



**Recorders Attachment 1 – Ford Airbag Module**

**Concan, Texas**

**HWY17MH011**

(8 pages)



## CONTINENTAL AUTOMOTIVE SYSTEMS, INC. FIELD EVENT ANALYSIS REPORT

### I. Overview

**A. General Description** - The following information was provided to Continental Automotive Systems, Inc.:

Model Year	2004
Vehicle Type	Ford E-350
Description of Event	2007 Dodge Ram 3500 pick-up truck crossed into southbound travel lane, colliding with the left front corner of E-350 church bus
Location of event	Uvalde County, TX
Date of event	March 29, 2017
Impacted object	2007 Dodge Ram 3500 Pick-up Truck
VIN	1FDWE35S64H [REDACTED]
Mileage	Approx. 61,000
Date of Download	5/25/2017

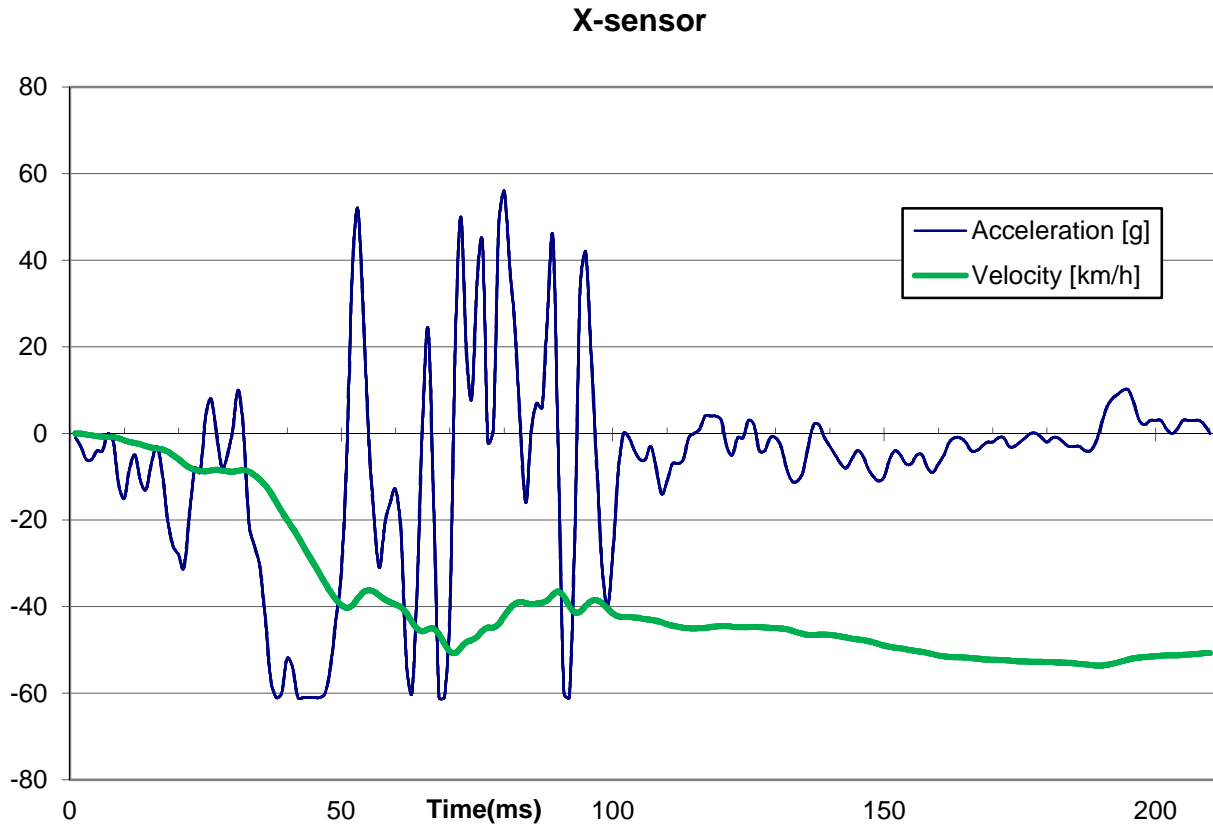
### B. Module Description

#	Module Type	Customer Part Number	MLFB Number	Serial Number
1	Siemens RCM	4C24-14B321-CD	5WY 72090	62220930170773

## II. Analysis

### A. Results

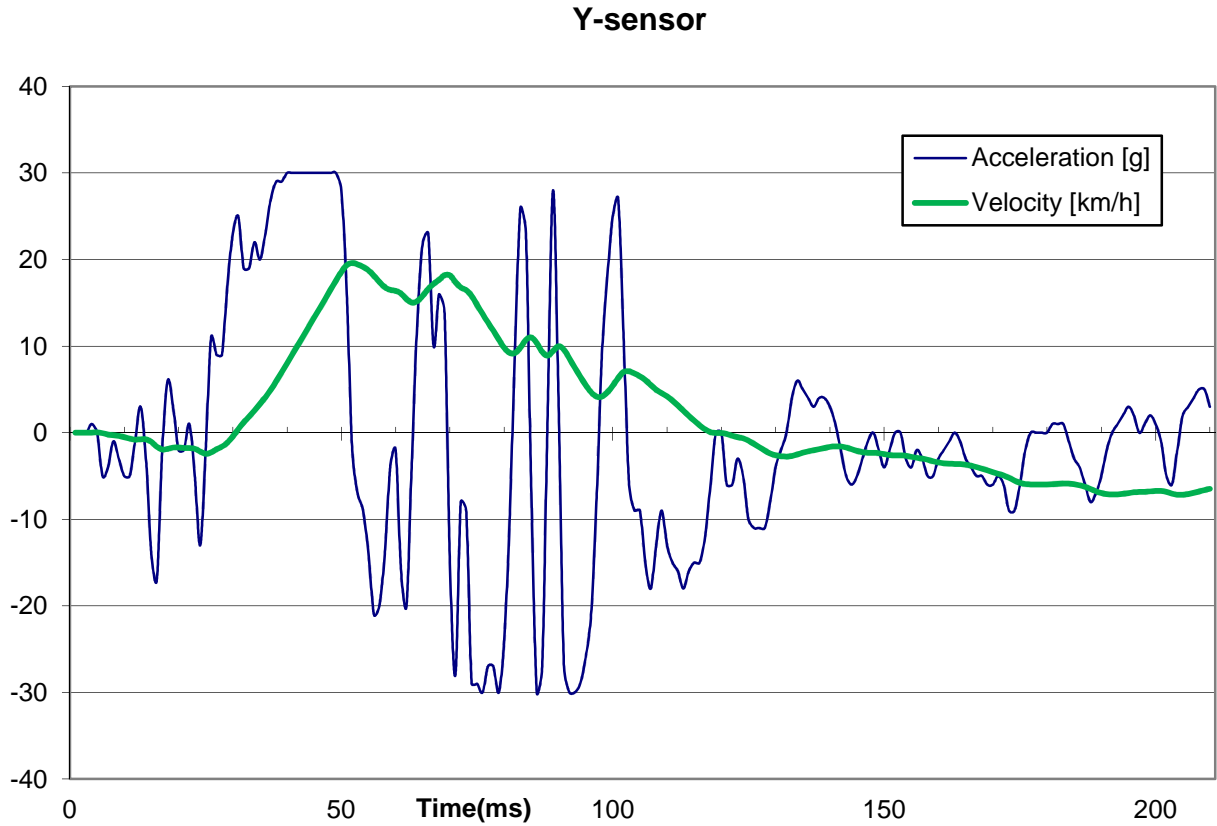
The following is a plot of the acceleration in g's and the velocity change in km/h of the data stored in this module. This data is from the longitudinal accelerometer inside the RCM located under the driver's seat. There was approximately 53.5 km/h change in velocity for the recorded event at the RCM location.



**Table 1: X-Sensor**

Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]
1	-1	0.00	54	29	-36.73	107	-3	-43.05	160	-7	-51.28
2	-3	-0.07	55	0	-36.22	108	-8	-43.24	161	-5	-51.49
3	-6	-0.23	56	-19	-36.55	109	-14	-43.63	162	-2	-51.61
4	-6	-0.44	57	-31	-37.43	110	-11	-44.07	163	-1	-51.67
5	-4	-0.62	58	-21	-38.35	111	-7	-44.39	164	-1	-51.70
6	-4	-0.76	59	-16	-39.01	112	-7	-44.64	165	-2	-51.76
7	0	-0.83	60	-13	-39.52	113	-6	-44.87	166	-4	-51.86
8	-2	-0.87	61	-23	-40.15	114	-1	-44.99	167	-4	-52.00
9	-12	-1.11	62	-53	-41.50	115	0	-45.01	168	-3	-52.13
10	-15	-1.59	63	-60	-43.49	116	1	-44.99	169	-2	-52.21
11	-8	-2.00	64	-34	-45.15	117	4	-44.90	170	-2	-52.29
12	-5	-2.22	65	4	-45.68	118	4	-44.76	171	-1	-52.34
13	-11	-2.51	66	24	-45.19	119	4	-44.62	172	-1	-52.37
14	-13	-2.93	67	-16	-45.05	120	3	-44.50	173	-3	-52.44
15	-7	-3.28	68	-61	-46.41	121	-3	-44.50	174	-3	-52.55
16	-3	-3.46	69	-61	-48.56	122	-5	-44.64	175	-2	-52.64
17	-9	-3.67	70	-41	-50.36	123	-1	-44.75	176	-1	-52.69
18	-20	-4.18	71	21	-50.71	124	-1	-44.78	177	0	-52.71
19	-26	-5.00	72	50	-49.46	125	3	-44.75	178	0	-52.71
20	-28	-5.95	73	20	-48.22	126	2	-44.66	179	-1	-52.73
21	-31	-6.99	74	8	-47.73	127	-4	-44.69	180	-2	-52.78
22	-19	-7.88	75	35	-46.97	128	-4	-44.83	181	-1	-52.83
23	-8	-8.35	76	44	-45.58	129	-1	-44.92	182	-1	-52.87
24	-9	-8.65	77	-2	-44.83	130	-1	-44.96	183	-2	-52.92
25	4	-8.74	78	1	-44.85	131	-3	-45.03	184	-3	-53.01
26	8	-8.53	79	48	-43.99	132	-8	-45.22	185	-3	-53.12
27	0	-8.39	80	56	-42.15	133	-11	-45.56	186	-3	-53.22
28	-8	-8.53	81	39	-40.47	134	-11	-45.95	187	-4	-53.34
29	-5	-8.76	82	24	-39.36	135	-9	-46.30	188	-4	-53.49
30	1	-8.83	83	1	-38.92	136	-3	-46.51	189	-2	-53.59
31	10	-8.63	84	-16	-39.18	137	2	-46.53	190	2	-53.59
32	0	-8.46	85	1	-39.45	138	2	-46.46	191	6	-53.45
33	-21	-8.83	86	7	-39.31	139	-1	-46.44	192	8	-53.20
34	-26	-9.66	87	6	-39.08	140	-3	-46.51	193	9	-52.90
35	-31	-10.67	88	28	-38.48	141	-5	-46.65	194	10	-52.57
36	-43	-11.97	89	45	-37.19	142	-7	-46.86	195	10	-52.21
37	-57	-13.74	90	-7	-36.52	143	-8	-47.13	196	7	-51.91
38	-61	-15.82	91	-60	-37.70	144	-6	-47.38	197	3	-51.74
39	-60	-17.96	92	-61	-39.84	145	-4	-47.55	198	2	-51.65
40	-52	-19.94	93	-24	-41.34	146	-5	-47.71	199	3	-51.56
41	-54	-21.81	94	34	-41.16	147	-8	-47.94	200	3	-51.46
42	-61	-23.84	95	42	-39.82	148	-10	-48.26	201	3	-51.35
43	-61	-25.99	96	19	-38.74	149	-11	-48.63	202	1	-51.28
44	-61	-28.15	97	-6	-38.51	150	-10	-49.00	203	0	-51.26
45	-61	-30.30	98	-30	-39.15	151	-6	-49.28	204	1	-51.24
46	-61	-32.46	99	-40	-40.38	152	-4	-49.46	205	3	-51.17
47	-60	-34.59	100	-28	-41.58	153	-5	-49.62	206	3	-51.07
48	-54	-36.61	101	-9	-42.24	154	-7	-49.83	207	3	-50.96
49	-43	-38.32	102	0	-42.40	155	-7	-50.08	208	3	-50.86
50	-32	-39.64	103	-1	-42.41	156	-5	-50.29	209	2	-50.77
51	-5	-40.30	104	-4	-42.50	157	-5	-50.47	210	0	-50.73
52	37	-39.73	105	-6	-42.68	158	-8	-50.70			
53	52	-38.16	106	-6	-42.89	159	-9	-51.00			

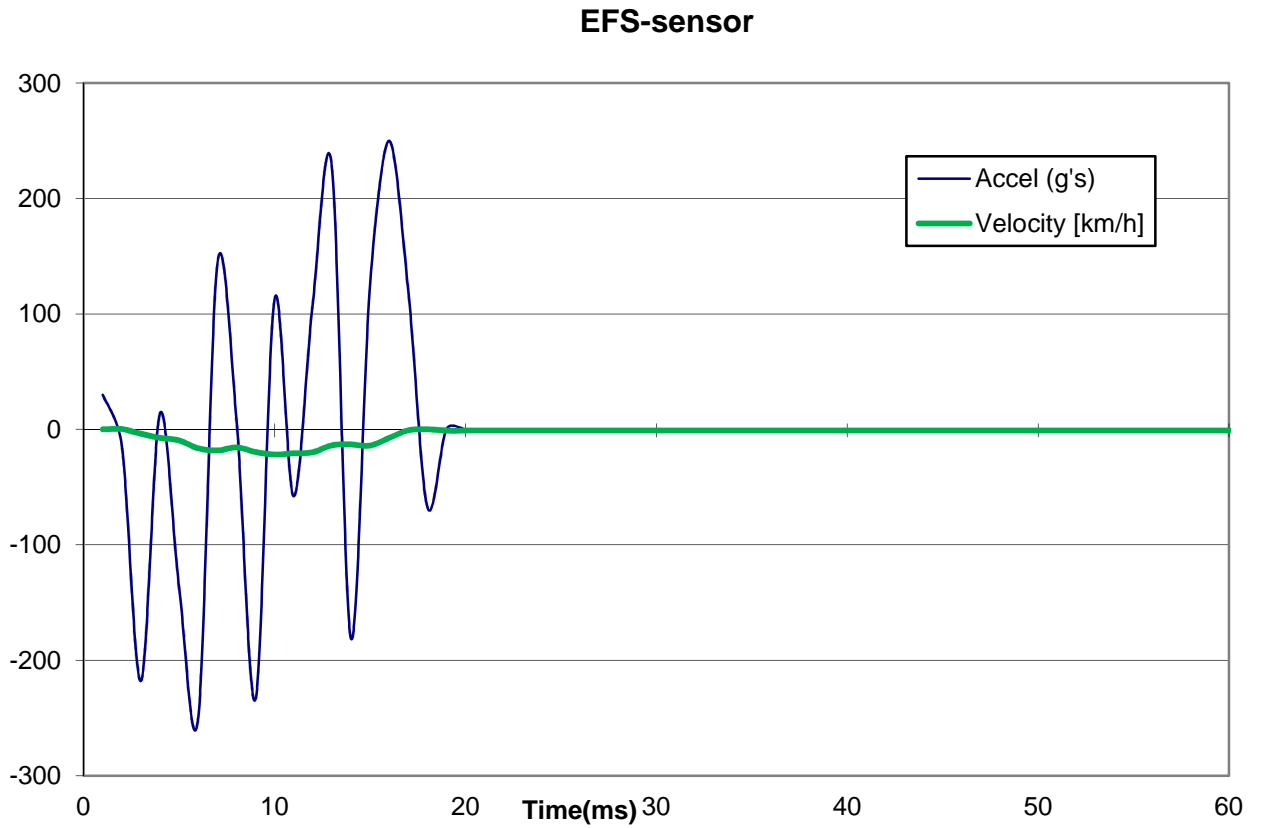
The following is a plot of the acceleration in g's and the velocity change in km/h of the data stored in this module. This data is from the lateral accelerometer inside the RCM located under the driver's seat. There was approximately 19.4 km/h change in velocity for the recorded event.



**Table 2: Y-Sensor**

Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]
1	0	0.00	54	-9	19.16	107	-18	5.51	160	-3	-3.44
2	0	0.00	55	-14	18.75	108	-13	4.96	161	-2	-3.53
3	0	0.00	56	-21	18.13	109	-9	4.57	162	-1	-3.58
4	1	0.02	57	-20	17.41	110	-13	4.18	163	0	-3.60
5	0	0.04	58	-14	16.81	111	-15	3.69	164	-1	-3.62
6	-5	-0.05	59	-4	16.49	112	-16	3.14	165	-3	-3.69
7	-4	-0.21	60	-2	16.39	113	-18	2.54	166	-4	-3.81
8	-1	-0.30	61	-16	16.07	114	-16	1.94	167	-5	-3.97
9	-3	-0.37	62	-20	15.43	115	-15	1.39	168	-5	-4.15
10	-5	-0.51	63	-3	15.03	116	-15	0.87	169	-6	-4.34
11	-5	-0.69	64	13	15.20	117	-12	0.39	170	-6	-4.56
12	-1	-0.79	65	22	15.82	118	-6	0.07	171	-5	-4.75
13	3	-0.76	66	23	16.62	119	0	-0.04	172	-6	-4.94
14	-3	-0.76	67	10	17.20	120	0	-0.04	173	-9	-5.21
15	-14	-1.06	68	16	17.66	121	-6	-0.14	174	-9	-5.53
16	-17	-1.61	69	14	18.19	122	-6	-0.35	175	-6	-5.79
17	-2	-1.94	70	-15	18.17	123	-3	-0.51	176	-2	-5.93
18	6	-1.87	71	-28	17.41	124	-5	-0.65	177	0	-5.97
19	3	-1.71	72	-8	16.78	125	-10	-0.92	178	0	-5.97
20	-2	-1.70	73	-9	16.47	126	-11	-1.29	179	0	-5.97
21	-2	-1.77	74	-29	15.80	127	-11	-1.68	180	0	-5.97
22	1	-1.78	75	-29	14.78	128	-11	-2.07	181	1	-5.95
23	-5	-1.85	76	-30	13.74	129	-8	-2.40	182	1	-5.92
24	-13	-2.17	77	-27	12.73	130	-4	-2.61	183	1	-5.88
25	-2	-2.44	78	-27	11.78	131	-2	-2.72	184	-1	-5.88
26	11	-2.28	79	-30	10.77	132	0	-2.75	185	-3	-5.95
27	9	-1.92	80	-24	9.82	133	4	-2.68	186	-4	-6.07
28	9	-1.61	81	-10	9.22	134	6	-2.51	187	-6	-6.25
29	17	-1.15	82	10	9.22	135	5	-2.31	188	-8	-6.50
30	23	-0.44	83	26	9.85	136	4	-2.15	189	-7	-6.76
31	25	0.41	84	23	10.72	137	3	-2.03	190	-5	-6.97
32	19	1.18	85	-7	11.00	138	4	-1.91	191	-2	-7.10
33	19	1.85	86	-30	10.35	139	4	-1.77	192	0	-7.13
34	22	2.58	87	-27	9.34	140	3	-1.64	193	1	-7.12
35	20	3.32	88	2	8.90	141	1	-1.57	194	2	-7.06
36	23	4.08	89	28	9.43	142	-2	-1.59	195	3	-6.97
37	27	4.96	90	4	9.99	143	-5	-1.71	196	2	-6.89
38	29	5.95	91	-27	9.59	144	-6	-1.91	197	0	-6.85
39	29	6.97	92	-30	8.58	145	-5	-2.10	198	1	-6.83
40	30	8.02	93	-30	7.52	146	-3	-2.24	199	2	-6.78
41	30	9.08	94	-29	6.48	147	-1	-2.31	200	1	-6.73
42	30	10.14	95	-26	5.51	148	0	-2.33	201	-1	-6.73
43	30	11.20	96	-21	4.68	149	-2	-2.37	202	-5	-6.83
44	30	12.25	97	-8	4.17	150	-4	-2.47	203	-6	-7.03
45	30	13.31	98	9	4.18	151	-2	-2.58	204	-2	-7.17
46	30	14.37	99	18	4.66	152	0	-2.61	205	2	-7.17
47	30	15.43	100	25	5.42	153	0	-2.61	206	3	-7.08
48	30	16.49	101	27	6.34	154	-3	-2.67	207	4	-6.96
49	30	17.55	102	11	7.01	155	-4	-2.79	208	5	-6.80
50	28	18.58	103	-6	7.10	156	-2	-2.90	209	5	-6.62
51	16	19.35	104	-9	6.83	157	-3	-2.98	210	3	-6.48
52	-2	19.60	105	-9	6.52	158	-5	-3.13			
53	-7	19.44	106	-15	6.09	159	-5	-3.30			

The following is a plot of the acceleration in g's and the velocity change in km/h from the Front Crash Sensor for this event. There was approximately 21.7 km/h change in velocity for the recorded event at the Front crash sensor location.



**Table 3: EFS-Sensor**

Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]	Time [ms]	Accel [g]	Velocity [km/h]
1	30	0.00	16	250	-7.42	31	0	-1.09	46	0	-1.09
2	-14	0.28	17	121	-0.87	32	0	-1.09	47	0	-1.09
3	-218	-3.81	18	-67	0.09	33	0	-1.09	48	0	-1.09
4	14	-7.42	19	0	-1.09	34	0	-1.09	49	0	-1.09
5	-137	-9.59	20	0	-1.09	35	0	-1.09	50	0	-1.09
6	-250	-16.42	21	0	-1.09	36	0	-1.09	51	0	-1.09
7	143	-18.31	22	0	-1.09	37	0	-1.09	52	0	-1.09
8	10	-15.61	23	0	-1.09	38	0	-1.09	53	0	-1.09
9	-234	-19.57	24	0	-1.09	39	0	-1.09	54	0	-1.09
10	113	-21.70	25	0	-1.09	40	0	-1.09	55	0	-1.09
11	-58	-20.73	26	0	-1.09	41	0	-1.09	56	0	-1.09
12	109	-19.83	27	0	-1.09	42	0	-1.09	57	0	-1.09
13	228	-13.88	28	0	-1.09	43	0	-1.09	58	0	-1.09
14	-181	-13.05	29	0	-1.09	44	0	-1.09	59	0	-1.09
15	125	-14.04	30	0	-1.09	45	0	-1.09	60	0	-1.09

**B. Stored Codes:**

A ZKEN fault code was active at the time of the crash. The ZKEN is the Firing Loop Enable function (FLEN). The Firing Loop Enable test is activated between the main and safing micro and the feedback from the communication to the Firing ASIC determines if the Firing Loop Enable lines are in the correct state. In the event that this test does not return the expected result, a ZKEN fault code will result and attempt to illuminate the Airbag Warning Lamp. The following table provides a complete history of the fault codes stored in this module.

Fault Code	First Occurrence		Last Occurrence		occurrence counter	Currently Active	Fault Removal		Error Description
	Life timer	Key-on timer	Life timer	Key-on timer			Life timer	Key-on timer	
B1	165h 32m	20sec	211h 3m	51m 32sec	2		211h 3m	1sec	APS_VCC40
B8	232h 17m	3sec	-	-	1	*	-	-	ZKEN Fault Code
61	452h 17m	1h 16m 30sec	-	-	1	*	-	-	Crash Pretensioners
60	452h 17m	1h 16m 30sec	-	-	1	*	-	-	Crash Front
9	452h 17m	1h 16m 38sec	-	-	1		452h 17m	10sec	SQ1: Resistance high
0D	452h 17m	1h 16m 38sec	-	-	1		452h 17m	10sec	SQ5: Resistance high
0F	452h 17m	1h 16m 38sec	-	-	1		452h 17m	10sec	SQ7: Resistance high
10	452h 17m	1h 16m 38sec	-	-	1		452h 17m	10sec	SQ8: Resistance high
62	452h 17m	0	-	-	1	*	-	-	Crash Memory Full

The ZKEN fault code first occurred at 232 hours and 17 minutes into the life of the vehicle. The fault code was never cleared and was active at the time of the crash event. The crash occurred at 452 hours and 17 minutes into the life of the vehicle.

**C. Algorithm Decisions:**

Frontal Safing time from algorithm wake up	12 ms
Pretensioner Decision Time from Algorithm wake up	19 ms
Airbag First Stage Decision time from algorithm wake up	19 ms