

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

August 5, 2021

Engine Monitoring Unit

Specialist's Factual Report

By Sean Payne

1. EVENT SUMMARY

Location: Palmyra, PA
Date: April 3, 2021
Aircraft: Robinson R66
Registration: N577DD
Operator: Private
NTSB Number: ERA21LA171

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following engine monitoring unit:

Device Manufacturer/Model:	Rolls-Royce EMU-300
Serial Number:	YR89102

2.1. Device Description

The Rolls-Royce EMU-300 is an engine monitoring unit capable of recording both engine fault and exceedance data, as well as limited 1 Hz engine performance data. The device can contain many years of logged data which is written to an internally secured and protected Compact Flash (CF) card. Undamaged units can be accessed by using a specialized cable and Rolls-Royce "owner's level" software. Rolls-Royce also provides a procedure for recovering data from damaged units. There are two versions of the software associated with the unit. One version, the "owner's level," allows review and summarization of exceedance data as well as the ability to reset a fault light on the unit which indicates the device had recorded an exceedance. The "owner's level" software also permits the download of a .EMUDATA filetype which contains 1 Hz engine monitor data. Rolls-Royce controls another version of the software that allows the .EMUDATA log to be reviewed and converted, as well as allows factory reset of the device and deletion of data.

2.2. Data Recovery

The device arrived at the Vehicle Recorder Division undamaged. The device is shown in Figure 1. The powered up normally and the data were extracted using the manufacturer's software and a custom cable.



Figure 1. The Rolls-Royce EMU-300 from the accident aircraft.

2.3. Data Description

The device contained fault, exceedance and 1 Hz data back to the year 2015. The date and timestamp for this report is provided in Universal Coordinated Time (UTC).

Attachment 1 is a summary log from the “owner’s level” software showing logged faults and exceedances.

The .EMUDATA log file was converted by Rolls-Royce and a session that was determined to be the accident flight is discussed in this report. The recording began at 19:08:50 and ended at 20:30:50. An offset of -49 seconds was applied to align the time of the EMU-300 to the data from the Garmin Aera 796 device which is discussed in the Global Positioning System Devices (GPS) – Specialist’s Factual Report, which can be found in the public docket for this accident.

2.4. Parameters Provided

Table 1 describes data parameters provided by the EMU-300.

Table 1. EMU-300 Data Parameters

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
EMU Temp (deg. F)	Engine monitoring unit temperature (degrees Fahrenheit)
TMOP (psi)	Torquemeter Oil Pressure (pounds per square inch)

N2 Speed (%)	Combustion section speed (percent)
N1 Speed (%)	Compressor section speed (percent)
MGT (deg. F)	Main gearbox temperature (degrees Fahrenheit)

2.5. OVERLAYS AND TABULAR DATA

Figure 2 is a plot of the 1 Hz EMU data for the entire accident flight. The recording began at 19:08:50 and ended at 20:30:50. Engine data for the flight was largely nominal.

Figure 3 is a plot of 1 Hz EMU data for the final portion of the accident flight. The plotted interval is from 20:28:00 to 20:31:00. Around 20:30:20, the data show a brief rise in values for all recorded parameters and then a drop off of the same parameters around 20:30:23. Data ended at 20:30:50.

Tabular data used to generate figures 2 and 3 are included in Attachment 2. This attachment is provided in electronic comma-delimited (.CSV) format.

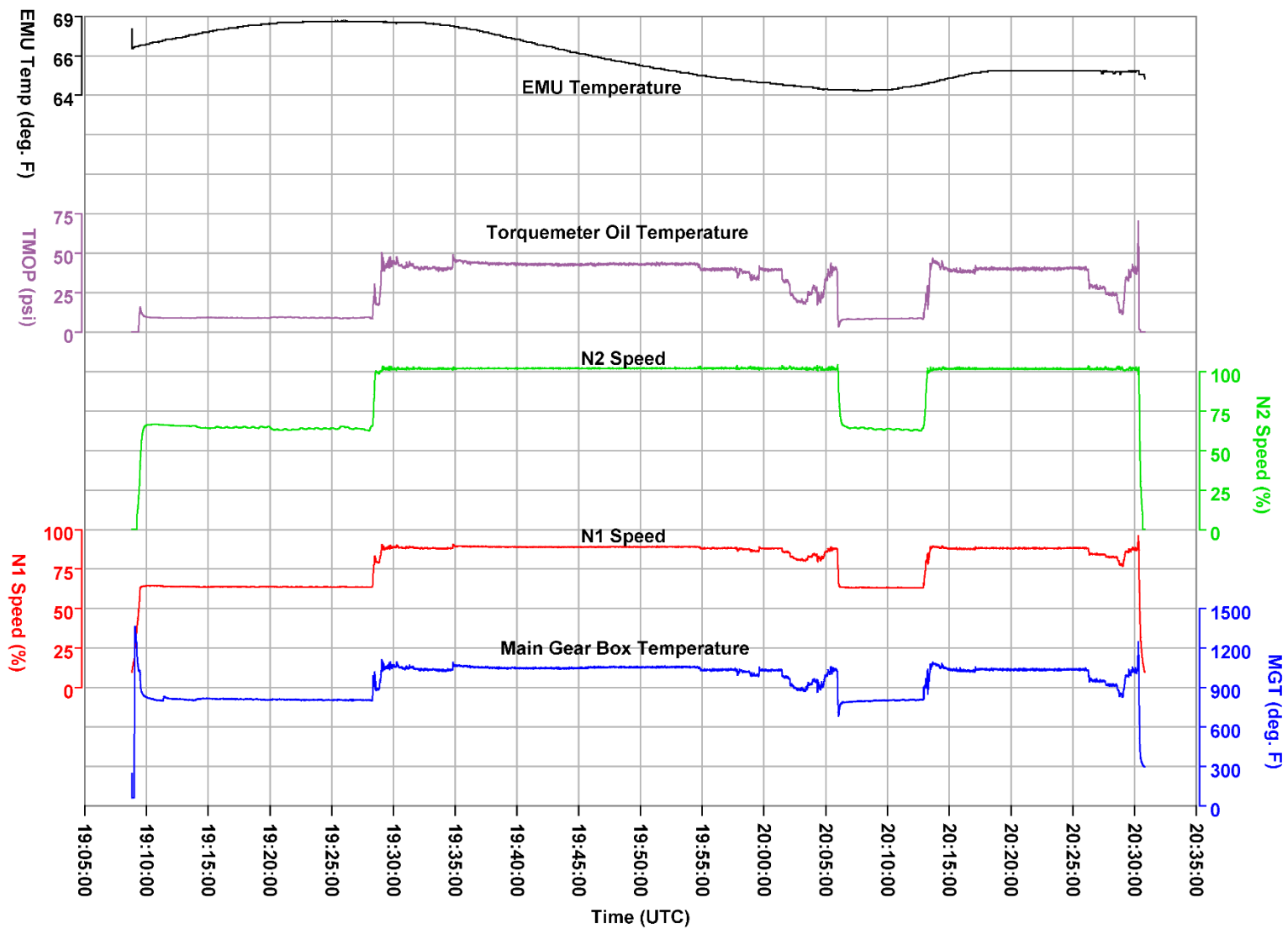


Figure 2. EMU data for the entire recorded session related to the accident flight.

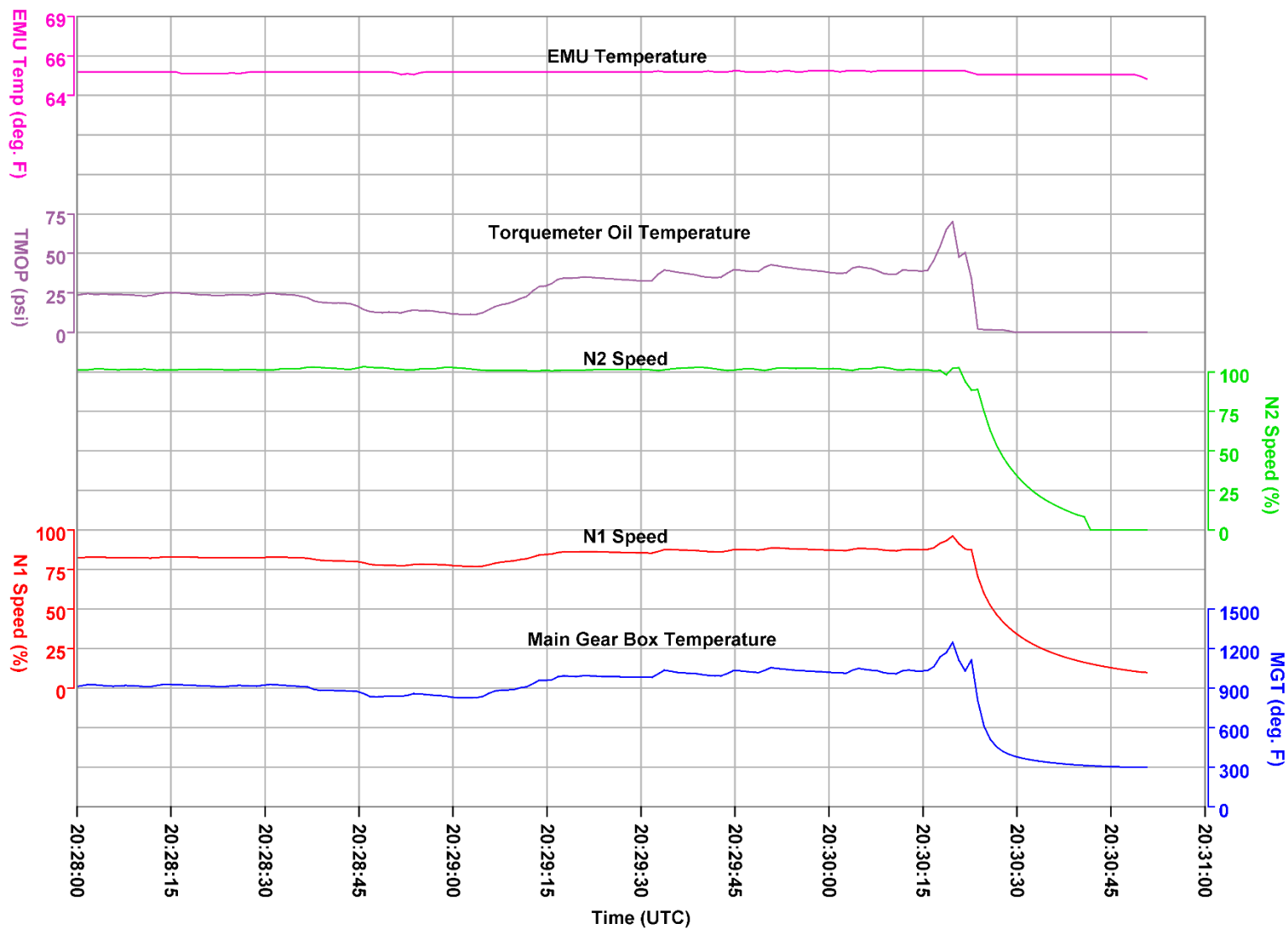


Figure 3. EMU data for the last 5 minutes of the recording session associated with the accident flight.