

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

August 20, 2015

Quick Access Recorder (QAR)

Specialist's Factual Report
By Sean Payne

1. EVENT SUMMARY

Location: Albuquerque, New Mexico
Date: April 9, 2014
Aircraft: Airbus Helicopter AS350 B3
Registration: N395P
Operator: PHI
NTSB Number: CEN14FA193

On April 9, 2014, about 1743 mountain daylight time, an Airbus (Eurocopter) AS 350 B3e helicopter, N395P, impacted the hospital roof top following a departure from the New Mexico heliport (NM11), Albuquerque, New Mexico. The helicopter was registered to PHI, Inc., Lafayette, Louisiana, and operated by PHI Air Medical, LLC, under the provisions of Title 14 Code of Federal Regulations Part 91. The commercial pilot and two paramedics received minor injuries and the helicopter was substantially damaged. Visual meteorological conditions prevailed and a company flight plan was filed for the local repositioning flight that was originating at the time of the accident

2. QUICK ACCESS RECORDER GROUP

A Quick Access Recorder (QAR) group was not convened.

3. DETAILS OF FDR INVESTIGATION

The National Transportation Safety Board Vehicle Recorder Division received a electronic file containing the QAR data from the N395P aircraft.

3.1. North Flight Data System

The Rotorcraft was equipped with a North Flight Data Systems Quick Access Recorder (QAR) and a North Flight Data Systems Multifunction Data Acquisition Unit (MFDAU). Both the QAR and the MFDAU work in conjunction with the North Flight Data Systems Cockpit Voice/Video Recorder to provide audio and data retrieval for post flight review. The MFDAU contains internal instruments that track 3 dimensional movements as well as external instruments. The unit is able to provide its own accurate heading, speed and altitude information. The QAR is a remotely mounted device that contains two SD memory cards which record both audio, GPS data and video (if equipped) and aircraft performance and redundant GPS data, respectively.

3.1.1. Recording Description

Timing of the QAR data is measured in subframe reference number (SRN), where each SRN equals one elapsed second. The event flight was the last flight of the recording and its duration was approximately 4 minutes and 15 seconds.

3.1.2. Engineering Units Conversions

The engineering units conversions used for the data was handled by the manufacturer's software program. 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 A-1 lists the QAR parameters verified and provided in this report. Additionally, table A-2 describes the unit abbreviations used in this report.

3.2. Time Correlation

Correlation of the QAR data from SRN to the event local time, mountain daylight time (MDT) was established by using the recorded Universal Coordinated Time (UTC) time and then applying an additional -6 hours offset to change UTC to MDT.

Accordingly, the time offset for the event flight data from SRN to local MDT is the following: $MDT = SRN - 21,600$. Therefore, for the rest of this report, all times are referenced as MDT not SRN.

3.3. QAR Plots and Corresponding Tabular Data

The following five figures contain QAR data recorded during the April 17, 2014 event. All the parameters listed in table A-1 are plotted. These figures are configured such that right turns are indicated by the trace moving toward the bottom of the page, left turns towards the top of the page, and nose up attitudes towards the top of the page.

Figure 1 shows the flight data system became powered around 17:39:45 MDT, and by 17:41:00 MDT, the rotorcraft's engine stabilized at about 75% N2/NR. About 50 seconds later at 17:41:50 MDT, the rotorcraft's engine power had increased to just under 100% N2/NR. Around 17:43:00 MDT, data shows the collective position being raised. By 17:43:10 MDT, the radio altimeter shows a slight increase in altitude. At the same time, the aircraft magnetic heading begins to change rapidly, indicating that the rotorcraft had entered a counter clockwise spin. Fluctuations in roll and radio altitude occur between 17:43:20 MDT and 17:43:30 MDT. At 17:43:26 MDT, main rotor speed (%NR), rapidly drops to a value of around 0. The parameters for radio altitude and roll drop to 0 shortly thereafter. The data for magnetic heading indicates the rotorcraft had made about 4 and one half counterclockwise turns before the heading parameter stabilized. Values for %N1

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 = +.

EECU and engine oil pressure drop while engine oil temperature slightly climbs for the remainder of the plotted data. All other parameters appear to flat line as the recording terminates.

Values recorded for Tail Rotor Pedal XPA remained steady at 52.5% throughout the majority of the recording. Due to the mechanical design of the interface between the rudder pedal linkage and Tail Rotor Pedal XPA potentiometer, the value for Tail Rotor Pedal XPA will remain constant at 52.5% under values of 70% of actual pedal position. Therefore, for the majority of this recording, excluding the spike in Tail Rotor Pedal XPA near the time of impact (17:43:26 MDT), the rudder pedal position could not be determined.

Figure 2 is a time expanded portion of the same parameters that appear in figure 1. The time interval presented is from 17:42:45 MDT to 17:43:55 MDT.

Figure 3 is a plot of the same basic flight control parameters for the first previous flight prior to the accident.

Figure 4 is a plot of the same basic flight control parameters for the second previous flight prior to the accident. This flight contained two takeoffs and two landings.

Figure 5 is a plot of the same basic flight control parameters for the third previous flight prior to the accident.

The corresponding tabular data used to create the two plots containing the April 17, 2014 event data are provided in electronic comma separated value (*.csv) format as Attachment 1 to this report.

Figure 1. Plot of selected recorded parameters from start up through impact for the accident flight.

PHI, Airbus Helicopters AS350 B3E, N395P

Location, Date: Albuquerque, NM, 04/17/2014

NTSB No. CEN14FA193

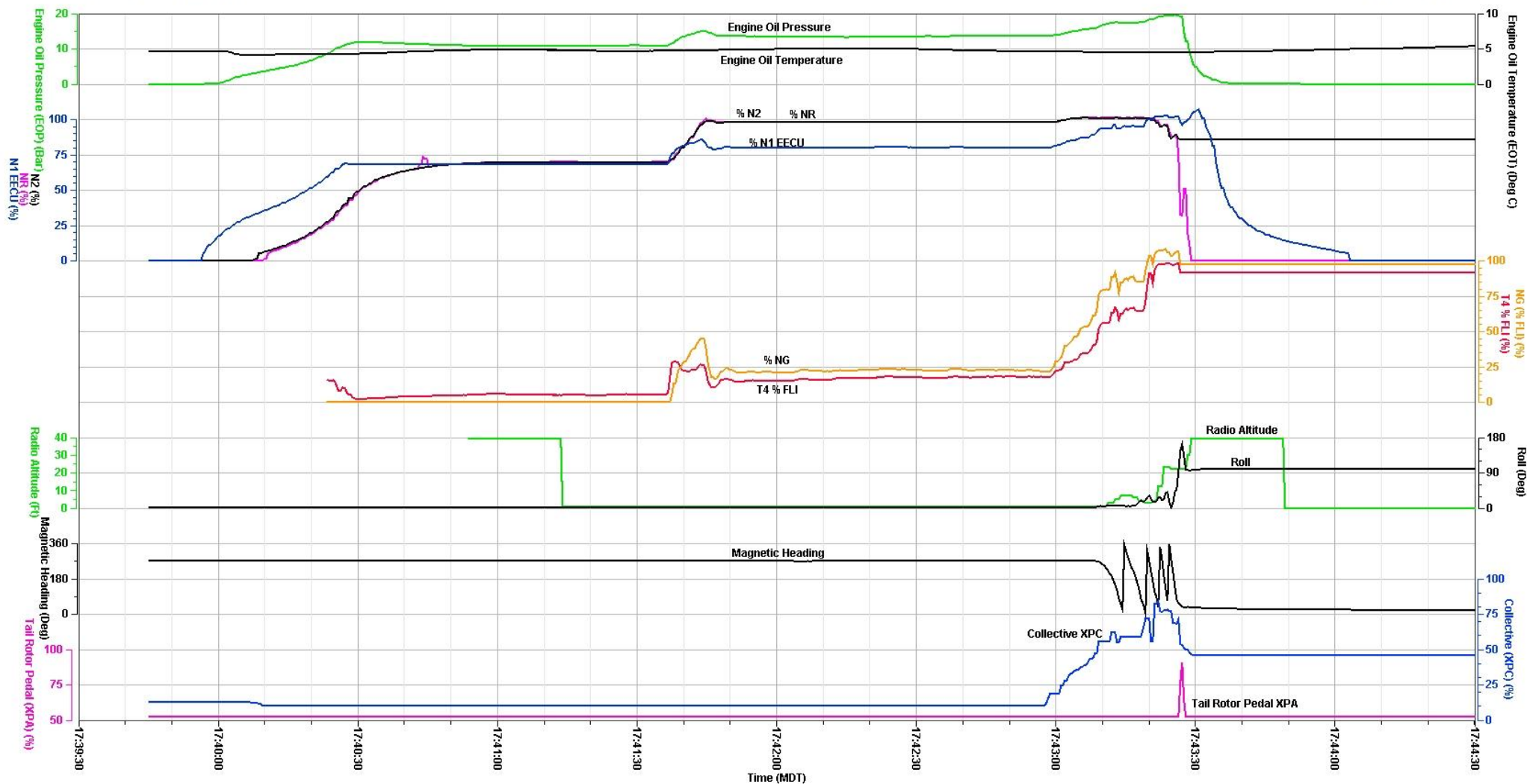


Figure 2. Plot of selected recorded parameters for the time interval between 17:42:50 MDT to 17:43:55 MDT.

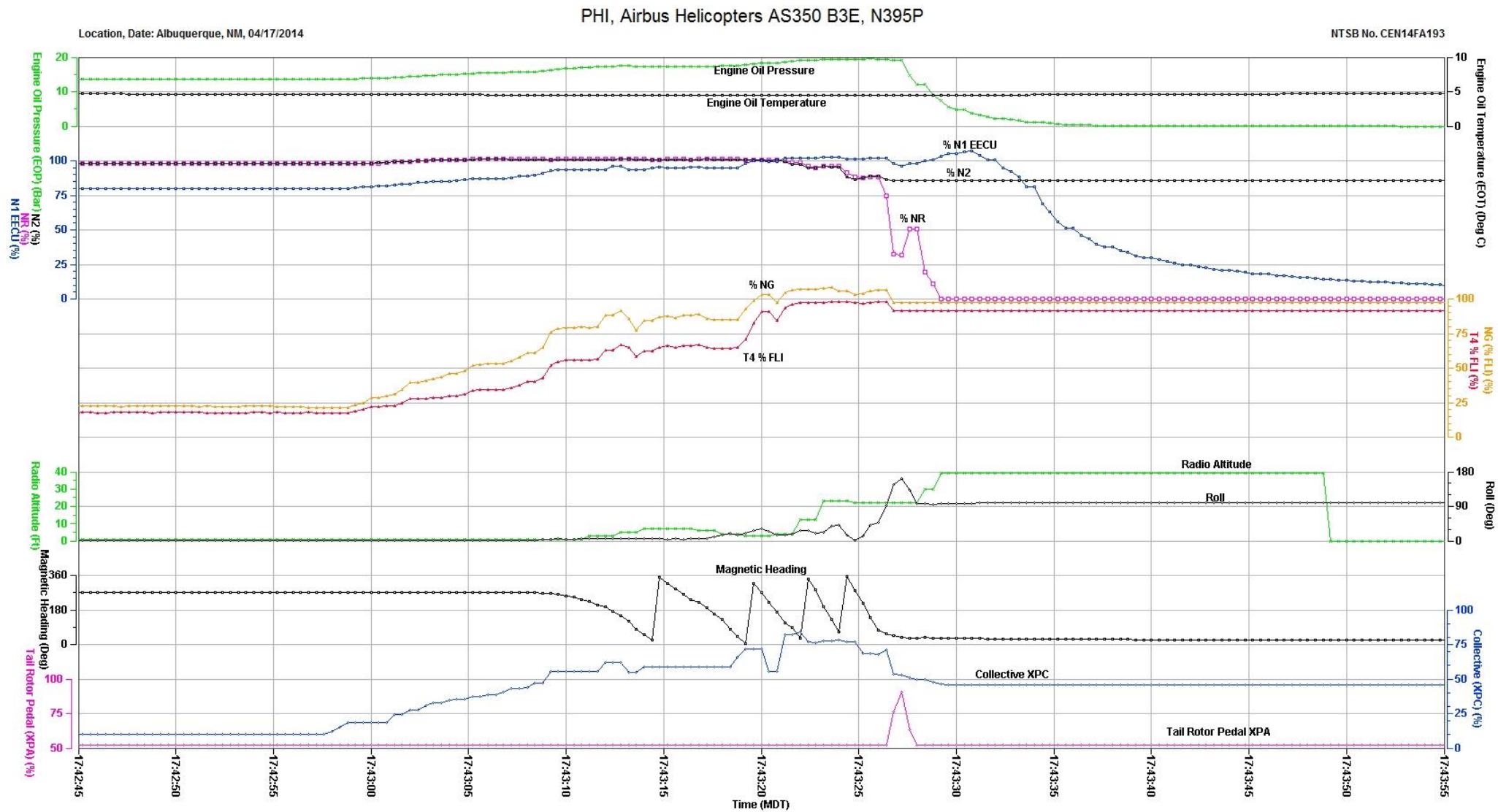


Figure 3. 1st previous flight.

PHI, Airbus Helicopters AS350 B3E, N395P, Previous Flight #1

Location, Date: Albuquerque, NM, 05/22/14

NTSB No. CEN14FA193

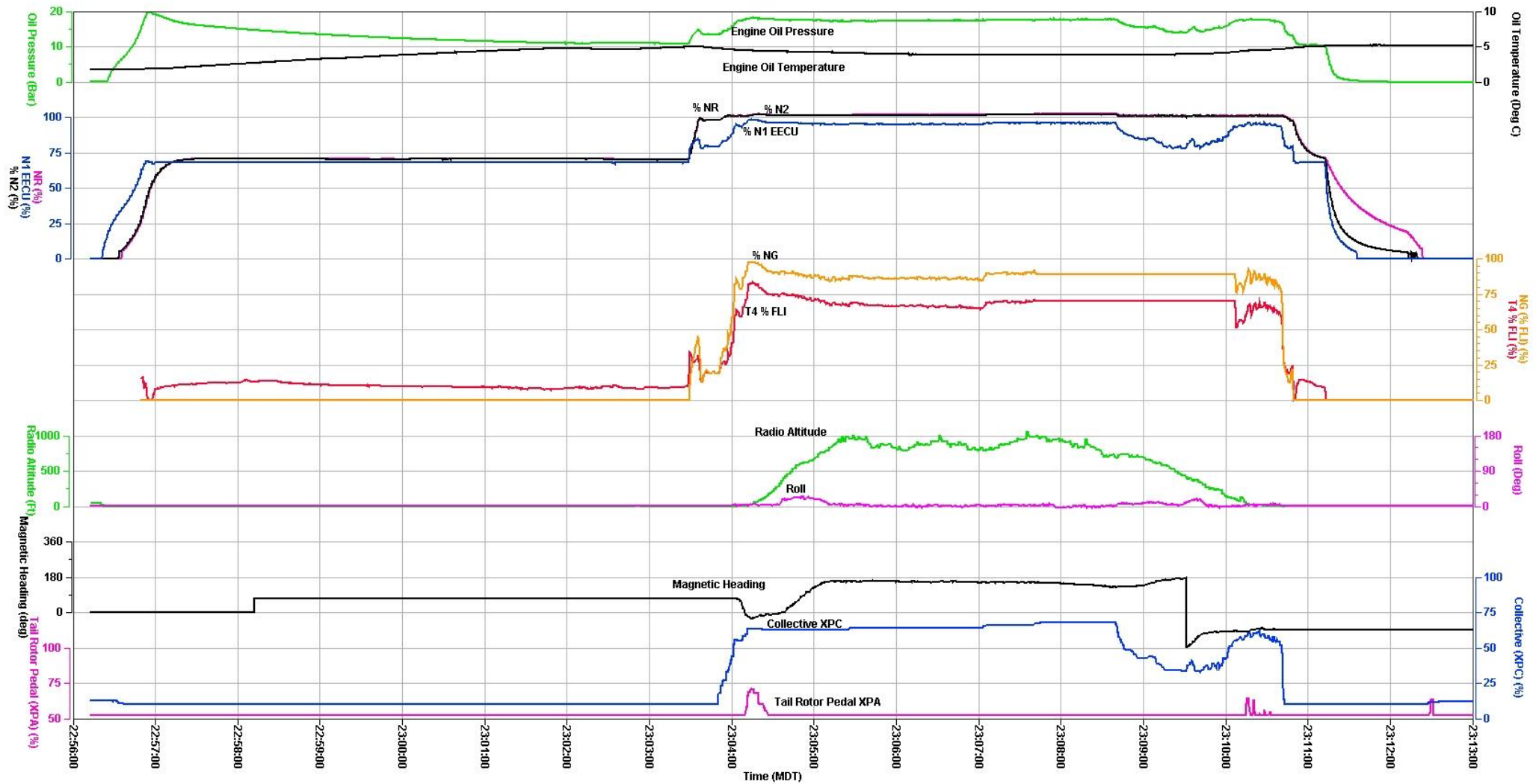


Figure 4. 2nd previous flight.

PHI, Airbus Helicopters AS350 B3E, N395P, Previous Flight #2

Location, Date: Albuquerque, NM, 05/22/14

NTSB No. CEN14FA193

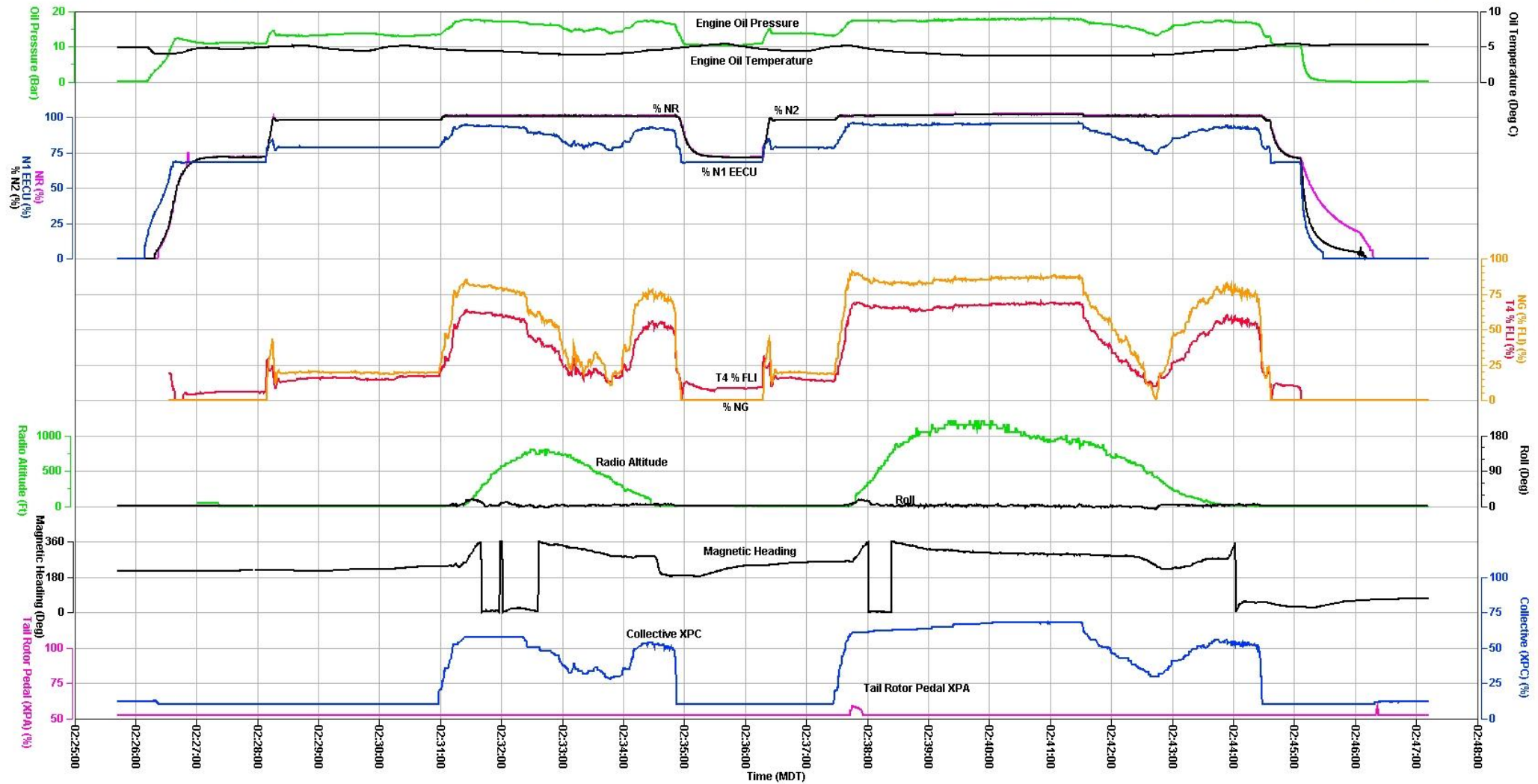
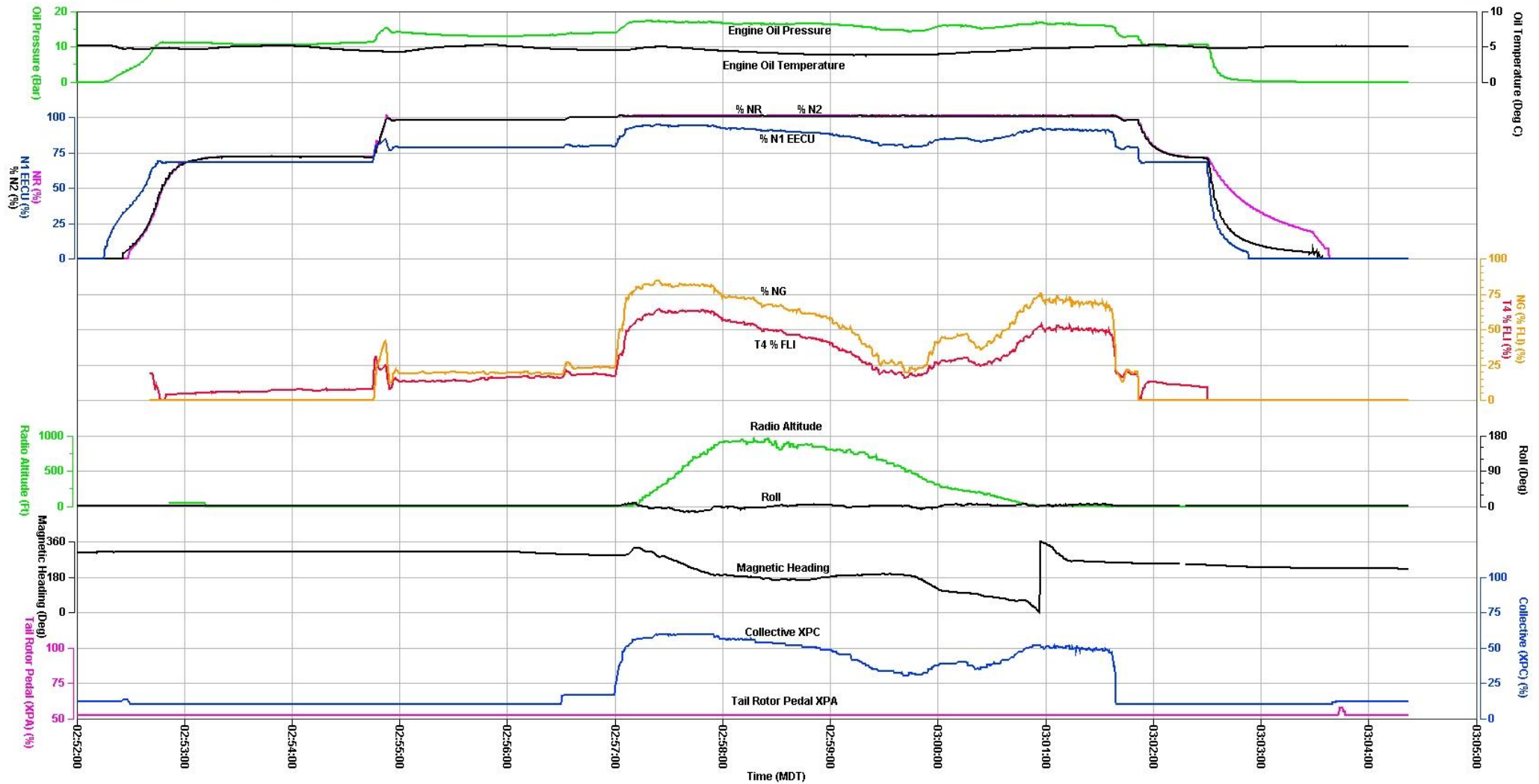


Figure 5. 3rd previous flight.

PHI, Airbus Helicopters AS350 B3E, N395P, Previous Flight #3

Location, Date: Albuquerque, NM, 05/22/14

NTSB No. CEN14FA193



APPENDIX A

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameters and table A-2 describes the unit abbreviations used in this report.

Table A-1. Verified and provided QAR parameters.

Parameter Name	Parameter Description
1. Oil Pressure (Bar)	Engine Oil Pressure
2. Oil Temperature (Deg C)	Engine Oil Temperature
3. NR (%)	% Main Rotor Speed
4. N1 EECU (%)	Electronic Engine Control Unit
5. N2 (%)	% Free Turbine Speed
6. NG (%FLI) (%)	% Gas Generator – First Limit Indicator
7. T4% FLI (%)	% Gas Turbine Temperature
8. Radio Altitude (Ft)	Radio Altitude
9. Roll (Deg)	Roll
10. Magnetic Heading (deg)	Magnetic Heading
11. Collective XPC (%)	% Collective Stick Position
12. Tail Rotor XPA (%)	% Tail Rotor Pedal Position ²

Table A-2. Unit abbreviations.

Units Abbreviation	Description
Deg C	Degrees Celsius
Bar	Bar
%	percent
Ft	feet
RPM	revolutions per minute

NOTE: For parameters with a unit description of discrete, a discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.

² See section 4.3 of this report for a description of the limitations of the Tail Rotor Pedal XPA parameter.