



RECORD OF CONVERSATION

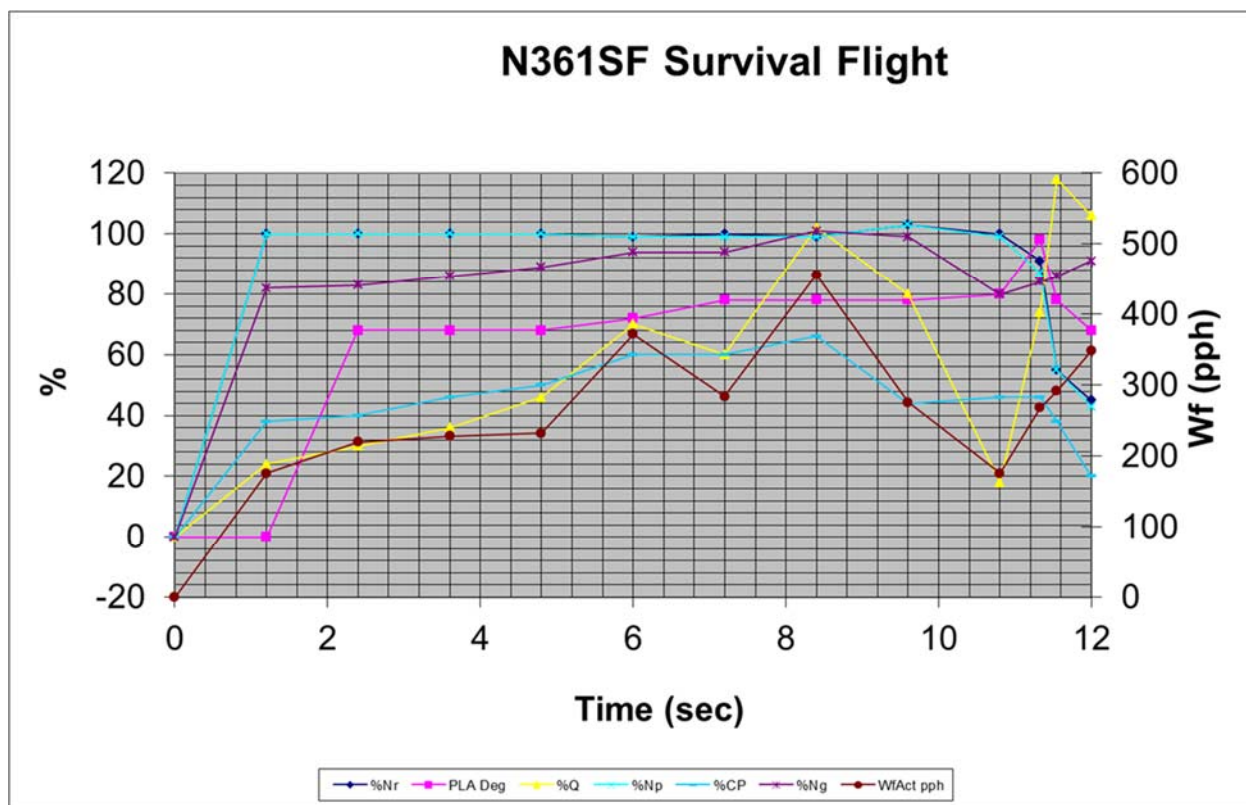
Jason Aguilera
Senior Air Safety Investigator
Central Region

Date: November 3, 2016
Person: Nicholas Shepler (Rolls-Royce)
NTSB Accident Number: CEN16LA386

The engine's ECU from the Bell 407 was sent to Triumph in West Hartford, CT, for data extraction.

A review of the data showed exceedances for main rotor (Nr) droop (speed) and torque (Q). These exceedances triggered the Incident Recorder (IR) function of the ECU are recorded as "snapshot data" during the download. Snapshot data is recorded each time a given parameter is exceeded; IR data records 10 lines of data prior to an exceedance and continues recording data for at least 48 seconds following the last exceedance. Data is recorded at a rate of 1 line every 1.2 seconds.

In this event, a total of 8 complete records or lines of data and 1 partial record were captured prior to the exceedances (pre-snapshot) and only 1 record was captured after the exceedances (post-snapshot). We should have recorded at least 48 post-snapshot records, so the lack of a full set of data implies that electrical power was lost to the ECU during the crash sequence.



In the graph below the following parameters are listed:

- %NR = Main Rotor Speed (in %)
- PLA Deg = Power Lever Angle (throttle - in degrees)
- %Q = Torque (in %)
- %Np = Power Turbine Speed (in %)
- %CP = Collective Pitch (in %)
- %Ng = Gas Generator Speed (in %)
- WfACT pph = Fuel Flow (in pound/hr)

The pre-snapshot data shows the engine at 100% NR, and other engine parameters (NG, Torque, collective) slowly increasing. At time = 6 seconds, there is a spike up in torque and fuel flow, and the throttle begins to increase as well. The throttle is already at 68 degrees, which is above the “fly” setting of 62 degrees. Therefore, the throttle increase does nothing to available power from the engine as long as the control is in auto mode (which it is). Another spike occurs at time = 8.4 seconds. These spikes are large relative to the collective inputs, which may be indicative of other aircraft control inputs adding to the demand on the engine. Immediately following this second spike, the collective is lowered, and the engine responds accordingly. Snapshot #1 for rotor droop occurs at time 11.3 seconds. This is likely when rotor blades began impacting hard objects. The torque goes up dramatically at this point as well. Snapshot #2 for this torque exceedance follows 0.2 seconds later. Rotor speed further decays, as shown in the last recorded data point at 12 seconds. Electrical power is then lost due to an interruption in aircraft 28 volt supply and the PMA being below 85% NP speed.

Numeric Record	Time HH:MM:SS.mmm Seconds	Ng %Ng	Nr %Nr	MGT Deg	Q %Q	Np %Np	WfAct pph	CP %CP	PLA Deg
1	0.000 00:00:00.000	0	0	0	0	0	0	0	0
2	1.200 00:00:00.000	82	100	980	24	100	176	38	0
3	2.400 714:36:14.520	83	100	980	30	100	220	40	68
4	3.600 714:36:15.720	86	100	1020	36	100	228	46	68
5	4.800 714:36:16.920	89	100	1040	46	100	232	50	68
6	6.000 714:36:18.120	94	99	1160	70	99	372	60	72
7	7.200 714:36:19.320	94	100	1140	60	99	284	60	78
8	8.400 714:36:20.520	101	99	1360	102	99	456	66	78
9	9.600 714:36:21.720	99	103	1300	80	103	276	44	78
10	10.800 714:36:22.920	80	100	900	18	99	176	46	80
NR Droop	11.328 714:36:23.448	84	91	1080	74	87	268	46	98
Q Exceedance	11.544 714:36:23.664	86	55	1140	118	55	292	38	78
11	12.000 714:36:24.120	91	45	1220	106	43	348	20	68