Technical Reconstruction Group Attachment – Tesla EDR Report

Ft Lauderdale, FL

HWY18FH013

(20 pages)

TESLA

EDR Report

File Information	Value
VIN	5YJSA1H24EFP███████
Retrieval Date	2018/05/11 17:30:04 (UTC)
Retrieval User Comments	NTSB Number: HWY18FH013 PD Case: 34-1805-072859
Retrieval Program Information	Tesla EDR Retrieval Program v17.32.1
EDR Report Information	Tesla EDR Reporting Service v18.14.1
Report Requested By	
Report Date	2018/05/17 18:12:28 (UTC)
Number Of Events	1
Time From Event 1 To 2 (seconds)	N/A
Ignition Cycle At Retrieval	5631

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Model S Data Limitations

General Data Limitations

This report represents data from a Tesla Event Data Recorder (EDR). The report was generated using EDR data that was uploaded to the Tesla EDR Report Service at https://edr.tesla.com. This service is periodically updated using the most current vehicle information available and report users should always ensure that the report was generated by the most recent version of the Report Service.

The Tesla EDR Retrieval Program and Tesla EDR Report Service are designed for vehicles configured for the North American market region only. Report elements found in this report may not have not been validated for vehicles configured for regions outside of North America.

The EDR is part of the vehicle's Restraints Control Module (RCM). When the EDR senses a crash or crash-like event, it may record a short period of data related to vehicle dynamics and safety systems. This recorded data may assist in understanding the crash or crash-like event. EDR data will only be recorded by a Tesla vehicle if the EDR senses a crash or crash-like event; no data is recorded by the EDR under normal driving conditions.

EDR data should only be used as part of a thorough and competent review of the human, vehicle, and environmental information associated with an event. The data recorded by the EDR has limitations including the number of items recorded, the time period of the recording, the data sampling interval, and the data range and resolution. Additionally, EDR data may be limited by sensor capabilities or the availability of 12 V DC power at the RCM. For these and other potential reasons, the EDR data may not capture an entire event, and the data elements captured may not fully represent all aspects of a given event.

Tesla has made all reasonable efforts to include sufficient information in this report's Data Limitations section to clarify terminology and data elements found in this document to assist the end user in understanding the recorded data. Tesla reserves the right to update, change or modify this information.

Event Data Recorder

An Event Data Recorder is defined as a device or function in a vehicle that records the vehicle's dynamic time-series data during the time period just prior to a crash event (e.g., vehicle speed vs. time) or during a crash event (e.g., delta–V vs. time), intended for retrieval after the crash event. For the purposes of this definition, the event data do not include audio and video data (49 CFR Part 563).

Data Synchronization

Pre-crash and crash data are recorded in discrete intervals and may be asynchronous.

Events

The Model S RCM can store up to two events: Event 1 and Event 2. The conditions for triggering the recording of an event differs depending on event type.

Time Zero

Time Zero, as indicated throughout the event record, is the point where the restraint control algorithm is activated in any sensing direction.

Recording duration

The end of an event is typically the moment at which the cumulative delta-V within a 20ms time period does not change by more than 0.8 km/h or the moment at which the crash detection algorithm of the RCM resets. Some events may lead to the recording of different duration data as provided for by 49 CFR Part 563.

Deployment events

A deployment event may be recorded when the RCM commands the deployment of a device (e.g. airbag, pretensioner, or High Voltage (HV) battery disconnect). Deployment events are always locked in memory and are never overwritten. Only the first two deployment events are recorded as in this case the available memory is full and locked.

Non-deployment events

A non-deployment event may be recorded when the RCM senses a physical occurrence triggering the recording of an event but does not command the deployment of a device (e.g. airbag, pretensioner, High Voltage (HV) battery disconnect). A non-deployment event is recorded if one of the two event memory locations is available (not locked). Non-deployment events are not locked in memory. A non-deployment event is not overwritten by another non-deployment or deployment event that occurs less than or equal to 5 seconds later (and on the same ignition cycle) unless the available memory is full (in which case the new event overwrites the oldest event). All non-deployment events may be overwritten if a second non-deployment or deployment event occurs greater than 5 seconds later.

Data polarity

Where applicable, the data in this report follows the polarity conventions found in SAE J1733 and J211. For example, forward longitudinal acceleration and resultant delta-V are positive and left-to-right lateral acceleration and resultant delta-V are positive. Positive roll angle is rotation about the vehicle's longitudinal axis using the right hand rule (clockwise vehicle roll when viewed from the rear of the vehicle). Positive steering wheel angle is clockwise rotation of the steering wheel (steering to the right from straight).

Data Element Definitions

Number Of Events

The Number Of Events represents the total number of events that are stored in the RCM memory. The maximum number of events that can be recorded is two.

Time From Event 1 to 2 (seconds)

The Time From Event 1 to 2 is the amount of time elapsed between the Time Zero of two linked events (if applicable). Linked events must occur within 5 seconds and in the same ignition cycle. Non-linked events will report "N/A" in the Time From Event 1 to 2 value. The value is reported to the nearest 0.1 seconds.

Vehicle Identification Number (VIN)

The Vehicle Identification Number (VIN) is stored in the RCM when it is installed at the Tesla Fremont Factory or by Tesla Service. The last 6 digits of the VIN can be anonymized by selecting the "Save without VIN sequence number" option in the Tesla EDR Retrieval Program.

Retrieval Date

The Retrieval Date is the calendar date and time when the data was retrieved from the RCM. This date and time is sourced from the computer that was used to retrieve the data. This is not the date and time of an event.

Retrieval User Comments

The Retrieval User Comments is an open field that can be used by the Tesla EDR Retrieval operator to record text comments at the time of retrieval.

Retrieval Program Information

The Retrieval Program Information is the version number of the Tesla EDR Retrieval Program that was used to retrieve the EDR data from the RCM.

EDR Report Information

The EDR Report Information identifies the version of the Tesla EDR Report Service.

Report Requested By

Report Requested By is the name of the "My Tesla" user that generated the report using the Tesla EDR Report Service.

Report Date

Report Date is the calendar date when the online Tesla EDR Report Service was used to generate the report. The source of this data element is the Tesla server.

Ignition Cycle At Retrieval

The Ignition Cycle At Retrieval is the number of times that the RCM had been powered on as reported at the time that the Tesla EDR Retrieval Program was used to retrieve the data from the RCM. The maximum value for ignition cycles is 65,534.

Maximum Delta-V, Longitudinal/Lateral (km/h)

The Maximum delta-V, Longitudinal/Lateral is the maximum magnitude of the recorded delta-V during the event from Time Zero to a maximum of 300 ms. The value is reported to the nearest kilometer per hour. The range for Maximum Delta-V is -127 km/h to +127 km/h. The source of the data is the internal calculation (integration) of the sensor data inside of the RCM.

Time to Maximum Delta-V, Longitudinal/Lateral (ms)

The Time to Maximum Delta-V, Longitudinal/Lateral is the time from Time Zero to the maximum magnitude of the recorded delta-V during the event. The maximum value is 300 ms and the value is reported to the nearest millisecond.

Time to Maximum Delta-V, Resultant (ms)

The Time to Maximum Delta-V, Resultant is the time from Time Zero to the calculated maximum resultant of the longitudinal and lateral delta-V components. The maximum value is 300 ms and the value is reported to the nearest millisecond.

Ignition Cycle At Event

The Ignition Cycle At Event is the number of times that the RCM had been powered on as reported at Time Zero. The maximum value for ignition cycles is 65,534.

Airbag Warning Lamp Status

Airbag Warning Lamp Status indicates the commanded state of the warning lamp as "on" or "off" within approximately the last second before Time Zero.

Driver/Passenger Safety Belt Status

The Driver/Passenger Safety Belt Status is the recorded status of the safety belt at the time of the event. This data element represents the last observed state within approximately the last second before Time Zero.

Occupant Classification In Front Passenger Seat

The Occupant Classification data element indicates the detected occupant type in the front passenger seat. Values include: Empty, Child, or Adult.

Driver Seat Position

Driver Seat Position indicates the recorded seat track position of the driver seat. The possible values are Rearward and Forward.

Complete File Recorded

Complete File Recorded indicates whether or not the complete data set available to the EDR was successfully recorded.

Deployment Summary

The Deployment Summary table indicates which of the deployable safety devices (if any) were commanded to deploy by the RCM and at what time (relative to the event Time Zero). The possible values for the status of each device is "Deployment Commanded" or "Deployment Not Commanded". The deployment commanded time is to the nearest millisecond.

Time Series Data

All time references are based on the event definition of Time Zero.

Vehicle Speed

Vehicle Speed is calculated and reported by the average of the four wheel speed signals. The minimum value for vehicle speed is 0 km/h and the maximum value is greater than 200 km/h. The resolution of Vehicle Speed is to the nearest kilometer per hour.

Accelerator Pedal (%)

Accelerator Pedal (%) is the percent of full application of the accelerator pedal. The resolution of Accelerator Pedal (%) is to the nearest percent.

Rear Motor Speed (rpm)

Rear Motor Speed is the rate of rotation of the rear drive motor. The units of this data element are rotations per minute. The minimum value for Rear Motor Speed is 0 rpm and the maximum value is 17,000 rpm. The resolution of Rear Motor Speed is to the nearest 100 rotations per minute.

Service Brake

Service Brake indicates the status of the brake pedal as reported by the brake pedal switch. The possible values for Service Brake are "On" (pedal applied) and "Off" (pedal not applied).

Steering Wheel Angle (deg)

Steering Wheel Angle represents the measured rotational angle of the steering wheel. The range for Steering Wheel Angle is -420 deg to +420 deg. The resolution of steering wheel angle is to the nearest degree.

Stability Control

Stability Control is the status of the Electronic Stability Control system (ESC). The possible values are "On" (meaning the ESC was enabled but not active), "Off" (meaning the ESC was turned off), and "Engaged" (meaning that the ESC was active).

ABS Activity

ABS Activity is the status of the Anti-lock Braking System (ABS). The possible values are "On" (meaning the ABS was active) and "Off" (meaning the ABS was not active). Active ABS status does not necessarily indicate that the ABS control unit was actively modulating braking at one or more wheels.

Longitudinal/Lateral Delta-V data

Longitudinal and Lateral Time Series Delta-V Data indicates the change in velocity of the vehicle. The source of the data is the internal calculation (integration) of the sensor data inside of the RCM. The resolution of delta-V data is to the nearest kilometer per hour and the data is reported every 10 ms after Time Zero. The range for delta-V data is -127 km/h to +127 km/h.

Longitudinal and Lateral Time Series Acceleration data

Longitudinal and Lateral Time Series Acceleration Data indicates the measured acceleration of the vehicle. The source of the data is the accelerometers located inside the RCM. The resolution of acceleration data is 0.5 g and the data is reported every 2 ms after Time Zero. The range of acceleration data is -63.5 g to +63.5 g.

Roll Angle

Roll Angle indicates the vehicles roll angle at a specific time before and/or after Time Zero. The source of the data is the internal calculation (integration) of the sensor data inside of the RCM. The measurement starts 1,000 ms before Time Zero and ends when the RCM rollover algorithm resets. The maximum recording time for Roll Angle Data is 1000 ms before and 5,000 ms after Time Zero. The range of roll angle data is -1,270 deg to +1,270 deg. The resolution of roll angle data is to the nearest 10 deg. From -1,000 ms to 1,000 ms, the time between each sample is 10 ms. From 1,000 ms to 5,000 ms the time between each sample is 100 ms.

Serial Numbers

Serial numbers are the sensor identification numbers that are stored in the RCM. These values are stored when the RCM is powered up (each ignition cycle).

Hexadecimal Data

The Hexadecimal Data found in this report represents the original, raw data and identifying information retrieved from the RCM accessed to ultimately generate this report. The binary data is represented in hexadecimal format as a matter of convenience. While it represents all the raw data retrieved from the subject RCM not all of that raw data may be used in a given report or application.

Event 1 Data Record

Data Element	Value
Maximum Delta-V, Longitudinal (km/h)	-4
Time To Maximum Delta-V, Longitudinal (ms)	64.0
Maximum Delta-V, Lateral (km/h)	-4
Time To Maximum Delta-V, Lateral (ms)	22.0
Time To Maximum Delta-V, Resultant (ms)	64.0
Ignition Cycle At Event	5630
Airbag Warning Lamp Status	Off
Driver Safety Belt status	Buckled
Passenger Safety Belt status	Buckled
Occupant Classification Status In Front Passenger Seat	Adult
Driver Seat Position	Rearward
Complete File Recorded	Yes

Deployment Summary (Event 1)

Device	Status	Deployment Command Time (ms)
Driver Front Airbag Stage 1	Deployment Commanded	55
Driver Front Airbag Stage 2	Deployment Commanded	155
Driver Knee Airbag	Deployment Commanded	55
Driver Retractor Pretensioner	Deployment Commanded	55
Driver Lap Pretensioner	Deployment Commanded	55
Driver Side Seat Airbag	Deployment Commanded	530
Passenger Front Airbag Stage 1	Deployment Commanded	55
Passenger Front Airbag Stage 2	Deployment Commanded	155
Passenger Knee Airbag	Deployment Commanded	55
Front Right Passenger Retractor Pretensioner	Deployment Commanded	55
Front Right Passenger Lap Pretensioner	Deployment Commanded	55
Passenger Side Seat Airbag	Deployment Commanded	530
Left Side Curtain Airbag	Deployment Commanded	494
Right Side Curtain Airbag	Deployment Commanded	494
HV Battery Disconnect	Deployment Commanded	55

Event Data (Event 1)

Time (sec)	Vehicle Speed (kph)	Accelerator Pedal %	Rear Motor Speed (rpm)	Service Brake	Steering Wheel Angle (deg)	Stability Control	ABS Activity
-5.0	176	78	13000	Off	8.4	On	Off
-4.5	179	75	13200	Off	12.6	On	Off
-4.0	182	74	13400	Off	16.8	On	Off
-3.5	185	74	13600	Off	16.8	On	Off
-3.0	187	0	13700	Off	-8.4	On	Off
-2.5	184	0	13600	On	-16.8	On	Off
-2.0	175	0	13000	On	-33.6	Engaged	Off
-1.5	166	0	12300	On	-42.0	Engaged	Off
-1.0	155	0	11400	On	-46.2	Engaged	Off
-0.5	144	0	10800	On	-54.6	Engaged	Off
0.0	139	0	10300	On	-54.6	Engaged	Off

Longitudinal Delta-V (Event 1)

Longitudinal Delta-V (km/h)
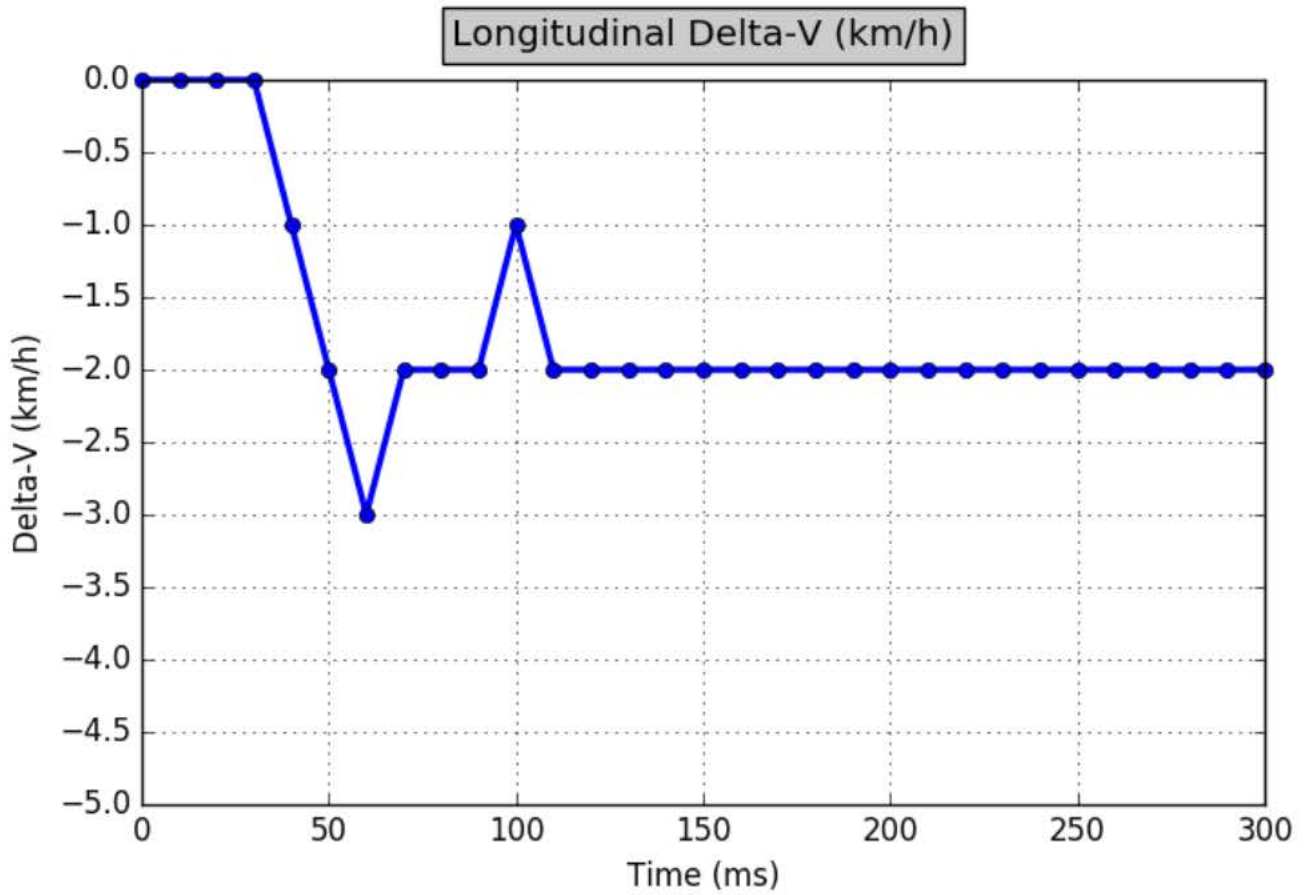
Time (ms)	Delta-V (km/h)	Time (ms)	Delta-V (km/h)
0	0	160	-2
10	0	170	-2
20	0	180	-2
30	0	190	-2
40	-1	200	-2
50	-2	210	-2
60	-3	220	-2
70	-2	230	-2
80	-2	240	-2
90	-2	250	-2
100	-1	260	-2
110	-2	270	-2
120	-2	280	-2
130	-2	290	-2
140	-2	300	-2
150	-2		

Lateral Delta-V (Event 1)

Lateral Delta-V (km/h)
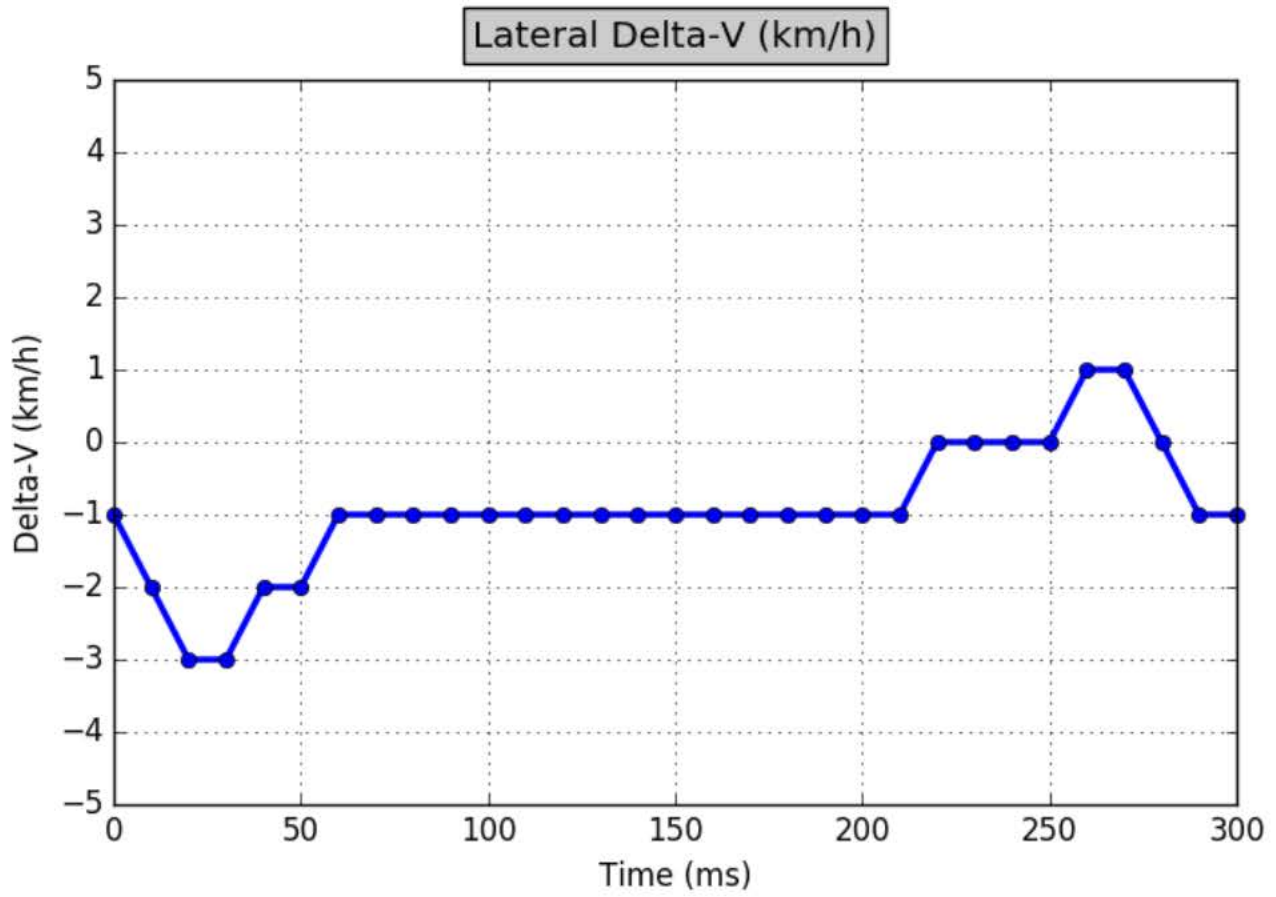
Time (ms)	Delta-V (km/h)	Time (ms)	Delta-V (km/h)
0	-1	160	-1
10	-2	170	-1
20	-3	180	-1
30	-3	190	-1
40	-2	200	-1
50	-2	210	-1
60	-1	220	0
70	-1	230	0
80	-1	240	0
90	-1	250	0
100	-1	260	1
110	-1	270	1
120	-1	280	0
130	-1	290	-1
140	-1	300	-1
150	-1		

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Longitudinal Acceleration (Event 1)

Longitudinal Acceleration (g)
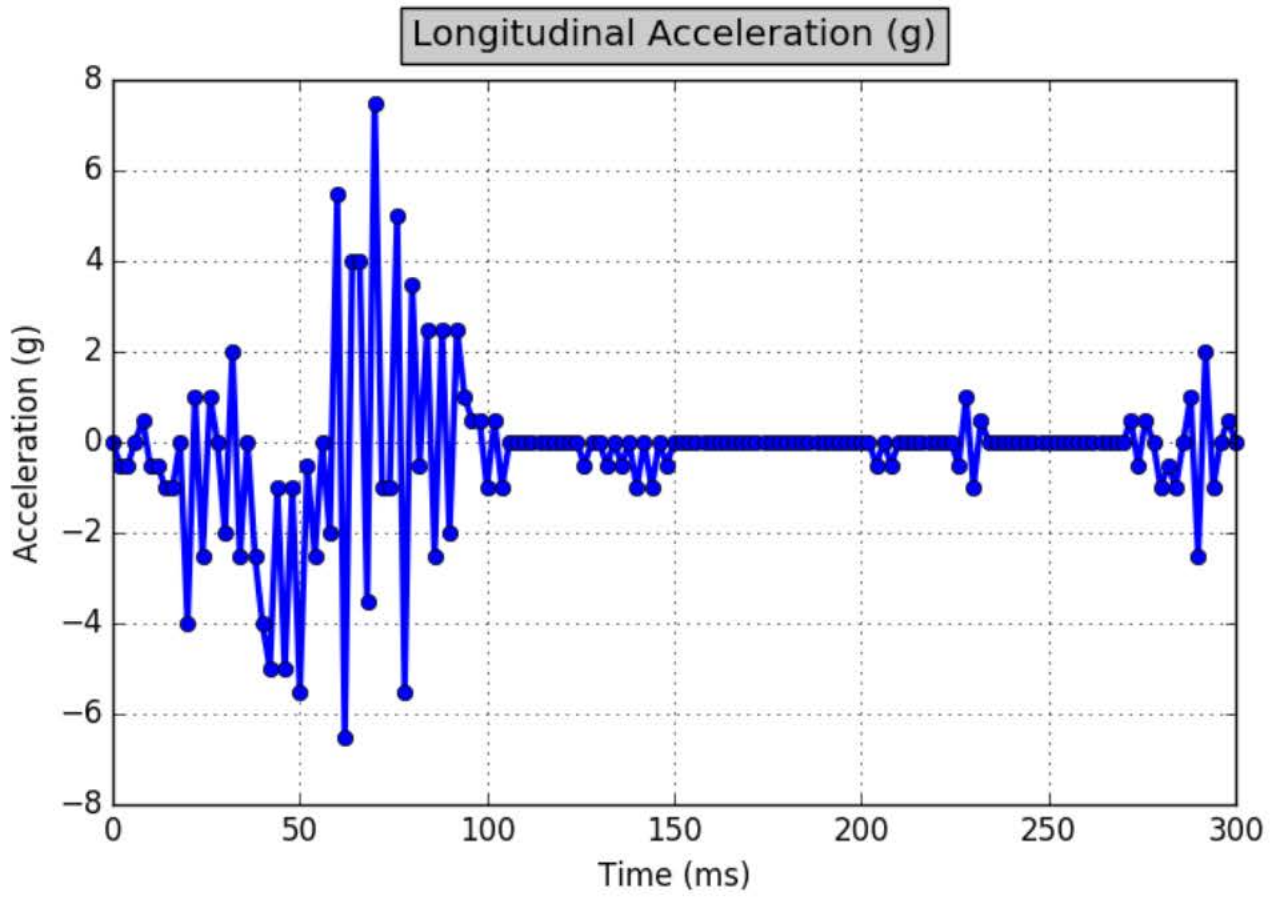
Longitudinal Acceleration Values (Event 1)

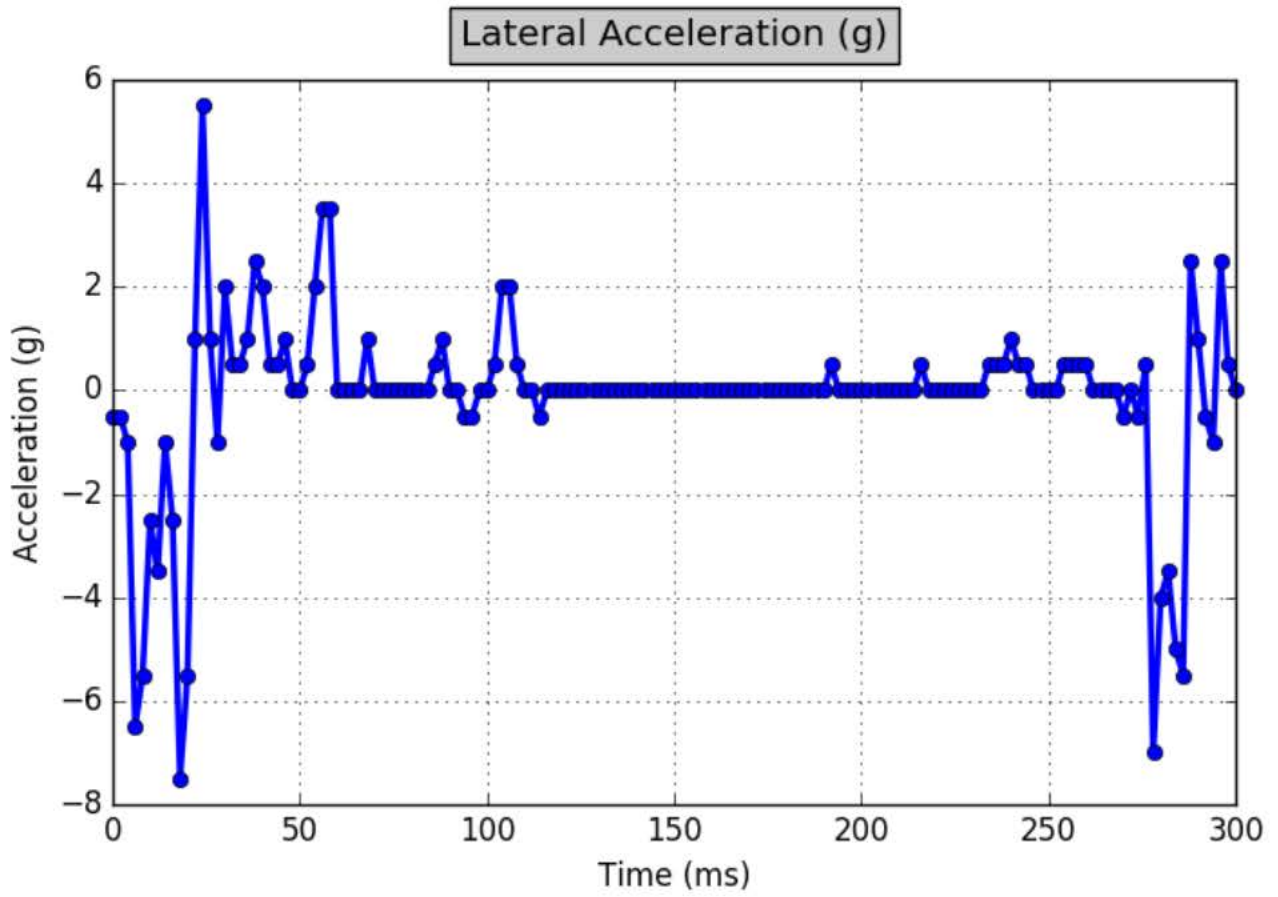| Time (ms)	Acceleration (g)	Time (ms)	Acceleration (g)	Time (ms)	Acceleration (g)
0	0.0	102	0.5	204	-0.5
2	-0.5	104	-1.0	206	0.0
4	-0.5	106	0.0	208	-0.5
6	0.0	108	0.0	210	0.0
8	0.5	110	0.0	212	0.0
10	-0.5	112	0.0	214	0.0
12	-0.5	114	0.0	216	0.0
14	-1.0	116	0.0	218	0.0
16	-1.0	118	0.0	220	0.0
18	0.0	120	0.0	222	0.0
20	-4.0	122	0.0	224	0.0
22	1.0	124	0.0	226	-0.5
24	-2.5	126	-0.5	228	1.0
26	1.0	128	0.0	230	-1.0
28	0.0	130	0.0	232	0.5
30	-2.0	132	-0.5	234	0.0
32	2.0	134	0.0	236	0.0
34	-2.5	136	-0.5	238	0.0
36	0.0	138	0.0	240	0.0
38	-2.5	140	-1.0	242	0.0
40	-4.0	142	0.0	244	0.0
42	-5.0	144	-1.0	246	0.0
44	-1.0	146	0.0	248	0.0
46	-5.0	148	-0.5	250	0.0
48	-1.0	150	0.0	252	0.0
50	-5.5	152	0.0	254	0.0
52	-0.5	154	0.0	256	0.0
54	-2.5	156	0.0	258	0.0
56	0.0	158	0.0	260	0.0
58	-2.0	160	0.0	262	0.0
60	5.5	162	0.0	264	0.0
62	-6.5	164	0.0	266	0.0
64	4.0	166	0.0	268	0.0
66	4.0	168	0.0	270	0.0
68	-3.5	170	0.0	272	0.5
70	7.5	172	0.0	274	-0.5
72	-1.0	174	0.0	276	0.5
74	-1.0	176	0.0	278	0.0
76	5.0	178	0.0	280	-1.0
78	-5.5	180	0.0	282	-0.5
80	3.5	182	0.0	284	-1.0
82	-0.5	184	0.0	286	0.0
84	2.5	186	0.0	288	1.0
86	-2.5	188	0.0	290	-2.5
88	2.5	190	0.0	292	2.0
90	-2.0	192	0.0	294	-1.0
92	2.5	194	0.0	296	0.0
94	1.0	196	0.0	298	0.5
96	0.5	198	0.0	300	0.0
98	0.5	200	0.0		
100	-1.0	202	0.0		

Lateral Acceleration (Event 1)

Lateral Acceleration Values (Event 1)

Time (ms)	Acceleration (g)	Time (ms)	Acceleration (g)	Time (ms)	Acceleration (g)
0	-0.5	102	0.5	204	0.0
2	-0.5	104	2.0	206	0.0
4	-1.0	106	2.0	208	0.0
6	-6.5	108	0.5	210	0.0
8	-5.5	110	0.0	212	0.0
10	-2.5	112	0.0	214	0.0
12	-3.5	114	-0.5	216	0.5
14	-1.0	116	0.0	218	0.0
16	-2.5	118	0.0	220	0.0
18	-7.5	120	0.0	222	0.0
20	-5.5	122	0.0	224	0.0
22	1.0	124	0.0	226	0.0
24	5.5	126	0.0	228	0.0
26	1.0	128	0.0	230	0.0
28	-1.0	130	0.0	232	0.0
30	2.0	132	0.0	234	0.5
32	0.5	134	0.0	236	0.5
34	0.5	136	0.0	238	0.5
36	1.0	138	0.0	240	1.0
38	2.5	140	0.0	242	0.5
40	2.0	142	0.0	244	0.5
42	0.5	144	0.0	246	0.0
44	0.5	146	0.0	248	0.0
46	1.0	148	0.0	250	0.0
48	0.0	150	0.0	252	0.0
50	0.0	152	0.0	254	0.5
52	0.5	154	0.0	256	0.5
54	2.0	156	0.0	258	0.5
56	3.5	158	0.0	260	0.5
58	3.5	160	0.0	262	0.0
60	0.0	162	0.0	264	0.0
62	0.0	164	0.0	266	0.0
64	0.0	166	0.0	268	0.0
66	0.0	168	0.0	270	-0.5
68	1.0	170	0.0	272	0.0
70	0.0	172	0.0	274	-0.5
72	0.0	174	0.0	276	0.5
74	0.0	176	0.0	278	-7.0
76	0.0	178	0.0	280	-4.0
78	0.0	180	0.0	282	-3.5
80	0.0	182	0.0	284	-5.0
82	0.0	184	0.0	286	-5.5
84	0.0	186	0.0	288	2.5
86	0.5	188	0.0	290	1.0
88	1.0	190	0.0	292	-0.5
90	0.0	192	0.5	294	-1.0
92	0.0	194	0.0	296	2.5
94	-0.5	196	0.0	298	0.5
96	-0.5	198	0.0	300	0.0
98	0.0	200	0.0		
100	0.0	202	0.0		

Roll Angle Data (Event 1)
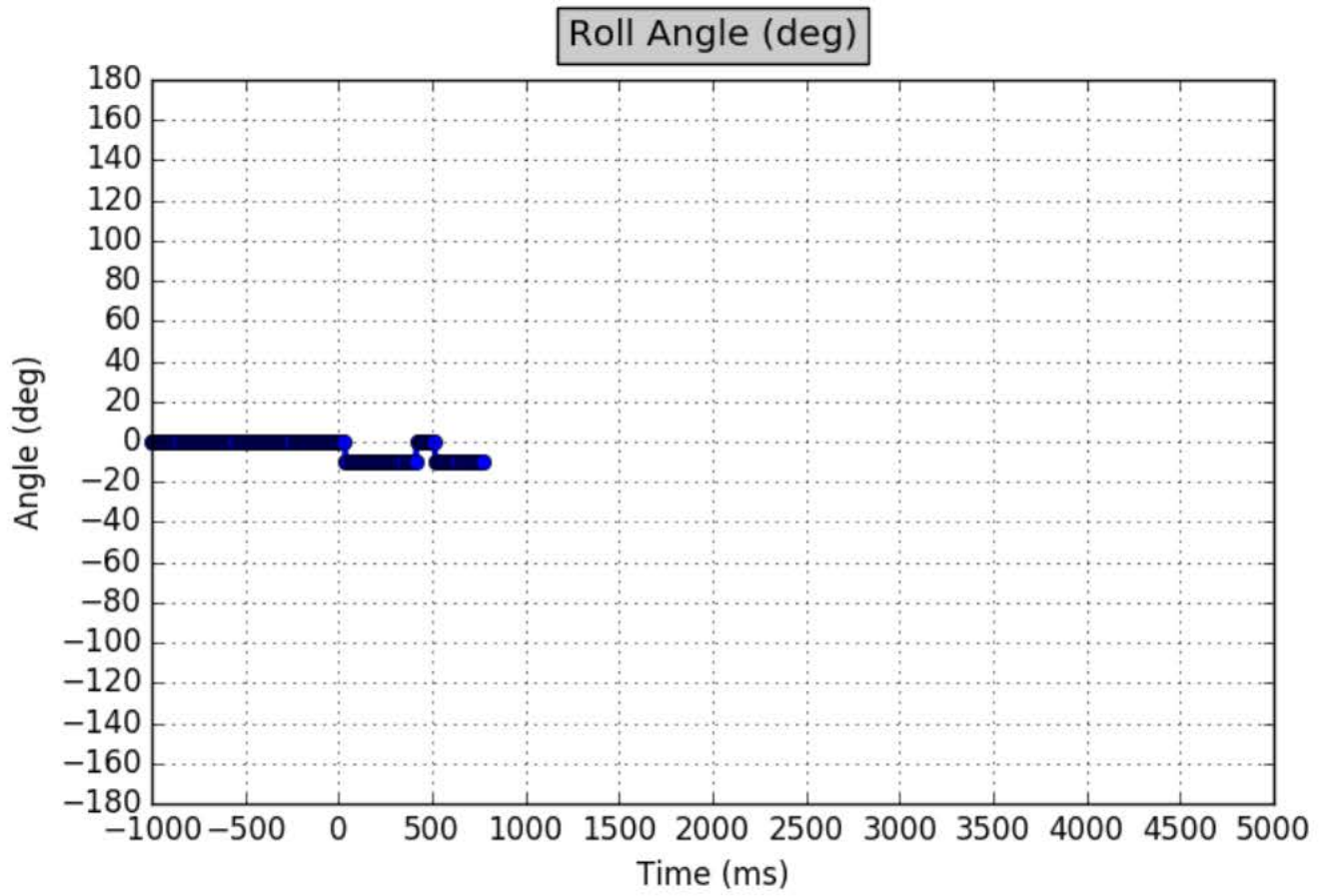
Roll Angle (deg)

Roll Angle Values (Event 1)

Time (ms)	Angle (deg)	Time (ms)	Angle (deg)	Time (ms)	Angle (deg)	Time (ms)	Angle (deg)
-1000	0	-390	0	220	-10	830	
-990	0	-380	0	230	-10	840	
-980	0	-370	0	240	-10	850	
-970	0	-360	0	250	-10	860	
-960	0	-350	0	260	-10	870	
-950	0	-340	0	270	-10	880	
-940	0	-330	0	280	-10	890	
-930	0	-320	0	290	-10	900	
-920	0	-310	0	300	-10	910	
-910	0	-300	0	310	-10	920	
-900	0	-290	0	320	-10	930	
-890	0	-280	0	330	-10	940	
-880	0	-270	0	340	-10	950	
-870	0	-260	0	350	-10	960	
-860	0	-250	0	360	-10	970	
-850	0	-240	0	370	-10	980	
-840	0	-230	0	380	-10	990	
-830	0	-220	0	390	-10	1000	
-820	0	-210	0	400	-10	1100	
-810	0	-200	0	410	-10	1200	
-800	0	-190	0	420	0	1300	
-790	0	-180	0	430	0	1400	
-780	0	-170	0	440	0	1500	
-770	0	-160	0	450	0	1600	
-760	0	-150	0	460	0	1700	
-750	0	-140	0	470	0	1800	
-740	0	-130	0	480	0	1900	
-730	0	-120	0	490	0	2000	
-720	0	-110	0	500	0	2100	
-710	0	-100	0	510	0	2200	
-700	0	-90	0	520	-10	2300	
-690	0	-80	0	530	-10	2400	
-680	0	-70	0	540	-10	2500	
-670	0	-60	0	550	-10	2600	
-660	0	-50	0	560	-10	2700	
-650	0	-40	0	570	-10	2800	
-640	0	-30	0	580	-10	2900	
-630	0	-20	0	590	-10	3000	
-620	0	-10	0	600	-10	3100	
-610	0	0	0	610	-10	3200	
-600	0	10	0	620	-10	3300	
-590	0	20	0	630	-10	3400	
-580	0	30	0	640	-10	3500	
-570	0	40	-10	650	-10	3600	
-560	0	50	-10	660	-10	3700	
-550	0	60	-10	670	-10	3800	
-540	0	70	-10	680	-10	3900	
-530	0	80	-10	690	-10	4000	
-520	0	90	-10	700	-10	4100	
-510	0	100	-10	710	-10	4200	
-500	0	110	-10	720	-10	4300	
-490	0	120	-10	730	-10	4400	
-480	0	130	-10	740	-10	4500	
-470	0	140	-10	750	-10	4600	
-460	0	150	-10	760	-10	4700	
-450	0	160	-10	770	-10	4800	
-440	0	170	-10	780		4900	
-430	0	180	-10	790		5000	
-420	0	190	-10	800			
-410	0	200	-10	810			
-400	0	210	-10	820			

Serial Numbers

Sensor Number	Sensor Type	Serial Number
1	RCM Serial Number	NO22
2	Left Front Crash Sensor	A00000000
3	Right Front Crash Sensor	A00000000
4	Left Side Impact Crash Sensor (B-Pillar)	A00000000
5	Right Side Impact Crash Sensor (B-Pillar)	A00000000
6	Right Side Impact Crash Sensor (C-Pillar)	A00000000
7	Left Side Impact Crash Sensor (C-Pillar)	A00000000
8	Right Side Door Pressure Sensor	P00000000
9	Left Side Door Pressure Sensor	P00000000

Hexadecimal Data

F187

```
31  30  33  32  32  32  34  2D  30  30  2D  41  00  00  00  00
```

FD94

```
0000  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F
0028  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F
0056  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F
0084  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7E  7E  7E  7E  7E  7E  7E  7E
0112  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E
0140  7E  7E  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E
0168  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0196  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0224  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
```

FD91

```
0000  B0  B3  B6  B9  BB  B8  AF  A6  9B  90  8B  4E  4B  4A  4A  00  00  00  00  00  00  00  82  84  86  88  89  88
0028  82  7B  72  6C  67  00  00  00  7D  7C  7B  7B  81  83  87  89  8A  8C  8C  00  54  15  55  A5  2A  15  FE  00
0056  00  00  00  00  00  00  01  01  00  03  02  03  00  00  00  00  00  C0  30  FC  00  80  E0  4B  4A  3D  3C  3F
0084  3E  3C  3C  3D  39  3F  00  43  41  00  43  39  00  00  00
```

FD90

```
0000  7F  7F  7F  7F  7E  7D  7C  7D  7D  7D  7E  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D  7D
0028  7D  7D  7D  7B  00  40  7E  7D  7C  7C  7D  7D  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E  7E
0056  7F  7F  7F  7F  80  80  7F  7E  7E  7B  00  16  00  40
```

FD93

```
0000  49  01  55  55  D5  75  FD  00  00  37  00  9B  00  37  00  9B  00  37  00  37  00  37  00  37  00  37  00  37
0028  02  12  FF  FF  01  EE  02  12  FF  FF  01  EE  00  37  FF  FF  FF  FF  FF  FF
```

FD92

```
0000  7F  7E  7E  7F  80  7E  7E  7D  7D  7F  77  81  7A  81  7F  7B  83  7A  7F  7A  77  75  7D  75  7D  74  7E  7A
0028  7F  7B  8A  72  87  87  78  8E  7D  7D  89  74  86  7E  84  7A  84  7B  84  81  80  80  7D  80  7D  7F  7F  7F
0056  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7E  7F  7E  7F  7D  7F  7D  7F  7E  7F  7F  7F  7F  7F  7F  7F  7F  7F
0084  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7E  7F  7E  7F  7F  7F  7F  7F  7F  7F  7F  7F
0112  7F  7E  81  7D  80  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  80  7E  80  7F
0140  7D  7E  7D  7F  81  7A  83  7D  7F  80  7F  7E  7E  7D  72  74  7A  78  7D  7A  70  74  81  8A  81  7D  83  80
0168  80  81  84  83  80  80  81  7F  7F  80  83  86  86  7F  7F  7F  7F  81  7F  7F  7F  7F  7F  7F  7F  7F  80  81
0196  7F  7F  7E  7E  7F  7F  80  83  83  80  7F  7F  7E  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F
0224  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  7F  80  7F  7F  7F
0252  7F  7F  7F  7F  7F  7F  7F  80  7F  7F  7F  7F  7F  7F  7F  7F  80  80  80  81  80  80  7F  7F  7F  7F  80  80
0280  80  80  7F  7F  7F  7F  7E  7F  7E  80  71  77  78  75  74  84  81  7E  7D  84  80  7F
```

FD53

```
04  00  04  00  04  00  04  00  02  00  04  00  04  00  04  00
```

FD52

```
01  02  06  07  09  08  0C  0B
```

FD14

```
00  FF  15  FF  00  00  00
```

F190

```
35  59  4A  53  41  31  48  32  34  45  46  50  36  32  36  39  33
```

FD95

```
0000  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0028  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0056  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0084  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0112  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0140  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0168  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF  FF
0196  FF  FF  FF  FF  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00  00
0224  00  00  00  00  00  00
```

FD80

03 03 FF FF FF FF 03 00

FD02

    4E 30 32 32

FD03

    00 FF FF FF FF 00 31 34 31 31 32 32 30 31 4E 30 32 32 41 4B 58

FD00

    28 44 54 97 20 20 00 00

FD01

    20 A2 D6 CB 59 D6 5A C3 D0

FD60

    FF 00 00 00 00 41 30 30 30 30 30 30 30 30

FD61

    FF 00 00 00 00 41 30 30 30 30 30 30 30 30

FD62

    FF 00 00 00 00 41 30 30 30 30 30 30 30 30

FD63

    FF 00 00 00 00 41 30 30 30 30 30 30 30 30

FD64

    FF 00 00 00 00 41 30 30 30 30 30 30 30 30

FD65

    FF 00 00 00 00 41 30 30 30 30 30 30 30 30

FD66

    FF 00 00 00 00 50 30 30 30 30 30 30 30 30

FD67

    FF 00 00 00 00 50 30 30 30 30 30 30 30 30

    99 88 BC 2B 59 31 6B 91 5F 9B 54 82 8C 6D 29 AA B6 CE 0C F3 B3 CD 4C AD 37 7A 2C 5C 5C E0 C8 0F

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