

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

September 21, 2018

Engine Monitor Devices

Specialist's Factual Report
By Ben Hsu

1. EVENT

Location: Austin, Texas
Date: July 22, 2017
Aircraft/ID: Cessna 180 / N3119D
Operator: Private
NTSB Number: CEN17LA283

2. EVENT SUMMARY

On July 22, 2017, at 1735 central daylight time, a Cessna 180, N3119D, impacted into Lake Travis near Austin, Texas. The pilot was uninjured, and the two passengers sustained minor injuries. The airplane sustained substantial damage. The airplane was operated by Up Above Austin, LLC, under 14 *Code of Federal Regulations* Part 91 as an air tour flight that was not operating on a flight plan. Visual meteorological conditions prevailed at the time of the accident for the local flight that was originating at the time of the accident.

3. DETAILS OF DEVICE INVESTIGATION

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

Device: J.P. Instruments EDM-700
Device Serial Number: 18066

Device: J.P. Instruments FS-450
Device Serial Number: Unknown

The J.P. Instruments (JPI) EDM-700 and FS-450 were known to have been exposed to water during the accident, however, arrived at the NTSB's laboratory dry. Figures 1 and 2 show the condition of the devices as they arrived. The devices were inspected, and power was applied normally using laboratory hardware. Data was downloaded from the EDM-700 using the manufacturer's tools and the FS-450 was examined manually.

3.1. JPI EDM-700 Device Description

The JPI EDM-700 is a panel-mounted gauge that allows the operator to monitor and record up to 24 parameters related to engine operations. Depending on the installation, engine parameters monitored can include:

- Exhaust Gas Temperature (EGT)
- Cylinder Head Temperature (CHT)
- Oil Pressure and Temperature
- Manifold Pressure
- Outside Air Temperature
- Turbine Inlet Temperature
- Engine Revolutions Per Minute (RPM)
- Compressor Discharge Temperature
- Fuel Flow
- Carburetor Temperature
- Battery Voltage

The unit can also calculate, in real time, percent of maximum horsepower, fuel used, shock cooling rate, and EGT differentials between highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation.

The unit contains non-volatile memory¹ for data storage of the parameters recorded and calculated. The rate at which the data is stored is selectable by the operator from 2 to 500 seconds per sample. The memory can store up to 20 hours of data at a 6 second sample rate. The data can then be downloaded by the operator using the J. P. Instruments software.

3.1.1. JPI EDM-700 Data Description

The data extracted included 45 sessions from June 17, 2017 through July 22, 2017. The last recorded session was determined to be related to the accident and is included in this report. The data was recorded at a 6 second-per-sample rate.

3.1.2. JPI EDM-700 Parameters Provided

Table 1 describes data parameters recorded by the device. The recorded time is based on the unit's internal clock, which is set and updated by the user.

¹ Non-volatile memory is semiconductor memory that does not require external power for data retention.

Table 1. JPI EDM-700 Recorded Parameters

Parameter Name	Parameter Description
Time	Time for recorded data point (UTC)
Batt-1 (V)	Battery Voltage (Volts)
Eng1 CHT#-1 (degF)	Cylinder Head Temperature Cylinder # (degrees Fahrenheit)
Eng1 EGT#-1 (degF)	Exhaust Gas Temperature Cylinder # (degrees Fahrenheit)
Eng1 Shock Cool (deg/min)	Shock Cooling Rate (degrees Fahrenheit per minute)

3.1.3. JPI EDM-700 Data Time Correlation

The date and time on the device is manually adjusted by the operator. The device begins recording data when power is applied and stops when power is disconnected. Time displayed on the device was determined to be 41 minutes ahead of a reference clock. The device display only provides time to the nearest minute. All times included in this report have been adjusted to reflect this offset.

3.2. JPI FS-450 Device Description

The JPI FS-450 is a panel-mounted display, part of a fuel management system, capable of displaying fuel information to the pilot. The FS-450 relies on the pilot to reset the fuel capacity when refueling the aircraft, then the device uses fuel-flow instrument data to calculate the used and remaining fuel in the aircraft's fuel tank.

The FS-450 from this accident was powered normally using laboratory equipment. The display showed 0.2 gal remaining, 54.8 gal used.

4. OVERLAYS AND TABULAR DATA

Figure 3 is a plot of engine parameters from the accident flight recorded on the JPI EDM-700 device.

The tabular data from the accident flight recorded by the JPI EDM-800 device is included as Attachment 1. This attachment is provided in electronic comma separated value (CSV) format.

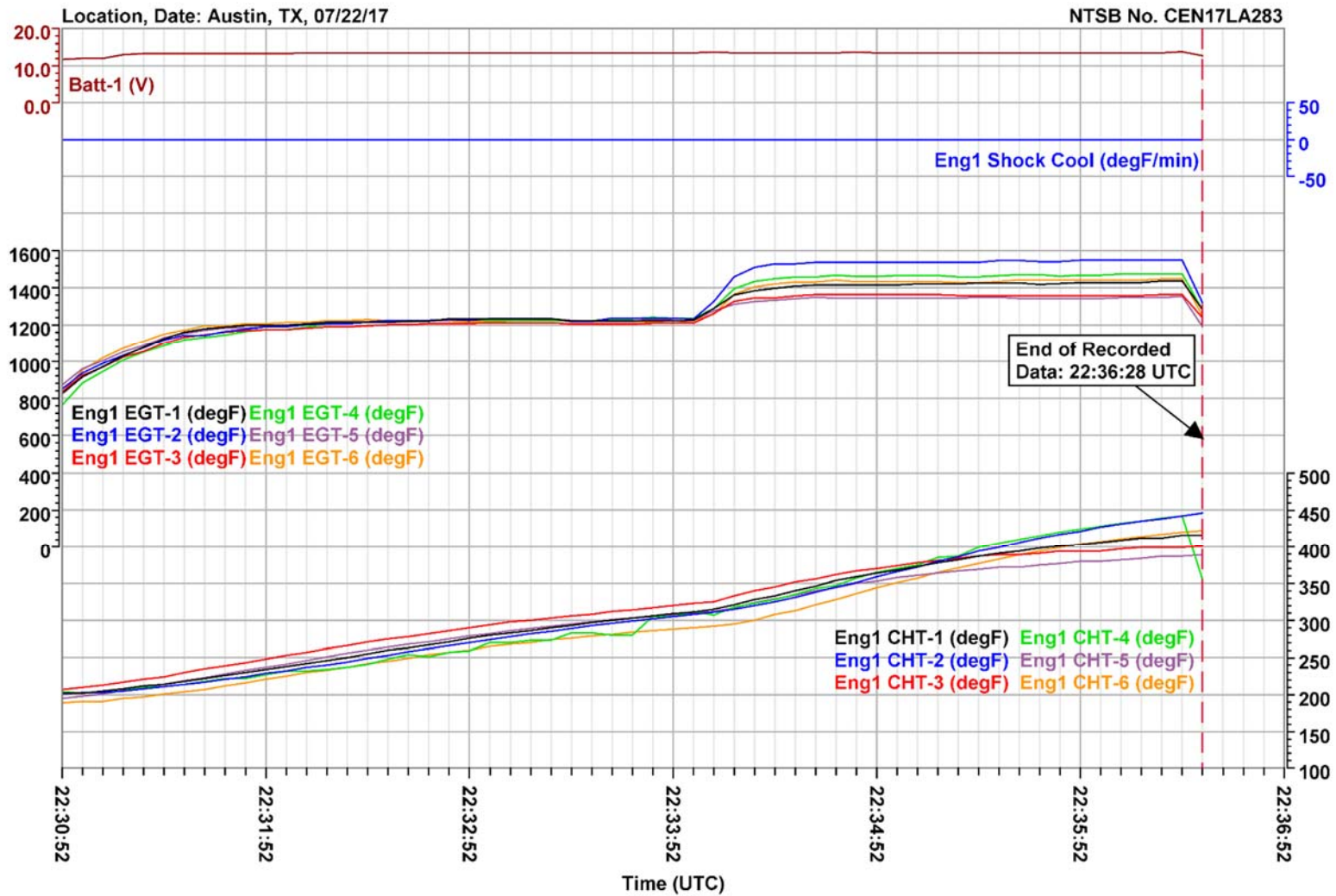


Figure 1. JPI EDM-700



Figure 2. JPI FS-450

Cessna 180, N3119D



Revised: 10 January 2018

Accident Flight

National Transportation Safety Board

Figure 3. Plot of accident flight data from JPI EDM-700