

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Washington, D.C.

July 18, 2003

Flight Data Recorder

Specialist's Factual Report of Investigation by Erin M. Gormley

A. EVENT

Location: Anchorage, AK
Date: October 9, 2002
Aircraft: B-747-400, N661US
Operator: Northwest Airlines Inc.
NTSB Number: ANC03IA001

B. GROUP

N/A

C. SUMMARY

On October 9, 2002, about 1740 Alaska daylight time, a Boeing 747-400 airplane, N661US, had a partial hydraulic system malfunction during cruise flight. The flight was being conducted as Flight 85, by Northwest Airlines Inc., as an instrument flight rules (IFR) scheduled international flight under Title 14, CFR Part 121. The flight originated at the Detroit International Airport, Detroit, Michigan, about 1403 eastern daylight time, and was bound for the Narita International Airport, Tokyo, Japan. The Captain said he declared an emergency and diverted the airplane to the Ted Stevens International Airport, Anchorage, Alaska.

D. DETAILS OF INVESTIGATION

On October 15, 2002, the NTSB Vehicle Recorders Division received the following flight data recorder (FDR):

Recorder Manufacturer/Model: **Allied Signal Model SSFDR**
Recorder Serial Number: **08182**

Recorder Description

This model FDR records Aeronautical Radio Incorporated (ARINC) 573 configuration data in a binary format onto solid state flash memory chips. The FDR records 128 words of digital information every second, with each word 12 bits in length. Each grouping of 128 words (each second) is called a subframe. Each subframe has a unique 12-bit synchronization (sync) word identifying it as either subframe 1, 2, 3, or 4. The sync word is the first word in each subframe. Each grouping of consecutive 1, 2, 3 and 4 subframes comprise a frame (i.e., four seconds of data). The data stream is "in sync" when successive sync words appear at the proper 128-word intervals. Each data parameter (e.g. altitude, heading, and airspeed) has a specifically assigned word number within the subframe.

Examination and Readout

The FDR was examined upon receipt and the exterior appeared undamaged. The recorder was downloaded in a normal manner. The data were transcribed to hard disk for further analysis using the NTSB laboratory equipment. The operator provided the parameter and conversion documentation, which includes the formulas to convert the data from recorded binary values (0's and 1's) to engineering units (feet, knots, degrees, etc.). The actual conversion is accomplished by an automated process which incorporates the NTSB laboratory's computers and associated software. The incident flight was located during the transcription. Select recorded parameters are displayed on the graphical plots.

Presentation of Data

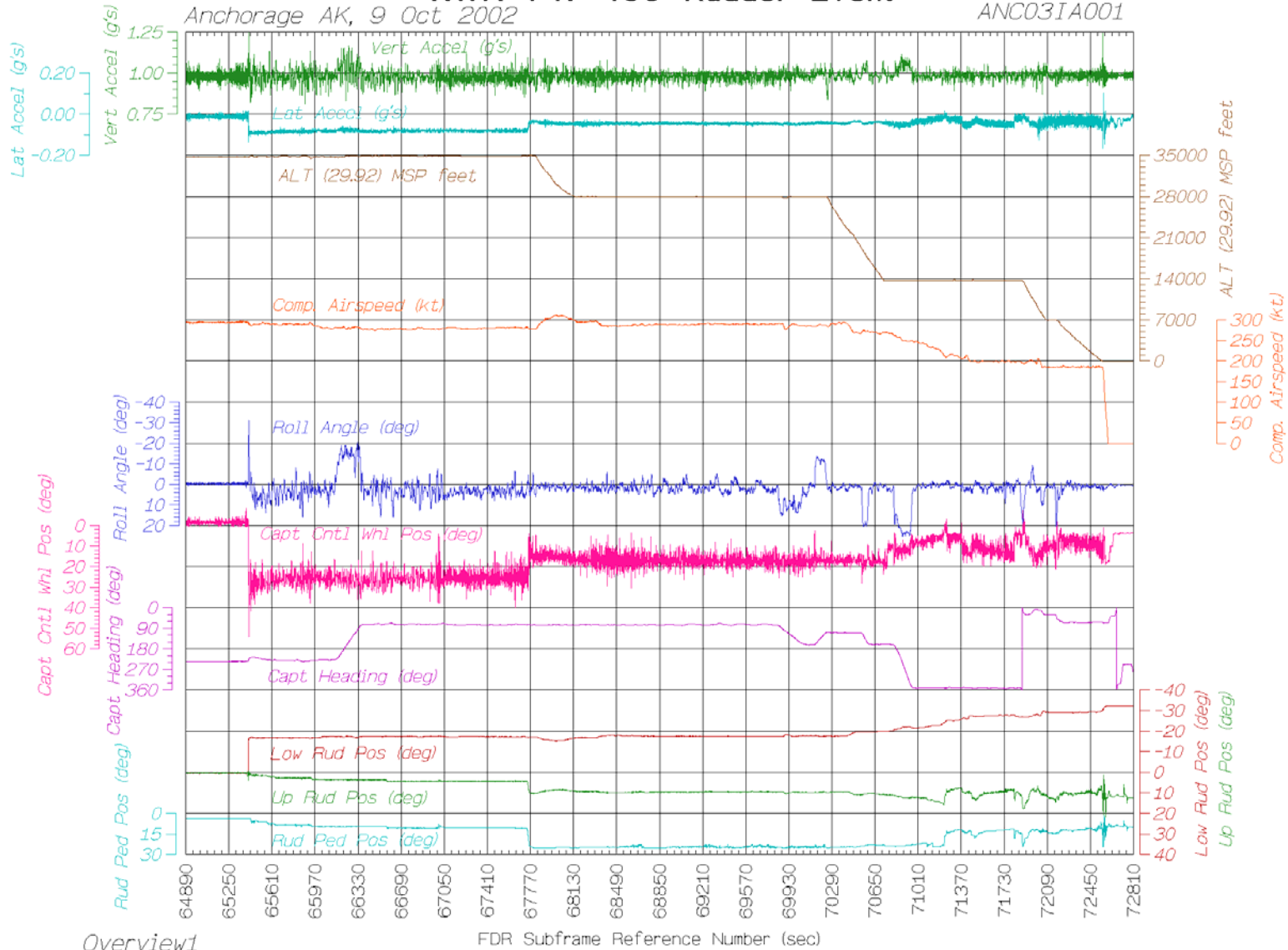
Plotted data for the event flight is displayed on the following four pages. The 3 plots, Overview1, Overview2, Overview3 contain select parameters from the time of the event until landing (SRN¹ 64890-72810). The fourth plot contains an expanded view of the landing (SRN 72090-72810). Attachment I contains the tabular data associated with these plots in the file, ANC03IA001_FDRtab.csv, which is a comma delimited (*.csv) file.

¹ The FDR Subframe Reference Number is a measure of relative time on the DFDR. One subframe is equivalent to one second.

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Overview1

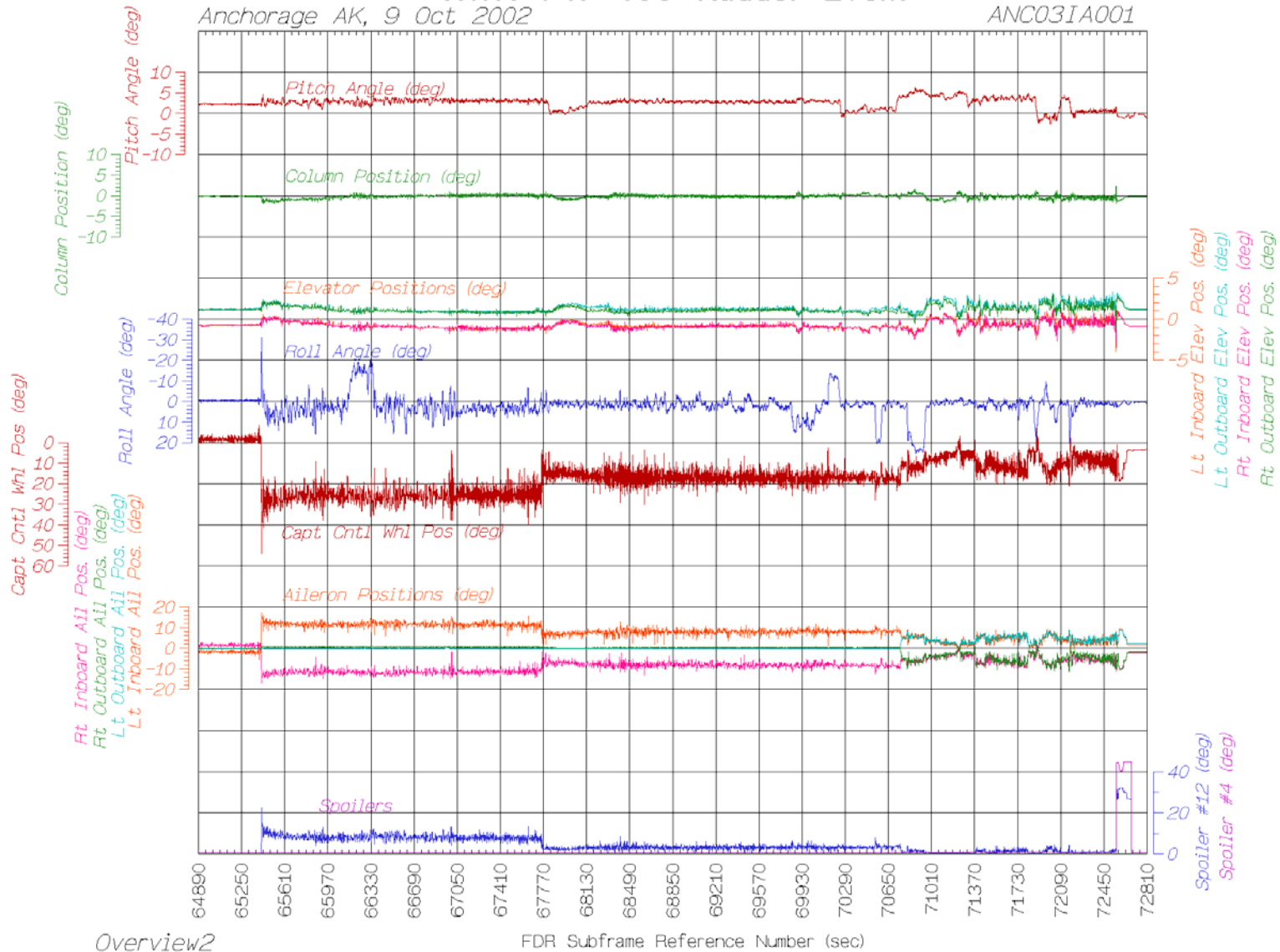
Revised: June 30, 2003

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Overview2

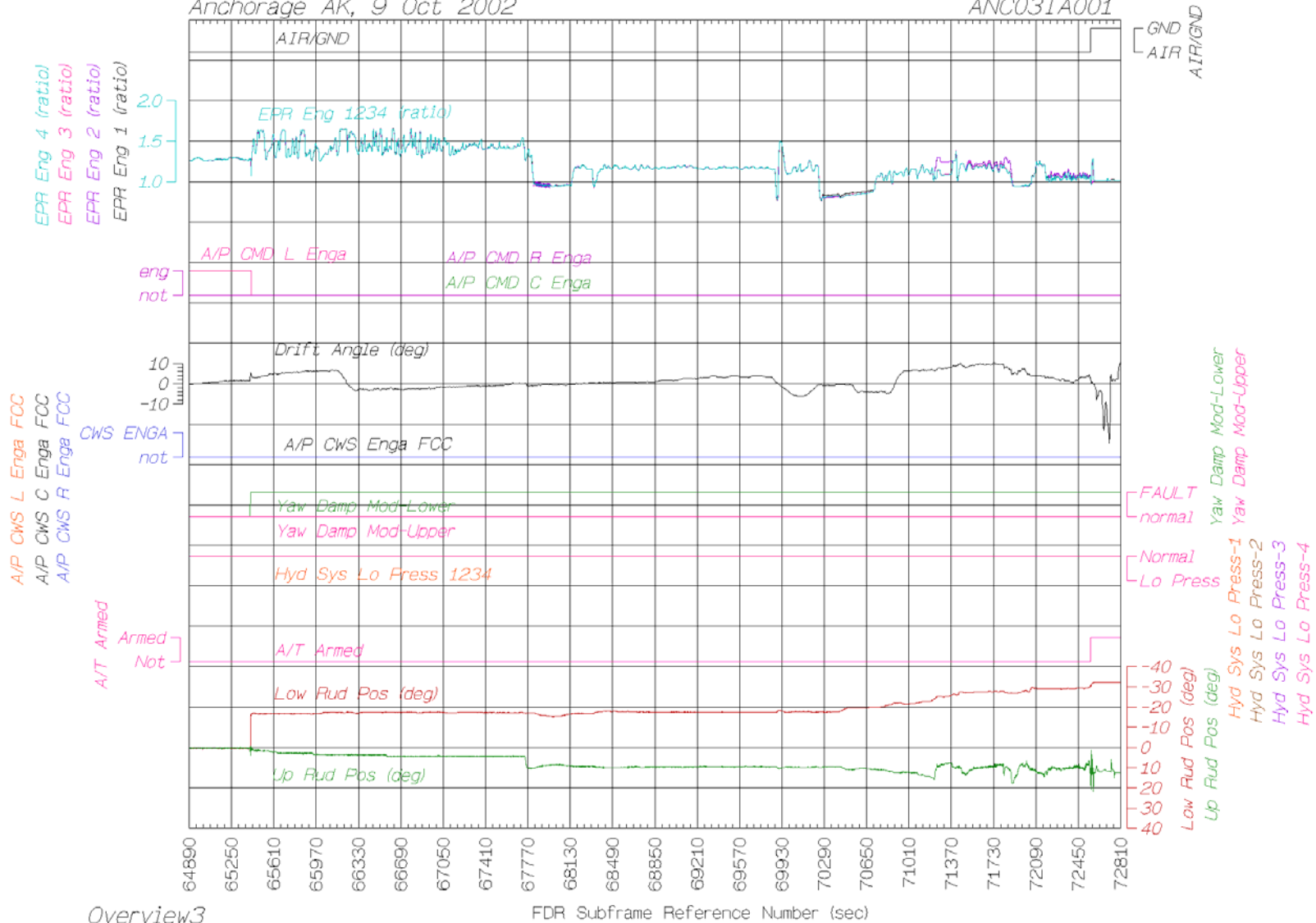
Created: June 22, 2003

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Overview3

Created: June 22, 2003

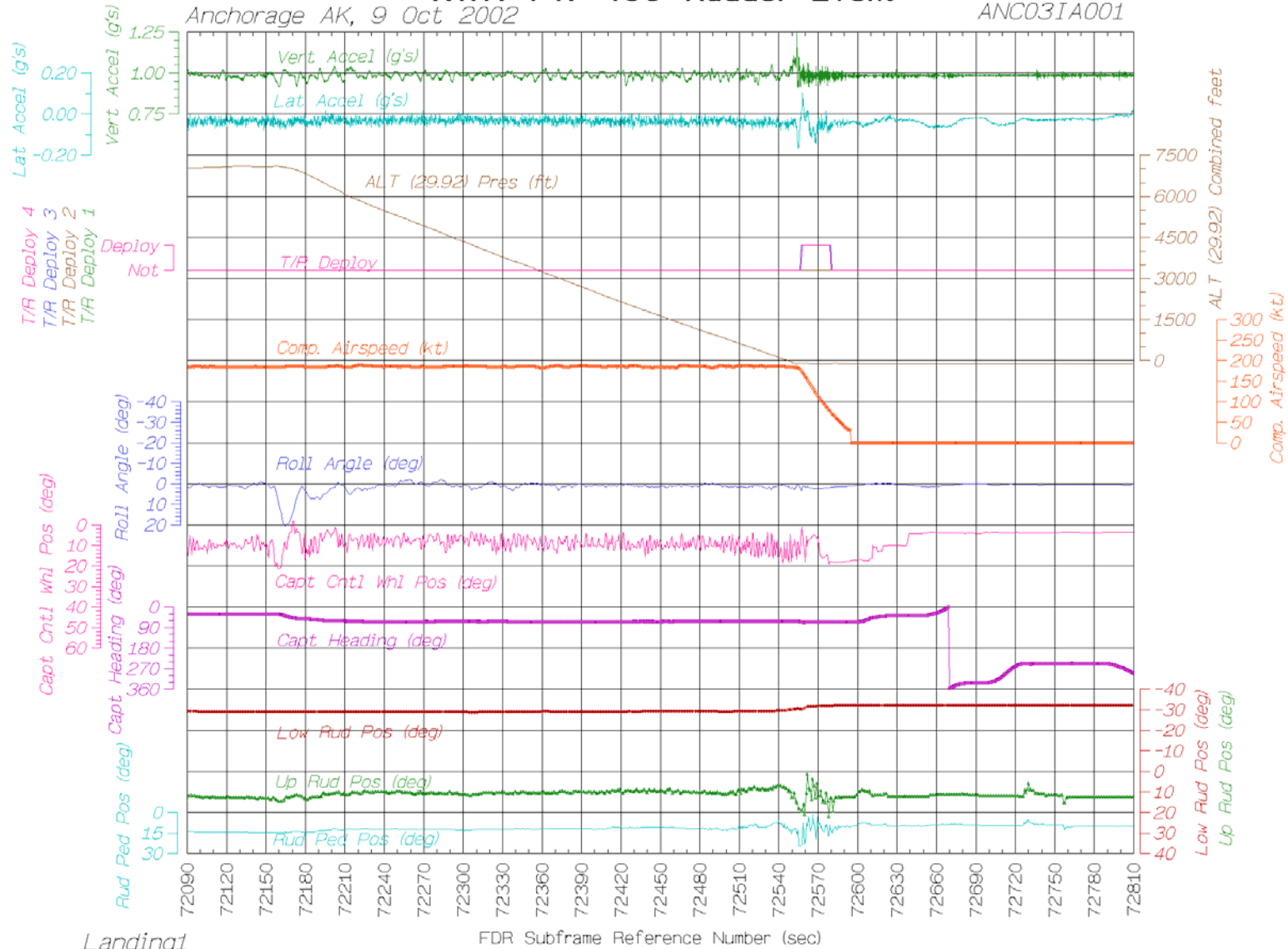
FDR Subframe Reference Number (sec)

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Landing1

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FDR Subframe Reference Number (sec)

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Data Description

The FDR data indicate that the aircraft took off around SRN 40636. At SRN 65410, as the aircraft was cruising at a pressure altitude of about 35000 feet and an airspeed of 293 knots, the lower rudder position parameter started deflecting from 0 degrees to the left. One second later, the yaw damper module lower parameter registered a fault and the aircraft began to roll to the left. At SRN 65416, the aircraft reached -31 degrees left roll, the captain control wheel position parameter showed a value to the right of +54 degrees. The data recorded during the next second show that the upper rudder parameter began to deflect to the right and the A/P command L parameter had moved to not engaged. At SRN 65418, the lower rudder position reached -17 degrees and remained near that value.

After SRN 67745, the upper rudder parameter moved further to the right and the recorded pressure altitude began to decrease. After SRN 70420, as the aircraft began descending from about 22400 feet, the airspeed began to decrease and the lower rudder parameter started moving further to the left. The lower rudder position parameter moved continually to the left as the aircraft descended and slowed and recorded over -30 degrees when the aircraft landed at SRN 72553.

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Vehicle Recorders Division

Attachment List:

Attachment I: ANC03IA001 Tabular Data (electronic only)