

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

November 15, 2021

Telemetry Data

Specialist's Factual Report

By Sean Payne

1. EVENT SUMMARY

Location: Edwards, CA
Date: March 5, 2021
Aircraft: Aermacchi Impala MB-326M
Registration: N155TP
Operator: Flight Research Inc
NTSB Number: WPR21LA123

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received telemetry data files:

Device Manufacturer/Model:	Telemetry Data Files
Serial Number:	N/A

3.1. Device Description

Specific details about the telemetry system were not documented. The files were provided to the NTSB by the operator.

3.2. Data Description

An Excel file consisting of data recorded during the accident flight from a telemetry system was transmitted to the NTSB lab for the accident aircraft. Timing for the file was provided in UTC. Modifications by the operator were made to the file to include parameter names for each data stream. Ultimately, the data file consisted of 50 Hz samples for a handful of aircraft performance and flight mechanic parameters.

The original data file was not filtered and contained multiple dropouts and erroneous values as recorded by the system during the accident flight. The author of this report

worked with the operator to identify dropouts and scrub the data of erroneously recorded values. The data was also down sampled to facilitate plotting. Furthermore, specific areas of interest in the data set were identified and segregated to help pare down the dataset. The areas of interest from the dataset are as follows:

- A previous inverted spin event from 17:48 to 17:49 UTC
- An upright spin event from 18:00 to 18:01 UTC
- The accident event, an inverted spin from approximately 18:04 to 18:06:40 UTC.

A representative from the operator stated that the accident aircraft had a telemetry antenna affixed below the wing. As such, when the aircraft spun inverted, or if the antenna was blocked by the fuselage, the system was prone to additional telemetry system dropouts.

3.3. Parameters Provided

Table 1 describes data parameters provided by the telemetry system.

The engineering unit conversions used for the data contained in this report are based on documentation from the aircraft manufacturer. Where applicable, the conversions have been changed to ensure that the parameters conform to the NTSB's standard sign convention that climbing right turns are positive (CRT=+).¹

Table 1. Telemetry System – Select Parameters and Units.

Parameter Abbreviation	Description
Rudder	Rudder Position (percent position)
VFSG	Vertical Stabilizer Strain Gauge Force (foot-pounds)
Elevator	Elevator Position (percent position)
Aileron	Aileron Position (percent position)
Pitch	Aircraft Pitch (degrees)
Roll	Aircraft Roll (degrees)
Heading	Heading (degrees)
VFTA	Vertical Stabilizer Acceleration (g)
KIAS	Knots Indicated Airspeed (kts)
Pressure Altitude	Pressure Altitude (ft)

¹ CRT=+ means that for any parameter recorded that indicates a climb or a right turn, the sign for that value is positive. Also, for any parameter recorded that indicates an action or deflection, if it induces a climb or right turn, the value is positive. Examples: Right Roll = +, Pitch Up = +, Elevator Trailing Edge Up = +, Right Rudder = +. The only exception to this convention is that positive left aileron will be indicative of a left turn/roll.

3.4. Data Plots

All times are presented in UTC. Note that some values may appear off scale, this is a result of erroneous values in the telemetry dataset.

Figure 1 is a plot of data from a previous inverted spin event which occurred between 17:48 and 17:49 UTC. Of note, around 17:48:30, the data show rudder deflection increases to a value of around 100 % and nearly simultaneously recorded an increase in values of load data on the vertical stabilizer. Cessation of rudder deflection also correlated to a decrease in values of recorded vertical stabilator strain gauge force. The aircraft completed the maneuver around 17:48:40.

Figure 2 is a plot of data from a previous upright spin event which occurred between 18:00 to 18:01 UTC. The data captured the event with fewer dropouts. There was not an obvious correlation between rudder deflection and vertical stabilizer force near the completion of the maneuver. Rudder deflection, however, was recorded at a value nearing 100 % throughout the maneuver in the direction of the spin, and nearly 100 % in the opposite direction of the spin upon completion of the maneuver.

Figure 3 is a plot of the accident event. The plotted data interval is between 18:04 and 18:07 UTC. The data shows entry to a spin maneuver around 18:05:00. Rudder position peaks at nearly 100 % near the entry to maneuver. Around 18:04:53, data from rudder position and vertical stabilizer strain gauge force diverge. Heading change shows the aircraft is established in a developed spin. Rudder deflection throughout the spin varies, but in general is recorded as lesser values as in previous spins. Around 18:05:46, the value for vertical stabilizer strain gauge force aligns with values for rudder deflection. The altitude at this time was approximately 10,370 feet MSL. Due to a number of data dropouts it was not possible to determine the flight condition of the aircraft near the end of the flight.

Figure 4 is an expanded plot of the accident event. The plotted data interval is between 18:05:33 and 18:06:04 UTC.

Tabular data used to generate figure 1 is included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

Tabular data used to generate figure 2 is included as Attachment 2. This attachment is provided in electronic comma-delimited (.CSV) format.

Tabular data used to generate figures 3 and 4 is included as Attachment 3. This attachment is provided in electronic comma-delimited (.CSV) format.

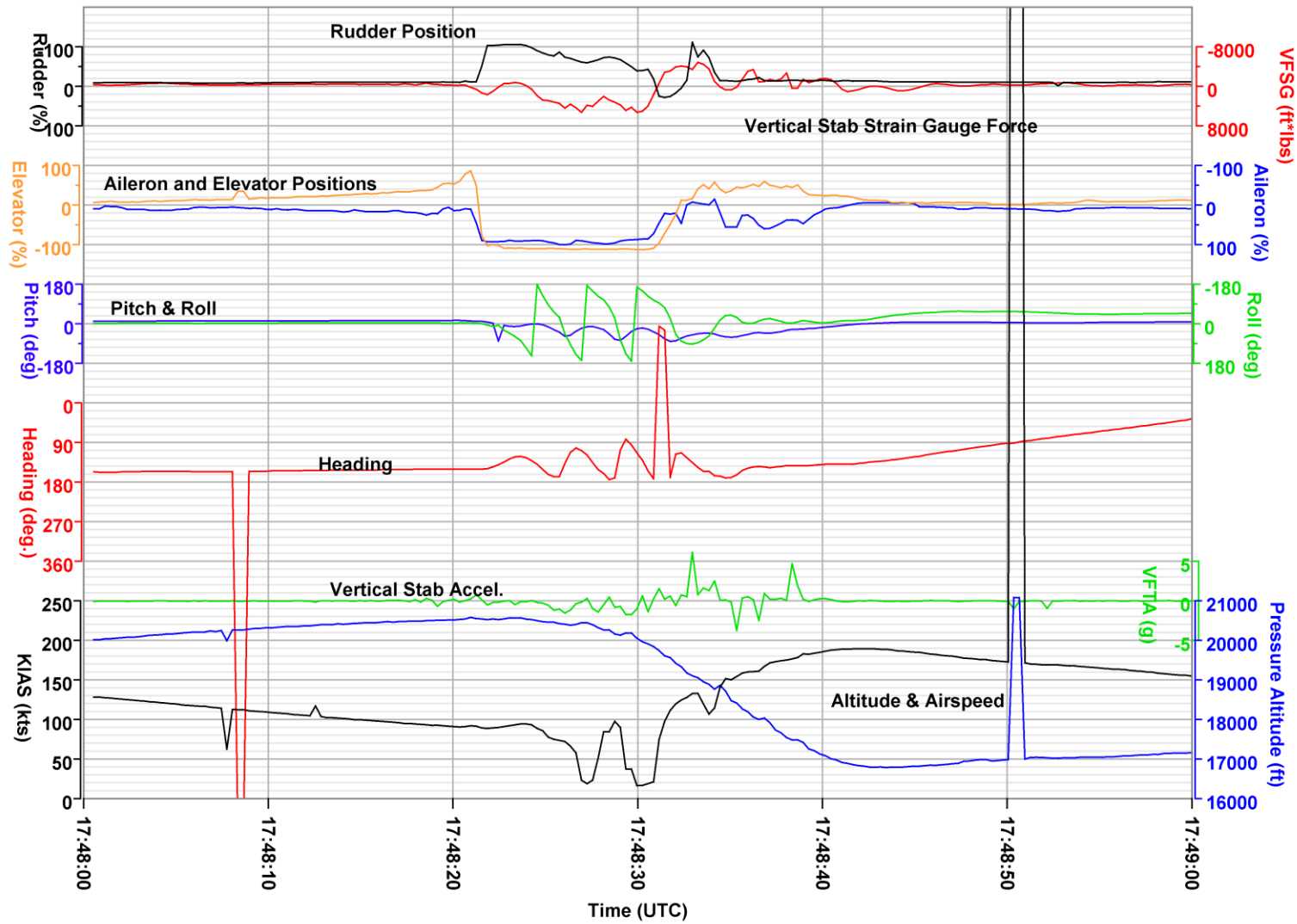


Figure 1. A plot of a previous inverted spin event between 17:48 and 17:49 UTC.

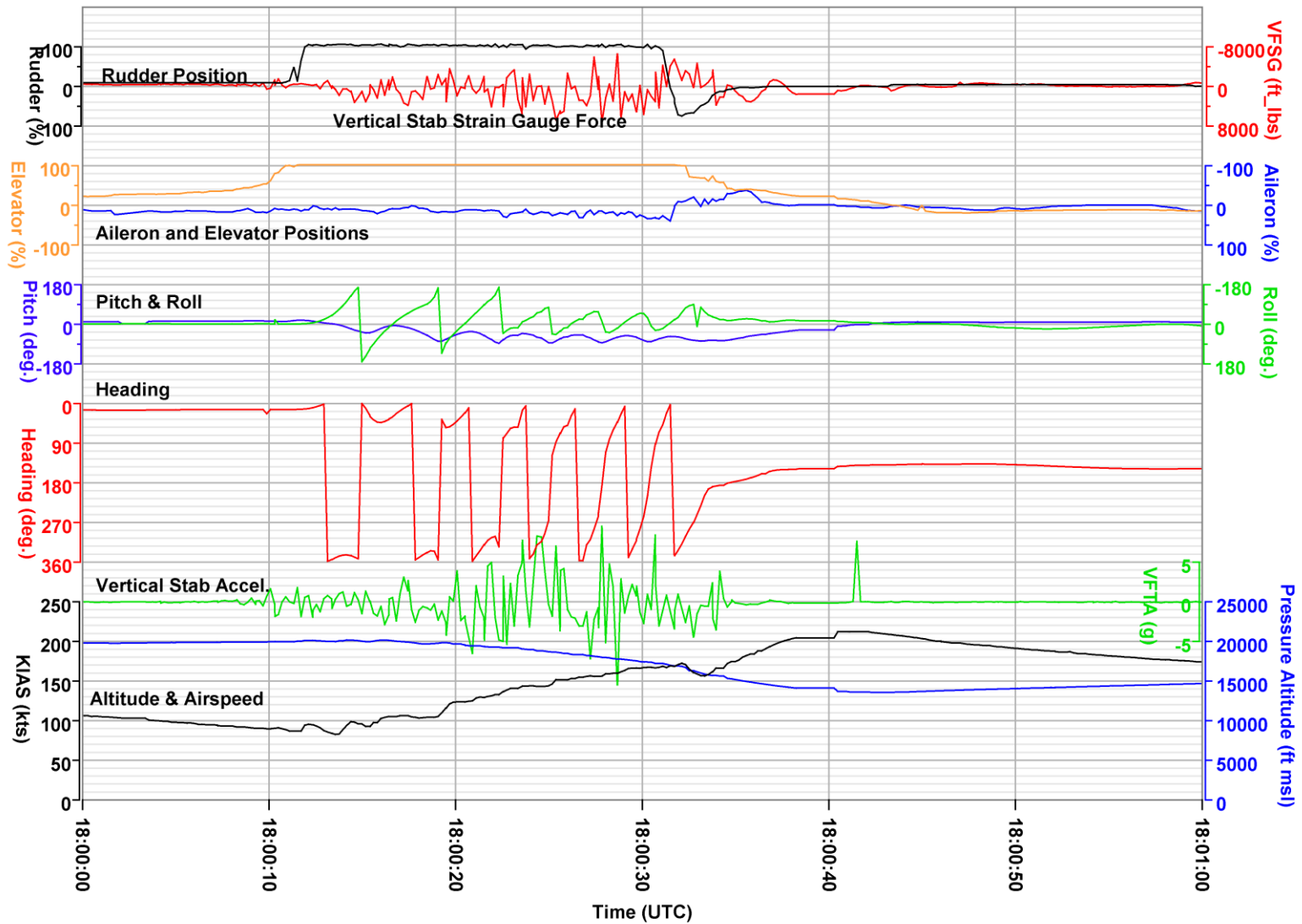


Figure 2. A plot of a previous upright spin event between 18:00 and 18:01 UTC.

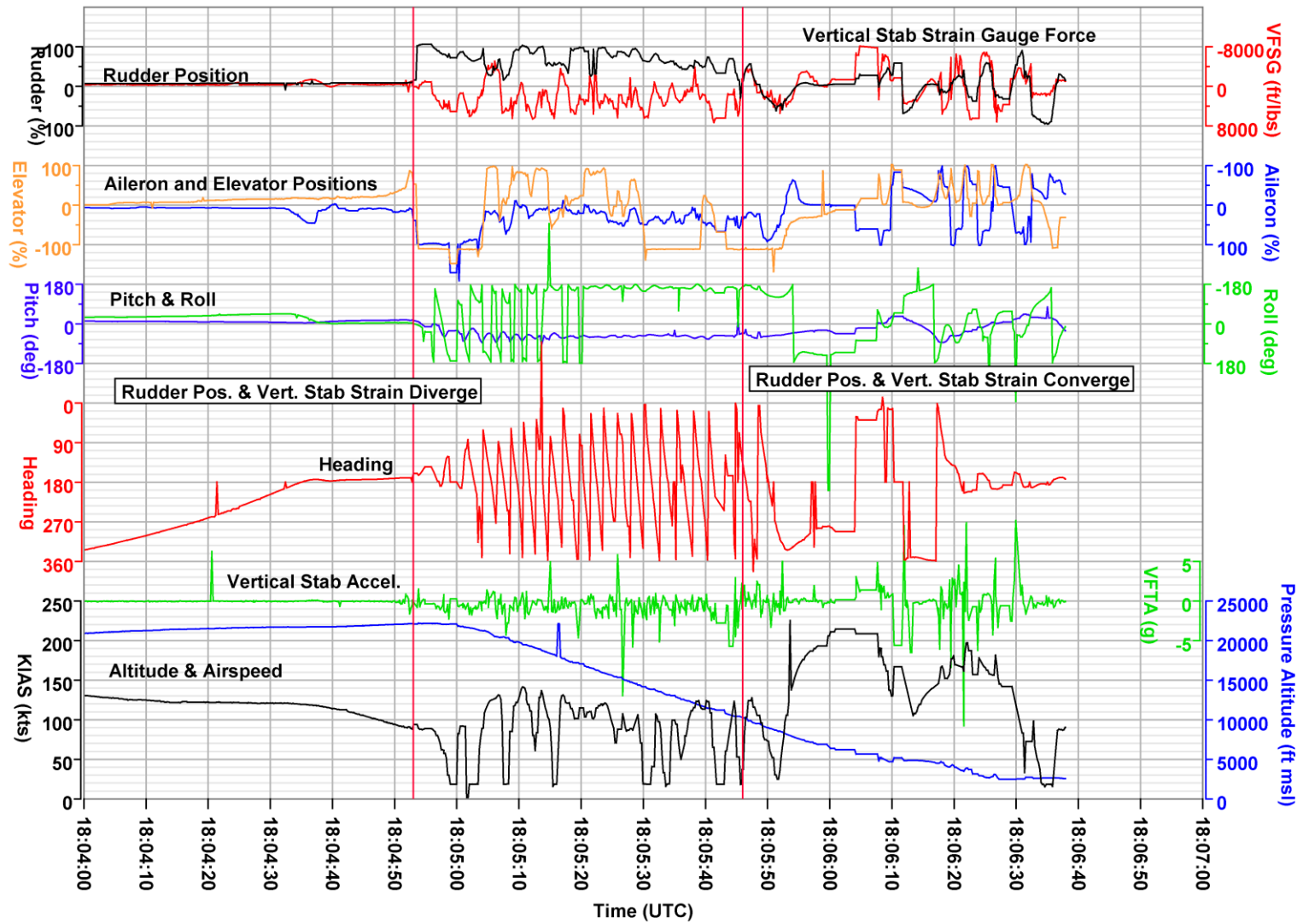


Figure 3. A plot of flight data surrounding the accident event.

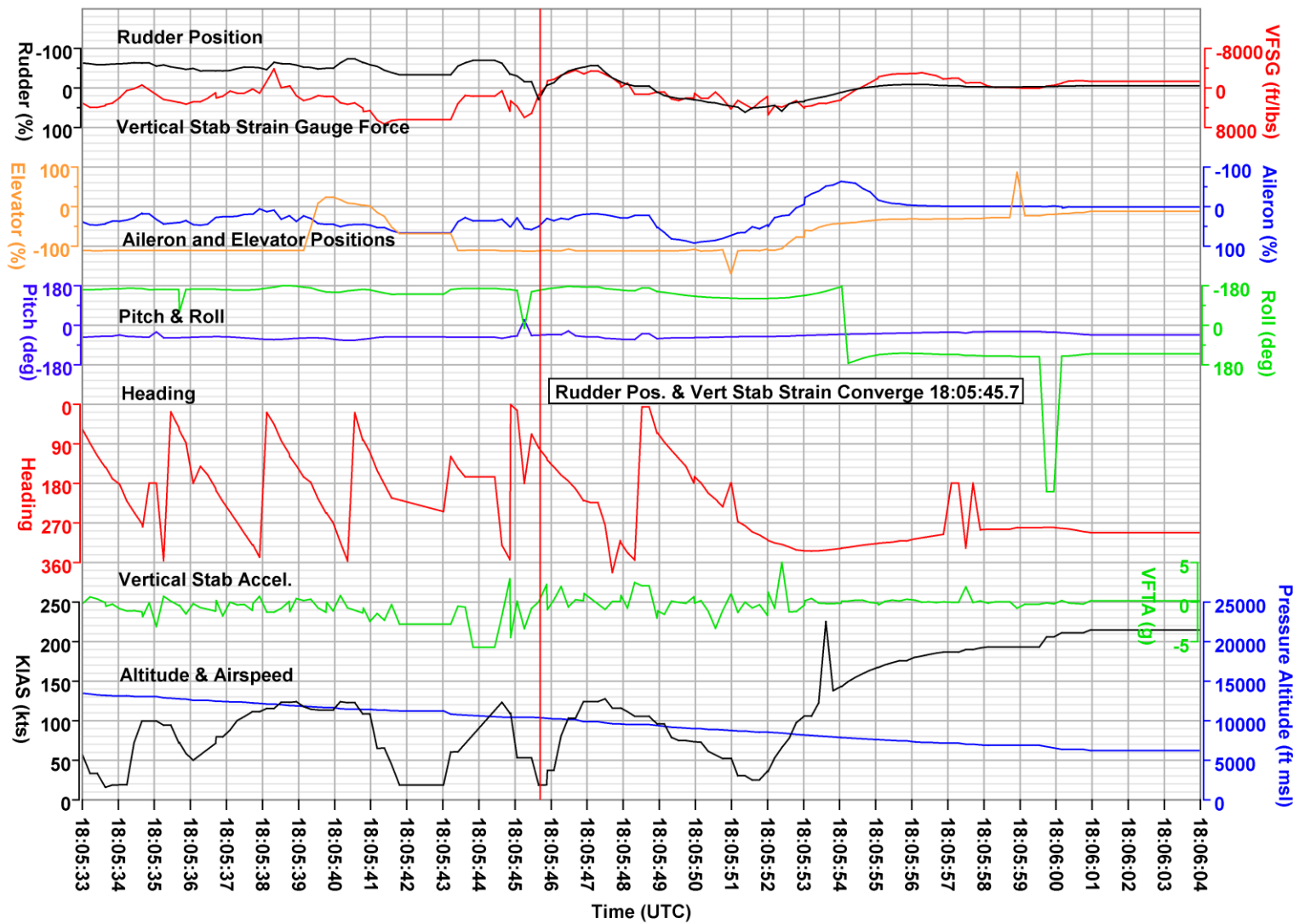


Figure 4. An expanded plot of the accident event.