

## CEN18FA204

### Flight history based on autopilot and MFD log data

The following table summarizes flights of the accident airplane recorded by the Avidyne DFC90 autopilot and EX5000 multi-function display. The purpose of this analysis is to catalog basic information about flights conducted over the full time span represented by the logs. (The PFD logs were separately examined but do not cover as great a time span as either the autopilot or MFD logs, so no PFD data are presented here.)

The autopilot records three separate data files: a high-resolution file with high-rate, detailed information relating to flight status and autopilot performance; an intermediate-resolution file with similar, but less, information recorded at a lesser rate over a longer time span; and a low-resolution file that includes only GPS time and location sampled at 80 second intervals. Because this analysis is intended to cover the greatest possible time span, only the low-resolution data file was considered.

The MFD records GPS location and a variety of engine performance parameters (manifold pressure, RPM, oil temperature, oil pressure, individual cylinder CHT and EGT, etc.) sampled at six second intervals. Each record is identified by the UTC date and time at which it was recorded, based on the MFD's own clock. This clock is periodically corrected to GPS time but may, due to sampling errors and drift, be inexact.

Both the autopilot and MFD have limited storage capacity for logs and overwrite the oldest data when that capacity is reached. The exact duration of each set of logs is unpredictable due to variations in log content associated with specific in-flight events.

The autopilot was found to contain data from 2/8/18 until the accident. The MFD was found to contain data from 3/12/18 until the accident. The autopilot's low-resolution data file was found to contain all of the power cycles recorded by the MFD. Since the MFD data were previously analyzed, the table that follows includes additional data from the autopilot for those flights not covered by the MFD.

The following notes apply:

1. All date/time pairs are UTC.
2. For autopilot data, start and end times are the first and last recorded times received from the GPS.
3. For MFD data, start and end times are "MFD time", which may differ from GPS time or PFD time. Start and end times reflect MFD runtime, not flight time.
4. A location in Bonner Springs KS is sometimes recorded before the GPS achieves a lock. This is a known characteristic of Garmin GPS systems and has been ignored in this analysis.
5. A track file for import into Google Earth (.kml) was generated in certain cases using [www.gpsvisualizer.com](http://www.gpsvisualizer.com) in order to determine or confirm the path of flight. This was done to permit identification of training flights or other "local" flights, as opposed to what would appear to be discontinued cross-country flights.
6. In the original analysis of this flight, one specific log file ended prior to the airplane's arrival. As a result, the destination could not be determined with certainty. In this analysis, we have used autopilot data to confirm the destination.
7. Because of the low sampling rate of the MFD (6 sec) and slow write performance of the operating system, it is considered normal for MFD logs to lose the end of an accident sequence.

Airport identifiers include the following:

E80	Alexander Municipal Airport, Belen NM
KDNA	Doña Ana County International Jetport, Santa Teresa NM
KHOB	Lea County Regional Airport, Hobbs NM
KHSD	Sundance Airport, Oklahoma City OK
KMAF	Midland International Air & Space Port, Midland TX
KMDD	Midland Airpark, Midland TX
KPEQ	Pecos Municipal Airport, Pecos TX

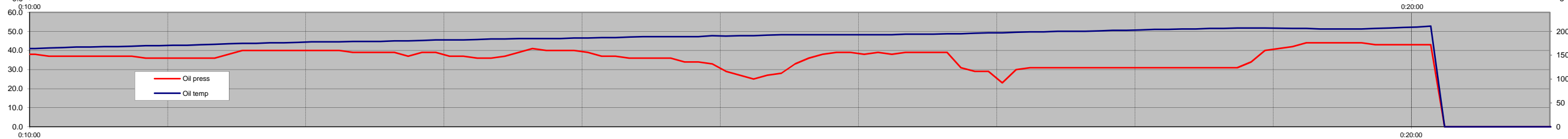
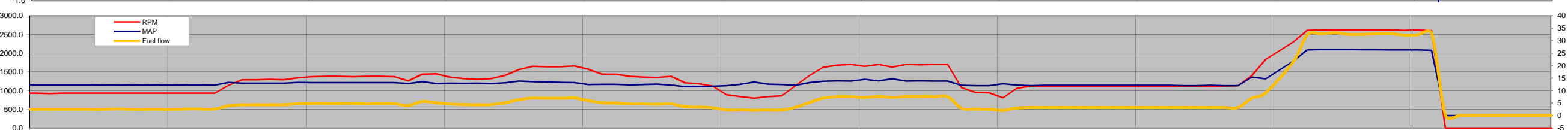
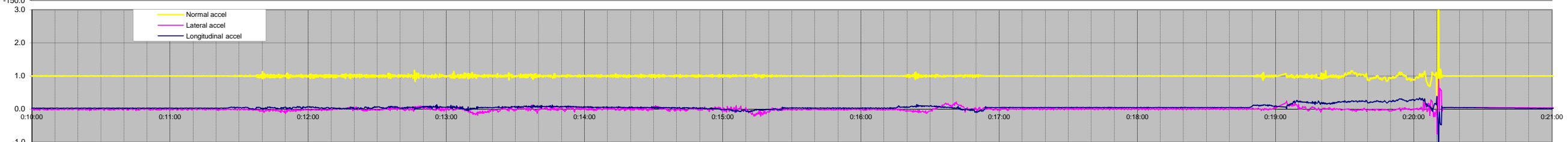
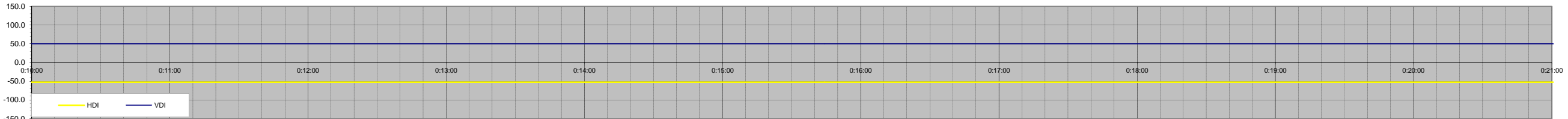
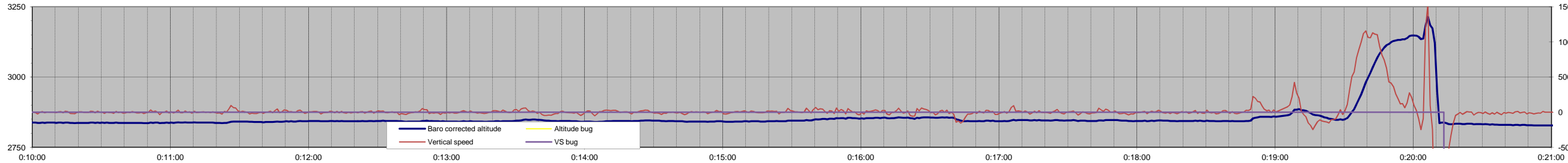
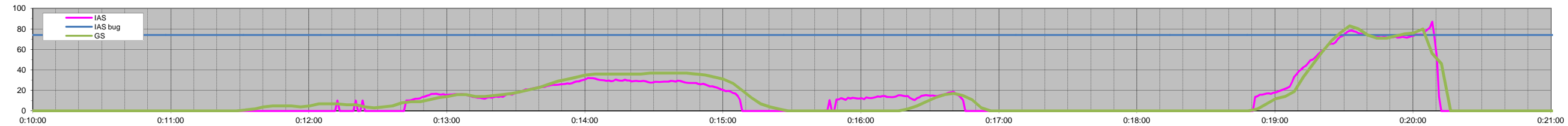
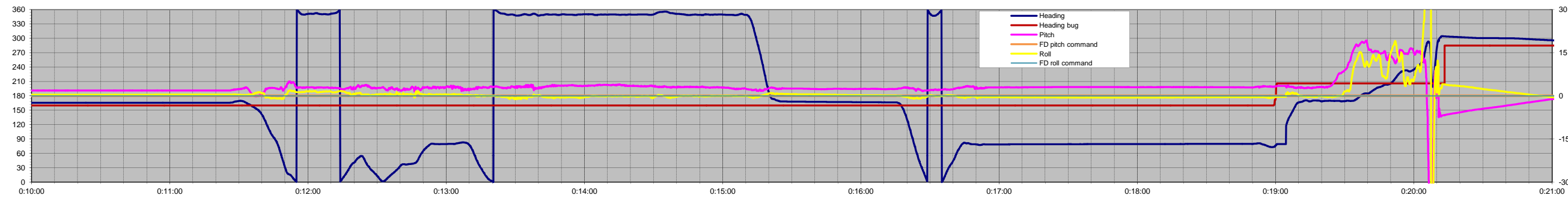
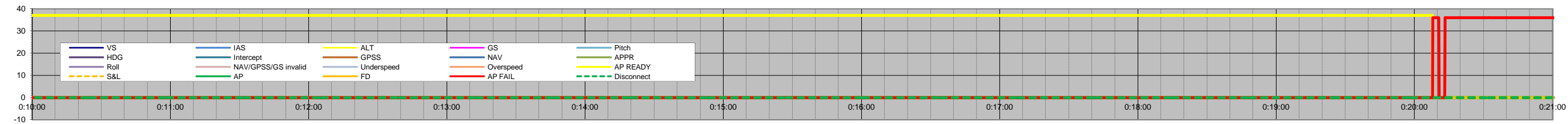
KSRE Seminole Municipal Airport, Seminole OK  
 KSRR Sierra Blanca Regional Airport, Ruidoso NM  
 KWWR West Woodward Airport, Woodward OK

Source	Date	Start time	End time	Duration	Starting location		Ending location		Comments
					Lat/long	Ident	Lat/long	Ident	
AP	2/8/18	21:39:00	23:25:42	1:46:42	31.94069 -102.211	KMAF	31.87803 -106.696	KDNA	
AP	2/11/18	21:30:48	21:41:30	0:10:42	31.87855 -106.707	KDNA	31.87803 -106.696	KDNA	No flight
AP	2/11/18	21:45:54	23:17:54	1:32:00	31.88404 -106.718	KDNA	31.94361 -102.21	KMAF	
AP	2/14/18	13:09:12	15:54:36	2:45:24	31.94069 -102.211	KMAF	36.47135 -99.5195	KWWR	
AP	2/14/18	16:15:48	17:01:06	0:45:18	36.43393 -99.5186	KWWR	35.62197 -97.7064	KHSD	
AP	2/14/18	22:20:36	0:40:36	2:20:00	35.60257 -97.7072	KHSD	31.94292 -102.21	KMAF	
AP	2/15/18	17:27:00	19:16:24	1:49:24	31.94103 -102.211	KMAF	31.87546 -106.689	KDNA	
AP	2/19/18	15:37:54	18:38:00	3:00:06	31.87855 -106.707	KDNA	35.6036 -97.7067	KHSD	
AP	2/20/18	22:57:12	23:02:36	0:05:24	35.59948 -97.7072	KHSD	35.59811 -97.7066	KHSD	No flight
AP	2/20/18	23:06:54	1:06:54	2:00:00	35.59501 -97.7064	KHSD	31.9431 -102.208	KMAF	
AP	2/22/18	21:52:06	23:48:06	1:56:00	31.94069 -102.211	KMAF	31.87786 -106.698	KDNA	
AP	2/25/18	17:30:24	18:58:24	1:28:00	31.8782 -106.707	KDNA	31.9431 -102.208	KMAF	
AP	2/26/18	19:58:42	22:13:24	2:14:42	31.94069 -102.211	KMAF	35.27573 -96.6749	KSRE	
AP	2/28/18	18:24:24	20:52:30	2:28:06	35.2747 -96.6739	KSRE	31.94275 -102.207	KMAF	
AP	3/1/18	21:05:42	22:40:24	1:34:42	31.94069 -102.211	KMAF	31.87958 -106.704	KDNA	
AP	3/5/18	18:38:24	20:14:24	1:36:00	31.87855 -106.707	KDNA	31.94189 -102.206	KMAF	
AP	3/8/18	12:43:42	14:50:24	2:06:42	31.94069 -102.211	KMAF	35.6012 -97.7066	KHSD	
AP	3/8/18	20:59:18	0:23:18	3:24:00	35.6012 -97.7069	KHSD	31.87271 -106.68	KDNA	
MFD	3/12/18	17:06:36	18:21:42	1:15:06	31.8785 -106.7071	KDNA	33.4652 -105.5381	KSRR	
MFD	3/12/18	21:08:00	22:30:48	1:22:48	33.4652 -105.5388	KSRR	31.9407 -102.2113	KMAF	
MFD	3/14/18	17:52:14	20:04:48	2:12:34	31.9407 -102.2113	KMAF	35.2716 -96.6721	KSRE	
MFD	3/16/18	14:32:36	17:07:30	2:34:54	35.2718 -96.6721	KSRE	31.9407 -102.2110	KMAF	
MFD	3/16/18	20:50:54	20:55:48	0:04:54	31.9410 -102.2123	KMAF	31.9412 -102.2120	KMAF	No flight
MFD	3/16/18	21:45:44	21:49:36	0:03:52	31.9412 -102.2120	KMAF	31.9409 -102.2113	KMAF	No flight
MFD	3/17/18	13:10:16	14:57:36	1:47:20	31.9407 -102.2111	KMAF	31.8780 -106.7049	KDNA	
MFD	3/19/18	16:34:22	18:00:24	1:26:02	31.8784 -106.7071	KDNA	34.6462 -106.8302	E80	
MFD	3/19/18	22:51:53	00:05:36	1:13:43	34.6468 -106.8300	E80	31.8784 -106.7071	KDNA	

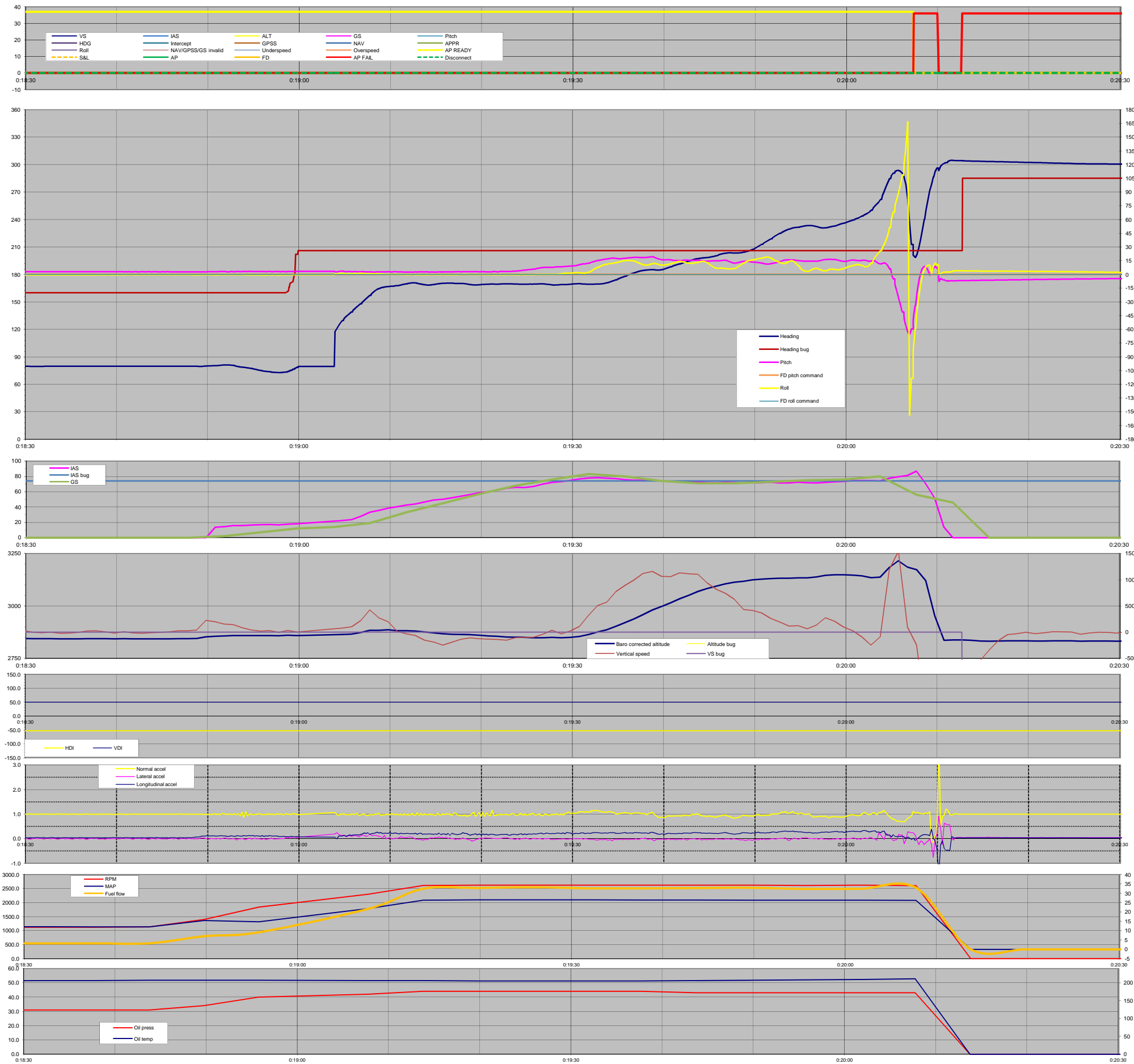
Source	Date	Start time	End time	Duration	Starting location		Ending location		Comments
					Lat/long	Ident	Lat/long	Ident	
MFD	3/20/18	19:34:43	21:04:36	1:29:53	31.8784 -106.7071	KDNA	31.9407 -102.2110	KMAF	
MFD	3/22/18	20:42:41	22:31:48	1:49:07	31.9407 -102.2113	KMAF	31.8784 -106.7071	KDNA	
MFD	3/26/18	19:30:43	21:07:48	1:37:05	31.8784 -106.7071	KDNA	31.9407 -102.2111	KMAF	
MFD	3/29/18	19:41:54	21:37:18	1:55:24	31.9407 -102.2113	KMAF	31.8784 -106.7069	KDNA	
MFD	4/1/18	20:13:05	21:40:54	1:27:49	31.8784 -106.7071	KDNA	31.9415 -102.2111	KMAF	
MFD	4/4/18	21:34:53	23:45:24	2:10:31	31.9403 -102.2089	KMAF	35.2716 -96.6720	KSRE	
MFD	4/8/18	21:52:08	00:07:42	2:15:34	35.2723 -96.6725	KSRE	31.9402 -102.2089	KMAF	
MFD	4/10/18	21:09:34	22:57:36	1:48:02	31.9402 -102.2089	KMAF	31.8784 -106.7069	KDNA	
MFD	4/15/18	20:52:03	22:00:54	1:08:51	31.8785 -106.7069	KDNA	33.4642 -105.5388	KSRR	
MFD	4/18/18	12:51:33	14:14:24	1:22:51	33.4642 -105.5388	KSRR	31.9410 -102.2086	KMAF	
AP	4/22/18	19:58:12	21:02:12	1:04:00	31.94035 -102.209	KMAF	32.69137 -103.218	KHOB	Note 6
MFD	4/24/18	15:21:46	15:24:42	0:02:56					No flight No GPS lock
MFD	4/24/18	22:45:46	22:46:36	0:00:50					No flight No GPS lock
MFD	4/25/18	00:08:59	00:51:18	0:42:19	32.6957 -103.2107	KHOB	31.9402 -102.2087	KMAF	
MFD	4/25/18	22:51:58	00:19:48	1:27:50	31.9405 -102.2089	KMAF	33.4635 -105.5369	KSRR	
MFD	4/26/18	16:34:57	17:40:30	1:05:33	33.4642 -105.5388	KSRR	31.8782 -106.7069	KDNA	
MFD	4/26/18	17:55:00	18:59:24	1:04:24	31.8782 -106.7069	KDNA	33.4647 -105.5379	KSRR	
MFD	4/29/18	14:17:47	15:40:36	1:22:49	33.4652 -105.5388	KSRR	31.9402 -102.2087	KMAF	
MFD	5/1/18	11:49:39	13:22:30	1:32:51	31.9403, -102.2089	KMAF	31.9402 -102.2089	KMAF	Aircraft flew approximately 105 nm NW (to vicinity of Loco Hills NM) then reversed course and returned to KMAF. Note 5
MFD	5/3/18	11:43:31	13:16:30	1:32:59	31.9403 -102.2089	KMAF	33.4642 -105.5378	KSRR	
MFD	5/7/18	15:29:57	16:47:42	1:17:45	33.4652 -105.5388	KSRR	31.9407 -102.2086	KMAF	
MFD	5/7/18	23:47:12	01:07:06	1:19:54	31.9403 -102.2089	KMAF	33.4642 -105.5390	KSRR	
MFD	5/8/18	22:11:20	23:32:06	1:20:46	33.4654 -105.5390	KSRR	31.9421 -102.2058	KMAF	
MFD	5/8/18	23:45:41	01:10:30	1:24:49	31.9402 -102.2070	KMAF	33.4645 -105.5388	KSRR	
MFD	5/9/18	21:21:16	22:43:06	1:21:50	33.4650 -105.5390	KSRR	31.9402 -102.2087	KMAF	
MFD	5/10/18	14:27:27	15:19:54	0:52:27	31.9403 -102.2089	KMAF	31.3898 -103.5113	KPEQ	
MFD	5/10/18	17:40:47	18:24:06	0:43:19	31.3897 -103.5113	KPEQ	31.9410 -102.2086	KMAF	
MFD	5/11/18	19:21:27	19:26:18	0:04:51	31.9412 -102.2120	KMAF	31.9412 -102.2120	KMAF	No flight

Source	Date	Start time	End time	Duration	Starting location		Ending location		Comments
					Lat/long	Ident	Lat/long	Ident	
MFD	5/11/18	20:41:09	20:44:06	0:02:57	31.9412 -102.2120	KMAF	31.9412 -102.2120	KMAF	No flight
MFD	5/12/18	10:33:21	12:07:12	1:33:51	31.9403 -102.2089	KMAF	33.4644 -105.5378	KSRR	
MFD	5/13/18	14:22:52	15:41:36	1:18:44	33.4652 -105.5388	KSRR	31.9410 -102.2084	KMAF	
MFD	5/13/18	19:20:35	19:55:54	0:35:19	31.9403 -102.2089	KMAF	31.9412 -102.2084	KMAF	Aircraft flew approximately 26 nm ESE then reversed course and returned to KMAF. Note 5
MFD	5/17/18	00:34:46	01:58:36	1:23:50	31.9403 -102.2089	KMAF	33.4640 -105.5386	KSRR	
MFD	5/20/18	21:32:37	22:54:36	1:21:59	33.4652 -105.5388	KSRR	31.9409 -102.2089	KMAF	
MFD	5/21/18	16:40:03	17:28:24	0:48:21	31.9403 -102.2089	KMAF	31.3897 -103.5120	KPEQ	
MFD	5/21/18	18:45:53	19:28:18	0:42:25	31.3897 -103.5113	KPEQ	32.0337 -102.0989	KMDD	
MFD	5/21/18	22:38:12	22:53:18	0:15:06	32.0329 -102.0978	KMDD	31.9414 -102.2084	KMAF	
MFD	5/22/18	00:49:41	01:56:12	1:06:31	31.9403 -102.2089	KMAF	31.9403 -102.2089	KMAF	Aircraft flew approximately 73 nm NW (NW of Eunice NM) then reversed course and returned to KMAF Note 5
MFD	5/22/18	11:07:12	13:06:24	1:59:12	31.9403 -102.2089	KMAF	21.9403 -102.2089	KMAF	Aircraft flew approximately 141 nm NW (to vicinity of Artesia NM) then reversed course and returned to KMAF. Note 5
MFD	5/23/18	01:01:39	02:20:24	1:18:45	31.9403 -102.2089	KMAF	33.4649 -105.5395	KSRR	
MFD	5/28/18	22:50:55	00:08:54	1:17:59	33.4654 -105.5390	KSRR	31.9410 -102.2089	KMAF	
MFD	6/1/18	00:02:44	00:19:48	0:17:04	31.9403 -102.2089	KMAF	31.9452 -102.2092	KMAF	Accident flight Note 7
MFD	6/8/18								On bench during data recovery

# Taxi and flight



Flight







Continental

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Challenger Dr

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