | 89 | -5.0  | -5.8  |
| 11:15:08 | 93585 | 456 | 466 | 1.2 | 1.2 | 52 | 83 |    | -6.5  | -5.5  |
| 11:15:09 | 93586 | 452 | 453 | 1.2 | 1.2 |    | 58 | 91 | -5.8  | -4.9  |
| 11:15:10 | 93587 | 450 | 441 | 1.2 | 1.3 | 54 | 84 |    | -5.5  | -6.0  |
| 11:15:11 | 93588 | 445 | 426 | 1.2 | 1.3 |    | 64 | 92 | -7.4  | -8.4  |
| 11:15:12 | 93589 | 445 | 414 | 1.2 | 1.3 | 55 | 85 |    | -9.2  | -6.5  |
| 11:15:13 | 93590 | 442 | 407 | 1.2 | 1.3 |    | 65 | 95 | -10.6 | -8.9  |
| 11:15:14 | 93591 | 439 | 398 | 1.1 | 1.2 | 52 | 75 |    | -10.2 | -12.1 |
| 11:15:15 | 93592 | 398 | 361 | 1.1 | 1.1 |    | 49 | 72 | -10.6 | -12.6 |
| 11:15:16 | 93593 | 374 | 345 | 1.1 | 1.1 | 39 | 64 |    | -10.7 | -12.6 |
| 11:15:17 | 93594 | 359 | 337 | 1.1 | 1.1 |    | 34 | 62 | -10.7 | -12.3 |
| 11:15:18 | 93595 | 359 | 344 | 1.0 | 1.1 | 31 | 59 |    | -10.7 | -12.2 |
| 11:15:19 | 93596 | 367 | 357 | 1.0 | 1.1 |    | 31 | 60 | -10.8 | -12.4 |
| 11:15:20 | 93597 | 375 | 369 | 1.0 | 1.1 | 29 | 57 |    | -10.6 | -10.8 |
| 11:15:21 | 93598 | 384 | 380 | 1.0 | 1.1 |    | 29 | 58 | -9.2  | -9.6  |
| 11:15:22 | 93599 | 391 | 390 | 1.0 | 1.1 | 28 | 56 |    | -8.7  | -8.6  |
| 11:15:23 | 93600 | 399 | 399 | 1.0 | 1.1 |    | 28 | 57 | -7.2  | -6.3  |
| 11:15:24 | 93601 | 403 | 406 | 1.0 | 1.1 | 27 | 56 |    | -5.2  | -5.9  |
| 11:15:25 | 93602 | 407 | 409 | 1.0 | 1.0 |    | 27 | 57 | -5.7  | -5.7  |
| 11:15:26 | 93603 | 409 | 412 | 1.0 | 1.0 | 26 | 55 |    | -5.8  | -5.5  |
| 11:15:27 | 93604 | 412 | 415 | 1.0 | 1.0 |    | 26 | 56 | -4.8  | -4.9  |
| 11:15:28 | 93605 | 414 | 417 | 1.0 | 1.0 | 26 | 55 |    | -5.0  | -5.3  |

|          |       |     |     |     |     |    |    |      |      |
|----------|-------|-----|-----|-----|-----|----|----|------|------|
| 11:15:29 | 93606 | 415 | 420 | 1.0 | 1.0 | 26 | 56 | -5.5 | -5.4 |
| 11:15:30 | 93607 | 417 | 423 | 1.0 | 1.0 | 26 | 55 | -5.6 | -5.8 |
| 11:15:31 | 93608 | 419 | 425 | 1.0 | 1.0 | 26 | 56 | -5.8 | -5.8 |
| 11:15:32 | 93609 | 421 | 426 | 1.0 | 1.0 | 26 | 55 | -5.9 | -6.0 |
| 11:15:33 | 93610 | 422 | 428 | 1.0 | 1.0 | 26 | 55 | -5.9 | -6.0 |
| 11:15:34 | 93611 | 423 | 430 | 1.0 | 1.0 | 26 | 55 | -5.7 | -6.4 |
| 11:15:35 | 93612 | 424 | 431 | 1.0 | 1.0 | 26 | 55 | -5.9 | -6.7 |
| 11:15:36 | 93613 | 425 | 433 | 1.0 | 1.0 | 26 | 55 | -6.0 | -6.7 |
| 11:15:37 | 93614 | 425 | 434 | 1.0 | 1.0 | 26 | 55 | -6.0 | -6.4 |
| 11:15:38 | 93615 | 425 | 435 | 1.0 | 1.0 | 26 | 55 | -6.0 | -6.4 |
| 11:15:39 | 93616 | 427 | 436 | 1.0 | 1.0 | 26 | 55 | -6.2 | -6.4 |
| 11:15:40 | 93617 | 427 | 436 | 1.0 | 1.0 | 26 | 54 | -6.3 | -6.2 |
| 11:15:41 | 93618 | 428 | 437 | 1.0 | 1.0 | 26 | 55 | -5.9 | -6.1 |
| 11:15:42 | 93619 | 428 | 437 | 1.0 | 1.0 | 26 | 54 | -5.8 | -6.2 |
| 11:15:43 | 93620 | 429 | 438 | 1.0 | 1.0 | 26 | 55 | -6.2 | -5.9 |

| FDR      | FDR   | Eng<br>Fire  | Eng<br>Fire   | Flap<br>Pos | Fuel<br>Flow | Fuel<br>Flow | GMT | GMT | Glideslope | Glideslope | Glideslope |
|----------|-------|--------------|---------------|-------------|--------------|--------------|-----|-----|------------|------------|------------|
| GMT      | SRN   | Warn<br>left | Warn<br>right | Left        | Eng1         | Eng2         | HR  | MIN | Dev1       | Dev2       | Warn       |
|          |       | (sec)        |               | (deg)       | (PPH)        | (PPH)        |     |     | (dots)     | (dots)     |            |
| 11:12:09 | 93406 | -            | -             |             |              | 923          |     |     | -0.26      | -0.29      | No Warn    |
| 11:12:10 | 93407 | -            | -             | 17          | 938          |              | 11  |     | -0.22      | -0.22      | No Warn    |
| 11:12:11 | 93408 | -            | -             |             |              | 923          |     |     | -0.27      | -0.24      | No Warn    |
| 11:12:12 | 93409 | -            | -             | 17          | 891          |              |     | 12  | -0.24      | -0.18      | No Warn    |
| 11:12:13 | 93410 | -            | -             |             |              | 876          |     |     | -0.22      | -0.22      | No Warn    |
| 11:12:14 | 93411 | -            | -             | 17          | 1314         |              | 11  |     | -0.11      | -0.13      | No Warn    |
| 11:12:15 | 93412 | -            | -             |             |              | 1392         |     |     | -0.12      | -0.08      | No Warn    |
| 11:12:16 | 93413 | -            | -             | 17          | 1642         |              |     | 12  | -0.07      | -0.12      | No Warn    |
| 11:12:17 | 93414 | -            | -             |             |              | 1517         |     |     | -0.14      | -0.15      | No Warn    |
| 11:12:18 | 93415 | -            | -             | 17          | 1705         |              | 11  |     | -0.04      | -0.03      | No Warn    |
| 11:12:19 | 93416 | -            | -             |             |              | 1611         |     |     | 0.01       | -0.11      | No Warn    |
| 11:12:20 | 93417 | -            | -             | 17          | 1673         |              |     | 12  | -0.02      | -0.04      | No Warn    |
| 11:12:21 | 93418 | -            | -             |             |              | 1627         |     |     | 0.00       | 0.06       | No Warn    |
| 11:12:22 | 93419 | -            | -             | 17          | 1642         |              | 11  |     | 0.00       | 0.05       | No Warn    |
| 11:12:23 | 93420 | -            | -             |             |              | 1580         |     |     | 0.06       | 0.06       | No Warn    |
| 11:12:24 | 93421 | -            | -             | 17          | 1627         |              |     | 12  | 0.10       | 0.14       | No Warn    |
| 11:12:25 | 93422 | -            | -             |             |              | 1517         |     |     | 0.18       | 0.19       | No Warn    |
| 11:12:26 | 93423 | -            | -             | 17          | 1595         |              | 11  |     | 0.15       | 0.11       | No Warn    |
| 11:12:27 | 93424 | -            | -             |             |              | 1517         |     |     | 0.08       | 0.07       | No Warn    |
| 11:12:28 | 93425 | -            | -             | 21          | 1611         |              |     | 12  | 0.14       | 0.17       | No Warn    |
| 11:12:29 | 93426 | -            | -             |             |              | 1517         |     |     | 0.26       | 0.27       | No Warn    |
| 11:12:30 | 93427 | -            | -             | 26          | 1580         |              | 11  |     | 0.23       | 0.19       | No Warn    |
| 11:12:31 | 93428 | -            | -             |             |              | 1517         |     |     | 0.14       | 0.17       | No Warn    |
| 11:12:32 | 93429 | -            | -             | 29          | 1548         |              |     | 12  | 0.18       | 0.14       | No Warn    |
| 11:12:33 | 93430 | -            | -             |             |              | 1423         |     |     | 0.05       | 0.10       | No Warn    |
| 11:12:34 | 93431 | -            | -             | 29          | 1564         |              | 11  |     | 0.12       | 0.08       | No Warn    |
| 11:12:35 | 93432 | -            | -             |             |              | 1455         |     |     | 0.10       | 0.14       | No Warn    |
| 11:12:36 | 93433 | -            | -             | 30          | 1533         |              |     | 12  | 0.09       | 0.03       | No Warn    |
| 11:12:37 | 93434 | -            | -             |             |              | 1580         |     |     | 0.12       | 0.14       | No Warn    |
| 11:12:38 | 93435 | -            | -             | 30          | 1517         |              | 11  |     | 0.10       | 0.08       | No Warn    |
| 11:12:39 | 93436 | -            | -             |             |              | 1501         |     |     | 0.14       | 0.14       | No Warn    |
| 11:12:40 | 93437 | -            | -             | 30          | 1580         |              |     | 12  | 0.09       | 0.07       | No Warn    |
| 11:12:41 | 93438 | -            | -             |             |              | 1533         |     |     | 0.15       | 0.15       | No Warn    |
| 11:12:42 | 93439 | -            | -             | 30          | 1548         |              | 11  |     | 0.11       | 0.08       | No Warn    |
| 11:12:43 | 93440 | -            | -             |             |              | 1517         |     |     | 0.14       | 0.16       | No Warn    |
| 11:12:44 | 93441 | -            | -             | 33          | 1580         |              |     | 12  | 0.14       | 0.10       | No Warn    |

|          |       |   |   |    |      |    |      |      |         |
|----------|-------|---|---|----|------|----|------|------|---------|
| 11:12:45 | 93442 | - | - |    | 1501 |    | 0.19 | 0.24 | No Warn |
| 11:12:46 | 93443 | - | - | 37 | 1627 | 11 | 0.14 | 0.14 | No Warn |
| 11:12:47 | 93444 | - | - |    | 1455 |    | 0.19 | 0.11 | No Warn |
| 11:12:48 | 93445 | - | - | 40 | 1501 | 12 | 0.10 | 0.11 | No Warn |
| 11:12:49 | 93446 | - | - |    | 1501 |    | 0.09 | 0.15 | No Warn |
| 11:12:50 | 93447 | - | - | 42 | 1548 | 11 | 0.11 | 0.14 | No Warn |
| 11:12:51 | 93448 | - | - |    | 1470 |    | 0.07 | 0.05 | No Warn |
| 11:12:52 | 93449 | - | - | 42 | 1595 | 12 | 0.11 | 0.10 | No Warn |
| 11:12:53 | 93450 | - | - |    | 1517 |    | 0.19 | 0.16 | No Warn |
| 11:12:54 | 93451 | - | - | 42 | 1533 | 11 | 0.12 | 0.15 | No Warn |
| 11:12:55 | 93452 | - | - |    | 1533 |    | 0.16 | 0.25 | No Warn |
| 11:12:56 | 93453 | - | - | 42 | 1548 | 12 | 0.17 | 0.21 | No Warn |
| 11:12:57 | 93454 | - | - |    | 1439 |    | 0.11 | 0.15 | No Warn |
| 11:12:58 | 93455 | - | - | 42 | 1580 | 11 | 0.21 | 0.22 | No Warn |
| 11:12:59 | 93456 | - | - |    | 1455 |    | 0.15 | 0.13 | No Warn |
| 11:13:00 | 93457 | - | - | 42 | 1455 | 13 | 0.16 | 0.16 | No Warn |
| 11:13:01 | 93458 | - | - |    | 1470 |    | 0.16 | 0.13 | No Warn |
| 11:13:02 | 93459 | - | - | 42 | 1611 | 11 | 0.09 | 0.12 | No Warn |
| 11:13:03 | 93460 | - | - |    | 1423 |    | 0.15 | 0.13 | No Warn |
| 11:13:04 | 93461 | - | - | 42 | 1580 | 13 | 0.08 | 0.09 | No Warn |
| 11:13:05 | 93462 | - | - |    | 1564 |    | 0.21 | 0.14 | No Warn |
| 11:13:06 | 93463 | - | - | 42 | 1517 | 11 | 0.20 | 0.15 | No Warn |
| 11:13:07 | 93464 | - | - |    | 1580 |    | 0.15 | 0.24 | No Warn |
| 11:13:08 | 93465 | - | - | 42 | 1595 | 13 | 0.24 | 0.23 | No Warn |
| 11:13:09 | 93466 | - | - |    | 1971 |    | 0.20 | 0.22 | No Warn |
| 11:13:10 | 93467 | - | - | 42 | 1846 | 11 | 0.16 | 0.16 | No Warn |
| 11:13:11 | 93468 | - | - |    | 2549 |    | 0.19 | 0.06 | No Warn |
| 11:13:12 | 93469 | - | - | 42 | 2252 | 13 | 0.21 | 0.19 | No Warn |
| 11:13:13 | 93470 | - | - |    | 3081 |    | 0.29 | 0.28 | No Warn |
| 11:13:14 | 93471 | - | - | 42 | 2768 | 11 | 0.17 | 0.26 | No Warn |
| 11:13:15 | 93472 | - | - |    | 3410 |    | 0.09 | 0.25 | No Warn |
| 11:13:16 | 93473 | - | - | 42 | 3488 | 13 | 0.19 | 0.21 | No Warn |
| 11:13:17 | 93474 | - | - |    | 4270 |    | 0.16 | 0.06 | No Warn |
| 11:13:18 | 93475 | - | - | 42 | 4145 | 11 | 0.14 | 0.24 | No Warn |
| 11:13:19 | 93476 | - | - |    | 4285 |    | 0.27 | 0.11 | No Warn |
| 11:13:20 | 93477 | - | - | 42 | 4051 | 13 | 0.21 | 0.26 | No Warn |
| 11:13:21 | 93478 | - | - |    | 3566 |    | 0.17 | 0.22 | No Warn |
| 11:13:22 | 93479 | - | - | 42 | 3503 | 11 | 0.09 | 0.11 | No Warn |
| 11:13:23 | 93480 | - | - |    | 3191 |    | 0.17 | 0.13 | No Warn |
| 11:13:24 | 93481 | - | - | 42 | 3284 | 13 | 0.07 | 0.06 | No Warn |
| 11:13:25 | 93482 | - | - |    | 3019 |    | 0.05 | 0.19 | No Warn |

|          |       |   |   |    |      |    |       |       |         |
|----------|-------|---|---|----|------|----|-------|-------|---------|
| 11:13:26 | 93483 | - | - | 42 | 3081 | 11 | 0.12  | -0.01 | No Warn |
| 11:13:27 | 93484 | - | - |    | 3081 |    | 0.05  | 0.04  | No Warn |
| 11:13:28 | 93485 | - | - | 42 | 3081 | 13 | 0.18  | 0.08  | No Warn |
| 11:13:29 | 93486 | - | - |    | 3316 |    | -0.04 | 0.15  | No Warn |
| 11:13:30 | 93487 | - | - | 42 | 3175 | 11 | -0.06 | 0.12  | No Warn |
| 11:13:31 | 93488 | - | - |    | 3675 |    | -0.11 | -0.06 | No Warn |
| 11:13:32 | 93489 | - | - | 42 | 3660 | 13 | -0.04 | -0.02 | No Warn |
| 11:13:33 | 93490 | - | - |    | 3738 |    | -0.17 | 0.10  | No Warn |
| 11:13:34 | 93491 | - | - | 42 | 3785 | 11 | -0.14 | -0.06 | No Warn |
| 11:13:35 | 93492 | - | - |    | 3832 |    | -0.07 | -0.13 | No Warn |
| 11:13:36 | 93493 | - | - | 42 | 3722 | 13 | 0.00  | -0.18 | No Warn |
| 11:13:37 | 93494 | - | - |    | 3050 |    | -0.04 | -0.26 | No Warn |
| 11:13:38 | 93495 | - | - | 42 | 3191 | 11 | -0.20 | -0.07 | No Warn |
| 11:13:39 | 93496 | - | - |    | 2299 |    | -0.33 | -0.35 | No Warn |
| 11:13:40 | 93497 | - | - | 42 | 2674 | 13 | -0.31 | -0.25 | No Warn |
| 11:13:41 | 93498 | - | - |    | 2549 |    | -0.17 | -0.14 | No Warn |
| 11:13:42 | 93499 | - | - | 42 | 2706 | 11 | -0.17 | -0.18 | No Warn |
| 11:13:43 | 93500 | - | - |    | 2487 |    | -0.28 | -0.26 | No Warn |
| 11:13:44 | 93501 | - | - | 42 | 2721 | 13 | -0.08 | -0.09 | No Warn |
| 11:13:45 | 93502 | - | - |    | 2440 |    | -0.29 | -0.33 | No Warn |
| 11:13:46 | 93503 | - | - | 42 | 2706 | 11 | -0.18 | -0.17 | No Warn |
| 11:13:47 | 93504 | - | - |    | 3097 |    | -0.11 | -0.12 | No Warn |
| 11:13:48 | 93505 | - | - | 42 | 2893 | 13 | -0.19 | -0.23 | No Warn |
| 11:13:49 | 93506 | - | - |    | 3425 |    | -0.28 | -0.17 | No Warn |
| 11:13:50 | 93507 | - | - | 42 | 3425 | 11 | -0.19 | -0.21 | No Warn |
| 11:13:51 | 93508 | - | - |    | 3754 |    | -0.26 | -0.10 | No Warn |
| 11:13:52 | 93509 | - | - | 42 | 3597 | 13 | -0.17 | -0.10 | No Warn |
| 11:13:53 | 93510 | - | - |    | 3863 |    | -0.23 | -0.11 | No Warn |
| 11:13:54 | 93511 | - | - | 42 | 3785 | 11 | -0.21 | -0.19 | No Warn |
| 11:13:55 | 93512 | - | - |    | 3754 |    | -0.14 | -0.23 | No Warn |
| 11:13:56 | 93513 | - | - | 42 | 3801 | 13 | -0.06 | -0.22 | No Warn |
| 11:13:57 | 93514 | - | - |    | 3754 |    | -0.07 | -0.18 | No Warn |
| 11:13:58 | 93515 | - | - | 42 | 3801 | 11 | -0.20 | -0.16 | No Warn |
| 11:13:59 | 93516 | - | - |    | 3519 |    | -0.26 | -0.11 | No Warn |
| 11:14:00 | 93517 | - | - | 42 | 3597 | 14 | -0.16 | -0.30 | No Warn |
| 11:14:01 | 93518 | - | - |    | 3081 |    | -0.16 | -0.31 | No Warn |
| 11:14:02 | 93519 | - | - | 42 | 3300 | 11 | -0.25 | -0.19 | No Warn |
| 11:14:03 | 93520 | - | - |    | 2909 |    | -0.30 | -0.14 | No Warn |
| 11:14:04 | 93521 | - | - | 42 | 2815 | 14 | -0.28 | -0.25 | No Warn |
| 11:14:05 | 93522 | - | - |    | 2424 |    | -0.15 | -0.15 | No Warn |
| 11:14:06 | 93523 | - | - | 42 | 2534 | 11 | -0.24 | -0.16 | No Warn |

|          |       |   |   |    |      |    |       |       |         |
|----------|-------|---|---|----|------|----|-------|-------|---------|
| 11:14:07 | 93524 | - | - |    | 2628 |    | -0.03 | 0.03  | No Warn |
| 11:14:08 | 93525 | - | - | 42 | 2581 | 14 | -0.03 | -0.07 | No Warn |
| 11:14:09 | 93526 | - | - |    | 2909 |    | 0.03  | 0.05  | No Warn |
| 11:14:10 | 93527 | - | - | 42 | 3347 | 11 | 0.07  | -0.02 | No Warn |
| 11:14:11 | 93528 | - | - |    | 3582 |    | 0.07  | 0.15  | No Warn |
| 11:14:12 | 93529 | - | - | 42 | 3378 | 14 | 0.12  | 0.08  | No Warn |
| 11:14:13 | 93530 | - | - |    | 4238 |    | 0.16  | 0.29  | No Warn |
| 11:14:14 | 93531 | - | - | 42 | 4348 | 11 | 0.24  | 0.19  | No Warn |
| 11:14:15 | 93532 | - | - |    | 4536 |    | 0.19  | 0.18  | No Warn |
| 11:14:16 | 93533 | - | - | 42 | 4348 | 14 | 0.11  | 0.22  | No Warn |
| 11:14:17 | 93534 | - | - |    | 3879 |    | 0.02  | 0.07  | No Warn |
| 11:14:18 | 93535 | - | - | 42 | 3910 | 11 | -0.03 | 0.02  | No Warn |
| 11:14:19 | 93536 | - | - |    | 3675 |    | -0.03 | -0.08 | No Warn |
| 11:14:20 | 93537 | - | - | 42 | 3754 | 14 | -0.29 | -0.13 | No Warn |
| 11:14:21 | 93538 | - | - |    | 3754 |    | -0.31 | -0.43 | No Warn |
| 11:14:22 | 93539 | - | - | 42 | 3754 | 11 | -0.47 | -0.46 | No Warn |
| 11:14:23 | 93540 | - | - |    | 3691 |    | -0.56 | -0.51 | No Warn |
| 11:14:24 | 93541 | - | - | 42 | 3582 | 14 | -0.47 | -0.58 | No Warn |
| 11:14:25 | 93542 | - | - |    | 3394 |    | -0.50 | -0.51 | No Warn |
| 11:14:26 | 93543 | - | - | 42 | 3347 | 11 | -0.54 | -0.55 | No Warn |
| 11:14:27 | 93544 | - | - |    | 3159 |    | -0.38 | -0.50 | No Warn |
| 11:14:28 | 93545 | - | - | 42 | 2956 | 14 | -0.36 | -0.41 | No Warn |
| 11:14:29 | 93546 | - | - |    | 2659 |    | -0.20 | -0.29 | No Warn |
| 11:14:30 | 93547 | - | - | 42 | 2831 | 11 | -0.20 | -0.20 | No Warn |
| 11:14:31 | 93548 | - | - |    | 2659 |    | -0.25 | -0.12 | No Warn |
| 11:14:32 | 93549 | - | - | 42 | 2878 | 14 | -0.05 | -0.07 | No Warn |
| 11:14:33 | 93550 | - | - |    | 2768 |    | -0.01 | 0.04  | No Warn |
| 11:14:34 | 93551 | - | - | 42 | 2846 | 11 | 0.04  | -0.01 | No Warn |
| 11:14:35 | 93552 | - | - |    | 3003 |    | 0.11  | 0.03  | No Warn |
| 11:14:36 | 93553 | - | - | 42 | 3019 | 14 | 0.06  | 0.16  | No Warn |
| 11:14:37 | 93554 | - | - |    | 3519 |    | 0.09  | 0.30  | No Warn |
| 11:14:38 | 93555 | - | - | 42 | 3347 | 11 | 0.26  | 0.18  | No Warn |
| 11:14:39 | 93556 | - | - |    | 3456 |    | 0.35  | 0.27  | No Warn |
| 11:14:40 | 93557 | - | - | 42 | 3503 | 14 | 0.32  | 0.55  | No Warn |
| 11:14:41 | 93558 | - | - |    | 3754 |    | 0.61  | 0.54  | No Warn |
| 11:14:42 | 93559 | - | - | 42 | 3628 | 11 | 0.64  | 0.61  | No Warn |
| 11:14:43 | 93560 | - | - |    | 3707 |    | 0.55  | 0.60  | No Warn |
| 11:14:44 | 93561 | - | - | 42 | 3660 | 14 | 0.43  | 0.65  | No Warn |
| 11:14:45 | 93562 | - | - |    | 3660 |    | 0.49  | 0.71  | No Warn |
| 11:14:46 | 93563 | - | - | 42 | 3769 | 11 | 0.59  | 0.74  | No Warn |
| 11:14:47 | 93564 | - | - |    | 3910 |    | 0.62  | 0.76  | No Warn |

|          |       |   |   |    |      |    |    |       |       |         |
|----------|-------|---|---|----|------|----|----|-------|-------|---------|
| 11:14:48 | 93565 | - | - | 42 | 4238 |    | 14 | 0.77  | 0.65  | No Warn |
| 11:14:49 | 93566 | - | - |    | 3269 |    |    | 0.62  | 0.58  | No Warn |
| 11:14:50 | 93567 | - | - | 42 | 1877 | 11 |    | 0.94  | 0.74  | No Warn |
| 11:14:51 | 93568 | - | - |    | 1173 |    |    | 0.52  | 0.50  | No Warn |
| 11:14:52 | 93569 | - | - | 42 | 1455 |    | 14 | 0.08  | 0.47  | No Warn |
| 11:14:53 | 93570 | - | - |    | 1423 |    |    | 0.14  | 0.70  | No Warn |
| 11:14:54 | 93571 | - | - | 42 | 1501 | 11 |    | 0.06  | 0.27  | No Warn |
| 11:14:55 | 93572 | - | - |    | 1408 |    |    | -1.65 | -1.32 | No Warn |
| 11:14:56 | 93573 | - | - | 42 | 1564 |    | 14 | -2.09 | -1.53 | No Warn |
| 11:14:57 | 93574 | - | - |    | 1486 |    |    | -0.99 | 0.17  | No Warn |
| 11:14:58 | 93575 | - | - | 42 | 1439 | 11 |    | 2.09  | 3.87  | No Warn |
| 11:14:59 | 93576 | - | - |    | 1470 |    |    | 3.85  | 5.11  | No Warn |
| 11:15:00 | 93577 | - | - | 42 | 1611 |    | 15 | 1.95  | 2.24  | No Warn |
| 11:15:01 | 93578 | - | - |    | 1408 |    |    | 0.60  | 0.38  | No Warn |
| 11:15:02 | 93579 | - | - | 42 | 1392 | 11 |    | -0.69 | 0.65  | No Warn |
| 11:15:03 | 93580 | - | - |    | 2581 |    |    | 0.04  | 1.22  | No Warn |
| 11:15:04 | 93581 | - | - | 42 | 2330 |    | 15 | -0.51 | 0.19  | No Warn |
| 11:15:05 | 93582 | - | - |    | 3394 |    |    | -1.09 | 0.80  | No Warn |
| 11:15:06 | 93583 | - | - | 42 | 2565 | 11 |    | -0.82 | 0.57  | No Warn |
| 11:15:07 | 93584 | - | - |    | 3394 |    |    | -0.51 | 0.98  | No Warn |
| 11:15:08 | 93585 | - | - | 42 | 2940 |    | 15 | -0.18 | 0.45  | No Warn |
| 11:15:09 | 93586 | - | - |    | 3879 |    |    | 0.14  | 1.94  | No Warn |
| 11:15:10 | 93587 | - | - | 42 | 2753 | 11 |    | -0.08 | 1.66  | No Warn |
| 11:15:11 | 93588 | - | - |    | 3675 |    |    | -1.24 | 0.96  | No Warn |
| 11:15:12 | 93589 | - | - | 42 | 2972 |    | 15 | -0.84 | 1.05  | No Warn |
| 11:15:13 | 93590 | - | - |    | 3019 |    |    | -0.12 | 1.37  | No Warn |
| 11:15:14 | 93591 | - | - | 42 | 938  | 11 |    | 0.40  | 1.30  | No Warn |
| 11:15:15 | 93592 | - | - |    | 704  |    |    | 0.26  | 1.10  | No Warn |
| 11:15:16 | 93593 | - | - | 42 | 422  |    | 15 | -2.33 | 0.90  | No Warn |
| 11:15:17 | 93594 | - | - |    | 688  |    |    | -1.76 | 1.12  | No Warn |
| 11:15:18 | 93595 | - | - | 42 | 876  | 11 |    | -0.82 | 1.33  | No Warn |
| 11:15:19 | 93596 | - | - |    | 954  |    |    | -0.40 | 0.87  | No Warn |
| 11:15:20 | 93597 | - | - | 42 | 891  |    | 15 | -1.36 | 1.29  | No Warn |
| 11:15:21 | 93598 | - | - |    | 907  |    |    | -0.17 | 1.80  | No Warn |
| 11:15:22 | 93599 | - | - | 42 | 985  | 11 |    | -0.68 | 0.62  | No Warn |
| 11:15:23 | 93600 | - | - |    | 985  |    |    | -1.62 | 1.81  | No Warn |
| 11:15:24 | 93601 | - | - | 42 | 923  |    | 15 | 0.50  | 1.09  | No Warn |
| 11:15:25 | 93602 | - | - |    | 985  |    |    | 0.20  | 1.20  | No Warn |
| 11:15:26 | 93603 | - | - | 42 | 891  | 11 |    | -0.22 | 0.83  | No Warn |
| 11:15:27 | 93604 | - | - |    | 923  |    |    | -0.80 | 0.83  | No Warn |

|          |       |   |   |    |      |    |    |       |      |         |
|----------|-------|---|---|----|------|----|----|-------|------|---------|
| 11:15:28 | 93605 | - | - | 42 | 891  |    | 15 | 0.34  | 1.23 | No Warn |
| 11:15:29 | 93606 | - | - |    | 891  |    |    | 0.24  | 0.48 | No Warn |
| 11:15:30 | 93607 | - | - | 42 | 923  | 11 |    | -1.18 | 0.19 | No Warn |
| 11:15:31 | 93608 | - | - |    | 938  |    |    | -0.36 | 1.05 | No Warn |
| 11:15:32 | 93609 | - | - | 42 | 923  |    | 15 | -0.64 | 0.84 | No Warn |
| 11:15:33 | 93610 | - | - |    | 1032 |    |    | -0.86 | 0.43 | No Warn |
| 11:15:34 | 93611 | - | - | 42 | 954  | 11 |    | -1.57 | 1.37 | No Warn |
| 11:15:35 | 93612 | - | - |    | 938  |    |    | -0.22 | 0.45 | No Warn |
| 11:15:36 | 93613 | - | - | 42 | 970  |    | 15 | -1.50 | 0.84 | No Warn |
| 11:15:37 | 93614 | - | - |    | 954  |    |    | -0.34 | 0.97 | No Warn |
| 11:15:38 | 93615 | - | - | 42 | 907  | 11 |    | -0.72 | 1.28 | No Warn |
| 11:15:39 | 93616 | - | - |    | 954  |    |    | 0.61  | 1.60 | No Warn |
| 11:15:40 | 93617 | - | - | 42 | 923  |    | 15 | 0.97  | 1.14 | No Warn |
| 11:15:41 | 93618 | - | - |    | 954  |    |    | 0.14  | 0.78 | No Warn |
| 11:15:42 | 93619 | - | - | 42 | 970  | 11 |    | -1.61 | 0.49 | No Warn |
| 11:15:43 | 93620 | - | - |    | 1001 |    |    | -0.69 | 1.12 | No Warn |

| FDR      | FDR   | Hyd<br>Sys                    | Hyd<br>Sys           | Hyd<br>Sys            | Main LDG  | Lateral      | Localizer | Localizer |
|----------|-------|-------------------------------|----------------------|-----------------------|-----------|--------------|-----------|-----------|
| GMT      | SRN   | Press<br>Low<br>Left<br>(sec) | Temp<br>High<br>Left | Press<br>Low<br>Right | Right_U/D | Acceleration | Dev1      | Dev2      |
| 11:12:09 | 93406 |                               | Light<br>Of          | Light<br>Of           |           | (g's)        | (dots)    | (dots)    |
|          |       |                               |                      |                       |           | 0.006        | 0.004     | 0.022     |
|          |       |                               |                      |                       |           |              | 0.004     | -0.04     |
| 11:12:10 | 93407 | Light<br>Of                   | Light<br>Of          |                       | Transit   | 0.010        | 0.004     | 0.006     |
|          |       |                               |                      |                       |           |              | 0.014     | -0.04     |
| 11:12:11 | 93408 |                               | Light<br>Of          | Light<br>Of           |           | 0.012        | 0.022     | 0.012     |
|          |       |                               |                      |                       |           |              | 0.006     | -0.09     |
| 11:12:12 | 93409 | Light<br>Of                   | Light<br>Of          |                       | Transit   | -0.004       | -0.006    | -0.004    |
|          |       |                               |                      |                       |           |              | -0.008    | -0.07     |
| 11:12:13 | 93410 |                               | Light<br>Of          | Light<br>Of           |           | -0.033       | -0.018    | -0.035    |
|          |       |                               |                      |                       |           |              | -0.010    | -0.03     |
| 11:12:14 | 93411 | Light<br>Of                   | Light<br>Of          |                       | Transit   | -0.020       | -0.016    | 0.002     |
|          |       |                               |                      |                       |           |              | -0.026    | -0.01     |
| 11:12:15 | 93412 |                               | Light<br>Of          | Light<br>Of           |           | 0.016        | -0.004    | 0.018     |
|          |       |                               |                      |                       |           |              | 0.018     | -0.05     |
| 11:12:16 | 93413 | Light<br>Of                   | Light<br>Of          |                       | Transit   | 0.020        | 0.000     | -0.022    |
|          |       |                               |                      |                       |           |              | -0.018    | -0.12     |
| 11:12:17 | 93414 |                               | Light<br>Of          | Light<br>Of           |           | -0.018       | -0.002    | 0.000     |
|          |       |                               |                      |                       |           |              | 0.006     | -0.01     |
| 11:12:18 | 93415 | Light<br>Of                   | Light<br>Of          |                       | Transit   | -0.004       | -0.012    | 0.000     |
|          |       |                               |                      |                       |           |              | 0.008     | -0.05     |
| 11:12:19 | 93416 |                               | Light<br>Of          | Light<br>Of           |           | 0.002        | 0.004     | -0.004    |
|          |       |                               |                      |                       |           |              | -0.016    | 0.01      |
| 11:12:20 | 93417 | Light<br>Of                   | Light<br>Of          |                       | Down      | -0.016       | -0.014    | -0.018    |
|          |       |                               |                      |                       |           |              | -0.006    | 0.02      |
| 11:12:21 | 93418 |                               | Light<br>Of          | Light<br>Of           |           | 0.012        | 0.010     | 0.006     |
|          |       |                               |                      |                       |           |              | 0.018     | -0.12     |
| 11:12:22 | 93419 | Light<br>Of                   | Light<br>Of          |                       | Down      | 0.020        | 0.028     | 0.018     |
|          |       |                               |                      |                       |           |              | 0.012     | -0.12     |
| 11:12:23 | 93420 |                               | Light<br>Of          | Light<br>Of           |           | 0.004        | 0.002     | 0.014     |
|          |       |                               |                      |                       |           |              | 0.008     | -0.03     |
| 11:12:24 | 93421 | Light<br>Of                   | Light<br>Of          |                       | Down      | 0.006        | 0.008     | -0.002    |
|          |       |                               |                      |                       |           |              | 0.002     | -0.07     |
| 11:12:25 | 93422 |                               | Light<br>Of          | Light<br>Of           |           | 0.000        | -0.002    | 0.000     |
|          |       |                               |                      |                       |           |              | -0.006    | 0.02      |
| 11:12:26 | 93423 | Light                         | Light                |                       | Down      | 0.000        | -0.006    | -0.004    |
|          |       |                               |                      |                       |           |              | 0.01      | -0.07     |

|          |       | Of    | Of    |       |       |      |        |        |        |        |
|----------|-------|-------|-------|-------|-------|------|--------|--------|--------|--------|
| 11:12:27 | 93424 |       |       | Light | Light |      | -0.006 | -0.006 | -0.002 | -0.002 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:28 | 93425 | Light | Light |       |       | Down | -0.006 | -0.002 | -0.010 | 0.000  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:29 | 93426 |       |       | Light | Light |      | -0.006 | 0.000  | 0.006  | 0.010  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:30 | 93427 | Light | Light |       |       | Down | 0.008  | -0.002 | 0.004  | -0.002 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:31 | 93428 |       |       | Light | Light |      | 0.000  | 0.002  | 0.006  | 0.004  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:32 | 93429 | Light | Light |       |       | Down | 0.000  | 0.002  | -0.004 | 0.006  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:33 | 93430 |       |       | Light | Light |      | 0.002  | -0.008 | 0.012  | 0.014  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:34 | 93431 | Light | Light |       |       | Down | 0.018  | -0.031 | -0.006 | 0.010  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:35 | 93432 |       |       | Light | Light |      | -0.016 | 0.014  | -0.008 | 0.010  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:36 | 93433 | Light | Light |       |       | Down | 0.016  | -0.004 | -0.002 | -0.014 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:37 | 93434 |       |       | Light | Light |      | 0.004  | 0.008  | -0.008 | 0.000  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:38 | 93435 | Light | Light |       |       | Down | -0.016 | -0.010 | -0.010 | -0.008 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:39 | 93436 |       |       | Light | Light |      | -0.004 | 0.004  | -0.004 | -0.006 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:40 | 93437 | Light | Light |       |       | Down | -0.010 | 0.002  | -0.006 | 0.000  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:41 | 93438 |       |       | Light | Light |      | 0.000  | -0.004 | -0.002 | -0.004 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:42 | 93439 | Light | Light |       |       | Down | -0.002 | 0.000  | -0.004 | -0.002 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:43 | 93440 |       |       | Light | Light |      | -0.004 | -0.002 | 0.004  | 0.004  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:44 | 93441 | Light | Light |       |       | Down | 0.000  | 0.000  | -0.010 | 0.000  |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:45 | 93442 |       |       | Light | Light |      | -0.018 | -0.014 | -0.010 | -0.012 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |
| 11:12:46 | 93443 | Light | Light |       |       | Down | -0.004 | -0.010 | 0.004  | -0.002 |
|          |       | Of    | Of    |       |       |      |        |        |        |        |

|          |       |             |             |             |      |        |        |        |        |       |       |
|----------|-------|-------------|-------------|-------------|------|--------|--------|--------|--------|-------|-------|
| 11:12:47 | 93444 |             | Light<br>Of | Light<br>Of |      | -0.006 | -0.014 | -0.018 | -0.004 | 0.06  | -0.05 |
| 11:12:48 | 93445 | Light<br>Of | Light<br>Of |             | Down | -0.006 | 0.002  | -0.014 | -0.014 | -0.06 | -0.05 |
| 11:12:49 | 93446 |             | Light<br>Of | Light<br>Of |      | -0.006 | -0.012 | -0.002 | -0.004 | -0.06 | 0.04  |
| 11:12:50 | 93447 | Light<br>Of | Light<br>Of |             | Down | -0.004 | -0.002 | -0.002 | 0.004  | 0.04  | 0.06  |
| 11:12:51 | 93448 |             | Light<br>Of | Light<br>Of |      | -0.008 | -0.004 | 0.006  | 0.002  | 0.05  | -0.03 |
| 11:12:52 | 93449 | Light<br>Of | Light<br>Of |             | Down | 0.004  | 0.006  | 0.004  | 0.010  | 0.04  | -0.01 |
| 11:12:53 | 93450 |             | Light<br>Of | Light<br>Of |      | 0.000  | 0.000  | -0.006 | -0.006 | 0.08  | -0.05 |
| 11:12:54 | 93451 | Light<br>Of | Light<br>Of |             | Down | -0.006 | -0.010 | -0.012 | -0.012 | -0.03 | -0.05 |
| 11:12:55 | 93452 |             | Light<br>Of | Light<br>Of |      | -0.006 | -0.002 | -0.010 | -0.010 | -0.05 | 0.07  |
| 11:12:56 | 93453 | Light<br>Of | Light<br>Of |             | Down | -0.012 | -0.010 | -0.004 | -0.006 | 0.02  | 0.03  |
| 11:12:57 | 93454 |             | Light<br>Of | Light<br>Of |      | -0.006 | -0.002 | -0.002 | 0.000  | -0.04 | 0.02  |
| 11:12:58 | 93455 | Light<br>Of | Light<br>Of |             | Down | 0.000  | 0.002  | 0.004  | -0.006 | 0.02  | 0.06  |
| 11:12:59 | 93456 |             | Light<br>Of | Light<br>Of |      | -0.002 | -0.006 | 0.010  | -0.002 | 0.00  | -0.03 |
| 11:13:00 | 93457 | Light<br>Of | Light<br>Of |             | Down | 0.004  | 0.002  | 0.000  | 0.002  | -0.04 | 0.04  |
| 11:13:01 | 93458 |             | Light<br>Of | Light<br>Of |      | -0.002 | 0.006  | 0.008  | 0.004  | 0.02  | -0.04 |
| 11:13:02 | 93459 | Light<br>Of | Light<br>Of |             | Down | 0.002  | 0.002  | 0.010  | 0.006  | -0.04 | -0.01 |
| 11:13:03 | 93460 |             | Light<br>Of | Light<br>Of |      | 0.002  | 0.004  | 0.004  | 0.006  | 0.04  | -0.04 |
| 11:13:04 | 93461 | Light<br>Of | Light<br>Of |             | Down | 0.002  | 0.002  | 0.006  | 0.004  | -0.03 | -0.02 |
| 11:13:05 | 93462 |             | Light<br>Of | Light<br>Of |      | 0.004  | 0.006  | 0.000  | 0.002  | 0.03  | -0.04 |
| 11:13:06 | 93463 | Light<br>Of | Light<br>Of |             | Down | -0.002 | -0.006 | -0.008 | -0.008 | 0.00  | -0.13 |
| 11:13:07 | 93464 |             | Light       | Light       |      | -0.010 | -0.008 | -0.006 | -0.006 | -0.12 | 0.02  |

|          |       | Of    | Of    |       |       |  |  |  |  |
|----------|-------|-------|-------|-------|-------|--|--|--|--|
| 11:13:08 | 93465 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:09 | 93466 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:10 | 93467 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:11 | 93468 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:12 | 93469 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:13 | 93470 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:14 | 93471 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:15 | 93472 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:16 | 93473 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:17 | 93474 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:18 | 93475 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:19 | 93476 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:20 | 93477 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:21 | 93478 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:22 | 93479 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:23 | 93480 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:24 | 93481 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:25 | 93482 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |
| 11:13:26 | 93483 | Light | Light |       |       |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |
| 11:13:27 | 93484 |       |       | Light | Light |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |

|          |       |       |       |  |      |        |        |        |        |       |       |
|----------|-------|-------|-------|--|------|--------|--------|--------|--------|-------|-------|
| 11:13:28 | 93485 | Light | Light |  | Down | -0.010 | -0.006 | -0.010 | -0.008 | -0.04 | -0.01 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:29 | 93486 | Light | Light |  |      | -0.010 | -0.006 | -0.004 | -0.006 | -0.01 | -0.02 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:30 | 93487 | Light | Light |  | Down | -0.006 | -0.010 | 0.000  | -0.004 | 0.03  | -0.03 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:31 | 93488 | Light | Light |  |      | -0.004 | -0.004 | -0.002 | -0.002 | -0.01 | 0.14  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:32 | 93489 | Light | Light |  | Down | -0.004 | 0.000  | -0.004 | -0.002 | -0.01 | 0.00  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:33 | 93490 | Light | Light |  |      | 0.002  | 0.010  | 0.006  | -0.004 | 0.00  | -0.04 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:34 | 93491 | Light | Light |  | Down | 0.002  | -0.014 | -0.004 | -0.012 | 0.07  | -0.02 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:35 | 93492 | Light | Light |  |      | 0.004  | 0.002  | -0.002 | -0.014 | 0.07  | -0.08 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:36 | 93493 | Light | Light |  | Down | -0.014 | -0.014 | -0.016 | -0.008 | -0.06 | 0.01  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:37 | 93494 | Light | Light |  |      | -0.012 | -0.014 | -0.014 | -0.010 | -0.12 | 0.07  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:38 | 93495 | Light | Light |  | Down | -0.010 | -0.002 | -0.002 | 0.010  | -0.11 | -0.01 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:39 | 93496 | Light | Light |  |      | -0.004 | 0.002  | -0.008 | -0.012 | -0.13 | -0.08 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:40 | 93497 | Light | Light |  | Down | -0.014 | -0.010 | -0.006 | -0.008 | -0.09 | 0.02  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:41 | 93498 | Light | Light |  |      | -0.004 | -0.010 | -0.004 | -0.014 | 0.08  | 0.08  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:42 | 93499 | Light | Light |  | Down | -0.008 | -0.012 | -0.014 | -0.008 | 0.04  | -0.06 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:43 | 93500 | Light | Light |  |      | -0.014 | -0.002 | -0.004 | -0.002 | -0.07 | 0.05  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:44 | 93501 | Light | Light |  | Down | -0.002 | -0.002 | 0.000  | -0.004 | 0.11  | 0.05  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:45 | 93502 | Light | Light |  |      | -0.004 | -0.002 | 0.000  | -0.002 | -0.03 | -0.02 |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:46 | 93503 | Light | Light |  | Down | -0.002 | 0.002  | -0.008 | 0.004  | 0.09  | 0.03  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:47 | 93504 | Light | Light |  |      | -0.006 | -0.004 | -0.004 | -0.006 | 0.05  | 0.00  |
|          |       | Of    | Of    |  |      |        |        |        |        |       |       |
| 11:13:48 | 93505 | Light | Light |  | Down | -0.008 | -0.004 | -0.004 | -0.008 | -0.06 | -0.05 |
|          |       |       |       |  |      |        |        |        |        |       |       |

|          |       | Of    | Of    |       |       |      |        |        |        |        |
|----------|-------|-------|-------|-------|-------|------|--------|--------|--------|--------|
| 11:13:49 | 93506 |       |       | Light | Light |      | -0.006 | -0.004 | -0.010 | -0.008 |
|          |       | Of    | Of    |       |       |      |        | 0.02   |        | -0.08  |
| 11:13:50 | 93507 | Light | Light |       |       | Down | -0.016 | -0.006 | -0.008 | -0.004 |
|          |       | Of    | Of    |       |       |      |        | -0.03  |        | 0.15   |
| 11:13:51 | 93508 |       |       | Light | Light |      | -0.002 | -0.002 | -0.004 | -0.006 |
|          |       | Of    | Of    |       |       |      |        | 0.03   |        | 0.06   |
| 11:13:52 | 93509 | Light | Light |       |       | Down | -0.002 | -0.002 | -0.012 | -0.004 |
|          |       | Of    | Of    |       |       |      |        | -0.03  |        | 0.14   |
| 11:13:53 | 93510 |       |       | Light | Light |      | -0.002 | -0.006 | -0.010 | -0.012 |
|          |       | Of    | Of    |       |       |      |        | -0.03  |        | 0.11   |
| 11:13:54 | 93511 | Light | Light |       |       | Down | -0.010 | -0.004 | -0.010 | -0.010 |
|          |       | Of    | Of    |       |       |      |        | 0.05   |        | 0.00   |
| 11:13:55 | 93512 |       |       | Light | Light |      | -0.012 | -0.008 | -0.006 | -0.004 |
|          |       | Of    | Of    |       |       |      |        | 0.11   |        | -0.04  |
| 11:13:56 | 93513 | Light | Light |       |       | Down | -0.012 | -0.006 | -0.012 | -0.006 |
|          |       | Of    | Of    |       |       |      |        | -0.07  |        | 0.07   |
| 11:13:57 | 93514 |       |       | Light | Light |      | -0.006 | -0.008 | -0.006 | 0.000  |
|          |       | Of    | Of    |       |       |      |        | -0.10  |        | 0.12   |
| 11:13:58 | 93515 | Light | Light |       |       | Down | -0.002 | 0.000  | -0.004 | 0.006  |
|          |       | Of    | Of    |       |       |      |        | -0.09  |        | 0.06   |
| 11:13:59 | 93516 |       |       | Light | Light |      | 0.012  | 0.006  | 0.004  | 0.002  |
|          |       | Of    | Of    |       |       |      |        | -0.04  |        | -0.01  |
| 11:14:00 | 93517 | Light | Light |       |       | Down | -0.002 | -0.002 | -0.006 | -0.004 |
|          |       | Of    | Of    |       |       |      |        | -0.04  |        | 0.08   |
| 11:14:01 | 93518 |       |       | Light | Light |      | -0.004 | -0.002 | -0.002 | 0.002  |
|          |       | Of    | Of    |       |       |      |        | -0.02  |        | 0.10   |
| 11:14:02 | 93519 | Light | Light |       |       | Down | 0.008  | 0.002  | 0.002  | -0.002 |
|          |       | Of    | Of    |       |       |      |        | -0.04  |        | -0.03  |
| 11:14:03 | 93520 |       |       | Light | Light |      | 0.000  | 0.002  | 0.002  | 0.016  |
|          |       | Of    | Of    |       |       |      |        | 0.03   |        | 0.11   |
| 11:14:04 | 93521 | Light | Light |       |       | Down | 0.008  | -0.004 | -0.002 | -0.002 |
|          |       | Of    | Of    |       |       |      |        | -0.04  |        | -0.03  |
| 11:14:05 | 93522 |       |       | Light | Light |      | 0.004  | -0.006 | -0.012 | -0.010 |
|          |       | Of    | Of    |       |       |      |        | -0.02  |        | -0.08  |
| 11:14:06 | 93523 | Light | Light |       |       | Down | -0.002 | 0.008  | 0.020  | 0.020  |
|          |       | Of    | Of    |       |       |      |        | -0.11  |        | 0.01   |
| 11:14:07 | 93524 |       |       | Light | Light |      | 0.006  | 0.004  | -0.006 | 0.006  |
|          |       | Of    | Of    |       |       |      |        | 0.04   |        | 0.04   |
| 11:14:08 | 93525 | Light | Light |       |       | Down | -0.012 | -0.012 | -0.016 | -0.014 |
|          |       | Of    | Of    |       |       |      |        | 0.09   |        | -0.12  |

|          |       |             |             |             |      |        |        |        |        |       |       |
|----------|-------|-------------|-------------|-------------|------|--------|--------|--------|--------|-------|-------|
| 11:14:09 | 93526 |             | Light<br>Of | Light<br>Of |      | -0.008 | -0.002 | -0.010 | -0.010 | -0.07 | -0.13 |
| 11:14:10 | 93527 | Light<br>Of | Light<br>Of |             | Down | -0.008 | -0.012 | -0.014 | -0.012 | -0.07 | -0.01 |
| 11:14:11 | 93528 |             | Light<br>Of | Light<br>Of |      | -0.018 | -0.016 | -0.020 | -0.024 | 0.03  | -0.11 |
| 11:14:12 | 93529 | Light<br>Of | Light<br>Of |             | Down | -0.024 | -0.035 | -0.016 | -0.022 | -0.07 | -0.05 |
| 11:14:13 | 93530 |             | Light<br>Of | Light<br>Of |      | -0.020 | -0.020 | -0.016 | -0.008 | 0.04  | -0.12 |
| 11:14:14 | 93531 | Light<br>Of | Light<br>Of |             | Down | -0.024 | -0.031 | -0.037 | -0.037 | -0.02 | -0.07 |
| 11:14:15 | 93532 |             | Light<br>Of | Light<br>Of |      | -0.026 | -0.018 | -0.010 | -0.014 | 0.02  | -0.13 |
| 11:14:16 | 93533 | Light<br>Of | Light<br>Of |             | Down | -0.020 | -0.028 | -0.035 | -0.024 | -0.09 | 0.03  |
| 11:14:17 | 93534 |             | Light<br>Of | Light<br>Of |      | -0.018 | -0.012 | -0.018 | -0.018 | -0.02 | 0.04  |
| 11:14:18 | 93535 | Light<br>Of | Light<br>Of |             | Down | -0.014 | -0.012 | -0.010 | -0.002 | -0.01 | -0.04 |
| 11:14:19 | 93536 |             | Light<br>Of | Light<br>Of |      | -0.006 | -0.006 | -0.002 | -0.010 | -0.13 | -0.02 |
| 11:14:20 | 93537 | Light<br>Of | Light<br>Of |             | Down | -0.004 | 0.000  | -0.002 | 0.000  | -0.04 | 0.00  |
| 11:14:21 | 93538 |             | Light<br>Of | Light<br>Of |      | -0.006 | -0.004 | -0.012 | -0.008 | -0.05 | 0.16  |
| 11:14:22 | 93539 | Light<br>Of | Light<br>Of |             | Down | -0.002 | -0.010 | -0.004 | -0.012 | -0.04 | -0.08 |
| 11:14:23 | 93540 |             | Light<br>Of | Light<br>Of |      | -0.002 | 0.000  | 0.004  | 0.002  | 0.16  | -0.05 |
| 11:14:24 | 93541 | Light<br>Of | Light<br>Of |             | Down | -0.008 | -0.002 | -0.010 | -0.016 | 0.03  | 0.07  |
| 11:14:25 | 93542 |             | Light<br>Of | Light<br>Of |      | -0.020 | -0.016 | -0.020 | -0.016 | -0.06 | -0.07 |
| 11:14:26 | 93543 | Light<br>Of | Light<br>Of |             | Down | -0.014 | -0.010 | -0.010 | -0.014 | -0.07 | -0.01 |
| 11:14:27 | 93544 |             | Light<br>Of | Light<br>Of |      | -0.022 | -0.018 | -0.016 | -0.022 | -0.10 | -0.03 |
| 11:14:28 | 93545 | Light<br>Of | Light<br>Of |             | Down | 0.002  | -0.014 | -0.006 | -0.008 | -0.02 | -0.03 |
| 11:14:29 | 93546 |             | Light       | Light       |      | -0.004 | -0.004 | -0.012 | -0.006 | 0.03  | 0.02  |

|          |       | Of    | Of    |       |       |  |  |  |  |  |
|----------|-------|-------|-------|-------|-------|--|--|--|--|--|
| 11:14:30 | 93547 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:31 | 93548 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:32 | 93549 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:33 | 93550 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:34 | 93551 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:35 | 93552 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:36 | 93553 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:37 | 93554 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:38 | 93555 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:39 | 93556 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:40 | 93557 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:41 | 93558 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:42 | 93559 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:43 | 93560 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:44 | 93561 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:45 | 93562 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:46 | 93563 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:47 | 93564 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |
| 11:14:48 | 93565 | Light | Light |       |       |  |  |  |  |  |
|          |       | Of    | Of    |       |       |  |  |  |  |  |
| 11:14:49 | 93566 |       |       | Light | Light |  |  |  |  |  |
|          |       |       |       | Of    | Of    |  |  |  |  |  |

|          |       |             |             |             |      |        |        |        |        |       |       |
|----------|-------|-------------|-------------|-------------|------|--------|--------|--------|--------|-------|-------|
| 11:14:50 | 93567 | Light<br>Of | Light<br>Of |             | Down | -0.020 | -0.026 | -0.002 | 0.002  | -0.19 | -0.21 |
| 11:14:51 | 93568 |             | Light<br>Of | Light<br>Of |      | 0.012  | -0.008 | -0.016 | -0.010 | -0.30 | -0.15 |
| 11:14:52 | 93569 | Light<br>Of | Light<br>Of |             | Down | -0.018 | -0.010 | -0.018 | -0.016 | -0.21 | -0.25 |
| 11:14:53 | 93570 |             | Light<br>Of | Light<br>Of |      | -0.010 | 0.004  | -0.004 | 0.006  | -0.27 | -0.32 |
| 11:14:54 | 93571 | Light<br>Of | Light<br>Of |             | Down | 0.006  | 0.020  | 0.028  | -0.006 | -0.41 | -0.39 |
| 11:14:55 | 93572 |             | Light<br>Of | Light<br>Of |      | -0.008 | -0.039 | -0.022 | -0.031 | -0.45 | -0.41 |
| 11:14:56 | 93573 | Light<br>Of | Light<br>Of |             | Down | -0.028 | -0.018 | -0.047 | -0.071 | -0.47 | -0.61 |
| 11:14:57 | 93574 |             | Light<br>Of | Light<br>Of |      | -0.090 | -0.051 | -0.061 | -0.065 | -0.67 | -0.76 |
| 11:14:58 | 93575 | Light<br>Of | Light<br>Of |             | Down | -0.073 | -0.120 | -0.144 | -0.220 | -0.68 | -0.85 |
| 11:14:59 | 93576 |             | Light<br>Of | Light<br>Of |      | -0.167 | -0.246 | -0.250 | -0.153 | -0.80 | -0.95 |
| 11:15:00 | 93577 | Light<br>Of | Light<br>Of |             | Down | -0.169 | -0.108 | -0.087 | -0.049 | -0.94 | -1.07 |
| 11:15:01 | 93578 |             | Light<br>Of | Light<br>Of |      | -0.006 | -0.090 | -0.045 | -0.067 | -1.00 | -1.05 |
| 11:15:02 | 93579 | Light<br>Of | Light<br>Of |             | Down | -0.138 | -0.116 | -0.071 | -0.006 | -1.07 | -0.96 |
| 11:15:03 | 93580 |             | Light<br>Of | Light<br>Of |      | -0.065 | -0.049 | -0.026 | 0.045  | -0.95 | -1.07 |
| 11:15:04 | 93581 | Light<br>Of | Light<br>Of |             | Down | -0.018 | -0.059 | -0.022 | -0.085 | -0.89 | -1.06 |
| 11:15:05 | 93582 |             | Light<br>Of | Light<br>Of |      | -0.035 | -0.051 | -0.057 | -0.035 | -1.04 | -0.94 |
| 11:15:06 | 93583 | Light<br>Of | Light<br>Of |             | Down | -0.006 | -0.087 | -0.167 | -0.120 | -0.91 | -0.97 |
| 11:15:07 | 93584 |             | Light<br>Of | Light<br>Of |      | -0.096 | -0.067 | -0.149 | -0.195 | -1.01 | -1.01 |
| 11:15:08 | 93585 | Light<br>Of | Light<br>Of |             | Down | -0.250 | -0.226 | -0.222 | -0.171 | -1.01 | -0.97 |
| 11:15:09 | 93586 |             | Light<br>Of | Light<br>Of |      | -0.201 | -0.210 | -0.291 | -0.250 | -1.02 | -1.05 |

|          |       |       |       |       |      |        |        |        |        |       |       |
|----------|-------|-------|-------|-------|------|--------|--------|--------|--------|-------|-------|
| 11:15:10 | 93587 | Light | Light |       | Down | -0.244 | -0.218 | -0.140 | -0.130 | -0.91 | -0.87 |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:11 | 93588 |       | Light | Light |      | -0.177 | -0.140 | -0.104 | -0.102 | -0.86 | -0.79 |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:12 | 93589 | Light | Light |       | Down | -0.075 | -0.041 | -0.016 | -0.006 | -0.67 | -0.57 |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:13 | 93590 |       | Light | Light |      | 0.022  | 0.033  | 0.073  | 0.043  | -0.39 | -0.31 |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:14 | 93591 | Light | Light |       | Down | 0.024  | 0.065  | 0.071  | 0.087  | -0.23 | -0.18 |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:15 | 93592 |       | Light | Light |      | 0.112  | 0.128  | 0.096  | 0.149  | 0.00  | 0.03  |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:16 | 93593 | Light | Light |       | Down | 0.132  | 0.140  | 0.138  | 0.116  | 0.19  | 0.20  |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:17 | 93594 |       | Light | Light |      | 0.118  | 0.106  | 0.108  | 0.083  | 0.25  | 0.28  |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:18 | 93595 | Light | Light |       | Down | 0.090  | 0.065  | 0.053  | 0.041  | 0.41  | 0.37  |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:19 | 93596 |       | Light | Light |      | 0.051  | 0.045  | 0.045  | 0.039  | 0.39  | 0.38  |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:20 | 93597 | Light | Light |       | Down | 0.045  | 0.039  | 0.033  | 0.037  | 0.34  | 0.40  |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:21 | 93598 |       | Light | Light |      | 0.039  | 0.028  | 0.028  | 0.031  | 0.33  | 0.36  |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:22 | 93599 | Light | Light |       | Down | 0.024  | 0.035  | 0.026  | 0.014  | 0.28  | 0.34  |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:23 | 93600 |       | Light | Light |      | 0.006  | 0.010  | 0.012  | -0.004 | 0.29  | 0.29  |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:24 | 93601 | Light | Light |       | Down | -0.012 | -0.010 | 0.004  | -0.006 | 0.15  | 0.22  |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:25 | 93602 |       | Light | Light |      | -0.020 | -0.018 | -0.031 | -0.035 | 0.12  | 0.13  |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:26 | 93603 | Light | Light |       | Down | -0.035 | -0.041 | -0.053 | -0.057 | 0.07  | 0.09  |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:27 | 93604 |       | Light | Light |      | -0.055 | -0.051 | -0.037 | -0.026 | 0.02  | -0.02 |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |
| 11:15:28 | 93605 | Light | Light |       | Down | -0.026 | -0.024 | -0.022 | -0.024 | 0.02  | 0.02  |
|          |       | Of    | Of    |       |      |        |        |        |        |       |       |
| 11:15:29 | 93606 |       | Light | Light |      | -0.024 | -0.018 | -0.020 | -0.026 | -0.07 | -0.05 |
|          |       |       | Of    | Of    |      |        |        |        |        |       |       |

|          |       |             |             |             |      |        |        |        |        |       |       |
|----------|-------|-------------|-------------|-------------|------|--------|--------|--------|--------|-------|-------|
| 11:15:30 | 93607 | Light<br>Of | Light<br>Of |             | Down | -0.020 | -0.024 | -0.018 | -0.016 | -0.04 | -0.06 |
| 11:15:31 | 93608 |             | Light<br>Of | Light<br>Of |      | -0.012 | -0.006 | -0.006 | -0.004 | 0.00  | -0.07 |
| 11:15:32 | 93609 | Light<br>Of | Light<br>Of |             | Down | 0.002  | -0.012 | -0.012 | -0.010 | 0.02  | -0.02 |
| 11:15:33 | 93610 |             | Light<br>Of | Light<br>Of |      | 0.000  | -0.004 | -0.004 | 0.004  | -0.04 | 0.00  |
| 11:15:34 | 93611 | Light<br>Of | Light<br>Of |             | Down | -0.006 | 0.002  | 0.000  | 0.008  | -0.01 | -0.01 |
| 11:15:35 | 93612 |             | Light<br>Of | Light<br>Of |      | 0.004  | -0.002 | 0.004  | 0.010  | -0.01 | 0.02  |
| 11:15:36 | 93613 | Light<br>Of | Light<br>Of |             | Down | 0.006  | 0.000  | 0.004  | 0.006  | -0.02 | -0.02 |
| 11:15:37 | 93614 |             | Light<br>Of | Light<br>Of |      | 0.010  | -0.004 | -0.006 | -0.012 | -0.04 | -0.07 |
| 11:15:38 | 93615 | Light<br>Of | Light<br>Of |             | Down | -0.012 | -0.014 | -0.020 | -0.031 | -0.01 | -0.03 |
| 11:15:39 | 93616 |             | Light<br>Of | Light<br>Of |      | -0.033 | -0.028 | -0.033 | -0.033 | -0.11 | -0.04 |
| 11:15:40 | 93617 | Light<br>Of | Light<br>Of |             | Down | -0.026 | -0.024 | -0.026 | -0.024 | -0.11 | -0.09 |
| 11:15:41 | 93618 |             | Light<br>Of | Light<br>Of |      | -0.020 | -0.012 | -0.016 | -0.020 | -0.04 | -0.11 |
| 11:15:42 | 93619 | Light<br>Of | Light<br>Of |             | Down | -0.022 | -0.012 | -0.010 | -0.020 | -0.03 | -0.05 |
| 11:15:43 | 93620 |             | Light<br>Of | Light<br>Of |      | -0.026 | -0.020 | -0.026 | -0.012 | -0.06 | -0.01 |

| FDR<br>GMT | FDR<br>SRN | Longitudinal<br>Accel<br>(sec) | (g's)             | Mach    | Magnetic | Marker | Marker  | Master   | Pitch | Pitch     |
|------------|------------|--------------------------------|-------------------|---------|----------|--------|---------|----------|-------|-----------|
|            |            |                                |                   | Heading | Middle   | Outer  | Warning | Attitude | Trim  |           |
|            |            |                                |                   | (M)     | (deg)    |        |         | (deg)    | (deg) |           |
| 11:12:09   | 93406      | -0.050                         | -0.05 -0.05 -0.06 | 102     | -        | -      | Off     | -3.8     | -4    |           |
| 11:12:10   | 93407      | -0.070                         | -0.07 -0.07 -0.07 | 0.31    | 102      | -      | -       | Off      | -3.8  | -4 -4.3   |
| 11:12:11   | 93408      | -0.070                         | -0.07 -0.07 -0.08 |         | 101      | -      | -       | Off      | -3.7  | -4        |
| 11:12:12   | 93409      | -0.080                         | -0.07 -0.07 -0.07 | 0.3     | 101      | -      | -       | Off      | -3.5  | -3.6 -4.3 |
| 11:12:13   | 93410      | -0.080                         | -0.07 -0.07 -0.08 |         | 101      | -      | -       | Off      | -3.1  | -3.1      |
| 11:12:14   | 93411      | -0.080                         | -0.08 -0.07 -0.07 | 0.3     | 100      | -      | -       | Off      | -3    | -3.1 -4.3 |
| 11:12:15   | 93412      | -0.070                         | -0.07 -0.07 -0.07 |         | 100      | -      | -       | Off      | -3.1  | -3.6      |
| 11:12:16   | 93413      | -0.070                         | -0.08 -0.08 -0.08 | 0.3     | 101      | -      | -       | Off      | -3.7  | -4 -4.3   |
| 11:12:17   | 93414      | -0.070                         | -0.07 -0.07 -0.07 |         | 101      | -      | -       | Off      | -3.9  | -3.6      |
| 11:12:18   | 93415      | -0.060                         | -0.06 -0.07 -0.06 | 0.29    | 101      | -      | -       | Off      | -3.6  | -3.6 -4.3 |
| 11:12:19   | 93416      | -0.050                         | -0.05 -0.05 -0.07 |         | 101      | -      | -       | Off      | -3.4  | -3.1      |
| 11:12:20   | 93417      | -0.060                         | -0.06 -0.05 -0.05 | 0.29    | 101      | -      | -       | Off      | -3.2  | -3.1 -4.3 |
| 11:12:21   | 93418      | -0.050                         | -0.06 -0.06 -0.06 |         | 101      | -      | -       | Off      | -3.1  | -3.1      |
| 11:12:22   | 93419      | -0.060                         | -0.06 -0.06 -0.06 | 0.3     | 101      | -      | -       | Off      | -3.4  | -3.6 -4.3 |
| 11:12:23   | 93420      | -0.060                         | -0.05 -0.05 -0.05 |         | 101      | -      | -       | Off      | -3.4  | -3.6      |
| 11:12:24   | 93421      | -0.060                         | -0.06 -0.05 -0.06 | 0.29    | 100      | -      | -       | Off      | -3.4  | -3.6 -4.3 |
| 11:12:25   | 93422      | -0.060                         | -0.06 -0.06 -0.06 |         | 99       | -      | -       | Off      | -3.5  | -3.6      |
| 11:12:26   | 93423      | -0.060                         | -0.05 -0.05 -0.05 | 0.29    | 99       | -      | -       | Off      | -3.2  | -3.1 -4.3 |
| 11:12:27   | 93424      | -0.050                         | -0.05 -0.05 -0.06 |         | 99       | -      | -       | Off      | -3    | -3.1      |
| 11:12:28   | 93425      | -0.060                         | -0.07 -0.07 -0.08 | 0.29    | 99       | -      | -       | Off      | -3.4  | -4 -4.3   |
| 11:12:29   | 93426      | -0.080                         | -0.09 -0.09 -0.1  |         | 99       | -      | -       | Off      | -3.9  | -4.5      |
| 11:12:30   | 93427      | -0.100                         | -0.11 -0.11 -0.12 | 0.29    | 99       | -      | -       | Off      | -4.8  | -5.4 -4.3 |
| 11:12:31   | 93428      | -0.120                         | -0.12 -0.12 -0.12 |         | 99       | -      | -       | Off      | -5.5  | -5.8      |
| 11:12:32   | 93429      | -0.120                         | -0.12 -0.12 -0.13 | 0.28    | 98       | -      | -       | Off      | -5.8  | -6.2 -4.3 |
| 11:12:33   | 93430      | -0.130                         | -0.13 -0.13 -0.13 |         | 98       | -      | -       | Off      | -6.5  | -6.7      |
| 11:12:34   | 93431      | -0.130                         | -0.13 -0.13 -0.13 | 0.28    | 98       | -      | -       | Off      | -6.6  | -6.2 -4.5 |
| 11:12:35   | 93432      | -0.130                         | -0.12 -0.12 -0.12 |         | 98       | -      | -       | Off      | -6.1  | -5.8      |
| 11:12:36   | 93433      | -0.120                         | -0.12 -0.11 -0.12 | 0.28    | 98       | -      | -       | Off      | -5.6  | -5.4 -4.4 |
| 11:12:37   | 93434      | -0.110                         | -0.11 -0.1 -0.1   |         | 98       | -      | -       | Off      | -4.9  | -4.9      |
| 11:12:38   | 93435      | -0.100                         | -0.1 -0.1 -0.11   | 0.27    | 97       | -      | -       | Off      | -4.5  | -4.5 -4.4 |
| 11:12:39   | 93436      | -0.110                         | -0.11 -0.11 -0.1  |         | 97       | -      | -       | Off      | -4.5  | -4.9      |
| 11:12:40   | 93437      | -0.100                         | -0.11 -0.11 -0.11 | 0.27    | 97       | -      | -       | Off      | -4.6  | -4.9 -4.3 |
| 11:12:41   | 93438      | -0.110                         | -0.11 -0.11 -0.1  |         | 97       | -      | -       | Off      | -4.8  | -4.9      |
| 11:12:42   | 93439      | -0.100                         | -0.1 -0.1 -0.11   | 0.27    | 97       | -      | -       | Off      | -4.7  | -4.9 -4.3 |
| 11:12:43   | 93440      | -0.110                         | -0.11 -0.11 -0.11 |         | 97       | -      | -       | Off      | -4.7  | -4.9      |
| 11:12:44   | 93441      | -0.110                         | -0.12 -0.12 -0.12 | 0.26    | 97       | -      | -       | Off      | -4.8  | -4.9 -4.3 |
| 11:12:45   | 93442      | -0.130                         | -0.13 -0.13 -0.13 |         | 97       | -      | -       | Off      | -4.9  | -5.4      |

|                |        |       |       |       |      |    |   |   |     |      |      |      |
|----------------|--------|-------|-------|-------|------|----|---|---|-----|------|------|------|
| 11:12:46 93443 | -0.130 | -0.14 | -0.14 | -0.14 | 0.26 | 97 | - | - | Off | -5.4 | -5.8 | -4.3 |
| 11:12:47 93444 | -0.140 | -0.14 | -0.14 | -0.15 |      | 97 | - | - | Off | -5.8 | -6.2 |      |
| 11:12:48 93445 | -0.150 | -0.16 | -0.15 | -0.16 | 0.25 | 97 | - | - | Off | -6.4 | -6.7 | -4.3 |
| 11:12:49 93446 | -0.160 | -0.16 | -0.16 | -0.15 |      | 97 | - | - | Off | -6.8 | -6.7 |      |
| 11:12:50 93447 | -0.160 | -0.15 | -0.15 | -0.15 | 0.25 | 98 | - | - | Off | -6.9 | -7.1 | -4.3 |
| 11:12:51 93448 | -0.150 | -0.15 | -0.15 | -0.15 |      | 98 | - | - | Off | -6.9 | -6.7 |      |
| 11:12:52 93449 | -0.150 | -0.15 | -0.14 | -0.14 | 0.24 | 98 | - | - | Off | -6.6 | -6.2 | -4.3 |
| 11:12:53 93450 | -0.140 | -0.13 | -0.13 | -0.13 |      | 98 | - | - | Off | -6.1 | -5.8 |      |
| 11:12:54 93451 | -0.130 | -0.13 | -0.13 | -0.13 | 0.24 | 97 | - | - | Off | -5.8 | -5.8 | -4.3 |
| 11:12:55 93452 | -0.130 | -0.13 | -0.13 | -0.12 |      | 97 | - | - | Off | -5.6 | -5.8 |      |
| 11:12:56 93453 | -0.130 | -0.13 | -0.13 | -0.12 | 0.24 | 97 | - | - | Off | -5.5 | -5.8 | -4.5 |
| 11:12:57 93454 | -0.120 | -0.13 | -0.13 | -0.13 |      | 97 | - | - | Off | -5.5 | -5.8 |      |
| 11:12:58 93455 | -0.120 | -0.12 | -0.12 | -0.12 | 0.23 | 98 | - | - | Off | -5.6 | -5.8 | -4.7 |
| 11:12:59 93456 | -0.120 | -0.12 | -0.12 | -0.12 |      | 98 | - | - | Off | -5.5 | -5.4 |      |
| 11:13:00 93457 | -0.110 | -0.12 | -0.12 | -0.11 | 0.23 | 98 | - | - | Off | -5   | -4.9 | -4.9 |
| 11:13:01 93458 | -0.110 | -0.11 | -0.11 | -0.11 |      | 98 | - | - | Off | -4.6 | -4.5 |      |
| 11:13:02 93459 | -0.110 | -0.11 | -0.11 | -0.1  | 0.23 | 97 | - | - | Off | -4.2 | -4   | -5.1 |
| 11:13:03 93460 | -0.100 | -0.1  | -0.1  | -0.1  |      | 97 | - | - | Off | -3.8 | -3.6 |      |
| 11:13:04 93461 | -0.100 | -0.1  | -0.1  | -0.1  | 0.22 | 96 | - | - | Off | -3.5 | -3.6 | -5.3 |
| 11:13:05 93462 | -0.090 | -0.09 | -0.09 | -0.09 |      | 95 | - | - | Off | -3.4 | -3.6 |      |
| 11:13:06 93463 | -0.090 | -0.09 | -0.09 | -0.09 | 0.22 | 95 | - | - | Off | -3.4 | -3.6 | -5.5 |
| 11:13:07 93464 | -0.090 | -0.09 | -0.09 | -0.08 |      | 94 | - | - | Off | -3.4 | -3.6 |      |
| 11:13:08 93465 | -0.080 | -0.08 | -0.08 | -0.07 | 0.22 | 94 | - | - | Off | -3.1 | -3.1 | -5.8 |
| 11:13:09 93466 | -0.070 | -0.07 | -0.07 | -0.07 |      | 94 | - | - | Off | -2.7 | -2.7 |      |
| 11:13:10 93467 | -0.070 | -0.06 | -0.06 | -0.06 | 0.21 | 94 | - | - | Off | -2.3 | -2.2 | -6   |
| 11:13:11 93468 | -0.050 | -0.05 | -0.05 | -0.05 |      | 94 | - | - | Off | -1.8 | -1.8 |      |
| 11:13:12 93469 | -0.050 | -0.04 | -0.03 | -0.04 | 0.21 | 94 | - | - | Off | -1.2 | -1.3 | -6.2 |
| 11:13:13 93470 | -0.040 | -0.03 | -0.03 | -0.02 |      | 95 | - | - | Off | 0    | 0    |      |
| 11:13:14 93471 | -0.020 | -0.02 | -0.01 | -0.01 | 0.21 | 95 | - | - | Off | 0.2  | 0.4  | -6.4 |
| 11:13:15 93472 | -0.010 | -0.01 | 0     | 0     |      | 95 | - | - | Off | 0.7  | 0.9  |      |
| 11:13:16 93473 | 0.010  | 0.01  | 0.01  | 0.02  | 0.21 | 95 | - | - | Off | 1    | 0.9  | -6.6 |
| 11:13:17 93474 | 0.020  | 0.02  | 0.03  | 0.03  |      | 94 | - | - | Off | 1.1  | 0.9  |      |
| 11:13:18 93475 | 0.030  | 0.04  | 0.04  | 0.04  | 0.21 | 94 | - | - | Off | 1.3  | 1.3  | -6.8 |
| 11:13:19 93476 | 0.040  | 0.04  | 0.04  | 0.04  |      | 93 | - | - | Off | 1.5  | 1.3  |      |
| 11:13:20 93477 | 0.030  | 0.04  | 0.03  | 0.03  | 0.21 | 93 | - | - | Off | 1.5  | 1.3  | -6.9 |
| 11:13:21 93478 | 0.030  | 0.02  | 0.03  | 0.02  |      | 93 | - | - | Off | 1.2  | 0.9  |      |
| 11:13:22 93479 | 0.020  | 0.02  | 0.02  | 0.01  | 0.21 | 94 | - | - | Off | 1.1  | 0.9  | -7   |
| 11:13:23 93480 | 0.020  | 0.01  | 0.01  | 0.01  |      | 94 | - | - | Off | 0.9  | 0.4  |      |
| 11:13:24 93481 | 0.010  | 0     | 0.01  | 0.01  | 0.21 | 95 | - | - | Off | 0.9  | 0.9  | -7   |
| 11:13:25 93482 | 0.010  | 0.01  | 0.01  | 0.01  |      | 95 | - | - | Off | 0.8  | 0.9  |      |
| 11:13:26 93483 | 0.010  | 0.01  | 0.01  | 0.02  | 0.2  | 95 | - | - | Off | 1.1  | 0.9  | -7.1 |

|                |        |       |       |       |      |    |   |   |     |     |      |
|----------------|--------|-------|-------|-------|------|----|---|---|-----|-----|------|
| 11:13:27 93484 | 0.010  | 0.01  | 0.02  | 0.01  |      | 95 | - | - | Off | 1.3 | 1.3  |
| 11:13:28 93485 | 0.020  | 0.02  | 0.02  | 0.02  | 0.2  | 95 | - | - | Off | 1.7 | 1.8  |
| 11:13:29 93486 | 0.020  | 0.03  | 0.02  | 0.02  |      | 95 | - | - | Off | 2   | 1.8  |
| 11:13:30 93487 | 0.020  | 0.03  | 0.02  | 0.03  | 0.2  | 95 | - | - | Off | 2.1 | 2.2  |
| 11:13:31 93488 | 0.020  | 0.03  | 0.03  | 0.03  |      | 95 | - | - | Off | 2   | 1.8  |
| 11:13:32 93489 | 0.030  | 0.04  | 0.03  | 0.03  | 0.2  | 95 | - | - | Off | 1.8 | 1.8  |
| 11:13:33 93490 | 0.030  | 0.03  | 0.03  | 0.02  |      | 95 | - | - | Off | 1.6 | 1.3  |
| 11:13:34 93491 | 0.030  | 0.03  | 0.03  | 0.03  | 0.2  | 95 | - | - | Off | 1.1 | 0.9  |
| 11:13:35 93492 | 0.020  | 0.03  | 0.03  | 0.03  |      | 95 | - | - | Off | 0.9 | 0.9  |
| 11:13:36 93493 | 0.030  | 0.03  | 0.03  | 0.03  | 0.2  | 94 | - | - | Off | 1   | 0.9  |
| 11:13:37 93494 | 0.020  | 0.01  | 0.02  | 0.01  |      | 94 | - | - | Off | 0.8 | 0.4  |
| 11:13:38 93495 | 0.010  | 0.01  | 0     | 0     | 0.21 | 94 | - | - | Off | 0.4 | 0.4  |
| 11:13:39 93496 | 0.000  | -0.01 | -0.01 | -0.01 |      | 95 | - | - | Off | 0.3 | 0    |
| 11:13:40 93497 | -0.010 | -0.01 | -0.01 | -0.01 | 0.2  | 95 | - | - | Off | 0.1 | 0    |
| 11:13:41 93498 | 0.000  | -0.01 | 0     | 0     |      | 95 | - | - | Off | 0.3 | 0.4  |
| 11:13:42 93499 | 0.000  | 0     | 0     | 0     | 0.2  | 96 | - | - | Off | 0.4 | 0.4  |
| 11:13:43 93500 | 0.000  | 0     | -0.01 | -0.01 |      | 96 | - | - | Off | 0.6 | 0.4  |
| 11:13:44 93501 | 0.000  | 0     | 0     | 0     | 0.2  | 97 | - | - | Off | 0.7 | 0.4  |
| 11:13:45 93502 | 0.000  | 0     | -0.01 | 0     |      | 97 | - | - | Off | 0.6 | 0.4  |
| 11:13:46 93503 | 0.000  | 0     | 0     | 0.01  | 0.2  | 97 | - | - | Off | 0.9 | 0.9  |
| 11:13:47 93504 | 0.010  | 0.01  | 0.01  | 0.02  |      | 98 | - | - | Off | 1.1 | 1.3  |
| 11:13:48 93505 | 0.020  | 0.02  | 0.02  | 0.02  | 0.2  | 97 | - | - | Off | 1.5 | 1.3  |
| 11:13:49 93506 | 0.020  | 0.03  | 0.02  | 0.03  |      | 97 | - | - | Off | 1.6 | 1.3  |
| 11:13:50 93507 | 0.030  | 0.03  | 0.03  | 0.03  | 0.2  | 97 | - | - | Off | 1.6 | 1.3  |
| 11:13:51 93508 | 0.030  | 0.04  | 0.03  | 0.03  |      | 97 | - | - | Off | 1.5 | 1.3  |
| 11:13:52 93509 | 0.040  | 0.03  | 0.03  | 0.03  | 0.2  | 97 | - | - | Off | 1.3 | 0.9  |
| 11:13:53 93510 | 0.040  | 0.04  | 0.04  | 0.04  |      | 97 | - | - | Off | 1.1 | 0.9  |
| 11:13:54 93511 | 0.040  | 0.05  | 0.04  | 0.04  | 0.2  | 97 | - | - | Off | 1.2 | 0.9  |
| 11:13:55 93512 | 0.040  | 0.05  | 0.04  | 0.05  |      | 97 | - | - | Off | 1.2 | 1.3  |
| 11:13:56 93513 | 0.040  | 0.04  | 0.04  | 0.04  | 0.2  | 97 | - | - | Off | 1.3 | 1.3  |
| 11:13:57 93514 | 0.040  | 0.04  | 0.04  | 0.04  |      | 97 | - | - | Off | 1.3 | 1.3  |
| 11:13:58 93515 | 0.040  | 0.04  | 0.04  | 0.03  | 0.2  | 98 | - | - | Off | 1.3 | 0.9  |
| 11:13:59 93516 | 0.040  | 0.03  | 0.03  | 0.02  |      | 98 | - | - | Off | 1.1 | 0.9  |
| 11:14:00 93517 | 0.030  | 0.02  | 0.03  | 0.02  | 0.2  | 97 | - | - | Off | 0.9 | 0.9  |
| 11:14:01 93518 | 0.030  | 0.03  | 0.03  | 0.02  |      | 97 | - | - | Off | 1.3 | 1.3  |
| 11:14:02 93519 | 0.020  | 0.02  | 0.02  | 0.01  | 0.2  | 97 | - | - | Off | 1.2 | 0.9  |
| 11:14:03 93520 | 0.010  | 0.01  | 0     | 0     |      | 98 | - | - | Off | 0.6 | 0    |
| 11:14:04 93521 | -0.010 | 0     | 0     | 0     | 0.2  | 98 | - | - | Off | 0   | -0.9 |
| 11:14:05 93522 | 0.000  | 0.01  | 0.01  | 0.01  |      | 98 | - | - | Off | 0.2 | 0.4  |
| 11:14:06 93523 | 0.010  | 0.01  | 0.01  | 0     | 0.2  | 98 | - | - | Off | 1   | 1.3  |
| 11:14:07 93524 | 0.010  | 0     | 0     | 0.01  |      | 98 | - | - | Off | 1.7 | 1.8  |

|          |       |       |      |      |      |     |    |    |   |     |      |      |      |
|----------|-------|-------|------|------|------|-----|----|----|---|-----|------|------|------|
| 11:14:08 | 93525 | 0.010 | 0.01 | 0.01 | 0.01 | 0.2 | 97 | -  | - | Off | 1.8  | 1.3  | -7.9 |
| 11:14:09 | 93526 | 0.010 | 0.01 | 0.02 | 0.02 |     | 96 | -  | - | Off | 1.5  | 1.3  |      |
| 11:14:10 | 93527 | 0.030 | 0.02 | 0.03 | 0.03 | 0.2 | 96 | -  | - | Off | 1.3  | 1.3  | -7.9 |
| 11:14:11 | 93528 | 0.030 | 0.03 | 0.03 | 0.04 |     | 95 | -  | - | Off | 1.7  | 1.8  |      |
| 11:14:12 | 93529 | 0.050 | 0.04 | 0.05 | 0.05 | 0.2 | 94 | -  | - | Off | 2    | 2.2  | -8   |
| 11:14:13 | 93530 | 0.050 | 0.05 | 0.06 | 0.07 |     | 94 | -  | - | Off | 2.6  | 2.7  |      |
| 11:14:14 | 93531 | 0.070 | 0.07 | 0.08 | 0.07 | 0.2 | 94 | -  | - | Off | 3.1  | 3.1  | -8   |
| 11:14:15 | 93532 | 0.070 | 0.07 | 0.07 | 0.07 |     | 94 | -  | - | Off | 3.1  | 2.7  |      |
| 11:14:16 | 93533 | 0.070 | 0.06 | 0.06 | 0.06 | 0.2 | 94 | -  | - | Off | 2.8  | 2.7  | -8   |
| 11:14:17 | 93534 | 0.060 | 0.05 | 0.05 | 0.04 |     | 94 | -  | - | Off | 2.3  | 1.8  |      |
| 11:14:18 | 93535 | 0.040 | 0.04 | 0.04 | 0.05 | 0.2 | 95 | -  | - | Off | 1.7  | 1.8  | -8.1 |
| 11:14:19 | 93536 | 0.040 | 0.04 | 0.04 | 0.04 |     | 96 | -  | - | Off | 1.7  | 1.8  |      |
| 11:14:20 | 93537 | 0.040 | 0.04 | 0.04 | 0.04 | 0.2 | 97 | -  | - | Off | 1.8  | 1.8  | -8.1 |
| 11:14:21 | 93538 | 0.040 | 0.04 | 0.03 | 0.03 |     | 97 | -  | - | Off | 1.7  | 1.8  |      |
| 11:14:22 | 93539 | 0.040 | 0.03 | 0.03 | 0.03 | 0.2 | 97 | -  | - | Off | 1.6  | 0.9  | -8.1 |
| 11:14:23 | 93540 | 0.030 | 0.03 | 0.03 | 0.03 |     | 97 | -  | - | Off | 0.7  | 0.4  |      |
| 11:14:24 | 93541 | 0.030 | 0.03 | 0.03 | 0.03 | 0.2 | 97 | -  | - | Off | 0.4  | 0.4  | -8.1 |
| 11:14:25 | 93542 | 0.030 | 0.03 | 0.03 | 0.03 |     | 96 | -  | - | Off | 0.7  | 0.9  |      |
| 11:14:26 | 93543 | 0.020 | 0.03 | 0.03 | 0.02 | 0.2 | 96 | -  | - | Off | 0.8  | 0.4  | -8.1 |
| 11:14:27 | 93544 | 0.030 | 0.02 | 0.02 | 0.02 |     | 96 | -  | - | Off | 0.4  | 0    |      |
| 11:14:28 | 93545 | 0.020 | 0.01 | 0.01 | 0.01 | 0.2 | 96 | -  | - | Off | 0    | -0.9 | -8.1 |
| 11:14:29 | 93546 | 0.010 | 0    | 0.01 | 0    |     | 97 | -  | - | Off | -0.9 | -1.3 |      |
| 11:14:30 | 93547 | 0.010 | 0.01 | 0    | 0    | 0.2 | 97 | -  | - | Off | -1   | -0.9 | -8.1 |
| 11:14:31 | 93548 | 0.010 | 0.01 | 0.01 | 0.01 |     | 97 | -  | - | Off | 0    | 0.4  |      |
| 11:14:32 | 93549 | 0.010 | 0.01 | 0.01 | 0.01 | 0.2 | 96 | MM | - | Off | 0.7  | 0.4  | -8.2 |
| 11:14:33 | 93550 | 0.010 | 0.02 | 0.02 | 0.02 |     | 96 | MM | - | Off | 0.7  | 0.4  |      |
| 11:14:34 | 93551 | 0.020 | 0.01 | 0.02 | 0.02 | 0.2 | 96 | MM | - | Off | 0.8  | 0.9  | -8.2 |
| 11:14:35 | 93552 | 0.020 | 0.01 | 0.01 | 0.02 |     | 96 | MM | - | Off | 1.2  | 0.9  |      |
| 11:14:36 | 93553 | 0.010 | 0.02 | 0.02 | 0.02 | 0.2 | 96 | MM | - | Off | 1.2  | 1.3  | -8.2 |
| 11:14:37 | 93554 | 0.020 | 0.03 | 0.03 | 0.03 |     | 97 | MM | - | Off | 1.6  | 1.3  |      |
| 11:14:38 | 93555 | 0.030 | 0.03 | 0.03 | 0.03 | 0.2 | 97 | -  | - | Off | 1.6  | 1.3  | -8.2 |
| 11:14:39 | 93556 | 0.030 | 0.03 | 0.03 | 0.03 |     | 97 | -  | - | Off | 1.5  | 1.3  |      |
| 11:14:40 | 93557 | 0.030 | 0.04 | 0.03 | 0.03 | 0.2 | 97 | -  | - | Off | 1.3  | 1.3  | -8.2 |
| 11:14:41 | 93558 | 0.040 | 0.04 | 0.04 | 0.04 |     | 96 | -  | - | Off | 1.9  | 1.8  |      |
| 11:14:42 | 93559 | 0.040 | 0.04 | 0.04 | 0.04 | 0.2 | 96 | -  | - | Off | 1.8  | 1.8  | -8.3 |
| 11:14:43 | 93560 | 0.040 | 0.04 | 0.04 | 0.04 |     | 96 | -  | - | Off | 1.8  | 1.8  |      |
| 11:14:44 | 93561 | 0.040 | 0.04 | 0.04 | 0.04 | 0.2 | 97 | -  | - | Off | 1.7  | 1.8  | -8.3 |
| 11:14:45 | 93562 | 0.040 | 0.05 | 0.05 | 0.05 |     | 97 | -  | - | Off | 1.9  | 2.2  |      |
| 11:14:46 | 93563 | 0.060 | 0.05 | 0.05 | 0.06 | 0.2 | 98 | -  | - | Off | 2.5  | 2.2  | -8.3 |
| 11:14:47 | 93564 | 0.060 | 0.06 | 0.06 | 0.07 |     | 98 | -  | - | Off | 2.6  | 2.7  |      |
| 11:14:48 | 93565 | 0.070 | 0.07 | 0.08 | 0.08 | 0.2 | 98 | -  | - | Off | 3.2  | 3.6  | -8.3 |

|                |        |       |       |       |      |     |   |   |     |      |      |
|----------------|--------|-------|-------|-------|------|-----|---|---|-----|------|------|
| 11:14:49 93566 | 0.080  | 0.08  | 0.07  | 0.05  |      | 99  | - | - | Off | 3.4  | 3.1  |
| 11:14:50 93567 | 0.040  | 0.03  | 0.03  | 0.03  | 0.19 | 98  | - | - | Off | 3.2  | 3.6  |
| 11:14:51 93568 | 0.030  | 0.02  | 0.02  | 0.02  |      | 99  | - | - | Off | 4.1  | 4.5  |
| 11:14:52 93569 | 0.020  | 0.02  | 0.03  | 0.02  | 0.19 | 99  | - | - | Off | 4.4  | 4.5  |
| 11:14:53 93570 | 0.020  | 0.01  | 0     | 0.01  |      | 99  | - | - | Off | 3.9  | 3.1  |
| 11:14:54 93571 | 0.030  | 0.03  | 0.03  | 0.04  | 0.18 | 100 | - | - | Off | 3.5  | 3.6  |
| 11:14:55 93572 | 0.010  | -0.01 | -0.02 | -0.01 |      | 99  | - | - | Off | 3.7  | 2.7  |
| 11:14:56 93573 | -0.010 | -0.01 | -0.01 | -0.02 | 0.18 | 96  | - | - | Off | 2.1  | 1.3  |
| 11:14:57 93574 | -0.030 | -0.04 | -0.07 | -0.08 |      | 90  | - | - | Off | 0    | -2.7 |
| 11:14:58 93575 | -0.080 | -0.11 | -0.17 | -0.23 | 0.18 | 86  | - | - | Off | -2.6 | -2.2 |
| 11:14:59 93576 | -0.180 | -0.24 | -0.22 | -0.23 |      | 82  | - | - | Off | -2.1 | -2.2 |
| 11:15:00 93577 | -0.300 | -0.13 | -0.23 | -0.1  | 0.17 | 82  | - | - | Off | -2.3 | -2.2 |
| 11:15:01 93578 | -0.140 | -0.16 | -0.14 | -0.16 |      | 85  | - | - | Off | -2.2 | -2.2 |
| 11:15:02 93579 | -0.170 | -0.22 | -0.21 | -0.27 | 0.16 | 89  | - | - | Off | -2   | -1.8 |
| 11:15:03 93580 | -0.270 | -0.27 | -0.28 | -0.31 |      | 92  | - | - | Off | -1.7 | -2.2 |
| 11:15:04 93581 | -0.350 | -0.25 | -0.27 | -0.31 | 0.15 | 93  | - | - | Off | -1.9 | -2.2 |
| 11:15:05 93582 | -0.290 | -0.33 | -0.29 | -0.34 |      | 94  | - | - | Off | -2.3 | -2.2 |
| 11:15:06 93583 | -0.370 | -0.23 | -0.24 | -0.26 | 0.15 | 93  | - | - | Off | -2.3 | -2.2 |
| 11:15:07 93584 | -0.230 | -0.22 | -0.21 | -0.16 |      | 91  | - | - | Off | -2.3 | -2.7 |
| 11:15:08 93585 | -0.150 | -0.14 | -0.13 | -0.18 | 0.15 | 88  | - | - | Off | -2.5 | -2.7 |
| 11:15:09 93586 | -0.280 | -0.23 | -0.22 | -0.24 |      | 84  | - | - | Off | -2.3 | -2.7 |
| 11:15:10 93587 | -0.240 | -0.23 | -0.22 | -0.19 | 0.15 | 81  | - | - | Off | -2.1 | -2.7 |
| 11:15:11 93588 | -0.190 | -0.2  | -0.2  | -0.2  |      | 81  | - | - | Off | -2.6 | -2.7 |
| 11:15:12 93589 | -0.200 | -0.2  | -0.2  | -0.21 | 0.15 | 82  | - | - | Off | -2.3 | -2.7 |
| 11:15:13 93590 | -0.230 | -0.24 | -0.26 | -0.1  |      | 84  | - | - | Off | -2.6 | -2.7 |
| 11:15:14 93591 | -0.090 | -0.09 | -0.08 | -0.04 | 0.15 | 87  | - | - | Off | -2.7 | -2.7 |
| 11:15:15 93592 | -0.030 | -0.08 | -0.09 | -0.08 |      | 90  | - | - | Off | -2.8 | -2.7 |
| 11:15:16 93593 | -0.040 | -0.04 | -0.04 | -0.05 | 0.15 | 94  | - | - | Off | -2.7 | -2.7 |
| 11:15:17 93594 | -0.050 | -0.05 | -0.04 | -0.04 |      | 98  | - | - | Off | -2.6 | -2.7 |
| 11:15:18 93595 | -0.030 | -0.04 | -0.05 | -0.08 | 0.15 | 99  | - | - | Off | -2.5 | -2.7 |
| 11:15:19 93596 | -0.120 | -0.08 | -0.05 | -0.04 |      | 99  | - | - | Off | -2.6 | -2.7 |
| 11:15:20 93597 | -0.030 | -0.04 | -0.04 | -0.04 | 0.15 | 101 | - | - | Off | -2.6 | -2.7 |
| 11:15:21 93598 | -0.040 | -0.03 | -0.03 | -0.04 |      | 101 | - | - | Off | -2.6 | -2.7 |
| 11:15:22 93599 | -0.040 | -0.03 | -0.03 | -0.03 | 0.15 | 102 | - | - | Off | -2.6 | -2.7 |
| 11:15:23 93600 | -0.030 | -0.03 | -0.03 | -0.03 |      | 103 | - | - | Off | -2.7 | -2.7 |
| 11:15:24 93601 | -0.030 | -0.04 | -0.04 | -0.04 | 0.15 | 102 | - | - | Off | -2.5 | -2.7 |
| 11:15:25 93602 | -0.050 | -0.04 | -0.04 | -0.04 |      | 101 | - | - | Off | -2.6 | -2.7 |
| 11:15:26 93603 | -0.050 | -0.06 | -0.1  | -0.11 | 0.15 | 100 | - | - | Off | -2.5 | -2.7 |
| 11:15:27 93604 | -0.110 | -0.09 | -0.06 | -0.05 |      | 99  | - | - | Off | -2.5 | -2.7 |
| 11:15:28 93605 | -0.050 | -0.05 | -0.05 | -0.04 | 0.15 | 98  | - | - | Off | -2.5 | -2.7 |

|                |        |       |       |       |      |    |   |   |     |      |      |      |
|----------------|--------|-------|-------|-------|------|----|---|---|-----|------|------|------|
| 11:15:29 93606 | -0.040 | -0.04 | -0.04 | -0.04 |      | 98 | - | - | Off | -2.5 | -2.7 |      |
| 11:15:30 93607 | -0.040 | -0.04 | -0.04 | -0.04 | 0.15 | 97 | - | - | Off | -2.6 | -2.7 | -8.4 |
| 11:15:31 93608 | -0.030 | -0.04 | -0.04 | -0.03 |      | 97 | - | - | Off | -2.5 | -2.7 |      |
| 11:15:32 93609 | -0.030 | -0.03 | -0.03 | -0.03 | 0.15 | 98 | - | - | Off | -2.5 | -2.7 | -8.4 |
| 11:15:33 93610 | -0.030 | -0.03 | -0.03 | -0.03 |      | 98 | - | - | Off | -2.5 | -2.7 |      |
| 11:15:34 93611 | -0.040 | -0.03 | -0.03 | -0.02 | 0.15 | 98 | - | - | Off | -2.5 | -2.7 | -8.4 |
| 11:15:35 93612 | -0.020 | -0.03 | -0.02 | -0.02 |      | 98 | - | - | Off | -2.3 | -2.7 |      |
| 11:15:36 93613 | -0.020 | -0.03 | -0.04 | -0.04 | 0.15 | 98 | - | - | Off | -2.3 | -2.7 | -8.4 |
| 11:15:37 93614 | -0.050 | -0.05 | -0.05 | -0.05 |      | 98 | - | - | Off | -2.5 | -2.7 |      |
| 11:15:38 93615 | -0.040 | -0.04 | -0.04 | -0.04 | 0.15 | 98 | - | - | Off | -2.5 | -2.7 | -8.4 |
| 11:15:39 93616 | -0.040 | -0.03 | -0.02 | -0.02 |      | 98 | - | - | Off | -2.5 | -2.7 |      |
| 11:15:40 93617 | -0.020 | -0.02 | -0.02 | -0.02 | 0.15 | 97 | - | - | Off | -2.3 | -2.7 | -8.4 |
| 11:15:41 93618 | -0.020 | -0.02 | -0.02 | -0.03 |      | 97 | - | - | Off | -2.3 | -2.7 |      |
| 11:15:42 93619 | -0.020 | -0.02 | -0.02 | -0.02 | 0.15 | 97 | - | - | Off | -2.3 | -2.2 | -8.4 |
| 11:15:43 93620 | -0.020 | -0.02 | -0.02 | -0.02 |      | 97 | - | - | Off | -2.5 | -2.7 |      |

| FDR      | FDR   | Radio    | Roll     | Rudder | STAB  | Spoiler      | Spoiler       | Spoiler       | Spoiler        | Thrust | Thrust |
|----------|-------|----------|----------|--------|-------|--------------|---------------|---------------|----------------|--------|--------|
| GMT      | SRN   | Altitude | Attitude | Pos    |       | Inboard-Left | Inboard-Right | Outboard-Left | Outboard-Right | Rev    | Rev    |
|          |       |          |          |        |       |              |               |               |                | Left   | Right  |
|          |       | (sec)    | (ft)     | (deg)  | (deg) | (deg)        | (deg)         | (deg)         | (deg)          |        |        |
| 11:12:09 | 93406 | 2071.5   | -5.4     | -4.4   | -1.0  | -1.0         | 0.0           | 0.0           | 1.3            | 1.3    | Stowed |
| 11:12:10 | 93407 | 1986.3   | -4.0     | -3.2   | -0.7  | -0.5         | 3.5           | 0.0           | 0.0            | 1.3    | 1.3    |
| 11:12:11 | 93408 | 1956.6   | -2.7     | -2.2   | -0.5  | -0.3         |               | 0.0           | 0.0            | 1.3    | 1.3    |
| 11:12:12 | 93409 | 1877.8   | -2.2     | -1.6   | -0.3  | -0.5         | 3.5           | 0.0           | 0.0            | 1.3    | 1.3    |
| 11:12:13 | 93410 | 1915.3   | -1.3     | -1.6   | -0.3  | -0.7         |               | 0.0           | 0.0            | 0.9    | 0.9    |
| 11:12:14 | 93411 | 1959.2   | -1.8     | -1.6   | -1.0  | -1.5         | 3.5           | 0.0           | 0.0            | 0.9    | 0.9    |
| 11:12:15 | 93412 | 1943.7   | -0.9     | 0.4    | -1.5  | -1.2         |               | 0.0           | 0.0            | 0.9    | 0.0    |
| 11:12:16 | 93413 | 2012.1   | 0.9      | 1.6    | -0.8  | -0.3         | 3.5           | 0.0           | 0.0            | 0.9    | 2.2    |
| 11:12:17 | 93414 | 2101.2   | 1.8      | 1.2    | -0.7  | -1.0         |               | 0.0           | 0.0            | 5.4    | 5.8    |
| 11:12:18 | 93415 | 2101.2   | -1.3     | -1.3   | -1.2  | -1.0         | 3.5           | 0.0           | 0.0            | 2.2    | 1.3    |
| 11:12:19 | 93416 | 2089.6   | -1.8     | -1.6   | -0.8  | -0.7         |               | 0.0           | 0.0            | 1.8    | 1.8    |
| 11:12:20 | 93417 | 2116.7   | -2.2     | -2.8   | -0.7  | -1.0         | 3.5           | 0.0           | 0.0            | 1.8    | 1.3    |
| 11:12:21 | 93418 | 2088.3   | -2.7     | 0.0    | -1.5  | -0.8         |               | 0.0           | 0.0            | 0.0    | 2.2    |
| 11:12:22 | 93419 | 2092.2   | 0.9      | 0.2    | -0.5  | -0.2         | 3.5           | 0.0           | 0.0            | 7.6    | 6.7    |
| 11:12:23 | 93420 | 2106.4   | -1.8     | -1.9   | -0.2  | -0.2         |               | 0.0           | 0.0            | 2.2    | 2.2    |
| 11:12:24 | 93421 | 2076.7   | -2.7     | -3.4   | -0.2  | -0.2         | 3.5           | 0.0           | 0.0            | 3.6    | 2.7    |
| 11:12:25 | 93422 | 2054.7   | -4.0     | -4.2   | -0.3  | -0.5         |               | 0.0           | 0.0            | 1.3    | 1.3    |
| 11:12:26 | 93423 | 2066.4   | -4.0     | -3.0   | -0.5  | -0.5         | 3.5           | 0.0           | 0.0            | 0.9    | 0.0    |
| 11:12:27 | 93424 | 2026.3   | -2.7     | -1.7   | -0.7  | -0.7         |               | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:28 | 93425 | 2038.0   | -0.9     | 0.3    | -0.7  | -0.7         | 3.5           | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:29 | 93426 | 1995.3   | 0.4      | 1.3    | -0.7  | -0.8         |               | 0.0           | 0.0            | 0.0    | 0.9    |
| 11:12:30 | 93427 | 1929.5   | 0.9      | 0.4    | -0.7  | -0.5         | 3.5           | 0.0           | 0.0            | 2.2    | 1.8    |
| 11:12:31 | 93428 | 1942.4   | 0.0      | -1.1   | -0.7  | -0.7         |               | 0.0           | 0.0            | 1.3    | 2.2    |
| 11:12:32 | 93429 | 1955.3   | -2.2     | -3.2   | -0.7  | -0.7         | 3.5           | 0.0           | 0.0            | 2.2    | 1.3    |
| 11:12:33 | 93430 | 1933.3   | -4.9     | -5.0   | -0.7  | -0.7         |               | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:34 | 93431 | 1899.8   | -4.9     | -4.6   | -0.5  | -0.3         | 3.6           | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:35 | 93432 | 1876.5   | -4.5     | -4.2   | -0.5  | -0.7         |               | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:36 | 93433 | 1881.7   | -4.0     | -2.1   | -0.8  | -0.7         | 3.5           | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:37 | 93434 | 1871.3   | -0.9     | 0.0    | -0.5  | -0.3         |               | 0.0           | 0.0            | 0.0    | 1.8    |
| 11:12:38 | 93435 | 1840.4   | -1.3     | -1.8   | -0.7  | -0.7         | 3.5           | 0.0           | 0.0            | 1.3    | 0.0    |
| 11:12:39 | 93436 | 1833.9   | -2.2     | -2.0   | -0.8  | -0.8         |               | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:40 | 93437 | 1777.1   | -2.2     | -2.0   | -0.7  | -0.7         | 3.5           | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:41 | 93438 | 1796.4   | -2.2     | -2.3   | -0.7  | -0.7         |               | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:42 | 93439 | 1762.9   | -2.2     | -1.1   | -0.8  | -0.7         | 3.5           | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:43 | 93440 | 1724.1   | 0.0      | 0.8    | -0.7  | -0.7         |               | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:44 | 93441 | 1771.9   | 0.9      | 1.2    | -0.7  | -0.5         | 3.5           | 0.0           | 0.0            | 0.0    | 0.0    |
| 11:12:45 | 93442 | 1743.5   | 1.3      | 1.5    | -0.5  | -0.8         |               | 0.0           | 0.0            | 0.0    | 0.0    |

|          |       |        |      |      |      |      |     |     |     |     |     |        |
|----------|-------|--------|------|------|------|------|-----|-----|-----|-----|-----|--------|
| 11:12:46 | 93443 | 1725.4 | 1.3  | 1.9  | -1.0 | -1.0 | 3.5 | 0.0 | 0.0 | 0.0 | 0.0 | Stowed |
| 11:12:47 | 93444 | 1712.5 | 1.8  | 2.0  | -1.0 | -0.8 |     | 0.0 | 0.0 | 0.9 | 1.3 | Stowed |
| 11:12:48 | 93445 | 1706.0 | 1.8  | 1.5  | -0.8 | -0.8 | 3.5 | 0.0 | 0.0 | 1.8 | 1.8 | Stowed |
| 11:12:49 | 93446 | 1682.8 | 0.9  | 1.3  | -1.0 | -0.8 |     | 0.0 | 0.0 | 1.8 | 3.1 | Stowed |
| 11:12:50 | 93447 | 1697.0 | 0.9  | 0.3  | -0.8 | -0.8 | 3.5 | 0.0 | 0.0 | 5.8 | 4.0 | Stowed |
| 11:12:51 | 93448 | 1684.1 | -1.3 | -1.7 | -0.8 | -0.8 |     | 0.0 | 0.0 | 1.8 | 1.3 | Stowed |
| 11:12:52 | 93449 | 1626.0 | -2.2 | -1.5 | -0.8 | -0.7 | 3.5 | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:12:53 | 93450 | 1623.4 | -1.3 | 0.0  | -0.7 | -0.5 |     | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:12:54 | 93451 | 1596.3 | 0.4  | 0.7  | -0.5 | -0.7 | 3.5 | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:12:55 | 93452 | 1582.0 | 1.3  | 1.0  | -0.7 | -0.7 |     | 0.0 | 0.0 | 3.6 | 4.9 | Stowed |
| 11:12:56 | 93453 | 1571.7 | -0.9 | -1.5 | -0.8 | -1.0 | 3.6 | 0.0 | 0.0 | 2.2 | 1.3 | Stowed |
| 11:12:57 | 93454 | 1531.7 | -1.8 | -1.7 | -1.0 | -1.0 |     | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:12:58 | 93455 | 1518.8 | -1.8 | -1.5 | -1.0 | -0.8 | 3.8 | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:12:59 | 93456 | 1511.0 | -1.8 | -1.3 | -0.8 | -0.8 |     | 0.0 | 0.0 | 1.8 | 4.5 | Stowed |
| 11:13:00 | 93457 | 1492.9 | -2.2 | -3.5 | -0.7 | -0.7 | 3.9 | 0.0 | 0.0 | 5.8 | 3.6 | Stowed |
| 11:13:01 | 93458 | 1390.9 | -4.5 | -4.6 | -0.7 | -0.5 |     | 0.0 | 0.0 | 2.7 | 3.1 | Stowed |
| 11:13:02 | 93459 | 1419.3 | -4.9 | -5.4 | -0.3 | -0.2 | 4.2 | 0.0 | 0.0 | 3.1 | 2.2 | Stowed |
| 11:13:03 | 93460 | 1430.9 | -5.8 | -5.2 | 0.0  | 0.0  |     | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:13:04 | 93461 | 1371.5 | -4.9 | -4.2 | 0.0  | 0.3  | 4.4 | 0.0 | 0.0 | 1.3 | 0.9 | Stowed |
| 11:13:05 | 93462 | 1390.9 | -3.6 | -2.7 | 0.3  | 0.3  |     | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:13:06 | 93463 | 1363.8 | -1.8 | -0.8 | 0.3  | 0.3  | 4.6 | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:13:07 | 93464 | 1341.8 | 0.9  | 1.5  | 0.2  | -0.2 |     | 0.0 | 0.0 | 2.2 | 4.5 | Stowed |
| 11:13:08 | 93465 | 1341.8 | 1.3  | 1.1  | -0.3 | -0.7 | 4.8 | 0.0 | 0.0 | 4.9 | 2.7 | Stowed |
| 11:13:09 | 93466 | 1352.2 | 1.3  | 1.9  | -0.8 | -0.8 |     | 0.0 | 0.0 | 2.7 | 4.5 | Stowed |
| 11:13:10 | 93467 | 1272.1 | 1.8  | 1.5  | -1.0 | -1.0 | 4.9 | 0.0 | 0.0 | 5.8 | 4.5 | Stowed |
| 11:13:11 | 93468 | 1279.8 | 0.4  | 0.6  | -1.0 | -1.0 |     | 0.0 | 0.0 | 2.7 | 1.8 | Stowed |
| 11:13:12 | 93469 | 1268.2 | 0.4  | 1.0  | -1.0 | -1.0 | 5.2 | 0.0 | 0.0 | 1.8 | 4.0 | Stowed |
| 11:13:13 | 93470 | 1250.1 | 0.9  | 0.6  | -1.0 | -0.8 |     | 0.0 | 0.0 | 6.2 | 6.7 | Stowed |
| 11:13:14 | 93471 | 1226.9 | -1.8 | -2.5 | -0.7 | -0.7 | 5.3 | 0.0 | 0.0 | 4.5 | 1.8 | Stowed |
| 11:13:15 | 93472 | 1161.0 | -3.6 | -3.9 | -0.7 | -0.7 |     | 0.0 | 1.0 | 1.3 | 0.9 | Stowed |
| 11:13:16 | 93473 | 1162.3 | -4.5 | -3.9 | -0.3 | -0.2 | 5.5 | 3.9 | 2.6 | 0.9 | 0.9 | Stowed |
| 11:13:17 | 93474 | 1172.6 | -2.7 | -1.8 | 0.0  | 0.3  |     | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:13:18 | 93475 | 1118.4 | -1.8 | -1.6 | 0.3  | 0.2  | 5.7 | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:13:19 | 93476 | 1142.9 | -1.8 | -1.1 | -0.3 | -0.5 |     | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:13:20 | 93477 | 1106.8 | 0.0  | 0.6  | -0.8 | -0.8 | 5.9 | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:13:21 | 93478 | 1121.0 | 0.4  | 0.8  | -0.8 | -1.2 |     | 0.0 | 0.0 | 0.9 | 1.3 | Stowed |
| 11:13:22 | 93479 | 1113.2 | 0.4  | 0.3  | -1.3 | -1.3 | 5.9 | 0.0 | 0.0 | 2.7 | 4.0 | Stowed |
| 11:13:23 | 93480 | 1082.2 | -1.3 | -1.6 | -1.2 | -1.3 |     | 0.0 | 0.0 | 2.7 | 1.8 | Stowed |
| 11:13:24 | 93481 | 1065.4 | -1.8 | -1.0 | -1.2 | -1.2 | 6.0 | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:13:25 | 93482 | 1073.2 | 0.0  | 0.6  | -1.0 | -0.8 |     | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:13:26 | 93483 | 1015.1 | 0.9  | 1.2  | -0.8 | -0.8 | 6.0 | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |

|          |       |        |      |      |      |      |     |     |     |     |        |        |
|----------|-------|--------|------|------|------|------|-----|-----|-----|-----|--------|--------|
| 11:13:27 | 93484 | 1034.4 | 0.9  | 0.9  | -0.8 | -0.8 | 0.0 | 0.0 | 1.8 | 1.8 | Stowed |        |
| 11:13:28 | 93485 | 1021.5 | 0.4  | 0.3  | -1.0 | -1.0 | 6.2 | 0.0 | 0.0 | 1.8 | 1.8    | Stowed |
| 11:13:29 | 93486 | 1015.1 | 0.0  | -0.8 | -1.0 | -1.0 |     | 0.0 | 0.0 | 1.8 | 1.8    | Stowed |
| 11:13:30 | 93487 | 966.0  | -0.9 | -1.0 | -1.0 | -1.0 | 6.3 | 0.0 | 0.0 | 1.8 | 1.8    | Stowed |
| 11:13:31 | 93488 | 993.1  | -1.3 | -1.7 | -1.0 | -0.8 |     | 0.0 | 0.0 | 1.8 | 1.8    | Stowed |
| 11:13:32 | 93489 | 966.0  | -2.7 | -3.2 | -0.8 | -0.8 | 6.3 | 0.0 | 0.0 | 1.3 | 1.3    | Stowed |
| 11:13:33 | 93490 | 954.4  | -4.0 | -4.1 | -0.8 | -0.8 |     | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:34 | 93491 | 933.7  | -4.5 | -4.2 | -0.3 | -0.3 | 6.3 | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:35 | 93492 | 901.9  | -3.6 | -2.9 | -0.7 | -0.3 |     | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:36 | 93493 | 893.0  | -2.7 | -2.5 | -0.3 | -0.7 | 6.3 | 0.0 | 0.0 | 1.3 | 0.9    | Stowed |
| 11:13:37 | 93494 | 864.0  | -2.7 | -2.1 | -0.8 | -1.0 |     | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:38 | 93495 | 873.5  | -1.8 | -1.1 | -1.2 | -1.2 | 6.3 | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:39 | 93496 | 884.1  | 0.4  | 1.1  | -1.0 | -1.0 |     | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:40 | 93497 | 853.9  | 1.8  | 2.6  | -1.0 | -1.0 | 6.3 | 0.0 | 0.0 | 0.9 | 3.6    | Stowed |
| 11:13:41 | 93498 | 865.7  | 2.7  | 2.2  | -1.2 | -1.2 |     | 0.0 | 0.0 | 5.4 | 4.9    | Stowed |
| 11:13:42 | 93499 | 841.6  | 0.9  | -1.1 | -1.2 | -1.2 | 6.3 | 0.0 | 0.0 | 2.7 | 1.3    | Stowed |
| 11:13:43 | 93500 | 826.0  | -2.7 | -3.1 | -1.3 | -1.5 |     | 1.2 | 2.1 | 0.9 | 0.9    | Stowed |
| 11:13:44 | 93501 | 830.5  | -3.6 | -2.8 | -1.5 | -1.3 | 6.3 | 1.3 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:45 | 93502 | 818.2  | -2.2 | -1.3 | -1.2 | -1.0 |     | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:46 | 93503 | 812.6  | -0.9 | 0.4  | -1.0 | -1.0 | 6.3 | 0.0 | 0.0 | 0.9 | 1.8    | Stowed |
| 11:13:47 | 93504 | 775.8  | 0.4  | 0.8  | -1.0 | -0.8 |     | 0.0 | 0.0 | 2.2 | 2.7    | Stowed |
| 11:13:48 | 93505 | 747.3  | 0.4  | -0.9 | -0.8 | -0.8 | 6.5 | 0.0 | 0.0 | 2.7 | 2.2    | Stowed |
| 11:13:49 | 93506 | 758.5  | -1.8 | -2.2 | -0.8 | -0.8 |     | 0.0 | 0.0 | 1.8 | 1.3    | Stowed |
| 11:13:50 | 93507 | 743.9  | -2.7 | -2.6 | -0.8 | -1.0 | 6.6 | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:51 | 93508 | 732.8  | -2.7 | -2.1 | -1.0 | -1.0 |     | 0.0 | 1.0 | 0.9 | 0.9    | Stowed |
| 11:13:52 | 93509 | 736.1  | -1.8 | -1.1 | -0.8 | -0.8 | 6.7 | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:13:53 | 93510 | 733.9  | 0.0  | 0.6  | -0.8 | -0.7 |     | 0.0 | 0.0 | 0.9 | 1.3    | Stowed |
| 11:13:54 | 93511 | 724.4  | 0.4  | 0.3  | -0.7 | -0.8 | 6.7 | 0.0 | 0.0 | 1.3 | 1.3    | Stowed |
| 11:13:55 | 93512 | 719.4  | 0.0  | 0.2  | -0.8 | -1.0 |     | 0.0 | 0.0 | 1.3 | 1.3    | Stowed |
| 11:13:56 | 93513 | 709.3  | 0.0  | -0.9 | -1.0 | -1.0 | 6.8 | 0.0 | 0.0 | 1.3 | 2.2    | Stowed |
| 11:13:57 | 93514 | 696.5  | -1.3 | -1.7 | -1.0 | -1.0 |     | 0.0 | 0.0 | 2.2 | 1.8    | Stowed |
| 11:13:58 | 93515 | 685.3  | -1.8 | -1.0 | -1.0 | -0.8 | 6.8 | 0.0 | 0.0 | 1.3 | 1.3    | Stowed |
| 11:13:59 | 93516 | 674.1  | 0.0  | -0.9 | -0.8 | -0.3 |     | 0.0 | 0.0 | 3.1 | 4.9    | Stowed |
| 11:14:00 | 93517 | 661.9  | -1.8 | -2.7 | -0.2 | 0.3  | 6.8 | 0.0 | 0.0 | 2.2 | 0.9    | Stowed |
| 11:14:01 | 93518 | 632.3  | -3.1 | -2.9 | 1.8  | 1.3  |     | 0.6 | 0.9 | 0.9 | 0.9    | Stowed |
| 11:14:02 | 93519 | 625.6  | -2.2 | -1.0 | 1.3  | 2.0  | 6.8 | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:14:03 | 93520 | 612.2  | 0.4  | 1.5  | 2.1  | 0.0  |     | 0.0 | 0.0 | 0.9 | 0.9    | Stowed |
| 11:14:04 | 93521 | 587.0  | 2.2  | 2.9  | -1.8 | -0.5 | 6.8 | 0.0 | 0.0 | 1.3 | 3.1    | Stowed |
| 11:14:05 | 93522 | 584.8  | 2.2  | 1.5  | -1.0 | -0.8 |     | 0.0 | 0.0 | 3.1 | 4.0    | Stowed |
| 11:14:06 | 93523 | 555.8  | 0.9  | 0.3  | -3.6 | -3.8 | 6.8 | 0.0 | 0.0 | 2.7 | 5.4    | Stowed |
| 11:14:07 | 93524 | 506.6  | -1.3 | -2.3 | -2.0 | -2.1 |     | 0.0 | 0.0 | 4.0 | 1.8    | Stowed |

|          |       |       |      |      |      |      |     |     |     |     |     |        |
|----------|-------|-------|------|------|------|------|-----|-----|-----|-----|-----|--------|
| 11:14:08 | 93525 | 472.1 | -3.6 | -3.9 | -1.8 | -1.5 | 6.9 | 3.6 | 6.4 | 0.9 | 0.9 | Stowed |
| 11:14:09 | 93526 | 471.7 | -3.6 | -2.1 | -3.0 | -4.1 |     | 2.6 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:10 | 93527 | 468.5 | -1.3 | -0.9 | -4.6 | -3.5 | 6.9 | 0.0 | 0.0 | 1.3 | 2.7 | Stowed |
| 11:14:11 | 93528 | 462.4 | -1.8 | -2.2 | -2.0 | -2.6 |     | 0.0 | 0.0 | 2.2 | 1.3 | Stowed |
| 11:14:12 | 93529 | 448.7 | -3.6 | -3.2 | -3.0 | -4.1 | 7.0 | 5.0 | 4.1 | 0.9 | 0.9 | Stowed |
| 11:14:13 | 93530 | 405.9 | -2.7 | -1.8 | -3.1 | -2.5 |     | 3.0 | 1.5 | 0.9 | 0.9 | Stowed |
| 11:14:14 | 93531 | 393.4 | -2.2 | -2.0 | -1.5 | -1.0 | 7.0 | 5.7 | 7.1 | 0.9 | 0.9 | Stowed |
| 11:14:15 | 93532 | 421.2 | -1.3 | 0.2  | -2.1 | -4.0 |     | 4.1 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:16 | 93533 | 351.8 | 0.4  | 0.3  | -3.5 | -3.0 | 7.0 | 0.0 | 0.0 | 0.9 | 1.3 | Stowed |
| 11:14:17 | 93534 | 384.1 | 0.0  | 0.2  | -3.1 | -3.1 |     | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:18 | 93535 | 397.8 | 0.0  | 0.0  | -3.1 | -2.6 | 7.1 | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:19 | 93536 | 389.4 | 0.4  | 1.0  | -2.1 | -1.8 |     | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:20 | 93537 | 378.0 | 1.3  | 1.8  | -3.1 | -3.8 | 7.1 | 0.0 | 0.0 | 0.9 | 2.2 | Stowed |
| 11:14:21 | 93538 | 369.6 | 1.3  | 0.8  | -2.8 | -2.6 |     | 0.0 | 0.0 | 2.2 | 2.2 | Stowed |
| 11:14:22 | 93539 | 357.9 | 0.0  | -1.1 | -3.1 | -2.8 | 7.1 | 0.0 | 0.0 | 1.8 | 1.3 | Stowed |
| 11:14:23 | 93540 | 353.4 | -1.3 | -0.8 | -3.1 | -3.8 |     | 0.0 | 0.0 | 0.9 | 1.8 | Stowed |
| 11:14:24 | 93541 | 347.8 | 0.0  | -1.0 | -3.3 | -1.3 | 7.1 | 0.0 | 0.0 | 2.7 | 2.2 | Stowed |
| 11:14:25 | 93542 | 331.6 | -1.8 | -0.9 | -0.5 | -0.8 |     | 3.4 | 0.8 | 0.9 | 0.9 | Stowed |
| 11:14:26 | 93543 | 315.1 | 0.4  | 1.0  | -0.8 | -0.5 | 7.1 | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:27 | 93544 | 311.4 | 0.9  | 1.3  | -0.7 | -2.6 |     | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:28 | 93545 | 284.4 | 0.9  | 0.8  | -4.5 | -5.8 | 7.1 | 0.0 | 0.0 | 2.2 | 2.7 | Stowed |
| 11:14:29 | 93546 | 275.1 | 0.0  | -1.1 | -4.1 | -4.0 |     | 0.0 | 0.0 | 3.1 | 2.2 | Stowed |
| 11:14:30 | 93547 | 247.2 | -1.3 | -1.1 | -5.5 | -4.5 | 7.1 | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:14:31 | 93548 | 238.4 | -1.3 | -1.0 | -2.8 | -2.0 |     | 0.0 | 0.0 | 1.3 | 1.3 | Stowed |
| 11:14:32 | 93549 | 223.8 | -1.3 | -0.9 | -1.8 | -2.1 | 7.2 | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:33 | 93550 | 206.9 | -1.3 | -1.3 | -3.3 | -2.6 |     | 0.0 | 2.3 | 0.9 | 0.9 | Stowed |
| 11:14:34 | 93551 | 201.2 | -1.3 | -0.9 | -2.3 | -2.5 | 7.2 | 2.1 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:35 | 93552 | 183.9 | -0.9 | 0.0  | -2.0 | -2.0 |     | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:36 | 93553 | 167.7 | 0.0  | 0.8  | -2.0 | -2.5 | 7.2 | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:37 | 93554 | 163.7 | 0.9  | 1.3  | -4.1 | -2.6 |     | 0.0 | 0.0 | 2.2 | 3.1 | Stowed |
| 11:14:38 | 93555 | 145.1 | 0.9  | 0.1  | -4.1 | -4.3 | 7.2 | 0.0 | 0.0 | 2.7 | 2.7 | Stowed |
| 11:14:39 | 93556 | 130.6 | -1.8 | -2.2 | -4.0 | -3.3 |     | 0.0 | 3.8 | 1.8 | 0.9 | Stowed |
| 11:14:40 | 93557 | 134.2 | -2.2 | -1.7 | -3.1 | -3.0 | 7.2 | 0.9 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:41 | 93558 | 117.3 | -1.8 | -1.8 | -2.3 | -1.8 |     | 0.0 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:42 | 93559 | 103.1 | -1.8 | -0.9 | -1.3 | -1.2 | 7.3 | 4.8 | 0.0 | 0.9 | 0.9 | Stowed |
| 11:14:43 | 93560 | 91.0  | 0.9  | 0.9  | -3.8 | -1.8 |     | 0.0 | 0.0 | 1.8 | 3.1 | Stowed |
| 11:14:44 | 93561 | 85.8  | 0.0  | -0.8 | -0.5 | -0.8 | 7.3 | 6.0 | 7.3 | 0.9 | 0.9 | Stowed |
| 11:14:45 | 93562 | 80.1  | 0.4  | 1.7  | 0.5  | -3.1 |     | 0.8 | 0.0 | 0.9 | 1.3 | Stowed |
| 11:14:46 | 93563 | 63.6  | 1.8  | 2.2  | -3.5 | -0.8 | 7.3 | 0.0 | 0.0 | 5.4 | 5.8 | Stowed |
| 11:14:47 | 93564 | 50.6  | 1.8  | 1.9  | 0.0  | -2.6 |     | 0.0 | 0.0 | 1.3 | 1.8 | Stowed |
| 11:14:48 | 93565 | 41.0  | 1.3  | 1.0  | -3.1 | -5.1 | 7.3 | 0.0 | 0.0 | 4.0 | 2.2 | Stowed |

|          |       |      |      |      |       |       |     |      |      |      |      |        |
|----------|-------|------|------|------|-------|-------|-----|------|------|------|------|--------|
| 11:14:49 | 93566 | 33.3 | 0.9  | 1.2  | -4.3  | 2.1   |     | 0.0  | 0.0  | 1.3  | 1.3  | Stowed |
| 11:14:50 | 93567 | 25.6 | 1.3  | 2.1  | 4.0   | -7.3  | 7.3 | 0.0  | 0.0  | 0.9  | 0.9  | Stowed |
| 11:14:51 | 93568 | 19.6 | 2.2  | 1.6  | -2.0  | 0.5   |     | 0.0  | 0.0  | 7.1  | 1.8  | Stowed |
| 11:14:52 | 93569 | 13.1 | 0.4  | 0.7  | -0.8  | 2.3   | 7.3 | 1.8  | 1.1  | 0.9  | 0.9  | Stowed |
| 11:14:53 | 93570 | 7.9  | 1.3  | 2.3  | -3.8  | -3.5  |     | 0.0  | 0.0  | 0.9  | 0.9  | Stowed |
| 11:14:54 | 93571 | 2.2  | 3.6  | 4.4  | -13.5 | -23.0 | 7.3 | 0.0  | 0.0  | 0.9  | 3.6  | Stowed |
| 11:14:55 | 93572 | 1.0  | 1.3  | -1.2 | -23.0 | -22.6 |     | 0.0  | 0.0  | 5.8  | 1.3  | Stowed |
| 11:14:56 | 93573 | 0.6  | -2.2 | -1.7 | -23.1 | 2.0   | 7.4 | 0.0  | 5.9  | 0.9  | 0.0  | Stowed |
| 11:14:57 | 93574 | -1.0 | -1.8 | -1.7 | -13.2 | -24.1 |     | 0.0  | 0.0  | 0.0  | 0.0  | Stowed |
| 11:14:58 | 93575 | -1.4 | -1.3 | 0.2  | -4.3  | 2.5   | 7.4 | 35.9 | 56.4 | 22.9 | 52.6 | Stowed |
| 11:14:59 | 93576 | -1.8 | 2.2  | 2.7  | -3.0  | -11.7 |     | 56.3 | 54.7 | 55.5 | 58.3 | Unlock |
| 11:15:00 | 93577 | -1.8 | 1.3  | 0.2  | -25.1 | -25.1 | 7.4 | 53.8 | 52.6 | 58.6 | 59.0 | Stowed |
| 11:15:01 | 93578 | -2.6 | 0.0  | 1.0  | -24.0 | -23.6 |     | 52.2 | 51.0 | 58.6 | 59.0 | Deploy |
| 11:15:02 | 93579 | -1.4 | 0.9  | 3.7  | -23.5 | -23.0 | 7.4 | 46.9 | 46.3 | 58.6 | 58.6 | Deploy |
| 11:15:03 | 93580 | -1.0 | 1.8  | 2.1  | -23.0 | -23.6 |     | 45.2 | 42.8 | 59.0 | 58.6 | Deploy |
| 11:15:04 | 93581 | -0.6 | 2.2  | 1.7  | -24.3 | -23.8 | 7.4 | 41.7 | 41.9 | 59.3 | 59.0 | Deploy |
| 11:15:05 | 93582 | -1.0 | 2.2  | 2.3  | -24.3 | -24.5 |     | 39.9 | 38.1 | 58.6 | 58.6 | Deploy |
| 11:15:06 | 93583 | -1.0 | 2.2  | 2.0  | -24.8 | -23.8 | 7.4 | 38.6 | 40.5 | 59.0 | 59.0 | Deploy |
| 11:15:07 | 93584 | -1.8 | 2.2  | 1.6  | -24.8 | -10.9 |     | 44.4 | 48.2 | 59.0 | 59.0 | Deploy |
| 11:15:08 | 93585 | -2.2 | 1.8  | 2.1  | 1.0   | 4.8   | 7.4 | 54.4 | 56.0 | 59.0 | 59.0 | Deploy |
| 11:15:09 | 93586 | -0.6 | 2.7  | 2.3  | 2.8   | 13.7  |     | 56.4 | 56.4 | 59.0 | 59.0 | Deploy |
| 11:15:10 | 93587 | -2.2 | 2.2  | 2.3  | 12.7  | 0.5   | 7.4 | 56.4 | 56.3 | 59.0 | 59.0 | Deploy |
| 11:15:11 | 93588 | -2.6 | 0.9  | 1.9  | 7.9   | 15.0  |     | 56.3 | 56.4 | 59.3 | 59.0 | Deploy |
| 11:15:12 | 93589 | -1.8 | 1.3  | 1.0  | -1.5  | 7.1   | 7.4 | 56.4 | 56.4 | 59.0 | 59.3 | Deploy |
| 11:15:13 | 93590 | -3.0 | 0.4  | 0.7  | -1.0  | -3.1  |     | 56.3 | 56.5 | 59.0 | 59.0 | Deploy |
| 11:15:14 | 93591 | -1.0 | 0.0  | -1.6 | 3.5   | 5.6   | 7.5 | 56.4 | 56.5 | 59.0 | 59.0 | Unlock |
| 11:15:15 | 93592 | -1.4 | -2.2 | -2.1 | 1.2   | -2.0  |     | 56.5 | 56.4 | 59.0 | 59.3 | Stowed |
| 11:15:16 | 93593 | -2.2 | -2.2 | -2.2 | -3.6  | -3.6  | 7.4 | 56.5 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:17 | 93594 | -1.4 | -2.7 | -2.2 | -6.4  | -2.6  |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:18 | 93595 | -3.0 | -2.2 | -2.1 | -0.3  | 4.5   | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:19 | 93596 | -1.0 | -2.2 | -2.0 | -2.5  | -3.5  |     | 56.5 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:20 | 93597 | -1.4 | -1.8 | -1.9 | -2.5  | -0.8  | 7.4 | 56.5 | 56.4 | 59.0 | 59.3 | Stowed |
| 11:15:21 | 93598 | -1.4 | -1.8 | -1.7 | -0.5  | 3.1   |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:22 | 93599 | -1.0 | -1.8 | -1.7 | -2.0  | -5.1  | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:23 | 93600 | -0.2 | -2.2 | -1.7 | -2.3  | -5.9  |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:24 | 93601 | -1.0 | -2.2 | -1.8 | -0.7  | 1.0   | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:25 | 93602 | -1.8 | -1.8 | -1.5 | 1.0   | 1.2   |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:26 | 93603 | -0.6 | -1.3 | -1.0 | 1.3   | 5.5   | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:27 | 93604 | -1.0 | -0.9 | -0.8 | 1.3   | -2.8  |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:28 | 93605 | -1.0 | -0.9 | -0.8 | 1.2   | 1.7   | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |

|          |       |      |      |      |      |      |     |      |      |      |      |        |
|----------|-------|------|------|------|------|------|-----|------|------|------|------|--------|
| 11:15:29 | 93606 | -2.2 | -0.9 | -0.8 | 1.5  | 4.0  |     | 56.5 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:30 | 93607 | -1.8 | 0.0  | 0.0  | 1.3  | 0.7  | 7.4 | 56.4 | 56.5 | 59.3 | 59.3 | Stowed |
| 11:15:31 | 93608 | -2.2 | -0.9 | -0.9 | -0.2 | 1.0  |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:32 | 93609 | -1.0 | 0.0  | -0.8 | -0.5 | 1.5  | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:33 | 93610 | -1.0 | -0.9 | -1.0 | 2.1  | 0.7  |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:34 | 93611 | -1.8 | -1.3 | -1.0 | -0.8 | -3.8 | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:35 | 93612 | -2.6 | -0.9 | -1.1 | -3.3 | -1.7 |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:36 | 93613 | -1.0 | -0.9 | -0.9 | -4.5 | -4.5 | 7.4 | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:37 | 93614 | -2.2 | 0.0  | 0.0  | -1.3 | -4.0 |     | 56.5 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:38 | 93615 | -3.0 | 0.0  | 0.0  | -1.8 | -2.8 | 7.4 | 56.5 | 56.5 | 59.3 | 59.3 | Stowed |
| 11:15:39 | 93616 | -1.8 | -0.9 | -0.8 | 1.2  | 4.0  |     | 56.5 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:40 | 93617 | -1.0 | 0.0  | 0.2  | 0.0  | -0.3 | 7.4 | 56.4 | 56.5 | 59.3 | 59.3 | Stowed |
| 11:15:41 | 93618 | -1.4 | 0.0  | 0.1  | -0.8 | -0.7 |     | 56.4 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:42 | 93619 | -3.4 | 0.0  | 0.0  | -0.3 | 2.1  | 7.4 | 56.5 | 56.4 | 59.3 | 59.3 | Stowed |
| 11:15:43 | 93620 | -1.4 | 0.0  | -0.8 | 3.5  | 4.0  |     | 56.5 | 56.4 | 59.3 | 59.3 | Stowed |

| FDR<br>GMT | FDR<br>SRN | Total<br>Air  | VHF 1<br>Keying | Vertical<br>Accel |       |       |       |       |       |       |       |
|------------|------------|---------------|-----------------|-------------------|-------|-------|-------|-------|-------|-------|-------|
|            |            | Temp<br>(sec) | (deg C)         | (g's)             |       |       |       |       |       |       |       |
| 11:12:09   | 93406      | 16            |                 | 0.979             | 0.995 | 1.002 | 1.011 | 0.991 | 1.018 | 1.009 | 0.956 |
| 11:12:10   | 93407      |               |                 | 0.945             | 0.917 | 0.936 | 0.933 | 0.929 | 0.963 | 0.940 | 0.961 |
| 11:12:11   | 93408      | 16            |                 | 0.959             | 0.972 | 0.993 | 0.991 | 0.991 | 0.959 | 0.961 | 0.940 |
| 11:12:12   | 93409      |               |                 | 0.908             | 0.931 | 0.963 | 0.956 | 0.986 | 1.007 | 1.048 | 1.011 |
| 11:12:13   | 93410      | 16            |                 | 1.004             | 0.988 | 1.004 | 1.020 | 1.034 | 1.025 | 1.016 | 1.009 |
| 11:12:14   | 93411      |               |                 | 1.020             | 1.007 | 1.009 | 1.018 | 1.023 | 1.039 | 0.993 | 1.030 |
| 11:12:15   | 93412      | 16            |                 | 1.030             | 1.039 | 1.036 | 1.011 | 1.036 | 1.009 | 1.000 | 1.016 |
| 11:12:16   | 93413      |               |                 | 0.991             | 0.975 | 0.938 | 0.931 | 0.940 | 0.940 | 0.897 | 0.906 |
| 11:12:17   | 93414      | 16            |                 | 0.878             | 0.910 | 0.943 | 0.949 | 0.981 | 0.972 | 0.972 | 0.954 |
| 11:12:18   | 93415      |               |                 | 0.993             | 1.007 | 1.064 | 1.023 | 0.975 | 0.931 | 0.977 | 0.959 |
| 11:12:19   | 93416      | 16            |                 | 1.023             | 1.036 | 1.030 | 1.036 | 1.020 | 1.025 | 1.071 | 0.988 |
| 11:12:20   | 93417      |               |                 | 0.970             | 1.002 | 0.988 | 1.000 | 1.011 | 1.048 | 1.094 | 1.059 |
| 11:12:21   | 93418      | 16            |                 | 0.988             | 1.016 | 1.023 | 1.018 | 0.991 | 1.009 | 1.014 | 0.984 |
| 11:12:22   | 93419      |               |                 | 0.997             | 0.979 | 0.981 | 0.972 | 0.979 | 0.979 | 0.979 | 0.988 |
| 11:12:23   | 93420      | 16            |                 | 0.981             | 0.986 | 0.986 | 0.981 | 0.991 | 0.991 | 1.004 | 1.002 |
| 11:12:24   | 93421      |               |                 | 1.000             | 0.988 | 0.977 | 0.979 | 0.981 | 0.993 | 0.993 | 1.002 |
| 11:12:25   | 93422      | 16            |                 | 1.004             | 1.014 | 1.004 | 1.004 | 0.997 | 0.981 | 0.984 | 0.984 |
| 11:12:26   | 93423      |               |                 | 0.979             | 0.979 | 0.975 | 0.977 | 0.988 | 0.993 | 1.014 | 1.011 |
| 11:12:27   | 93424      | 16            |                 | 1.018             | 1.036 | 1.041 | 1.055 | 1.043 | 1.055 | 1.050 | 1.064 |
| 11:12:28   | 93425      |               |                 | 1.059             | 1.052 | 1.055 | 1.057 | 1.057 | 1.071 | 1.075 | 1.071 |
| 11:12:29   | 93426      | 15            |                 | 1.073             | 1.075 | 1.073 | 1.071 | 1.062 | 1.050 | 1.032 | 1.011 |
| 11:12:30   | 93427      |               |                 | 0.997             | 0.991 | 0.981 | 0.972 | 0.979 | 0.965 | 0.963 | 0.963 |
| 11:12:31   | 93428      | 15            |                 | 0.956             | 0.956 | 0.965 | 0.975 | 0.981 | 0.984 | 1.007 | 1.011 |
| 11:12:32   | 93429      |               |                 | 1.027             | 1.036 | 1.041 | 1.041 | 1.034 | 1.000 | 0.975 | 0.947 |
| 11:12:33   | 93430      | 15            |                 | 0.931             | 0.920 | 0.860 | 0.853 | 0.856 | 0.894 | 0.890 | 0.874 |
| 11:12:34   | 93431      |               |                 | 0.908             | 0.904 | 0.899 | 0.878 | 0.910 | 0.933 | 0.927 | 0.949 |
| 11:12:35   | 93432      | 16            |                 | 0.931             | 0.965 | 0.968 | 0.977 | 0.961 | 0.947 | 0.933 | 0.929 |
| 11:12:36   | 93433      |               |                 | 0.968             | 0.961 | 0.972 | 0.986 | 0.959 | 0.968 | 0.972 | 0.963 |
| 11:12:37   | 93434      | 16            |                 | 0.977             | 0.956 | 1.000 | 1.046 | 1.055 | 1.062 | 1.039 | 1.043 |
| 11:12:38   | 93435      |               |                 | 1.030             | 1.036 | 1.036 | 1.020 | 1.016 | 1.009 | 1.014 | 1.009 |
| 11:12:39   | 93436      | 16            |                 | 1.016             | 1.018 | 1.014 | 1.009 | 1.002 | 0.997 | 1.011 | 1.016 |
| 11:12:40   | 93437      |               |                 | 1.004             | 1.009 | 0.995 | 0.988 | 0.977 | 0.961 | 0.956 | 0.954 |
| 11:12:41   | 93438      | 15            |                 | 0.956             | 0.949 | 0.940 | 0.949 | 0.959 | 0.968 | 0.972 | 0.988 |
| 11:12:42   | 93439      |               |                 | 0.991             | 0.991 | 0.993 | 0.981 | 0.988 | 0.984 | 0.993 | 0.993 |
| 11:12:43   | 93440      | 15            |                 | 0.986             | 0.997 | 0.991 | 0.995 | 0.995 | 1.004 | 1.004 | 1.002 |
| 11:12:44   | 93441      |               |                 | 1.007             | 1.002 | 1.009 | 0.997 | 0.995 | 0.997 | 1.004 | 0.997 |
| 11:12:45   | 93442      | 15            |                 | 0.991             | 1.000 | 1.009 | 1.025 | 1.016 | 1.011 | 0.997 | 1.007 |

|          |       |       |       |       |       |       |       |       |       |       |       |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 11:12:46 | 93443 |       | 1.002 | 0.997 | 0.986 | 0.991 | 0.981 | 0.988 | 1.000 | 1.018 |       |
| 11:12:47 | 93444 | 15    | 1.023 | 1.025 | 1.000 | 0.986 | 0.968 | 0.956 | 0.970 | 0.965 |       |
| 11:12:48 | 93445 |       | 0.968 | 0.956 | 0.961 | 0.970 | 0.954 | 0.956 | 0.933 | 0.952 |       |
| 11:12:49 | 93446 | 15    | 0.924 | 0.947 | 0.933 | 0.952 | 0.956 | 0.979 | 0.979 | 0.968 |       |
| 11:12:50 | 93447 |       | 0.965 | 0.956 | 0.947 | 0.938 | 0.910 | 0.915 | 0.922 | 0.931 |       |
| 11:12:51 | 93448 | 15    | 0.920 | 0.929 | 0.913 | 0.927 | 0.917 | 0.931 | 0.947 | 0.947 |       |
| 11:12:52 | 93449 |       | 0.954 | 0.968 | 0.963 | 0.972 | 0.977 | 0.965 | 0.986 | 0.993 |       |
| 11:12:53 | 93450 | 15    | 1.002 | 1.002 | 1.009 | 1.007 | 1.002 | 1.002 | 0.995 | 0.991 |       |
| 11:12:54 | 93451 |       | 0.979 | 0.991 | 0.979 | 0.995 | 0.986 | 1.002 | 1.000 | 0.988 |       |
| 11:12:55 | 93452 | 15    | 0.991 | 0.995 | 1.007 | 1.023 | 1.032 | 1.034 | 1.046 | 1.043 |       |
| 11:12:56 | 93453 |       | 1.036 | 1.018 | 1.014 | 1.009 | 1.002 | 1.004 | 0.995 | 0.984 |       |
| 11:12:57 | 93454 | 15    | 0.979 | 0.975 | 0.981 | 0.970 | 0.984 | 0.981 | 0.991 | 0.991 |       |
| 11:12:58 | 93455 |       | 0.988 | 0.984 | 0.965 | 0.968 | 0.975 | 0.981 | 0.975 | 0.965 |       |
| 11:12:59 | 93456 | 15    | 0.959 | 0.956 | 0.940 | 0.940 | 0.949 | 0.954 | 0.963 | 0.968 |       |
| 11:13:00 | 93457 |       | 0.984 | 0.975 | 0.979 | 0.984 | 0.981 | 0.986 | 0.995 | 1.000 |       |
| 11:13:01 | 93458 | 15    | 1.002 | 1.002 | 0.986 | 0.979 | 0.981 | 0.979 | 0.997 | 1.000 |       |
| 11:13:02 | 93459 |       | 0.997 | 0.997 | 0.991 | 1.000 | 0.995 | 0.997 | 1.000 | 1.016 |       |
| 11:13:03 | 93460 | 15    | 1.011 | 1.007 | 1.014 | 0.997 | 0.993 | 0.993 | 1.002 | 1.002 |       |
| 11:13:04 | 93461 | keyed | 1.004 | 1.000 | 1.002 | 0.993 | 0.986 | 0.997 | 0.995 | 1.004 |       |
| 11:13:05 | 93462 | 15    | keyed | 1.000 | 1.007 | 1.002 | 1.009 | 1.007 | 1.000 | 1.004 | 0.997 |
| 11:13:06 | 93463 | keyed | 0.995 | 0.991 | 0.984 | 0.975 | 0.968 | 0.956 | 0.952 | 0.956 |       |
| 11:13:07 | 93464 | 15    | 0.954 | 0.965 | 0.956 | 0.970 | 0.965 | 0.965 | 0.975 | 0.972 |       |
| 11:13:08 | 93465 |       | 0.979 | 0.979 | 0.977 | 0.986 | 0.977 | 0.972 | 0.975 | 0.977 |       |
| 11:13:09 | 93466 | 15    | 0.984 | 0.979 | 0.977 | 0.981 | 0.986 | 0.991 | 1.000 | 0.991 |       |
| 11:13:10 | 93467 |       | 0.997 | 0.988 | 0.997 | 0.977 | 0.986 | 0.979 | 1.000 | 0.981 |       |
| 11:13:11 | 93468 | 15    | 0.988 | 1.004 | 0.991 | 1.007 | 0.986 | 0.997 | 0.997 | 1.002 |       |
| 11:13:12 | 93469 |       | 0.981 | 1.016 | 1.007 | 1.007 | 1.025 | 1.011 | 1.009 | 1.014 |       |
| 11:13:13 | 93470 | 15    | 1.007 | 1.007 | 0.986 | 0.986 | 0.979 | 0.984 | 0.988 | 0.997 |       |
| 11:13:14 | 93471 |       | 1.014 | 0.995 | 1.009 | 1.007 | 1.004 | 1.018 | 1.020 | 1.007 |       |
| 11:13:15 | 93472 | 15    | 1.011 | 1.023 | 1.032 | 1.030 | 1.014 | 1.007 | 0.997 | 1.016 |       |
| 11:13:16 | 93473 |       | 1.018 | 1.002 | 1.004 | 1.016 | 1.009 | 0.993 | 1.016 | 0.991 |       |
| 11:13:17 | 93474 | 15    | 0.995 | 0.997 | 0.993 | 1.002 | 1.000 | 1.011 | 0.988 | 0.988 |       |
| 11:13:18 | 93475 |       | 0.975 | 0.997 | 0.997 | 1.007 | 0.979 | 1.018 | 1.004 | 1.007 |       |
| 11:13:19 | 93476 | 15    | 0.993 | 1.027 | 1.000 | 1.002 | 1.004 | 1.011 | 0.988 | 1.016 |       |
| 11:13:20 | 93477 |       | 0.988 | 0.993 | 0.988 | 0.993 | 0.979 | 0.979 | 1.002 | 0.975 |       |
| 11:13:21 | 93478 | 15    | 0.997 | 1.000 | 0.963 | 0.993 | 1.004 | 0.972 | 0.979 | 0.984 |       |
| 11:13:22 | 93479 |       | 0.970 | 0.972 | 0.979 | 0.975 | 0.977 | 0.981 | 0.984 | 0.963 |       |
| 11:13:23 | 93480 | 15    | 0.993 | 0.991 | 0.984 | 0.979 | 0.961 | 0.977 | 0.984 | 0.968 |       |
| 11:13:24 | 93481 |       | 0.959 | 0.956 | 0.968 | 1.002 | 1.002 | 0.984 | 0.961 | 0.963 |       |
| 11:13:25 | 93482 | 15    | 0.968 | 0.981 | 0.979 | 0.981 | 0.970 | 0.984 | 0.984 | 0.981 |       |
| 11:13:26 | 93483 |       | 0.977 | 0.972 | 0.981 | 0.984 | 0.997 | 1.009 | 0.986 | 0.977 |       |

|          |       |    |       |       |       |       |       |       |       |       |
|----------|-------|----|-------|-------|-------|-------|-------|-------|-------|-------|
| 11:13:27 | 93484 | 15 | 0.970 | 0.981 | 0.995 | 0.988 | 0.995 | 0.984 | 0.984 | 0.991 |
| 11:13:28 | 93485 |    | 1.007 | 0.993 | 0.988 | 0.991 | 0.997 | 1.007 | 1.014 | 1.000 |
| 11:13:29 | 93486 | 15 | 1.009 | 1.011 | 1.016 | 1.000 | 0.986 | 0.991 | 1.004 | 1.002 |
| 11:13:30 | 93487 |    | 0.995 | 1.002 | 1.014 | 1.016 | 1.002 | 0.993 | 1.009 | 0.993 |
| 11:13:31 | 93488 | 15 | 0.979 | 1.002 | 1.009 | 0.997 | 0.995 | 0.991 | 0.975 | 0.984 |
| 11:13:32 | 93489 |    | 1.009 | 1.002 | 0.997 | 1.000 | 0.970 | 1.007 | 1.000 | 0.984 |
| 11:13:33 | 93490 | 15 | 0.984 | 0.968 | 0.984 | 0.981 | 0.956 | 0.977 | 0.961 | 0.972 |
| 11:13:34 | 93491 |    | 0.972 | 0.936 | 0.972 | 0.961 | 0.949 | 0.963 | 0.961 | 0.986 |
| 11:13:35 | 93492 | 15 | 0.954 | 0.963 | 0.995 | 0.970 | 0.981 | 0.997 | 1.011 | 1.009 |
| 11:13:36 | 93493 |    | 0.981 | 1.014 | 0.995 | 0.993 | 1.000 | 0.997 | 0.995 | 0.986 |
| 11:13:37 | 93494 | 15 | 0.975 | 0.991 | 0.968 | 0.952 | 0.986 | 0.981 | 0.954 | 0.945 |
| 11:13:38 | 93495 |    | 0.965 | 0.988 | 0.984 | 0.979 | 0.972 | 0.961 | 0.961 | 0.959 |
| 11:13:39 | 93496 | 15 | 0.963 | 0.972 | 0.968 | 0.959 | 0.970 | 0.956 | 0.963 | 0.968 |
| 11:13:40 | 93497 |    | 0.968 | 0.981 | 0.979 | 0.991 | 0.986 | 0.981 | 0.984 | 0.959 |
| 11:13:41 | 93498 | 15 | 0.965 | 0.961 | 0.961 | 0.961 | 0.956 | 0.954 | 0.959 | 0.975 |
| 11:13:42 | 93499 |    | 0.984 | 0.997 | 0.991 | 0.995 | 1.004 | 1.011 | 1.020 | 1.020 |
| 11:13:43 | 93500 | 15 | 1.018 | 1.016 | 1.014 | 1.009 | 1.000 | 0.991 | 0.984 | 0.968 |
| 11:13:44 | 93501 |    | 0.968 | 0.961 | 0.959 | 0.956 | 0.949 | 0.954 | 0.959 | 0.970 |
| 11:13:45 | 93502 | 14 | 0.972 | 0.984 | 0.979 | 0.991 | 0.984 | 0.981 | 0.970 | 0.963 |
| 11:13:46 | 93503 |    | 0.963 | 0.961 | 0.961 | 0.972 | 0.963 | 0.970 | 0.979 | 0.995 |
| 11:13:47 | 93504 | 14 | 0.988 | 0.975 | 0.977 | 0.979 | 0.970 | 0.972 | 0.986 | 1.000 |
| 11:13:48 | 93505 |    | 1.016 | 1.009 | 1.002 | 0.995 | 0.988 | 1.009 | 1.014 | 1.007 |
| 11:13:49 | 93506 | 14 | 0.993 | 1.002 | 1.014 | 1.007 | 0.995 | 0.988 | 1.007 | 0.997 |
| 11:13:50 | 93507 |    | 1.000 | 1.004 | 1.016 | 0.988 | 1.002 | 1.002 | 0.988 | 1.000 |
| 11:13:51 | 93508 | 14 | 1.011 | 1.002 | 1.004 | 1.000 | 0.981 | 0.975 | 0.993 | 0.977 |
| 11:13:52 | 93509 |    | 0.993 | 0.972 | 0.968 | 0.984 | 0.986 | 0.997 | 0.977 | 0.972 |
| 11:13:53 | 93510 | 14 | 0.975 | 0.965 | 0.972 | 0.979 | 0.972 | 0.993 | 0.995 | 0.991 |
| 11:13:54 | 93511 |    | 0.979 | 0.979 | 1.011 | 0.979 | 0.977 | 1.002 | 0.995 | 0.997 |
| 11:13:55 | 93512 | 14 | 0.975 | 0.991 | 1.000 | 0.975 | 0.988 | 0.986 | 1.000 | 0.991 |
| 11:13:56 | 93513 |    | 0.979 | 1.000 | 0.984 | 0.986 | 0.988 | 0.965 | 0.991 | 0.970 |
| 11:13:57 | 93514 | 14 | 0.977 | 1.002 | 0.986 | 1.007 | 0.997 | 1.007 | 1.011 | 0.988 |
| 11:13:58 | 93515 |    | 1.016 | 1.007 | 0.977 | 0.993 | 0.979 | 0.986 | 0.977 | 0.961 |
| 11:13:59 | 93516 | 14 | 0.991 | 0.970 | 0.952 | 0.968 | 0.959 | 0.952 | 0.945 | 0.954 |
| 11:14:00 | 93517 |    | 0.954 | 0.952 | 0.954 | 0.963 | 0.988 | 0.970 | 0.981 | 0.991 |
| 11:14:01 | 93518 | 15 | 1.034 | 1.007 | 1.000 | 1.023 | 1.014 | 1.014 | 0.986 | 0.991 |
| 11:14:02 | 93519 |    | 1.004 | 0.993 | 0.995 | 0.993 | 1.004 | 0.997 | 1.000 | 0.993 |
| 11:14:03 | 93520 | 15 | 0.993 | 0.984 | 0.975 | 0.961 | 0.922 | 0.910 | 0.901 | 0.904 |
| 11:14:04 | 93521 |    | 0.922 | 0.917 | 0.917 | 0.929 | 0.940 | 0.947 | 0.963 | 0.959 |
| 11:14:05 | 93522 | 15 | 0.959 | 0.947 | 0.961 | 0.975 | 0.991 | 0.993 | 1.018 | 1.011 |
| 11:14:06 | 93523 |    | 1.027 | 1.025 | 1.041 | 1.043 | 1.036 | 1.034 | 1.002 | 0.991 |
| 11:14:07 | 93524 | 15 | 0.997 | 1.007 | 1.009 | 1.007 | 0.995 | 0.991 | 0.997 | 1.007 |

|          |       |    |       |       |       |       |       |       |       |       |
|----------|-------|----|-------|-------|-------|-------|-------|-------|-------|-------|
| 11:14:08 | 93525 |    | 1.000 | 1.007 | 1.004 | 1.002 | 0.993 | 0.984 | 0.988 | 0.968 |
| 11:14:09 | 93526 | 15 | 0.968 | 0.959 | 0.956 | 0.963 | 0.975 | 0.984 | 0.991 | 1.011 |
| 11:14:10 | 93527 |    | 1.011 | 1.007 | 0.993 | 0.993 | 1.002 | 0.984 | 0.979 | 1.000 |
| 11:14:11 | 93528 | 15 | 0.986 | 0.968 | 0.970 | 1.000 | 0.984 | 1.009 | 1.004 | 0.993 |
| 11:14:12 | 93529 |    | 0.988 | 0.993 | 0.954 | 0.991 | 1.004 | 0.988 | 0.991 | 0.993 |
| 11:14:13 | 93530 | 15 | 0.970 | 1.002 | 0.993 | 1.009 | 1.023 | 1.016 | 1.041 | 1.014 |
| 11:14:14 | 93531 |    | 1.046 | 1.048 | 1.064 | 1.043 | 1.041 | 1.034 | 1.030 | 1.062 |
| 11:14:15 | 93532 | 15 | 1.002 | 1.034 | 1.000 | 1.018 | 1.025 | 1.004 | 1.034 | 0.997 |
| 11:14:16 | 93533 |    | 1.018 | 0.991 | 1.002 | 1.009 | 0.993 | 1.025 | 1.004 | 1.011 |
| 11:14:17 | 93534 | 15 | 1.007 | 1.000 | 0.986 | 0.988 | 0.970 | 0.997 | 0.961 | 0.975 |
| 11:14:18 | 93535 |    | 0.959 | 0.949 | 0.940 | 0.947 | 0.956 | 0.945 | 0.977 | 0.975 |
| 11:14:19 | 93536 | 15 | 0.965 | 0.986 | 0.959 | 0.972 | 0.981 | 0.970 | 0.991 | 0.970 |
| 11:14:20 | 93537 |    | 1.004 | 0.988 | 0.993 | 1.016 | 0.986 | 0.997 | 0.997 | 0.977 |
| 11:14:21 | 93538 | 15 | 0.979 | 0.972 | 0.986 | 0.981 | 0.972 | 0.995 | 0.977 | 0.988 |
| 11:14:22 | 93539 |    | 1.000 | 0.972 | 0.977 | 0.972 | 0.970 | 0.963 | 0.943 | 0.968 |
| 11:14:23 | 93540 | 15 | 0.931 | 0.938 | 0.940 | 0.917 | 0.933 | 0.936 | 0.933 | 0.936 |
| 11:14:24 | 93541 |    | 0.931 | 0.952 | 0.956 | 0.929 | 0.961 | 0.961 | 0.936 | 0.963 |
| 11:14:25 | 93542 | 15 | 0.959 | 0.956 | 0.965 | 0.959 | 0.952 | 0.986 | 0.995 | 0.986 |
| 11:14:26 | 93543 |    | 0.975 | 0.995 | 0.993 | 0.981 | 0.997 | 0.988 | 0.986 | 0.988 |
| 11:14:27 | 93544 | 15 | 1.009 | 0.988 | 0.965 | 0.968 | 0.995 | 0.975 | 0.979 | 0.970 |
| 11:14:28 | 93545 |    | 0.988 | 0.972 | 0.968 | 0.995 | 0.993 | 1.004 | 0.997 | 0.977 |
| 11:14:29 | 93546 | 15 | 0.977 | 0.963 | 0.956 | 0.961 | 0.968 | 0.968 | 0.956 | 0.959 |
| 11:14:30 | 93547 |    | 0.945 | 0.947 | 0.947 | 0.959 | 0.959 | 0.963 | 0.970 | 0.975 |
| 11:14:31 | 93548 | 15 | 0.979 | 0.981 | 0.991 | 0.988 | 0.988 | 0.997 | 1.002 | 0.993 |
| 11:14:32 | 93549 |    | 0.993 | 0.995 | 0.988 | 0.988 | 0.984 | 0.986 | 0.986 | 0.986 |
| 11:14:33 | 93550 | 15 | 0.988 | 0.993 | 0.993 | 0.984 | 0.986 | 0.986 | 0.984 | 0.988 |
| 11:14:34 | 93551 |    | 0.979 | 0.975 | 0.988 | 1.000 | 1.016 | 1.027 | 1.018 | 1.004 |
| 11:14:35 | 93552 | 15 | 0.986 | 0.979 | 0.991 | 0.997 | 0.993 | 1.004 | 0.993 | 0.979 |
| 11:14:36 | 93553 |    | 0.984 | 0.991 | 1.004 | 1.002 | 1.007 | 1.002 | 0.997 | 1.020 |
| 11:14:37 | 93554 | 15 | 1.004 | 1.002 | 1.023 | 1.023 | 1.014 | 0.997 | 1.009 | 0.995 |
| 11:14:38 | 93555 |    | 0.977 | 1.000 | 1.002 | 0.995 | 0.995 | 1.014 | 0.993 | 0.984 |
| 11:14:39 | 93556 | 15 | 0.995 | 0.984 | 0.986 | 0.988 | 0.995 | 0.975 | 0.968 | 0.981 |
| 11:14:40 | 93557 |    | 0.970 | 0.965 | 1.002 | 0.995 | 0.988 | 0.991 | 1.009 | 0.993 |
| 11:14:41 | 93558 | 15 | 1.018 | 1.025 | 0.991 | 1.014 | 1.009 | 1.014 | 1.014 | 0.988 |
| 11:14:42 | 93559 |    | 0.979 | 0.995 | 0.988 | 0.965 | 0.979 | 0.979 | 0.997 | 1.014 |
| 11:14:43 | 93560 | 15 | 0.975 | 1.002 | 1.018 | 0.984 | 0.997 | 0.981 | 0.988 | 1.007 |
| 11:14:44 | 93561 |    | 0.975 | 0.979 | 0.986 | 0.968 | 0.954 | 0.959 | 0.945 | 0.965 |
| 11:14:45 | 93562 | 15 | 0.952 | 0.945 | 0.977 | 0.997 | 0.988 | 0.997 | 1.009 | 1.004 |
| 11:14:46 | 93563 |    | 1.023 | 1.007 | 1.000 | 1.023 | 0.991 | 0.984 | 1.002 | 0.997 |
| 11:14:47 | 93564 | 14 | 0.991 | 1.002 | 1.016 | 1.016 | 0.993 | 1.027 | 1.027 | 0.997 |
| 11:14:48 | 93565 |    | 1.007 | 1.007 | 1.011 | 0.988 | 1.041 | 1.016 | 1.055 | 1.052 |

|          |       |    |       |       |       |       |       |       |       |       |
|----------|-------|----|-------|-------|-------|-------|-------|-------|-------|-------|
| 11:14:49 | 93566 | 14 | 1.048 | 1.046 | 1.043 | 1.014 | 1.004 | 1.000 | 0.936 | 0.922 |
| 11:14:50 | 93567 |    | 0.961 | 1.007 | 1.000 | 0.979 | 1.023 | 1.036 | 1.011 | 1.020 |
| 11:14:51 | 93568 | 14 | 1.032 | 1.030 | 0.993 | 1.007 | 0.968 | 1.016 | 1.059 | 1.041 |
| 11:14:52 | 93569 |    | 1.023 | 1.050 | 0.993 | 0.972 | 1.002 | 1.059 | 1.062 | 1.046 |
| 11:14:53 | 93570 | 14 | 1.039 | 1.018 | 0.986 | 0.943 | 0.917 | 0.908 | 0.920 | 0.913 |
| 11:14:54 | 93571 |    | 0.894 | 0.965 | 0.988 | 0.977 | 0.947 | 1.119 | 1.329 | 1.492 |
| 11:14:55 | 93572 | 14 | 1.597 | 1.288 | 1.215 | 0.927 | 0.968 | 0.874 | 0.842 | 0.856 |
| 11:14:56 | 93573 |    | 0.773 | 0.908 | 0.897 | 1.071 | 1.052 | 1.133 | 1.071 | 1.043 |
| 11:14:57 | 93574 | 14 | 1.014 | 0.968 | 0.920 | 0.908 | 0.878 | 0.913 | 1.048 | 1.107 |
| 11:14:58 | 93575 |    | 1.087 | 1.057 | 0.890 | 0.888 | 0.789 | 0.959 | 1.084 | 1.110 |
| 11:14:59 | 93576 | 14 | 1.210 | 0.833 | 0.904 | 0.947 | 1.114 | 1.084 | 1.023 | 0.936 |
| 11:15:00 | 93577 |    | 0.961 | 1.068 | 0.901 | 0.881 | 1.023 | 1.581 | 1.014 | 0.782 |
| 11:15:01 | 93578 | 14 | 0.446 | 0.787 | 1.222 | 1.245 | 1.117 | 0.872 | 0.812 | 0.997 |
| 11:15:02 | 93579 |    | 1.142 | 0.927 | 0.988 | 0.782 | 0.856 | 1.082 | 1.327 | 1.114 |
| 11:15:03 | 93580 | 14 | 1.018 | 0.892 | 0.812 | 0.968 | 0.940 | 0.972 | 0.961 | 0.965 |
| 11:15:04 | 93581 |    | 0.952 | 1.254 | 0.917 | 0.993 | 0.927 | 0.876 | 0.959 | 1.043 |
| 11:15:05 | 93582 | 14 | 0.959 | 0.899 | 0.927 | 1.066 | 0.986 | 0.892 | 0.972 | 1.039 |
| 11:15:06 | 93583 |    | 1.144 | 1.036 | 0.830 | 0.819 | 1.004 | 0.954 | 1.030 | 0.977 |
| 11:15:07 | 93584 | 13 | 1.062 | 1.034 | 0.876 | 0.929 | 0.997 | 0.993 | 1.004 | 0.885 |
| 11:15:08 | 93585 |    | 0.997 | 0.975 | 0.972 | 1.000 | 0.986 | 0.988 | 0.929 | 0.963 |
| 11:15:09 | 93586 | 13 | 0.997 | 1.032 | 1.075 | 0.899 | 0.904 | 0.892 | 1.062 | 0.986 |
| 11:15:10 | 93587 |    | 1.046 | 0.963 | 0.920 | 0.922 | 1.149 | 1.014 | 0.869 | 0.810 |
| 11:15:11 | 93588 | 13 | 0.931 | 1.089 | 1.068 | 0.975 | 0.890 | 0.922 | 1.032 | 1.027 |
| 11:15:12 | 93589 |    | 1.009 | 0.956 | 0.956 | 0.997 | 1.018 | 1.073 | 0.915 | 0.936 |
| 11:15:13 | 93590 | 13 | 0.959 | 1.107 | 1.011 | 0.970 | 0.867 | 0.965 | 0.947 | 0.965 |
| 11:15:14 | 93591 |    | 1.002 | 0.924 | 1.027 | 0.965 | 0.995 | 0.970 | 1.018 | 1.011 |
| 11:15:15 | 93592 | 13 | 1.002 | 0.949 | 0.931 | 0.917 | 1.057 | 1.034 | 1.009 | 0.952 |
| 11:15:16 | 93593 |    | 1.048 | 0.984 | 0.972 | 0.970 | 0.997 | 0.979 | 0.865 | 1.023 |
| 11:15:17 | 93594 | 13 | 1.002 | 1.064 | 1.009 | 1.046 | 0.869 | 0.956 | 0.952 | 1.078 |
| 11:15:18 | 93595 |    | 1.043 | 0.929 | 0.938 | 0.924 | 1.057 | 1.057 | 1.027 | 0.922 |
| 11:15:19 | 93596 | 13 | 0.947 | 0.977 | 0.993 | 0.979 | 1.014 | 0.997 | 0.947 | 0.972 |
| 11:15:20 | 93597 |    | 1.020 | 0.929 | 0.933 | 0.947 | 1.080 | 1.052 | 0.938 | 0.922 |
| 11:15:21 | 93598 | 13 | 0.959 | 1.039 | 1.027 | 0.981 | 0.931 | 0.959 | 1.002 | 1.007 |
| 11:15:22 | 93599 |    | 0.991 | 0.995 | 1.004 | 0.929 | 0.954 | 0.977 | 1.020 | 0.988 |
| 11:15:23 | 93600 | 13 | 0.984 | 0.959 | 0.995 | 1.009 | 1.000 | 0.956 | 0.952 | 1.002 |
| 11:15:24 | 93601 |    | 1.036 | 1.023 | 0.940 | 0.977 | 1.009 | 1.025 | 0.972 | 0.970 |
| 11:15:25 | 93602 | 13 | 0.938 | 1.025 | 0.968 | 1.004 | 0.933 | 0.981 | 1.034 | 1.011 |
| 11:15:26 | 93603 |    | 0.965 | 0.947 | 1.002 | 1.018 | 0.991 | 0.943 | 0.979 | 0.995 |
| 11:15:27 | 93604 | 13 | 1.020 | 0.956 | 0.959 | 0.970 | 1.041 | 0.977 | 0.995 | 0.954 |
| 11:15:28 | 93605 |    | 0.981 | 0.993 | 0.984 | 1.004 | 0.981 | 1.016 | 0.968 | 0.970 |

|          |       |    |       |       |       |       |       |       |       |       |       |
|----------|-------|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 11:15:29 | 93606 | 13 |       | 0.956 | 1.018 | 0.979 | 1.009 | 0.975 | 0.979 | 0.995 | 0.970 |
| 11:15:30 | 93607 |    |       | 0.984 | 0.972 | 1.018 | 0.979 | 1.002 | 0.943 | 0.981 | 0.972 |
| 11:15:31 | 93608 | 13 |       | 1.000 | 0.979 | 0.995 | 0.986 | 0.981 | 0.997 | 0.972 | 0.986 |
| 11:15:32 | 93609 |    |       | 1.002 | 1.009 | 0.997 | 0.956 | 0.945 | 1.016 | 0.986 | 0.984 |
| 11:15:33 | 93610 | 13 |       | 0.959 | 0.977 | 1.000 | 1.020 | 1.048 | 0.997 | 0.910 | 0.931 |
| 11:15:34 | 93611 |    |       | 1.023 | 1.078 | 0.981 | 0.954 | 0.897 | 1.052 | 1.050 | 0.986 |
| 11:15:35 | 93612 | 13 |       | 0.906 | 0.954 | 1.046 | 1.055 | 0.997 | 0.945 | 0.943 | 0.995 |
| 11:15:36 | 93613 |    |       | 1.011 | 0.984 | 0.975 | 0.972 | 1.002 | 1.004 | 1.032 | 0.970 |
| 11:15:37 | 93614 | 13 |       | 0.954 | 0.961 | 1.004 | 0.997 | 0.984 | 0.979 | 0.981 | 0.997 |
| 11:15:38 | 93615 |    |       | 0.959 | 1.000 | 0.995 | 1.009 | 0.977 | 0.943 | 1.000 | 1.004 |
| 11:15:39 | 93616 | 13 |       | 1.002 | 0.970 | 0.968 | 1.009 | 0.995 | 0.984 | 0.972 | 1.009 |
| 11:15:40 | 93617 |    |       | 1.014 | 0.988 | 0.956 | 0.929 | 0.970 | 1.050 | 1.027 | 1.000 |
| 11:15:41 | 93618 | 13 |       | 0.940 | 0.952 | 1.000 | 0.988 | 1.041 | 0.943 | 0.979 | 1.007 |
| 11:15:42 | 93619 |    | keyed | 0.963 | 0.984 | 0.979 | 0.988 | 1.000 | 0.968 | 0.952 | 0.995 |
| 11:15:43 | 93620 | 13 | keyed | 0.995 | 1.032 | 0.977 | 0.970 | 0.972 | 0.986 | 1.011 | 0.977 |

## (3) EF 066 SSFDR 事故期間相關飛航參數繪圖

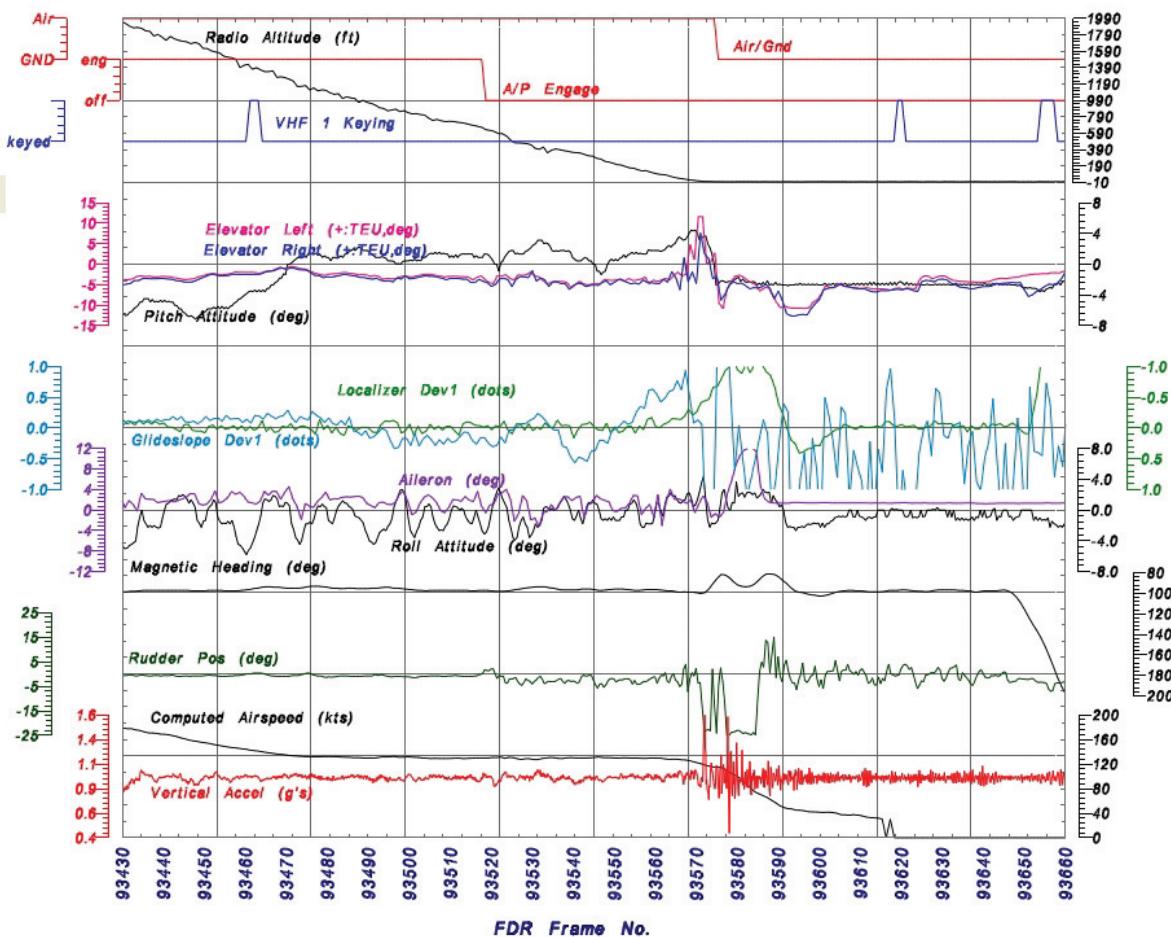


圖 A4-1 事故機相關飛航參數繪圖（2000呎以下至落地滾行期間）

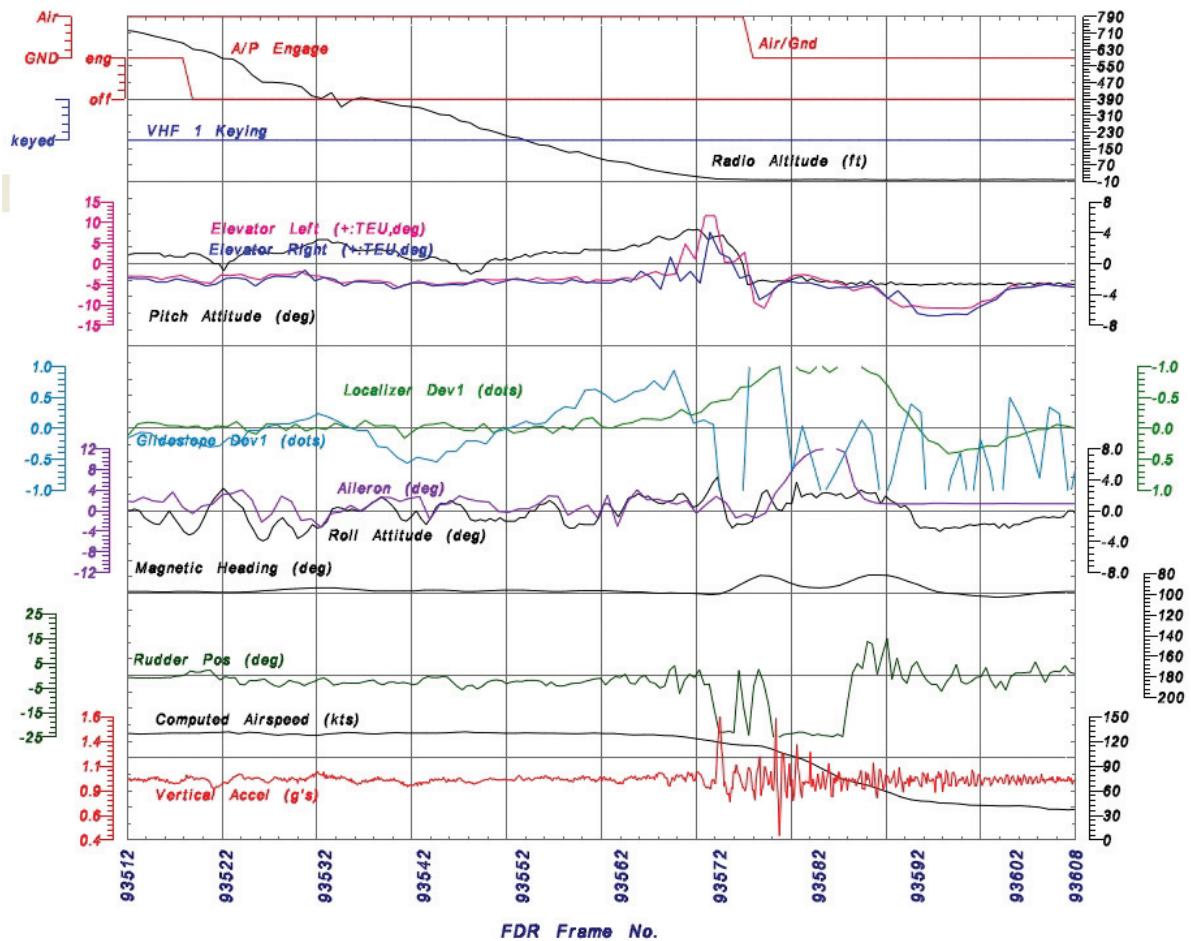


圖 A4-2 事故機相關飛航參數繪圖（800呎以下至落地滾行期間）

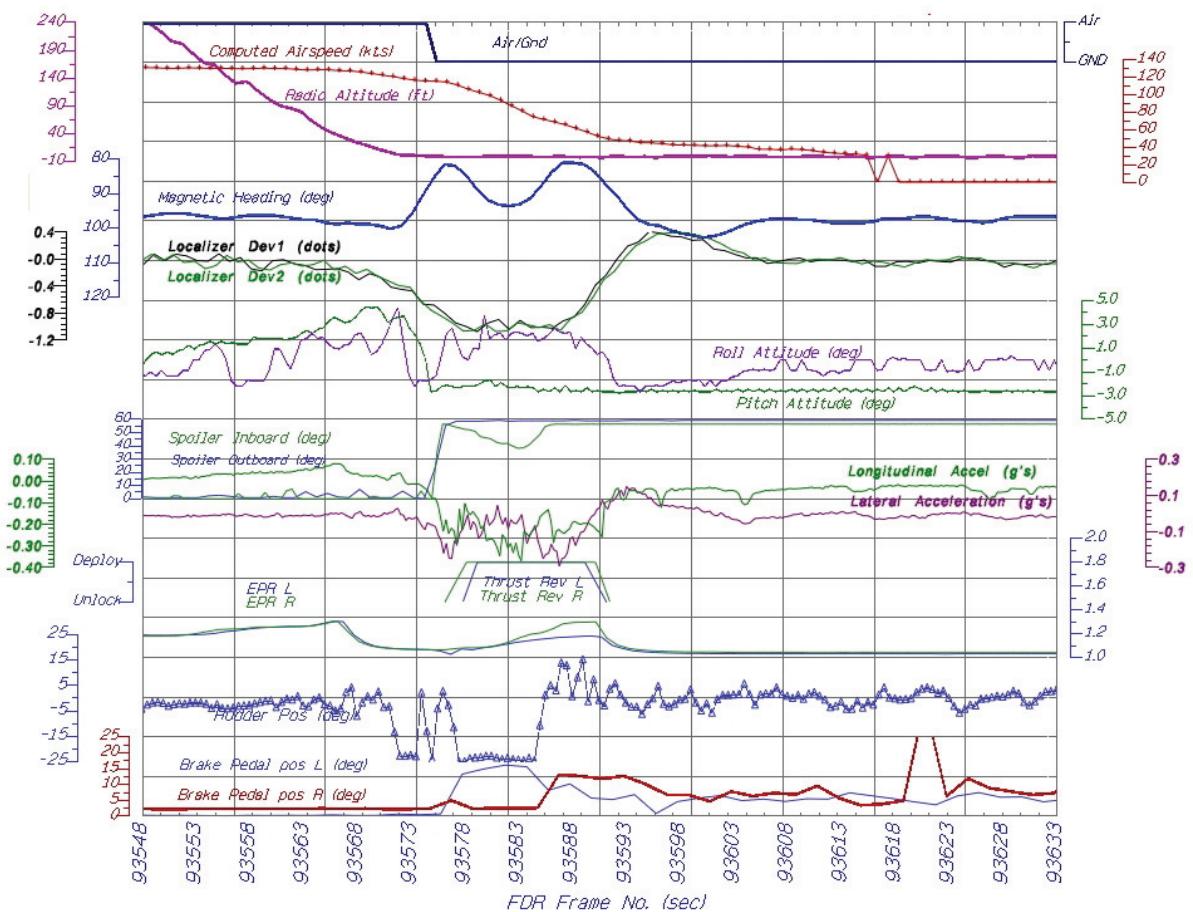


圖 A4-3 事故機相關飛航參數繪圖（250呎以下至落地滾行期間）

本頁空白

## 附錄五 雷達軌跡資料列表及繪圖

### (1) 雷達航跡資料列表

| FDR GMT  | RSX<br>(nm) | RSY<br>(nm) | XDOT<br>(kts) | YDOT<br>(kts) | GND SPD<br>(kts) | Track<br>(deg) | EALT<br>(ft) |
|----------|-------------|-------------|---------------|---------------|------------------|----------------|--------------|
| 10:55:59 | 443.03      | 369.95      | 96            | 316           | 330              | 16             | 10900        |
| 10:56:03 | 443.28      | 370.42      | 121           | 323           | 346              | 20             | 10900        |
| 10:56:12 | 443.79      | 371.25      | 154           | 312           | 348              | 26             | 10900        |
| 10:56:08 | 443.49      | 370.75      | 135           | 308           | 336              | 23             | 10900        |
| 10:56:17 | 443.96      | 371.70      | 157           | 316           | 353              | 26             | 10900        |
| 10:56:28 | 444.40      | 372.65      | 161           | 330           | 367              | 26             | 11000        |
| 10:56:22 | 444.18      | 372.17      | 159           | 321           | 358              | 26             | 10900        |
| 10:56:33 | 444.61      | 373.12      | 162           | 338           | 375              | 25             | 11000        |
| 10:56:42 | 445.19      | 374.01      | 174           | 341           | 383              | 27             | 11000        |
| 10:56:37 | 444.82      | 373.60      | 160           | 344           | 380              | 24             | 11000        |
| 10:56:47 | 445.38      | 374.49      | 176           | 341           | 384              | 27             | 10900        |
| 10:56:56 | 445.81      | 375.47      | 172           | 348           | 389              | 26             | 10900        |
| 10:56:53 | 445.57      | 374.96      | 173           | 343           | 384              | 26             | 10900        |
| 10:57:03 | 446.04      | 375.83      | 170           | 338           | 379              | 26             | 10900        |
| 10:57:11 | 446.54      | 376.74      | 172           | 333           | 375              | 27             | 10900        |
| 10:57:06 | 446.27      | 376.34      | 169           | 339           | 379              | 26             | 10900        |
| 10:57:16 | 446.75      | 377.24      | 172           | 334           | 376              | 27             | 10900        |
| 10:57:26 | 447.09      | 378.09      | 163           | 332           | 370              | 26             | 10900        |
| 10:57:21 | 446.90      | 377.73      | 167           | 336           | 375              | 26             | 11000        |
| 10:57:31 | 447.40      | 378.52      | 164           | 329           | 368              | 26             | 10900        |
| 10:57:39 | 447.58      | 379.25      | 91            | 313           | 326              | 16             | 11000        |
| 10:57:36 | 447.71      | 379.09      | 168           | 332           | 373              | 26             | 10900        |
| 10:57:43 | 447.72      | 379.57      | 80            | 289           | 300              | 15             | 11000        |
| 10:57:51 | 448.08      | 380.44      | 110           | 308           | 328              | 19             | 10900        |
| 10:57:47 | 447.98      | 379.99      | 105           | 295           | 313              | 19             | 10900        |
| 10:57:56 | 448.12      | 380.84      | 103           | 318           | 334              | 17             | 10900        |
| 10:58:04 | 448.22      | 381.84      | 87            | 338           | 349              | 14             | 11000        |
| 10:58:00 | 448.22      | 381.30      | 97            | 325           | 339              | 16             | 10900        |
| 10:58:09 | 448.25      | 382.24      | 78            | 343           | 352              | 12             | 11000        |
| 10:58:18 | 448.22      | 383.11      | 51            | 353           | 356              | 8              | 11000        |
| 10:58:13 | 448.19      | 382.72      | 64            | 350           | 355              | 10             | 11000        |
| 10:58:22 | 448.09      | 383.54      | 34            | 354           | 356              | 5              | 11000        |

|          |        |        |      |     |     |     |       |
|----------|--------|--------|------|-----|-----|-----|-------|
| 10:58:29 | 448.19 | 384.50 | 9    | 382 | 382 | 1   | 10900 |
| 10:58:27 | 448.02 | 384.01 | 16   | 357 | 357 | 2   | 11000 |
| 10:58:34 | 448.14 | 384.91 | 3    | 386 | 386 | 0   | 11000 |
| 10:58:44 | 447.81 | 385.88 | -21  | 385 | 385 | 356 | 11000 |
| 10:58:39 | 447.98 | 385.40 | -7   | 386 | 386 | 358 | 11000 |
| 10:58:49 | 447.64 | 386.37 | -37  | 382 | 384 | 354 | 11000 |
| 10:58:59 | 447.30 | 387.33 | -69  | 376 | 382 | 349 | 10900 |
| 10:58:54 | 447.52 | 386.88 | -52  | 380 | 384 | 352 | 10900 |
| 10:59:04 | 447.12 | 387.81 | -84  | 372 | 381 | 347 | 11000 |
| 10:59:13 | 446.74 | 388.61 | -107 | 354 | 370 | 343 | 11000 |
| 10:59:08 | 447.01 | 388.19 | -94  | 363 | 375 | 345 | 11000 |
| 10:59:18 | 446.56 | 389.08 | -117 | 347 | 367 | 341 | 11000 |
| 10:59:28 | 446.17 | 389.87 | -134 | 332 | 358 | 338 | 10900 |
| 10:59:23 | 446.33 | 389.53 | -127 | 342 | 365 | 339 | 10900 |
| 10:59:33 | 445.94 | 390.32 | -140 | 326 | 355 | 336 | 10900 |
| 10:59:43 | 445.47 | 391.21 | -152 | 319 | 353 | 334 | 10900 |
| 10:59:38 | 445.70 | 390.77 | -146 | 321 | 353 | 335 | 10900 |
| 10:59:48 | 445.30 | 391.55 | -154 | 313 | 349 | 333 | 10900 |
| 10:59:57 | 444.79 | 392.42 | -161 | 307 | 347 | 332 | 11000 |
| 10:59:53 | 445.07 | 392.00 | -156 | 309 | 347 | 333 | 11000 |
| 11:00:03 | 444.59 | 392.88 | -163 | 308 | 349 | 332 | 11000 |
| 11:00:12 | 444.14 | 393.64 | -164 | 302 | 344 | 331 | 11000 |
| 11:00:07 | 444.42 | 393.22 | -162 | 305 | 345 | 331 | 11000 |
| 11:00:17 | 443.90 | 394.08 | -166 | 302 | 345 | 331 | 11000 |
| 11:00:27 | 443.48 | 394.85 | -167 | 301 | 344 | 330 | 11000 |
| 11:00:22 | 443.66 | 394.52 | -169 | 304 | 347 | 330 | 11000 |
| 11:00:32 | 443.20 | 395.27 | -169 | 299 | 343 | 330 | 11000 |
| 11:00:42 | 442.68 | 396.12 | -174 | 300 | 347 | 329 | 11000 |
| 11:00:37 | 442.96 | 395.71 | -171 | 299 | 345 | 330 | 11000 |
| 11:00:47 | 442.47 | 396.44 | -175 | 295 | 344 | 329 | 11000 |
| 11:00:57 | 441.84 | 397.23 | -184 | 290 | 343 | 327 | 11000 |
| 11:00:52 | 442.15 | 396.83 | -179 | 292 | 343 | 328 | 11000 |
| 11:01:02 | 441.54 | 397.62 | -191 | 288 | 345 | 326 | 11000 |
| 11:01:11 | 440.93 | 398.28 | -201 | 277 | 343 | 323 | 11000 |
| 11:01:06 | 441.27 | 397.90 | -195 | 281 | 343 | 325 | 11000 |
| 11:01:16 | 440.57 | 398.64 | -210 | 273 | 345 | 322 | 11000 |
| 11:01:26 | 439.98 | 399.30 | -220 | 266 | 345 | 320 | 11000 |
| 11:01:21 | 440.24 | 399.02 | -217 | 271 | 347 | 321 | 11000 |
| 11:01:31 | 439.63 | 399.67 | -225 | 262 | 346 | 319 | 11000 |

|          |        |        |      |     |     |     |       |
|----------|--------|--------|------|-----|-----|-----|-------|
| 11:01:41 | 439.00 | 400.32 | -232 | 256 | 345 | 317 | 11000 |
| 11:01:36 | 439.28 | 400.05 | -230 | 261 | 348 | 318 | 11000 |
| 11:01:46 | 438.64 | 400.68 | -235 | 253 | 346 | 317 | 11000 |
| 11:01:55 | 437.98 | 401.31 | -241 | 248 | 346 | 315 | 11000 |
| 11:01:50 | 438.28 | 401.05 | -239 | 253 | 348 | 316 | 11000 |
| 11:02:00 | 437.63 | 401.69 | -243 | 247 | 347 | 315 | 11000 |
| 11:02:10 | 437.00 | 402.34 | -244 | 246 | 346 | 315 | 10900 |
| 11:02:05 | 437.28 | 402.07 | -245 | 248 | 349 | 315 | 10900 |
| 11:02:15 | 436.64 | 402.71 | -244 | 246 | 347 | 315 | 10800 |
| 11:02:25 | 436.00 | 403.36 | -243 | 243 | 344 | 315 | 10700 |
| 11:02:20 | 436.35 | 402.98 | -243 | 243 | 344 | 315 | 10800 |
| 11:02:30 | 435.70 | 403.62 | -241 | 240 | 341 | 314 | 10700 |
| 11:02:40 | 435.05 | 404.28 | -240 | 238 | 338 | 314 | 10600 |
| 11:02:35 | 435.34 | 404.00 | -241 | 241 | 341 | 314 | 10600 |
| 11:02:44 | 434.76 | 404.55 | -237 | 234 | 333 | 314 | 10500 |
| 11:02:54 | 434.11 | 405.08 | -233 | 223 | 323 | 313 | 10400 |
| 11:02:49 | 434.44 | 404.82 | -234 | 229 | 328 | 314 | 10500 |
| 11:02:59 | 433.79 | 405.21 | -232 | 211 | 314 | 312 | 10400 |
| 11:03:09 | 432.99 | 405.56 | -241 | 186 | 305 | 307 | 10200 |
| 11:03:04 | 433.39 | 405.45 | -236 | 200 | 309 | 310 | 10300 |
| 11:03:14 | 432.62 | 405.55 | -246 | 164 | 296 | 303 | 10200 |
| 11:03:24 | 431.84 | 405.56 | -260 | 114 | 284 | 293 | 10000 |
| 11:03:19 | 432.23 | 405.55 | -253 | 138 | 289 | 298 | 10100 |
| 11:03:29 | 431.50 | 405.47 | -263 | 86  | 277 | 288 | 10000 |
| 11:03:39 | 430.73 | 405.43 | -270 | 41  | 273 | 278 | 9900  |
| 11:03:33 | 431.11 | 405.50 | -267 | 63  | 274 | 283 | 9900  |
| 11:03:43 | 430.37 | 405.49 | -272 | 25  | 273 | 275 | 9800  |
| 11:03:53 | 429.65 | 405.39 | -272 | 0   | 272 | 269 | 9700  |
| 11:03:48 | 430.01 | 405.43 | -272 | 11  | 272 | 272 | 9700  |
| 11:03:58 | 429.28 | 405.49 | -272 | -4  | 272 | 269 | 9600  |
| 11:04:08 | 428.57 | 405.46 | -270 | -9  | 270 | 267 | 9500  |
| 11:04:03 | 428.94 | 405.47 | -270 | -7  | 270 | 268 | 9500  |
| 11:04:13 | 428.22 | 405.33 | -268 | -16 | 268 | 266 | 9400  |
| 11:04:24 | 427.52 | 405.37 | -260 | -20 | 261 | 265 | 9300  |
| 11:04:19 | 427.86 | 405.35 | -264 | -23 | 265 | 265 | 9300  |
| 11:04:28 | 427.16 | 405.40 | -259 | -11 | 259 | 267 | 9200  |
| 11:04:38 | 426.43 | 405.38 | -260 | -7  | 261 | 268 | 9100  |
| 11:04:34 | 426.78 | 405.32 | -261 | -15 | 261 | 266 | 9100  |
| 11:04:43 | 426.08 | 405.31 | -260 | -9  | 260 | 267 | 9000  |

|          |        |        |      |     |     |     |      |
|----------|--------|--------|------|-----|-----|-----|------|
| 11:04:53 | 425.35 | 405.22 | -260 | -16 | 261 | 266 | 8800 |
| 11:04:47 | 425.71 | 405.26 | -260 | -13 | 260 | 267 | 8900 |
| 11:04:57 | 425.01 | 405.19 | -260 | -18 | 261 | 265 | 8700 |
| 11:05:07 | 424.27 | 405.16 | -261 | -19 | 262 | 265 | 8500 |
| 11:05:02 | 424.64 | 405.17 | -260 | -19 | 261 | 265 | 8600 |
| 11:05:12 | 423.93 | 405.14 | -261 | -19 | 261 | 265 | 8300 |
| 11:05:22 | 423.22 | 405.16 | -259 | -14 | 260 | 266 | 8100 |
| 11:05:17 | 423.58 | 405.14 | -260 | -17 | 260 | 266 | 8200 |
| 11:05:28 | 422.89 | 405.17 | -256 | -6  | 256 | 268 | 8000 |
| 11:05:37 | 422.15 | 405.11 | -260 | -9  | 261 | 268 | 7800 |
| 11:05:32 | 422.49 | 405.08 | -260 | -11 | 261 | 267 | 7900 |
| 11:05:44 | 421.80 | 405.10 | -260 | -9  | 261 | 268 | 7700 |
| 11:05:50 | 421.10 | 405.05 | -298 | -10 | 298 | 268 | 7600 |
| 11:05:46 | 421.44 | 405.01 | -313 | -53 | 317 | 260 | 7700 |
| 11:05:54 | 420.82 | 404.99 | -272 | -16 | 273 | 266 | 7600 |
| 11:06:03 | 420.20 | 404.99 | -261 | -8  | 261 | 268 | 7400 |
| 11:05:58 | 420.47 | 405.04 | -269 | -6  | 270 | 268 | 7500 |
| 11:06:07 | 419.86 | 405.06 | -260 | -1  | 260 | 269 | 7300 |
| 11:06:16 | 419.23 | 405.09 | -256 | 3   | 256 | 270 | 7200 |
| 11:06:12 | 419.59 | 405.02 | -255 | -1  | 255 | 269 | 7300 |
| 11:06:20 | 418.95 | 405.06 | -254 | 3   | 254 | 270 | 7100 |
| 11:06:29 | 418.33 | 405.12 | -251 | 6   | 251 | 271 | 7000 |
| 11:06:25 | 418.67 | 405.03 | -252 | 2   | 252 | 270 | 7100 |
| 11:06:34 | 418.05 | 405.11 | -249 | 7   | 249 | 271 | 6900 |
| 11:06:43 | 417.47 | 405.09 | -245 | 6   | 245 | 271 | 6700 |
| 11:06:38 | 417.76 | 405.10 | -247 | 7   | 247 | 271 | 6800 |
| 11:06:47 | 417.18 | 405.09 | -243 | 5   | 243 | 271 | 6600 |
| 11:06:56 | 416.54 | 405.21 | -242 | 9   | 242 | 272 | 6300 |
| 11:06:51 | 416.89 | 405.09 | -241 | 4   | 241 | 270 | 6500 |
| 11:07:00 | 416.29 | 405.11 | -241 | 7   | 241 | 271 | 6200 |
| 11:07:09 | 415.68 | 405.14 | -239 | 5   | 240 | 271 | 5900 |
| 11:07:05 | 415.99 | 405.12 | -239 | 5   | 240 | 271 | 6000 |
| 11:07:14 | 415.37 | 405.17 | -240 | 6   | 240 | 271 | 5700 |
| 11:07:23 | 414.75 | 405.25 | -243 | 11  | 244 | 272 | 5500 |
| 11:07:18 | 415.03 | 405.20 | -242 | 8   | 242 | 271 | 5600 |
| 11:07:27 | 414.45 | 405.17 | -244 | 8   | 244 | 272 | 5400 |
| 11:07:36 | 413.82 | 405.29 | -246 | 12  | 247 | 272 | 5300 |
| 11:07:31 | 414.13 | 405.23 | -245 | 9   | 246 | 272 | 5400 |
| 11:07:40 | 413.54 | 405.24 | -246 | 11  | 246 | 272 | 5200 |

|          |        |        |      |     |     |     |      |
|----------|--------|--------|------|-----|-----|-----|------|
| 11:07:49 | 412.94 | 405.28 | -245 | 12  | 245 | 272 | 5000 |
| 11:07:45 | 413.24 | 405.32 | -246 | 13  | 246 | 273 | 5100 |
| 11:07:54 | 412.62 | 405.37 | -245 | 15  | 245 | 273 | 4800 |
| 11:08:03 | 412.07 | 405.59 | -242 | 30  | 244 | 277 | 4700 |
| 11:07:58 | 412.33 | 405.48 | -244 | 21  | 245 | 275 | 4700 |
| 11:08:07 | 411.81 | 405.83 | -239 | 46  | 243 | 280 | 4600 |
| 11:08:16 | 411.38 | 406.33 | -225 | 89  | 242 | 291 | 4400 |
| 11:08:12 | 411.59 | 406.08 | -233 | 67  | 242 | 286 | 4500 |
| 11:08:20 | 411.23 | 406.59 | -213 | 112 | 241 | 297 | 4400 |
| 11:08:29 | 411.05 | 407.22 | -178 | 162 | 240 | 312 | 4200 |
| 11:08:25 | 411.12 | 406.97 | -197 | 139 | 241 | 305 | 4300 |
| 11:08:33 | 411.03 | 407.60 | -155 | 185 | 241 | 319 | 4200 |
| 11:08:43 | 411.16 | 408.35 | -96  | 231 | 250 | 337 | 4000 |
| 11:08:38 | 411.08 | 407.97 | -126 | 209 | 245 | 328 | 4100 |
| 11:08:47 | 411.27 | 408.59 | -63  | 244 | 252 | 345 | 3900 |
| 11:08:56 | 411.62 | 409.21 | 4    | 260 | 260 | 0   | 3900 |
| 11:08:51 | 411.45 | 408.96 | -29  | 256 | 257 | 353 | 3900 |
| 11:09:00 | 411.82 | 409.58 | 37   | 266 | 269 | 7   | 3800 |
| 11:09:09 | 412.21 | 410.11 | 92   | 264 | 280 | 19  | 3700 |
| 11:09:05 | 412.01 | 409.84 | 66   | 267 | 275 | 14  | 3800 |
| 11:09:13 | 412.40 | 410.38 | 114  | 260 | 284 | 23  | 3700 |
| 11:09:22 | 412.80 | 410.95 | 145  | 250 | 289 | 30  | 3600 |
| 11:09:18 | 412.60 | 410.66 | 131  | 255 | 287 | 27  | 3600 |
| 11:09:26 | 412.99 | 411.24 | 155  | 247 | 292 | 32  | 3500 |
| 11:09:35 | 413.37 | 411.87 | 165  | 245 | 296 | 34  | 3400 |
| 11:09:31 | 413.18 | 411.55 | 162  | 245 | 294 | 33  | 3400 |
| 11:09:40 | 413.58 | 412.09 | 169  | 240 | 294 | 35  | 3300 |
| 11:09:48 | 413.95 | 412.68 | 169  | 237 | 292 | 35  | 3200 |
| 11:09:44 | 413.75 | 412.44 | 169  | 240 | 294 | 35  | 3300 |
| 11:09:53 | 414.15 | 412.94 | 169  | 234 | 289 | 35  | 3200 |
| 11:10:02 | 414.51 | 413.52 | 165  | 231 | 284 | 35  | 3100 |
| 11:09:57 | 414.34 | 413.22 | 168  | 232 | 286 | 35  | 3100 |
| 11:10:06 | 414.75 | 413.74 | 165  | 227 | 281 | 36  | 3000 |
| 11:10:15 | 415.19 | 414.24 | 168  | 219 | 276 | 37  | 2900 |
| 11:10:10 | 414.98 | 413.98 | 167  | 223 | 278 | 36  | 3000 |
| 11:10:19 | 415.36 | 414.50 | 167  | 216 | 274 | 37  | 2900 |
| 11:10:28 | 415.88 | 414.91 | 174  | 206 | 270 | 40  | 2800 |
| 11:10:23 | 415.63 | 414.70 | 170  | 211 | 271 | 38  | 2800 |
| 11:10:32 | 416.11 | 415.13 | 178  | 200 | 268 | 41  | 2800 |

|          |        |        |     |     |     |    |      |
|----------|--------|--------|-----|-----|-----|----|------|
| 11:10:41 | 416.51 | 415.56 | 180 | 190 | 262 | 43 | 2800 |
| 11:10:37 | 416.32 | 415.35 | 180 | 195 | 266 | 42 | 2800 |
| 11:10:45 | 416.81 | 415.75 | 184 | 185 | 261 | 44 | 2800 |
| 11:10:54 | 417.14 | 416.16 | 181 | 177 | 253 | 45 | 2800 |
| 11:10:50 | 416.98 | 415.97 | 184 | 181 | 258 | 45 | 2800 |
| 11:10:58 | 417.41 | 416.36 | 181 | 173 | 250 | 46 | 2800 |
| 11:11:07 | 417.81 | 416.74 | 176 | 166 | 242 | 46 | 2800 |
| 11:11:03 | 417.55 | 416.55 | 176 | 169 | 245 | 46 | 2800 |
| 11:11:12 | 418.06 | 416.91 | 178 | 162 | 240 | 47 | 2800 |
| 11:11:21 | 418.56 | 417.19 | 183 | 150 | 237 | 50 | 2800 |
| 11:11:16 | 418.31 | 417.06 | 180 | 157 | 239 | 48 | 2800 |
| 11:11:25 | 418.80 | 417.28 | 186 | 141 | 233 | 52 | 2800 |
| 11:11:34 | 419.30 | 417.29 | 192 | 109 | 221 | 60 | 2700 |
| 11:11:29 | 419.05 | 417.29 | 189 | 126 | 227 | 56 | 2800 |
| 11:11:38 | 419.56 | 417.27 | 195 | 89  | 214 | 65 | 2700 |
| 11:11:47 | 420.06 | 417.19 | 200 | 48  | 205 | 76 | 2500 |
| 11:11:43 | 419.81 | 417.23 | 197 | 69  | 209 | 70 | 2600 |
| 11:11:52 | 420.32 | 417.17 | 201 | 30  | 204 | 81 | 2400 |
| 11:12:00 | 420.82 | 417.14 | 204 | 3   | 204 | 88 | 2300 |
| 11:11:56 | 420.57 | 417.15 | 203 | 15  | 204 | 85 | 2400 |
| 11:12:05 | 421.07 | 417.12 | 205 | -5  | 205 | 91 | 2200 |
| 11:12:13 | 421.57 | 417.10 | 205 | -15 | 206 | 94 | 2000 |
| 11:12:09 | 421.32 | 417.10 | 205 | -11 | 206 | 93 | 2100 |
| 11:12:18 | 421.82 | 417.08 | 205 | -18 | 206 | 95 | 1900 |
| 11:12:26 | 422.07 | 417.06 | 205 | -18 | 206 | 95 | 1900 |
| 11:12:25 | 422.07 | 417.06 | 205 | -18 | 206 | 95 | 1900 |
| 11:12:30 | 422.58 | 417.13 | 228 | 0   | 228 | 90 | 1600 |
| 11:12:40 | 423.08 | 417.11 | 215 | 5   | 215 | 88 | 1500 |
| 11:12:35 | 422.83 | 417.12 | 225 | 6   | 226 | 88 | 1600 |
| 11:12:44 | 423.33 | 417.11 | 207 | 4   | 207 | 88 | 1400 |
| 11:12:54 | 423.83 | 417.10 | 196 | 1   | 196 | 89 | 1300 |
| 11:12:49 | 423.58 | 417.11 | 200 | 3   | 200 | 89 | 1300 |
| 11:12:59 | 423.95 | 417.09 | 186 | 0   | 186 | 89 | 1200 |
| 11:13:08 | 424.45 | 417.09 | 178 | -1  | 178 | 90 | 1100 |
| 11:13:03 | 424.20 | 417.09 | 181 | 0   | 181 | 90 | 1100 |
| 11:13:13 | 424.57 | 417.08 | 170 | -1  | 170 | 90 | 1000 |
| 11:13:23 | 424.95 | 417.08 | 158 | -2  | 158 | 90 | 900  |
| 11:13:18 | 424.83 | 417.07 | 166 | -2  | 166 | 90 | 1000 |
| 11:13:28 | 425.07 | 417.07 | 149 | -2  | 149 | 91 | 900  |

|          |        |        |     |    |     |    |      |
|----------|--------|--------|-----|----|-----|----|------|
| 11:13:38 | 425.45 | 417.05 | 139 | -3 | 139 | 91 | 800  |
| 11:13:33 | 425.32 | 417.06 | 145 | -3 | 145 | 91 | 800  |
| 11:13:43 | 425.70 | 417.05 | 137 | -3 | 137 | 91 | 700  |
| 11:13:53 | 425.95 | 417.04 | 128 | -3 | 128 | 91 | 600  |
| 11:13:48 | 425.82 | 417.05 | 134 | -3 | 134 | 91 | 700  |
| 11:13:58 | 426.20 | 417.04 | 128 | -3 | 128 | 91 | 600  |
| 11:14:07 | 426.58 | 417.03 | 128 | -3 | 128 | 91 | 500  |
| 11:14:02 | 426.32 | 417.04 | 126 | -3 | 126 | 91 | 500  |
| 11:14:12 | 426.70 | 417.03 | 127 | -3 | 127 | 91 | 400  |
| 11:14:22 | 427.08 | 417.03 | 126 | -3 | 126 | 91 | 300  |
| 11:14:17 | 426.83 | 417.02 | 125 | -3 | 125 | 91 | 400  |
| 11:14:27 | 427.20 | 417.02 | 125 | -3 | 125 | 91 | 300  |
| 11:14:37 | 427.58 | 417.01 | 125 | -2 | 125 | 91 | 100  |
| 11:14:32 | 427.33 | 417.01 | 123 | -3 | 123 | 91 | 200  |
| 11:14:42 | 427.71 | 417.01 | 124 | -2 | 124 | 91 | 100  |
| 11:14:53 | 428.09 | 417.01 | 129 | 0  | 129 | 90 | 0    |
| 11:14:46 | 427.84 | 416.99 | 122 | -3 | 122 | 91 | 0    |
| 11:14:58 | 428.19 | 417.14 | 124 | 15 | 125 | 83 | -100 |
| 11:15:10 | 428.53 | 417.18 | 124 | 15 | 125 | 83 | -100 |
| 11:15:03 | 428.36 | 417.16 | 124 | 15 | 125 | 83 | -100 |
| 11:15:15 | 428.70 | 417.20 | 124 | 15 | 125 | 83 | -100 |
| 11:15:21 | 428.86 | 417.22 | 124 | 15 | 125 | 83 | -100 |

## (2) 雷達航跡資料繪圖

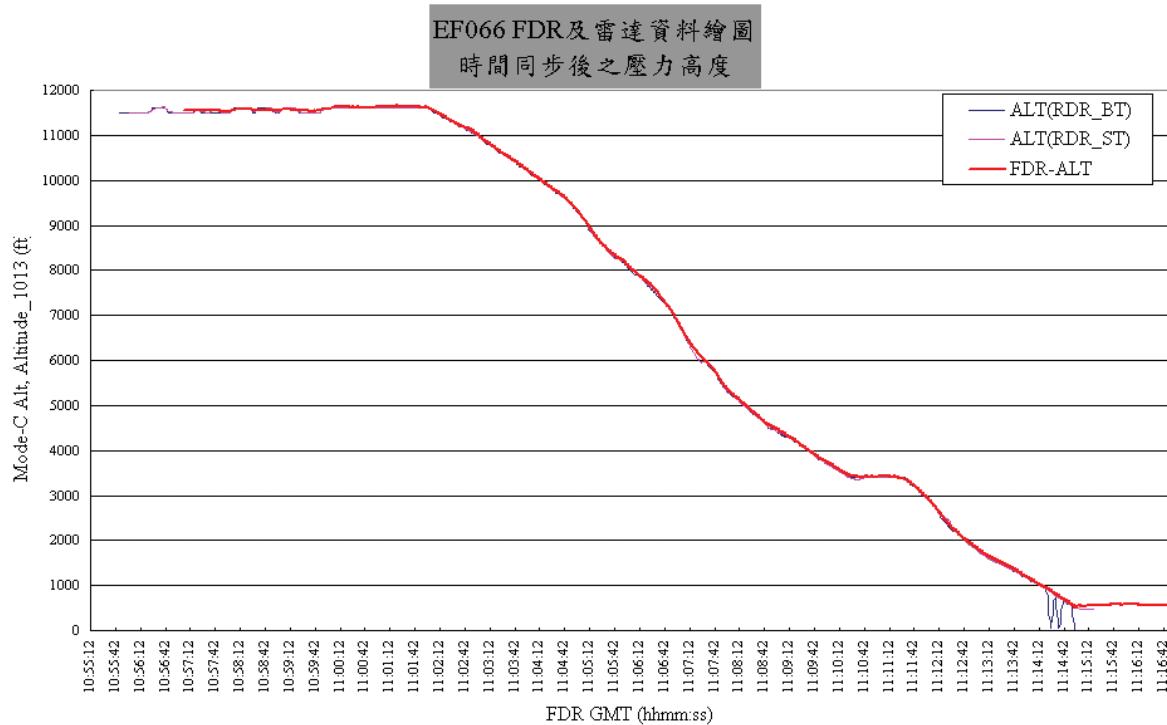


圖 A5-1 事故機 FDR 及雷達資料繪圖（時間同步後之壓力高度變化）

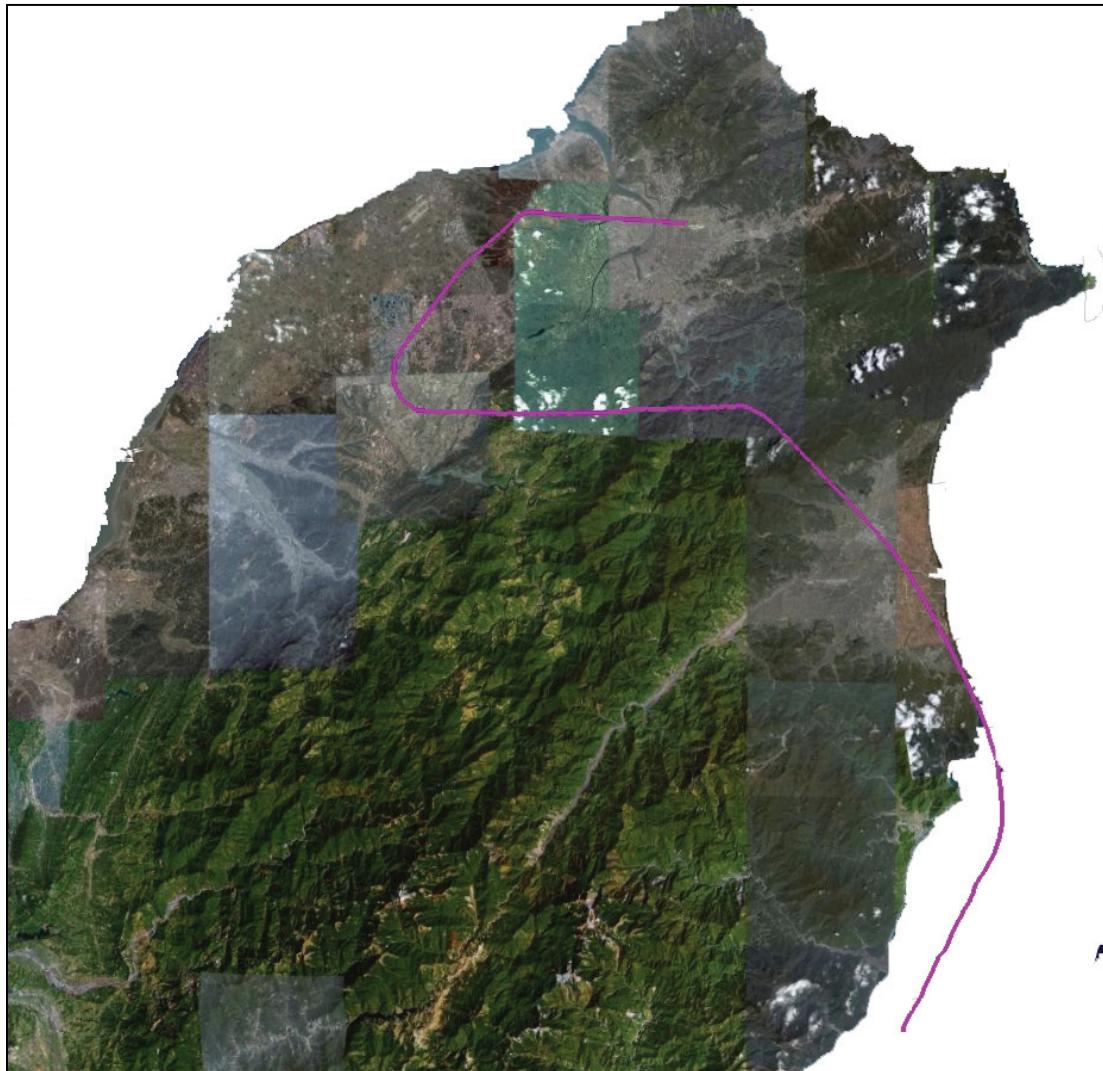


圖 A5-2 事故機雷達資料繪圖(FDR GMT 1056 時至 1114 時，高度 FL110 至 FL10)

本頁空白

國家圖書館出版品預行編目資料

飛航事故調查報告：中華民國 95 年 7 月 14 日，遠東航空公司 EF066 班機，MD-83 機型，國籍標誌及登記號碼 B-28031，於台北/松山機場落地時.....跑道 / 行政院飛航安全委員會編著。- 初版。- 台北縣新店市：飛安委員會，民 97.01

面；公分

ISBN 978-986-01-3072-0 (平裝)

1. 航空事故 2. 飛行安全

557.909

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飛航事故調查報告

飛航事故調查報告：中華民國 95 年 7 月 14 日，遠東航空公司 EF066 班機，MD-83 機型，國籍標誌及登記號碼 B-28031，於台北/松山機場落地時右主輪曾偏出跑道

編 著 者：行政院飛航安全委員會

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電話：(02) 8912-7388

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