

# NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division  
Washington, D.C. 20594

October 23, 2014

## Flight Data Recorder

### Specialist's Factual Report By Christopher Babcock

#### 1. EVENT SUMMARY

Location: Houma, Louisiana  
Date: October 22, 2012  
Aircraft: AgustaWestland AW139  
Registration: N385RH  
Operator: ERA Aviation  
NTSB Number: CEN13FA025

On October 22, 2012, an AgustaWestland AW139 helicopter, registration N385RH, was substantially damaged after colliding with terrain following a loss of control while the helicopter was being repositioned on the Houma-Terrebonne Airport in Houma, LA. One of the two airline transport-rated pilots on board suffered a serious injury. The helicopter was registered to and operated by ERA Helicopters LLC under the provisions of *14 Code of Federal Regulations* Part 91 as a repositioning flight. A combination flight data and cockpit voice recorder was recovered from the helicopter and forwarded to the NTSB Vehicle Recorder Laboratory for evaluation.

#### 2. FLIGHT DATA RECORDER GROUP

A flight data recorder group was not convened.

#### 3. FDR Carriage Requirements

The event aircraft, N385RH, was manufactured in June 2008, and was operating such that it was required to be equipped with an FDR that recorded, at a minimum, the 23 parameters, as cited in Appendix C to Part 135.

#### 4. DETAILS OF FDR INVESTIGATION

The National Transportation Safety Board's (NTSB's) Vehicle Recorder Division received the following device:

Recorder Manufacturer/Model: **Penny & Giles MPFR**  
Recorder Serial Number: **393806-005**

## **4.1. Penny & Giles MPFR Description**

The MPFR is a combination flight data and cockpit voice recorder.<sup>1</sup> The FDR portion of the MPFR records aircraft flight data in a digital format using solid-state memory chips as the recording medium. For this installation, the MPFR records information in an ARINC 573/717 format. The unit is configured to record 512 12-bit words of digital information every second. Each grouping of 512 words is called a subframe. Each subframe has a unique 12-bit synchronization word identifying it as subframe 1, 2, 3, or 4. The synch word is the first word in each subframe. Each parameter (e.g. altitude, airspeed, heading) has a specifically assigned word location within the subframe. The MPFR is designed to meet the crash-survivability requirements of TSO-123a and TSO-124a.

### **4.1.1. Recorder Condition**

The recorder was in good condition and the data were extracted normally from the recorder.

### **4.1.2. Recording Description**

The FDR recording contained approximately 25 hours of data. Timing of the FDR 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 3 minutes.

### **4.1.3. Engineering Units Conversions**

The engineering units conversions used for the data contained in this report are based on documentation from the 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=+).<sup>2</sup>

Table A-1 lists the FDR parameters verified and provided in this report. The data includes two values each for lateral, normal, and longitudinal acceleration. The parameters Accel Lat, Accel Long, and Accel Norm are sourced from the FDR tri-axial accelerometer while the Norm Accel \_AHRS\_, Lat Accel \_AHRS\_, and Long Accel \_AHRS\_ parameters are sourced from the Attitude Heading Reference System components.

## **4.2. Time Correlation**

Correlation of the FDR data from SRN to the local central daylight time was established by using the recorded UTC Time Hour, Time Minute, and Time Seconds parameters and then applying an additional 5 hour offset to correct to local central daylight time.

## **4.3. FDR Plots and Corresponding Tabular Data**

Figures 1 through 3 show basic, engine, and flight control data respectively from the accident flight. Figure 4 shows flight control data zoomed in on the accident event.

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<sup>1</sup> See Group Chairman's CVR Factual Report for details on the CVR

<sup>2</sup> 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 = +.

Figures 5 through 7 show basic, engine, and flight control data respectively from a maintenance test flight just after midnight on the accident day. Figures 8 through 11 show basic, engine, and flight control data respectively for a repositioning flight that took place after the maintenance flight and just prior to the accident flight.

The corresponding tabular data used to create these 11 plots are provided in electronic comma separated value (\*.csv) format as attachment 1 to this report.

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# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

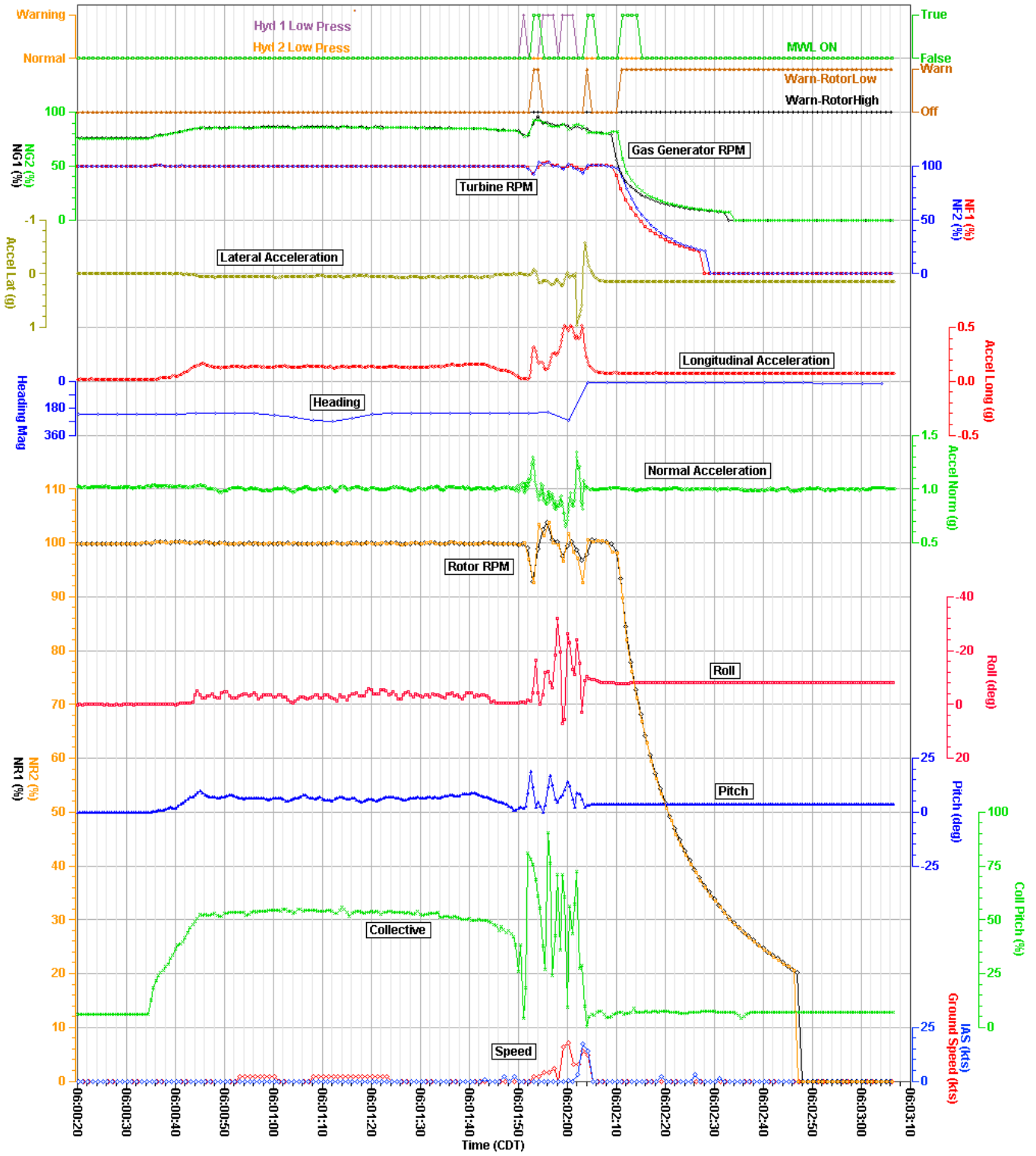


Figure 1. Basic flight data from accident flight.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

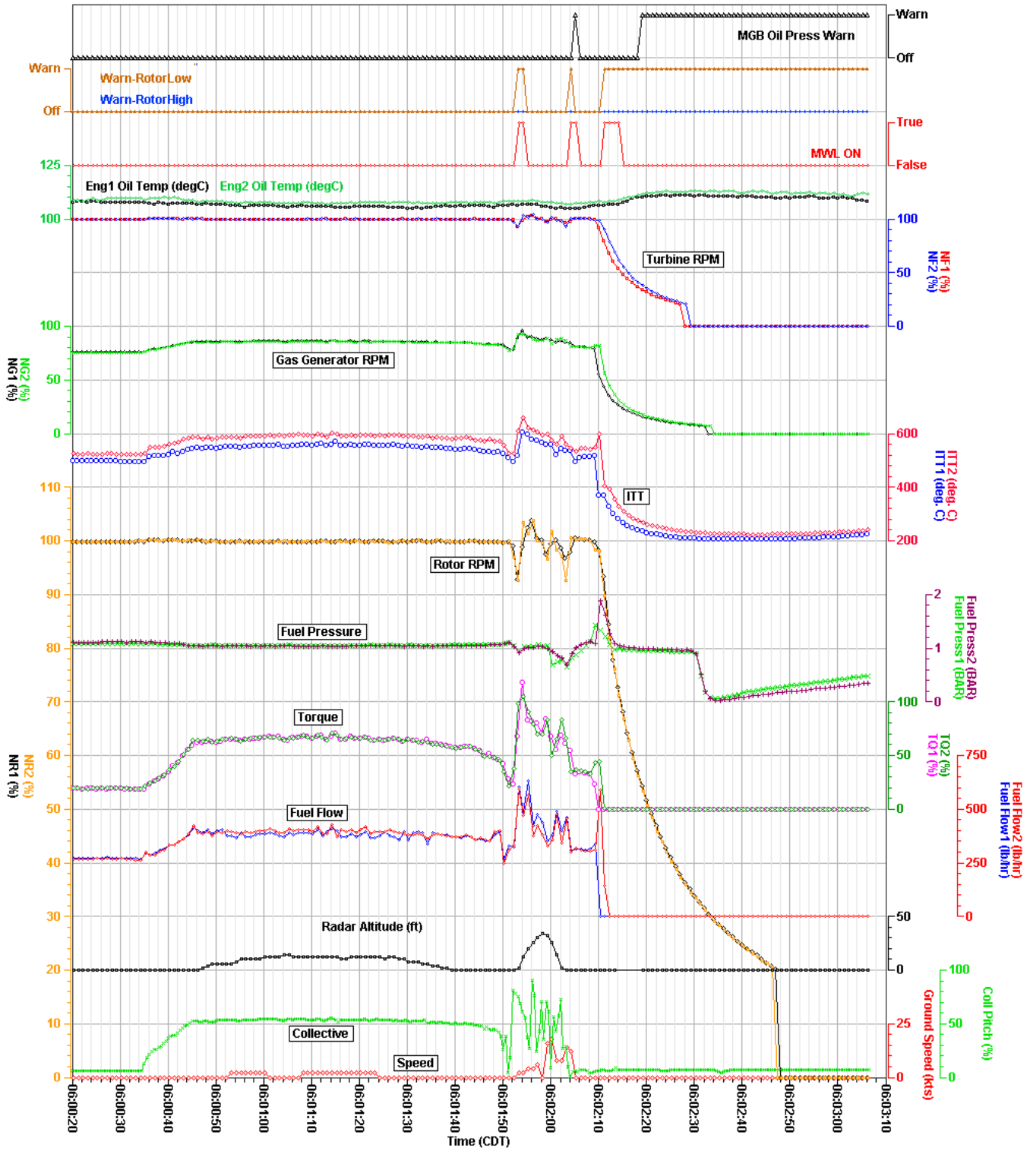


Figure 2. Engine data from accident flight.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

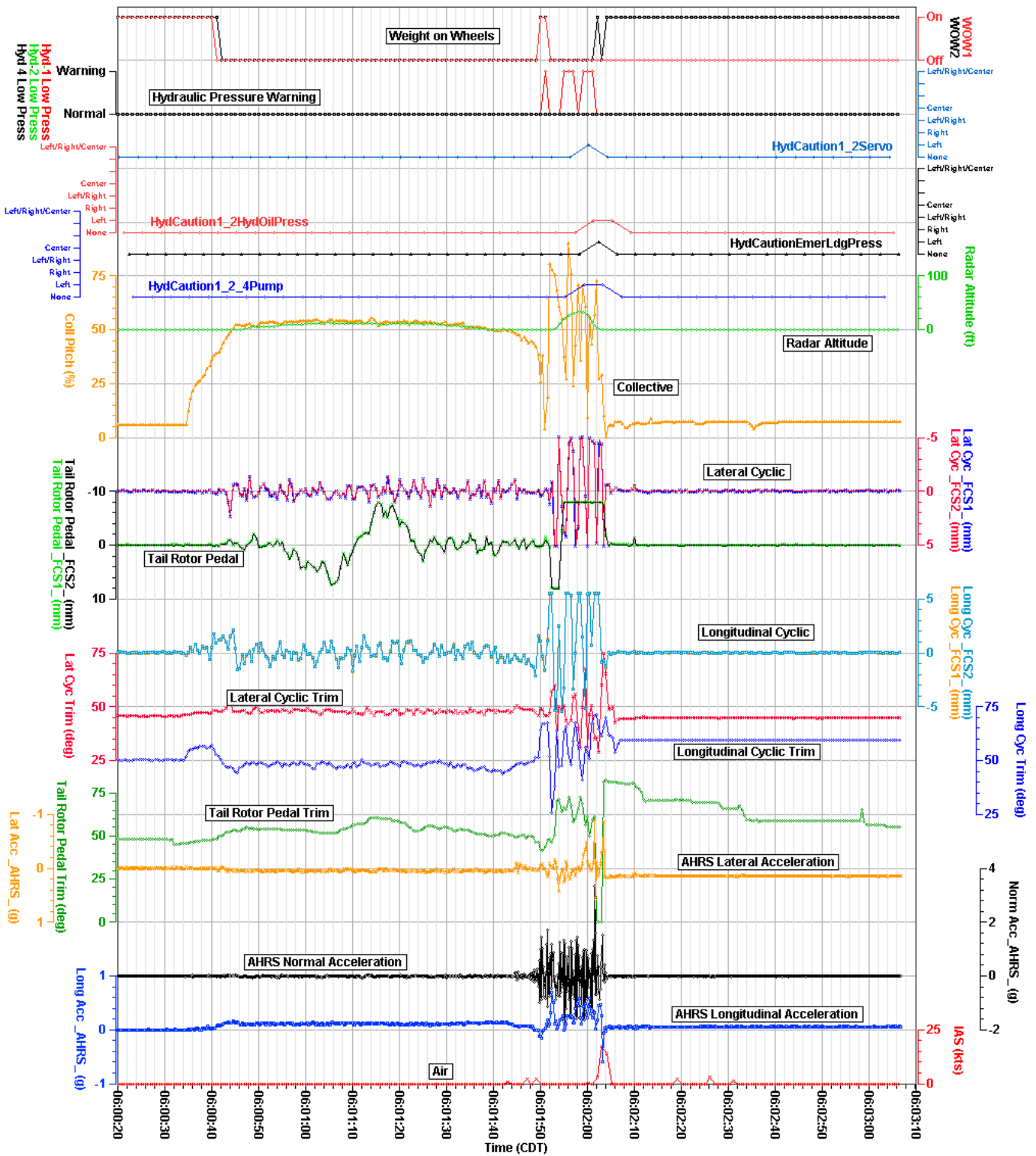


Figure 3. Flight control data from accident flight.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

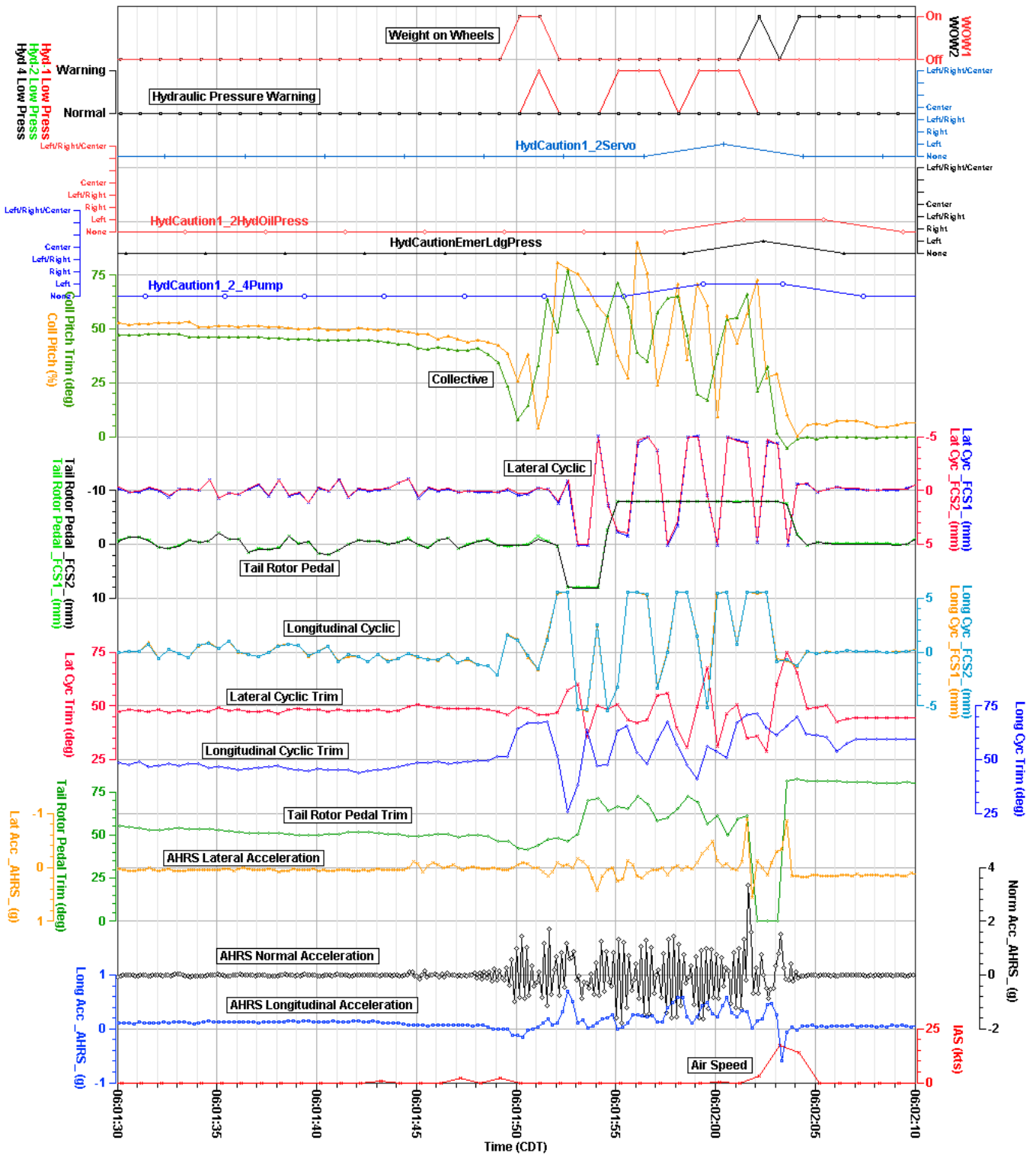


Figure 4. Flight control data from accident event.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

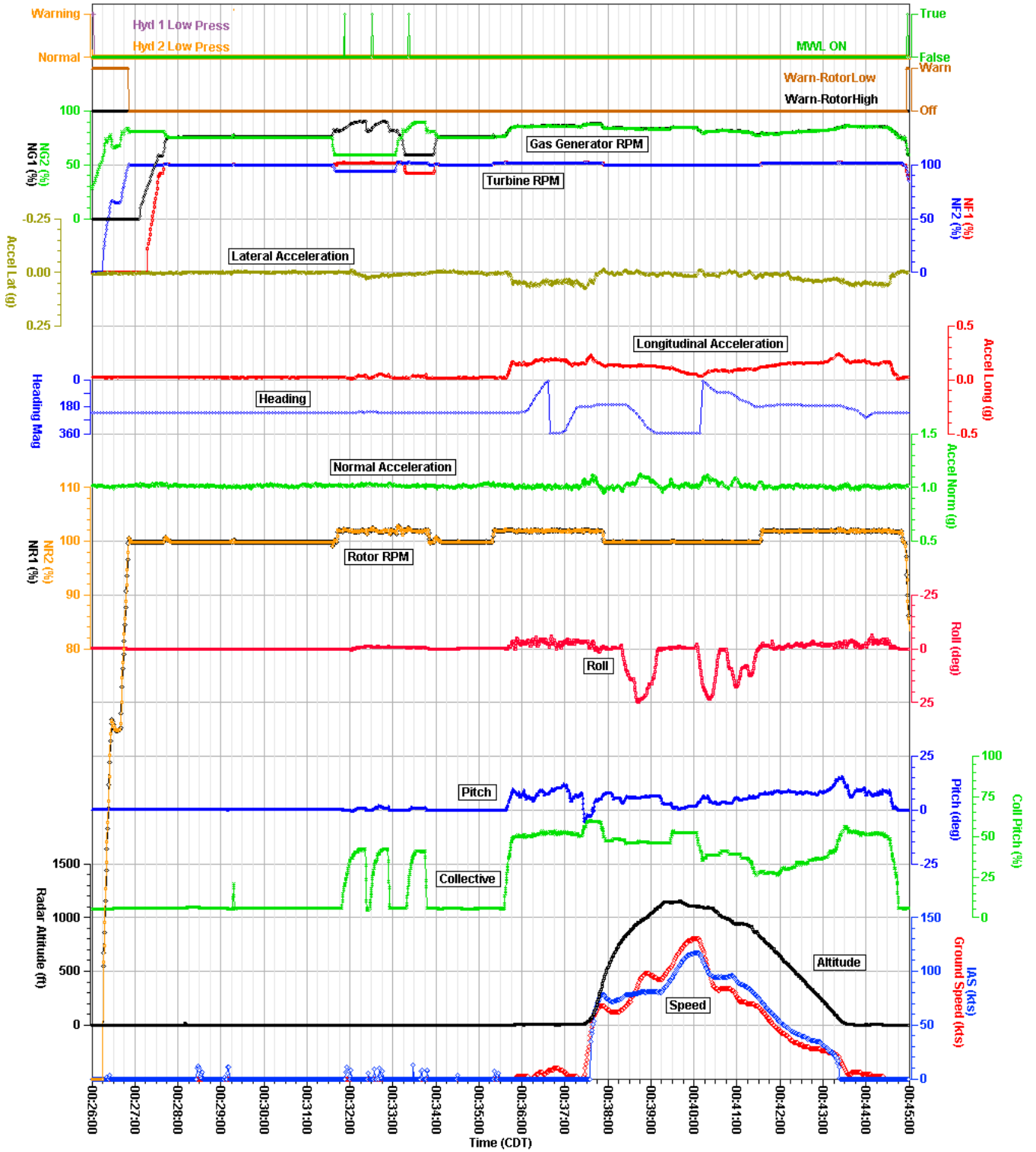


Figure 5. Basic flight data from maintenance flight.



# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

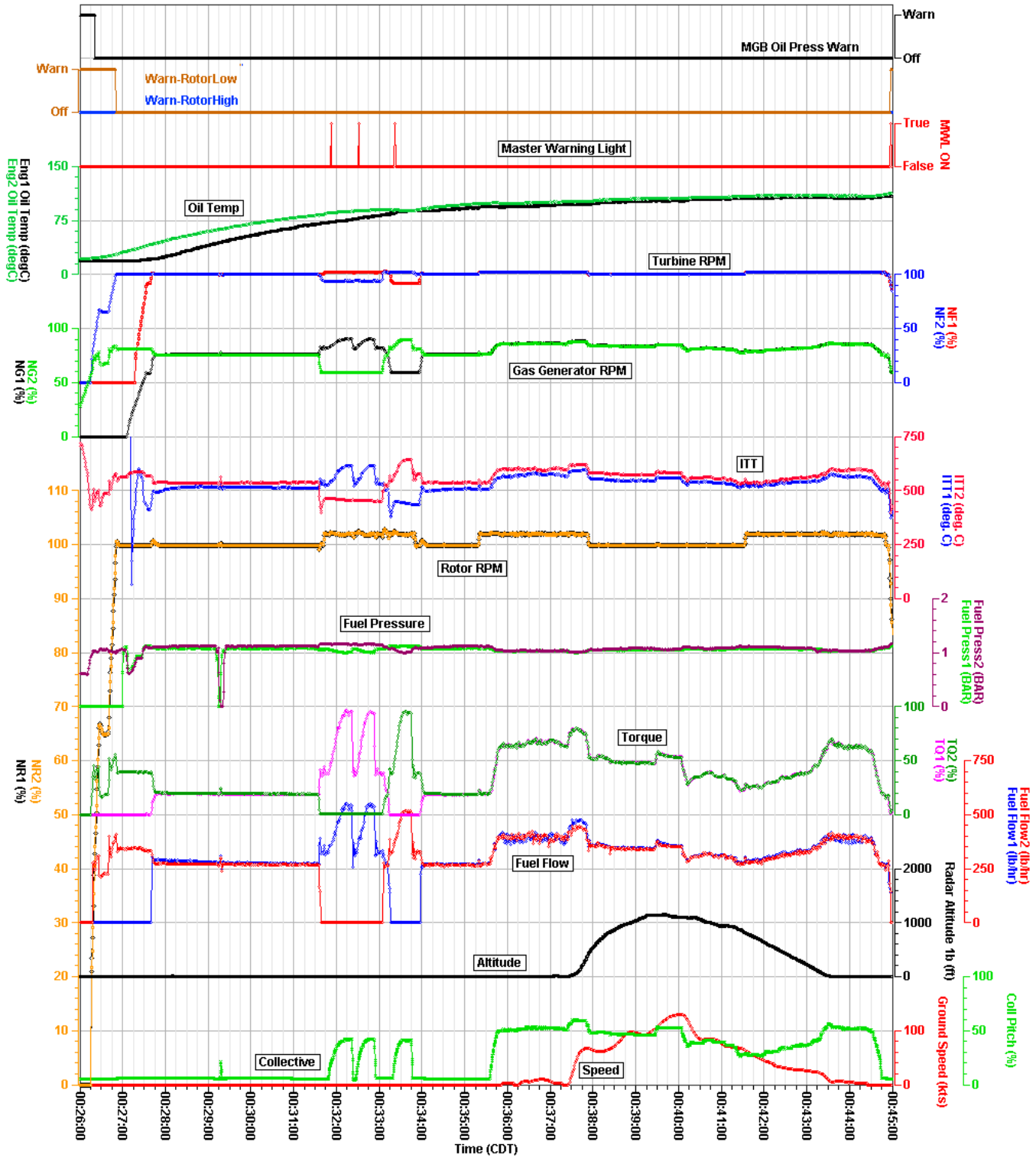


Figure 6. Engine data from maintenance flight.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

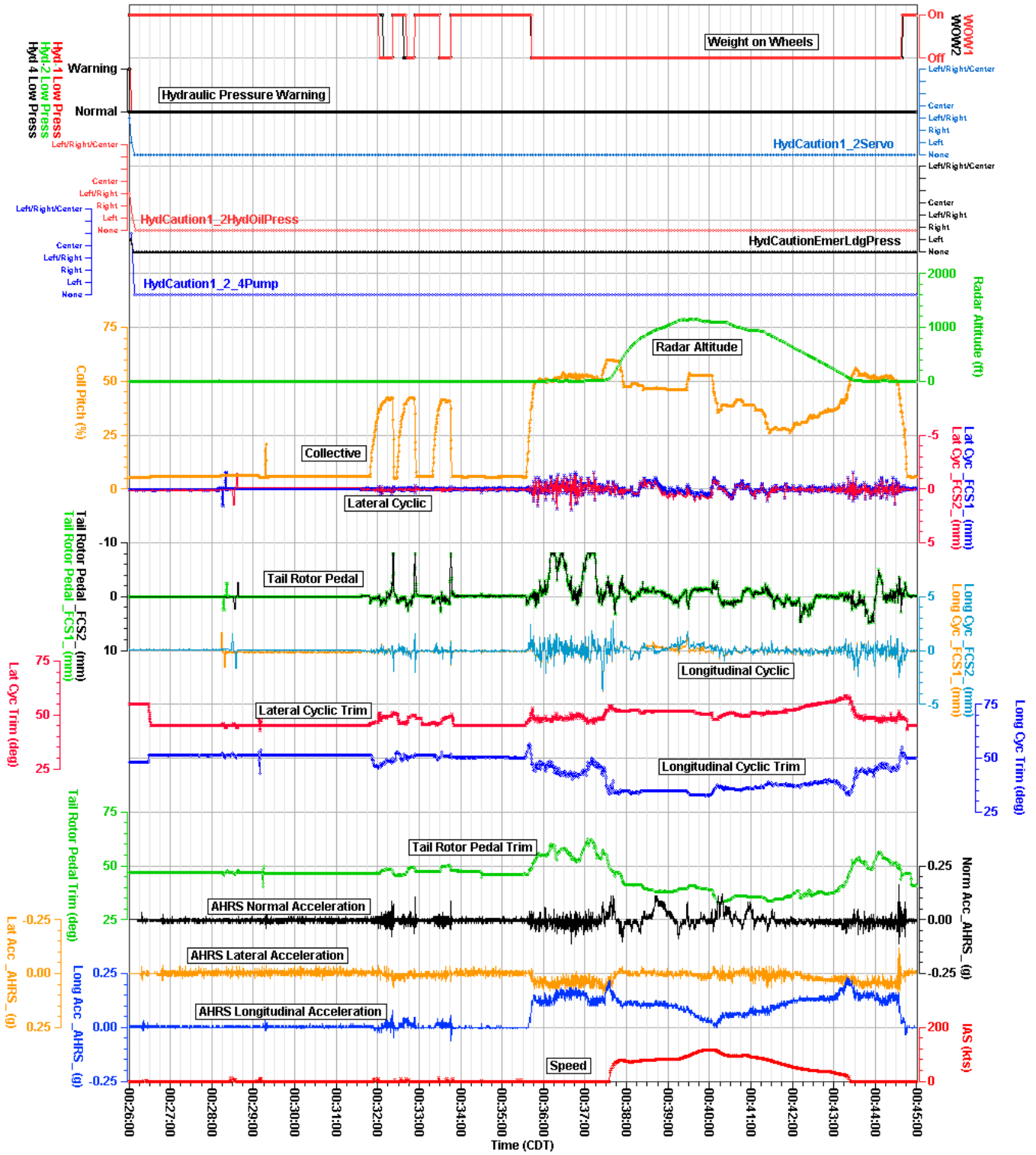


Figure 7. Flight control data from maintenance flight.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

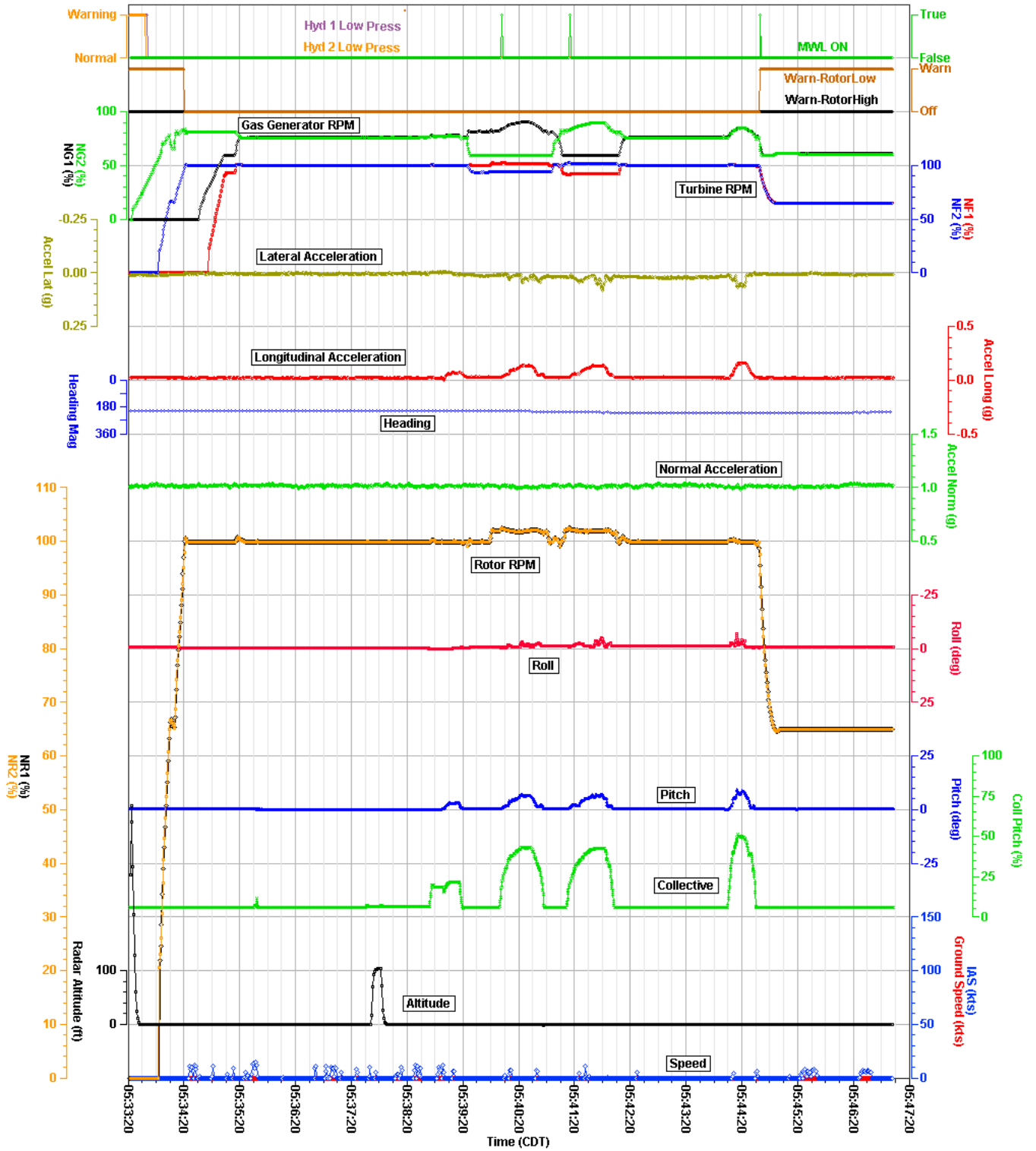


Figure 8. Basic flight data from repositioning flight.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

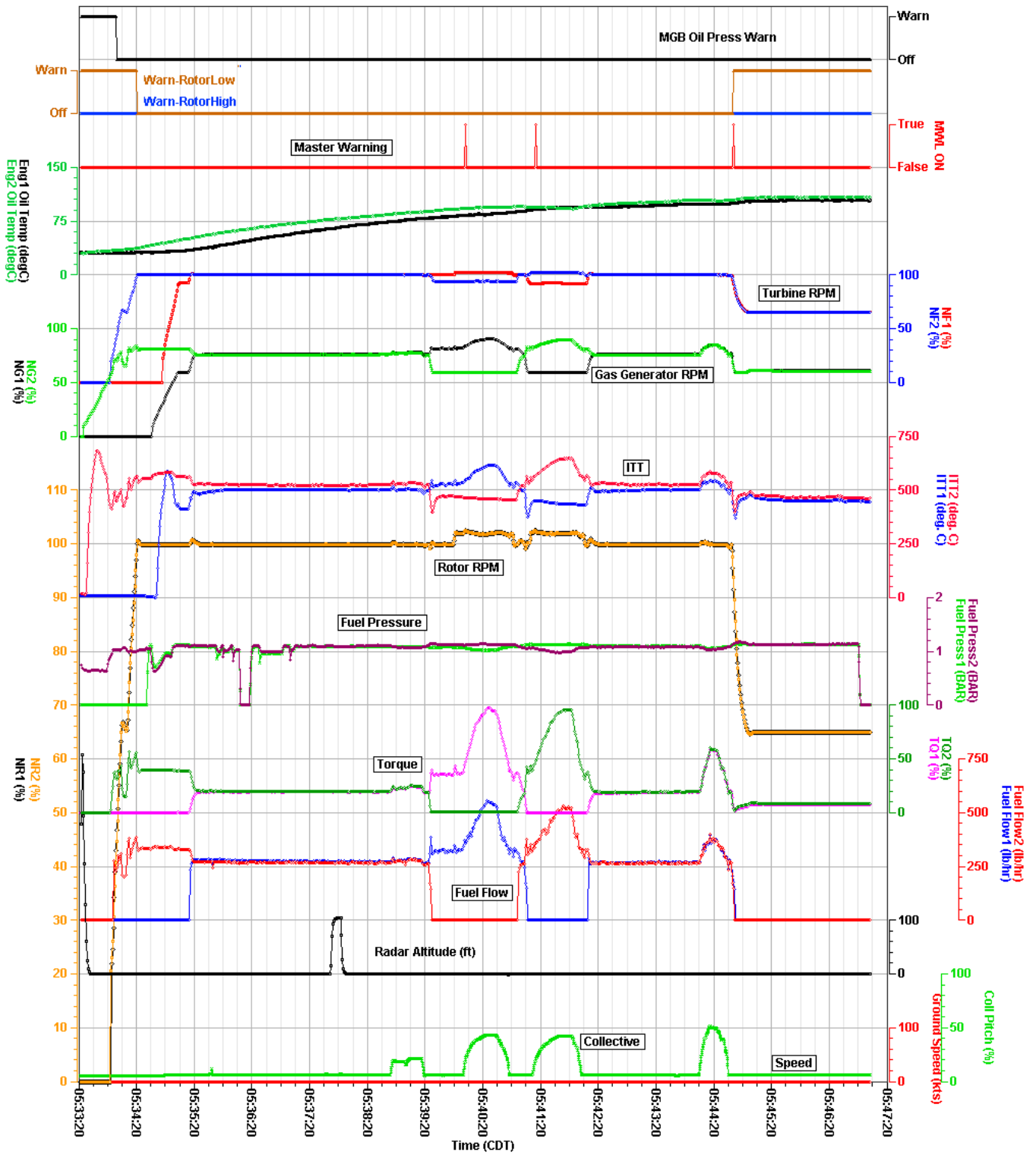


Figure 9. Engine data from repositioning flight.

# ERA Helicopters, Agusta Westland AW139, N385RH

Location, Date: Houma, Louisiana, 10/22/12

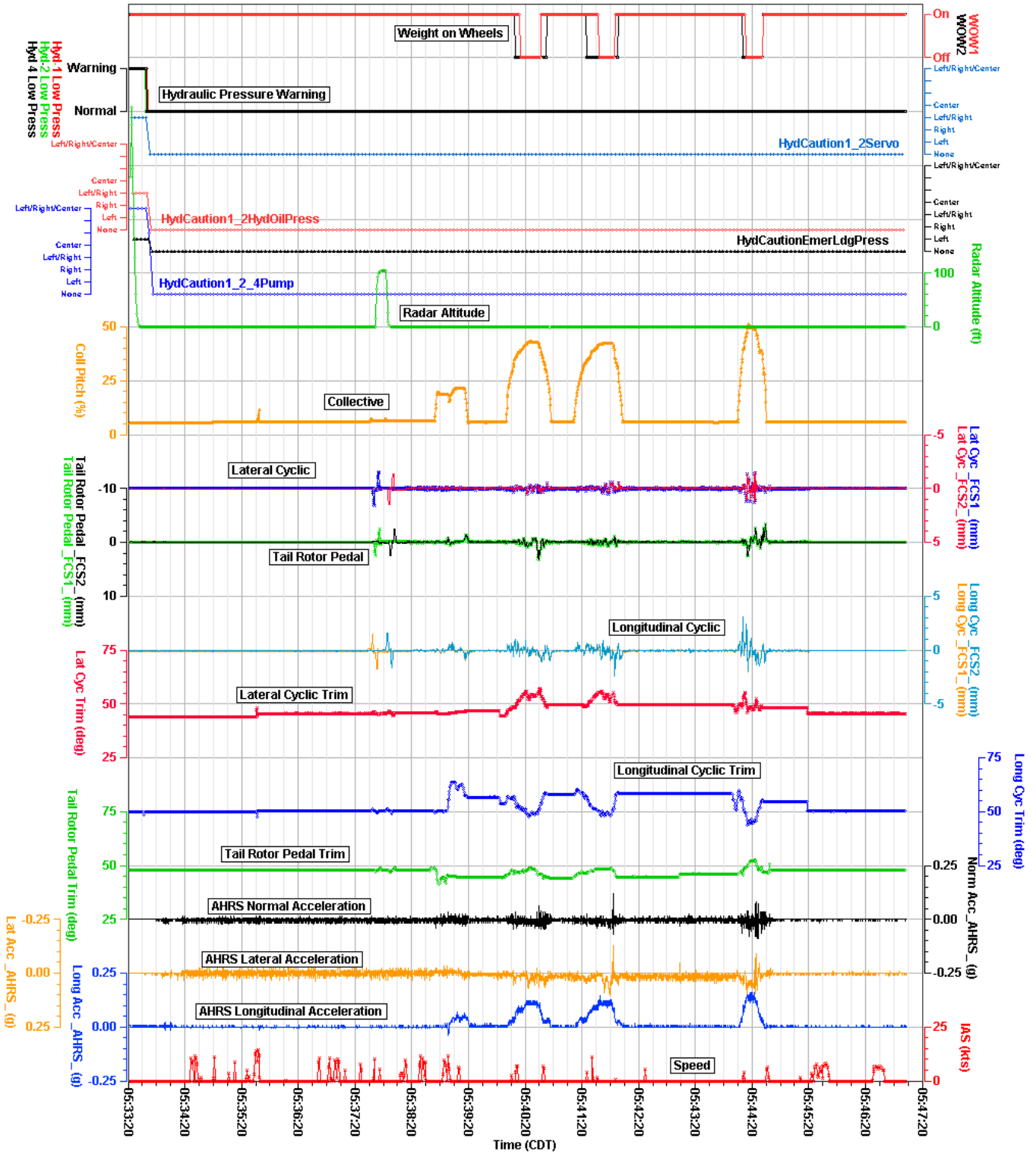


Figure 10. Flight control data from repositioning flight.

## APPENDIX A

This appendix describes the parameters provided and verified in this report.

**Table A-1.** Verified and provided FDR parameters.

Parameter Name	Parameter Description
1. Accel Lat (g)	Lateral FDR Acceleration - Analog
2. Accel Long (g)	Longitudinal FDR Acceleration - Analog
3. Accel Norm (g)	Normal FDR Acceleration - Analog
4. Coll Pitch (%)	Collective Pitch
5. Coll Pitch Trim (deg)	Collective Pitch Trim
6. Eng1 Oil Temp (degC)	Engine 1 Oil Temperature
7. Eng2 Oil Temp (degC)	Engine 2 Oil Temperature
8. Fuel Flow1 (lb/hr)	Engine 1 Fuel Flow
9. Fuel Flow2 (lb/hr)	Engine 2 Fuel Flow
10. Ground Speed (kts)	Ground Speed
11. Heading Mag (deg)	Magnetic Heading
12. Hyd 1 Low Press	Hydraulic Pump 1 Low Pressure Caution Discrete
13. Hyd 2 Low Press	Hydraulic Pump 2 Low Pressure Caution Discrete
14. Hyd 4 Low Press	Hydraulic Pump 4 Low Pressure Caution Discrete
15. HydCaution1_2HydOilPress	Hydraulic System 1/2 Low Pressure Caution Discrete
16. HydCaution1_2Servo	Hydraulic Servo System 1/2 in Bypass Caution Discrete
17. HydCautionEmerLdgPress	Emergency Landing Gear Extension Low Pressure Caution Discrete
18. IAS (kts)	Indicated Airspeed
19. Lat Acc _AHRS_ (g)	AHRS Lateral Acceleration - Digital
20. Lat Cyc _FCS1_ (mm)	Lateral Cyclic RVDT from Flight Control System 1
21. Lat Cyc _FCS2_ (mm)	Lateral Cyclic RVDT from Flight Control System 2
22. Lat Cyc Trim (deg)	Lateral Cyclic Trim
23. Long Acc _AHRS_ (g)	AHRS Longitudinal Acceleration - Digital
24. Long Cyc _FCS1_ (mm)	Longitudinal Cyclic RVDT from Flight Control System 1
25. Long Cyc _FCS2_ (mm)	Longitudinal Cyclic RVDT from Flight Control System 2
26. Long Cyc Trim (deg)	Longitudinal Cyclic Trim
27. MWL On	Master Warning Light On Discrete
28. NF1 (%)	Engine 1 Free Turbine Speed
29. NF2 (%)	Engine 2 Free Turbine Speed
30. NG1 (%)	Engine 1 Gas Generator Speed
31. NG2 (%)	Engine 2 Gas Generator Speed
32. Norm Accel _AHRS_ (g)	AHRS Normal Acceleration - Digital
33. NR1 (%)	Rotor Speed from Electronic Engine Control 1
34. NR2 (%)	Rotor Speed from Electronic Engine Control 2
35. PTT Cplt	Copilot Push-to-Talk Switch Discrete
36. PTT Plt	Pilot Push-to-Talk Switch Discrete
37. Radar Altitude (ft)	Radar Altitude
38. Roll (deg)	Roll Angle
39. Tail Rotor Pedal _FCS1_ (mm)	Tail Rotor Pedal RVDT from Flight Control System 1
40. Tail Rotor Pedal _FCS2_ (mm)	Tail Rotor Pedal RVDT from Flight Control System 2
41. Tail Rotor Pedal Trim (deg)	Tail Rotor Pedal Trim
42. TQ1 (%)	Engine 1 Torque

Parameter Name	Parameter Description
43. TQ2 (%)	Engine 2 Torque
44. Warn-Rotor High	High Rotor RPM Warning Discrete
45. Warn-Rotor Low	Low Rotor RPM Warning Discrete
46. WOW1	Weight on Wheels 1 Discrete
47. WOW2	Weight on Wheels 2 Discrete

**Table A-2.** Unit abbreviations.

Units Abbreviation	Description
deg	degrees
kts	knots
g	g
degC	degrees Celsius
ft	feet
mm	milimeters
lb	pounds
hr	hours

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.