CHIP-LEVEL FORENSICS ATTACHMENT

Exemplar 3 with Exemplar 2's MCU Installed CDR Report

Etna, OH

HWY24MH001

(11 pages)

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

CDR File Information

User Entered VIN	5N1AZ2MH2FN[redacted]
User	Jason Zeitler
Case Number	HWY24MH001
EDR Data Imaging Date	02/23/2024
Crash Date	
Filename	5N1AZ2MH2FN[redacted] ACM.CDRX
Saved on	Friday, February 23 2024 at 12:18:38
Imaged with CDR version	Crash Data Retrieval Tool 23.4.1
Imaged with Software Licensed to (Company Name)	NTSB, Office of Highway Safety
Reported with CDR version	Crash Data Retrieval Tool 23.1.2
Reported with Software Licensed to (Company Name)	NTSB, Office of Highway Safety
EDR Device Type	Airbag Control Module
Event(s) recovered	Event Record 1

Comments

E3 with E2's memory
DTM 387/780

Data Limitations

General Information:
Data limitations are intended to assist in reading event data that has been imaged from the vehicle's Air bag Control Unit (ACU). Event data should be considered in conjunction with other available physical evidence from the vehicle and scene.

Airbag Control Unit (ACU)

- The Air bag Control Unit (ACU) can store two types of events: Non-Deployment Events and Deployment.
  - A Non-Deployment Event is a crash or other physical occurrence which causes the ACU algorithm to be activated, but in which deployment thresholds are not reached.
  - A Deployment Event is a crash or other physical occurrence which causes ACU deployment thresholds to be reached or exceeded. Depending on the vehicle model, one or more of the following may be activated during a Deployment Event: front air bags, seat-mounted side airbags, roof-mounted or door-mounted curtain air bags, pretensioners, or pop-up roll bars.

- The ACU can record up to two events. If additional events occur subsequently, the older of the two events already recorded (i.e. the one which occurred first) is overwritten.
  - A Non-Deployment Event can be overwritten by another Non-Deployment event, or by a Deployment Event.
  - A Deployment Event has higher priority than a Non-Deployment Event, and cannot be interrupted or overwritten by another event.
  - The data pertaining to a Deployment Event is locked after being recorded. However, a second event can still be recorded subsequently in the portion of the event memory which is not locked.

- Event data includes both pre-crash data and crash data.
  - If the power supply to the ACU is lost during an event, all or part of the event data may not be recorded.
  - In addition to the recording of event data, the ACU has the ability to perform diagnostics and record Diagnostic Trouble Codes (DTCs).

Data Element Sign Convention:
The following table provides an explanation of the sign convention for data elements in the CDR report.

Data Element Name	Positive Sign Notation Indicates
Longitudinal Acceleration	Forward
Delta-V, Longitudinal	Forward
Maximum Delta-V, Longitudinal	Forward
Lateral Acceleration	Left to Right
Delta-V, Lateral	Left to Right
Maximum Delta-V, Lateral	Left to Right
Vehicle Roll Angle	Left to Right Rotation
Steering Input	Left Turn

- "Life Time Counter (sec)" indicates the elapsed time, in seconds, from the vehicle's first ignition activation until the start of the first recorded event. The counter is incremented whenever the vehicle's ignition is on. The counter is reset to 0 if the ACU is replaced.
- "Complete File Recorded" indicates whether a complete EDR data set has been stored after the event. "Yes" indicates that a complete data set has been recorded. "No" indicates that only a portion of the data set has been recorded, for example due to the power to the ACU being lost during the event.

- "Multi-Event, Number of Events (1, 2)" indicates the number of events which are stored during a given ignition cycle. A Multi-Event occurs whenever the time between Event 2 trigger threshold and Event 1 trigger threshold is less than or equal to 5 seconds during the same ignition cycle, and "2" will be recorded in this case. Otherwise, "1" will be recorded.
- "Air Bag Warning Lamp (On, Off)" indicates whether the ACU was in trouble mode or in normal operation mode at the time of the event. "On" indicates that the air bag warning lamp was illuminated at the time of the event, and the ACU was in trouble mode. "Off" indicates that the air bag warning lamp was not illuminated at the time of the event, and the ACU was in normal operation mode.
- "Frontal Air Bag Suppression Switch Status" indicates whether front passenger air bag deployment was suppressed at the time of the event. "On" indicates that the front passenger air bag was suppressed at the time of the event (deployment inhibited). "Off" indicates that the front passenger air bag was not suppressed at the time of the event (deployment enabled). This data will not be available for all vehicles.
- "Delta-V, Longitudinal" indicates the cumulative change in velocity along the longitudinal direction.
- "Acceleration, Longitudinal" indicates the rate of change of velocity with time along the longitudinal direction.
- "Delta-V, Lateral" indicates the cumulative change in velocity along the lateral direction.
- "Acceleration, Lateral" indicates the rate of change of velocity with time along the lateral direction.
- "Engine Throttle, % full" indicates the position of the accelerator pedal as a percentage of the fully depressed position.
- "Service Brake (On, Off)" indicates whether the service brake is activated ("On") or not activated ("Off").
- "Steering Input (deg)" indicates the angular displacement of the steering wheel measured in degrees. -250 deg indicates a 250 degree turn to the right of the steering wheel, 0 deg indicates the straight-ahead steering wheel position, and 250 deg indicates a 250 degree turn to the left of the steering wheel.
- The notation "CLP" indicates that the measurement captured by a sensor exceeded the design range of the sensor.
- "Seat Track Position Switch, Foremost, Status, Driver (Yes/No)" indicates whether the driver's seat is positioned within a designated threshold value of the most forward adjustment position. "Yes" indicates that the driver's seat is positioned within a designated threshold value of the most forward adjustment position. For all other adjustment positions, "No" is displayed. This data will not be available if the seat track position switch is not installed in the vehicle.
- "Occupant Size Classification, Right Front Passenger, Child (Yes/No)" indicates whether or not the right front passenger is classified as a child (as defined in 49 CFR part 572, subpart N or smaller). This data will not be available for all vehicles.
- "e-pedal ON/OFF Status" indicates whether "e-pedal" is activated (ON), or not activated (OFF). This data will not be available for all vehicles.
- "ABS Warning lamp, on/off" indicates whether "Anti-lock Brake System" was in trouble mode or in normal operation mode at the time of the event. This data will not be available for all vehicles.
- "AEB/FCW switch status ON/OFF (from ADAS)" indicates whether the switch of "Automatic Emergency Braking or Forward Collision Warning controlled by ADAS unit" was ON, or OFF at the time of the event. This data will not be available for all vehicles.
- "AEB Warning lamp (from ADAS)" indicates whether "Automatic Emergency Braking controlled by ADAS unit" was in trouble mode or in normal operation mode at the time of the event. This data will not be available for all vehicles.
- "ABS regulation status" indicates whether "Anti-lock Brake System" was activated (ABS in regulation), or not activated (no ABS regulation). This data will not be available for all vehicles.
- "VDC switch status ON/OFF" indicates whether the switch of "Vehicle Dynamic Control" in ON, or OFF. This data will not be available for all vehicles.
- "VDC status/warning" indicates whether "Vehicle Dynamic Control" was in normal operation mode and not activated (No failure and no control), in trouble mode and not activated (Failure), or in normal mode and activated (In active control). This data will not be available for all vehicles.
- "Adaptive Cruise Control status" indicates whether "Intelligent Cruise Control status" was activated (ACC activated), waiting (ACC waiting), suspended (ACC suspended), or not activated (No display request). This data will not be available for all vehicles.
- "AEB operating capability" indicates whether "Automatic Emergency Braking" was in trouble mode (Impossible to execute request) or in normal operation mode (Braking fully operational). This data will not be available for all vehicles.
- "AEB Brake request (from ADAS)" indicates whether "Automatic Emergency Braking controlled by ADAS unit" was activated (Brake Torque AEB Maximum), or not activated (No Brake Request). This data will not be available for all vehicles.
- "VIN retrieval from other ECU " indicates VIN data retrieval from other ECU when CDR connect to vehicle by using OBD system if available.
- "VIN retrieval from ACU " indicates VIN data retrieval from ACU. It will not be available for all vehicles.
- "Motor RPM " indicates RPM of motor used for vehicle drive on electric or hybr id vehicles. In case of ICE vehicles, this indicates input shaft revolution that is input to Gearbox. This data will not be available for all vehicles.
- "Motor RPM2" indicates RPM of motor used for vehicle drive on electric vehicles. This data will not be available for all vehicles.

Hexadecimal Data:
All data that has been specified for retrieval is shown in the Hexadecimal Data section of this report. However, the Hexadecimal Data section may contain data that is not translated by the CDR tool.

Data Sources:
- Crash data is measured internally in the ACU.
- Pre-crash data is not measured internally in the ACU, but is transmitted from other control units through the Controller Area Network (CAN).
- Pre-crash data and crash data are asynchronous.

0701_Nissan001_r010

System Status At Time Of Retrieval

VIN retrieved from ACU	Not Available
VIN Retrieval from other ECU	Not Available

DTCs at Time of Retrieval

DTC	Status	Description
B1422	Current	SIDE COLLISION DETECTION
B1429	Current	SEAT BELT BUCKLE SW RH CIRCUIT [OPEN]
B1429	Current	SEAT BELT BUCKLE SW RH CIRCUIT [UNDEFINED]
B1401	Current	CONTROL UNIT [UNIT FAIL]
U1000	Current	(CAN COMMUNICATION FAILER)
B0091	Current	B-PILLAR SATELLITE SENSOR LH [DISCONNECT]
B0096	Current	B-PILLAR SATELLITE SENSOR RH [DISCONNECT]
B0092	Current	C-PILLAR SATELLITE SENSOR LH [DISCONNECT]
B0097	Current	C-PILLAR SATELLITE SENSOR RH [DISCONNECT]
B0001	Current	DRIVER AIRBAG MODULE CIRCUIT [OPEN]
B0010	Current	ASSIST AIRBAG MODULE CIRCUIT [OPEN]
B1431	Current	FRONT PRE-TEN RH CIRCUIT [OPEN]
B1430	Current	FRONT PRE-TEN LH CIRCUIT [OPEN]
B1433	Current	FRONT PRE-TEN2 RH CIRCUIT [OPEN]
B1434	Current	KNEE AIRBAG MODULE LH CIRCUIT [OPEN]
B0002	Current	DRIVER AIRBAG MODULE 2ND CIRCUIT [OPEN]
B00A0	Past	OCCUPANT DETECTION SENSOR [POWER FAIL]
B1422	Past	SIDE COLLISION DETECTION
U1000	Trouble Diag. Record	(CAN COMMUNICATION FAILER)

System Status at Event (Event Record 1)

Life Time Counter (sec)	6305963
Complete File Recorded (Yes/No)	Yes (Complete)
Ignition Cycle, Crash	7974
Ignition Cycle, Download	8027
Multi-Event, Number of Events (1, 2)	1
Time from Event 1 to 2 (sec)	N/A
Safety Belt Status, Driver	On (Fastened)
Safety Belt Status, Right Front Passenger (buckled, not buckled)	On (Fastened)
Frontal Air Bag Warning Lamp (On, Off)	Off
Frontal Air Bag Suppression Switch Status	Off (AS airbag deploy)
Maximum Delta-V, Longitudinal (MPH [km/h])	2 [4]
Time, Maximum Delta-V, Longitudinal (msec)	247.5
Maximum Delta-V, Lateral (MPH [km/h])	-4 [-6]
Time, Maximum Delta-V, Lateral (msec)	160
Maximum Acceleration, Longitudinal (g)	2
Time, Maximum Acceleration, Longitudinal (msec)	82.5
Maximum Acceleration, Lateral (g)	-3
Time, Maximum Acceleration, Lateral (msec)	72.5
Occupant Size Classification, Right Front Passenger, Child (Yes/No)	No

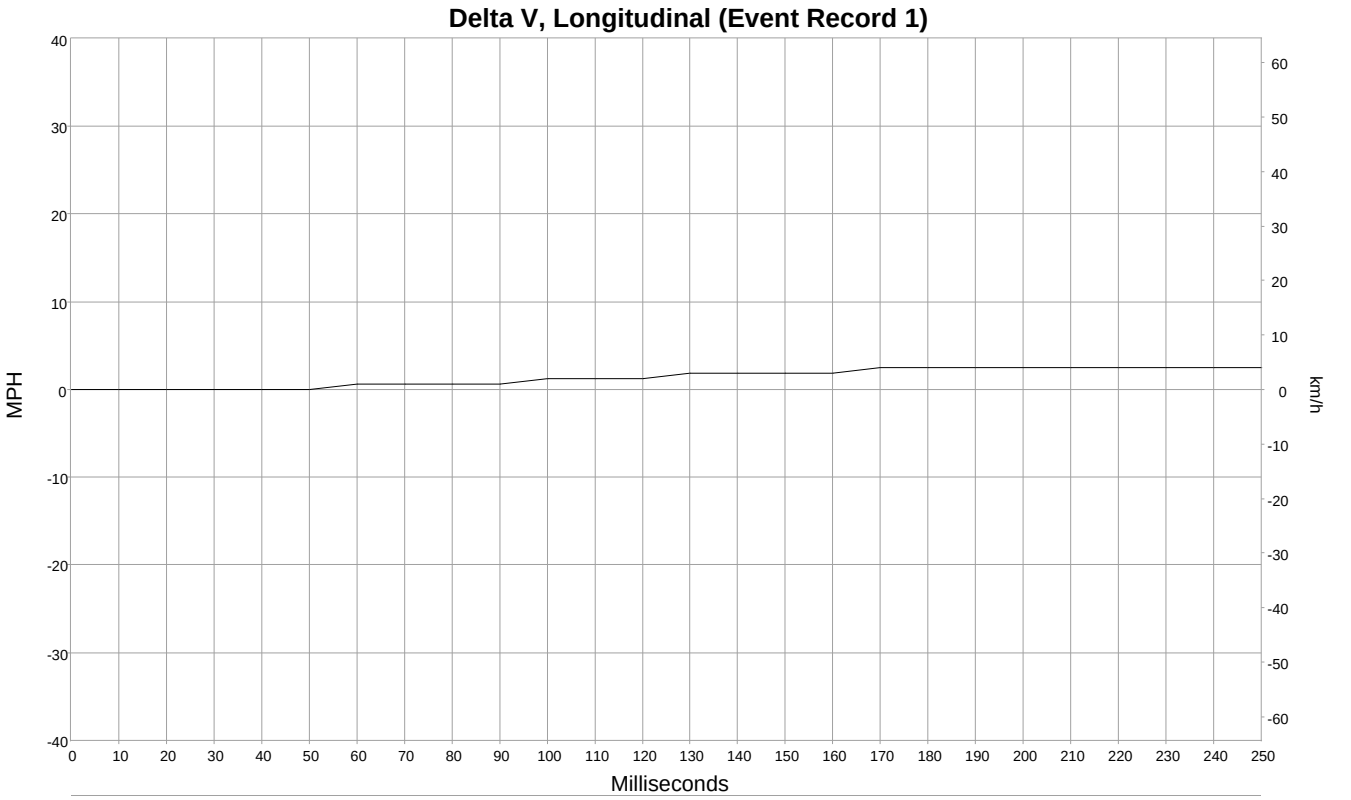
Deployment Command Data (Event Record 1)

Frontal Air Bag Deployment, Time to Deploy/First Stage, Driver (msec)	N/A
Frontal Air Bag Deployment, Time to Deploy/First Stage, Passenger (msec)	N/A
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (msec)	N/A
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (msec)	N/A
Side Air Bag Deployment, Time to Deploy, Driver (msec)	N/A
Side Air Bag Deployment, Time to Deploy, Right Front Passenger (msec)	62
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Driver Side (msec)	N/A
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Right Side (msec)	62
Pretensioner Deployment, Time to Fire, Driver (msec)	N/A
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	76

Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 1)

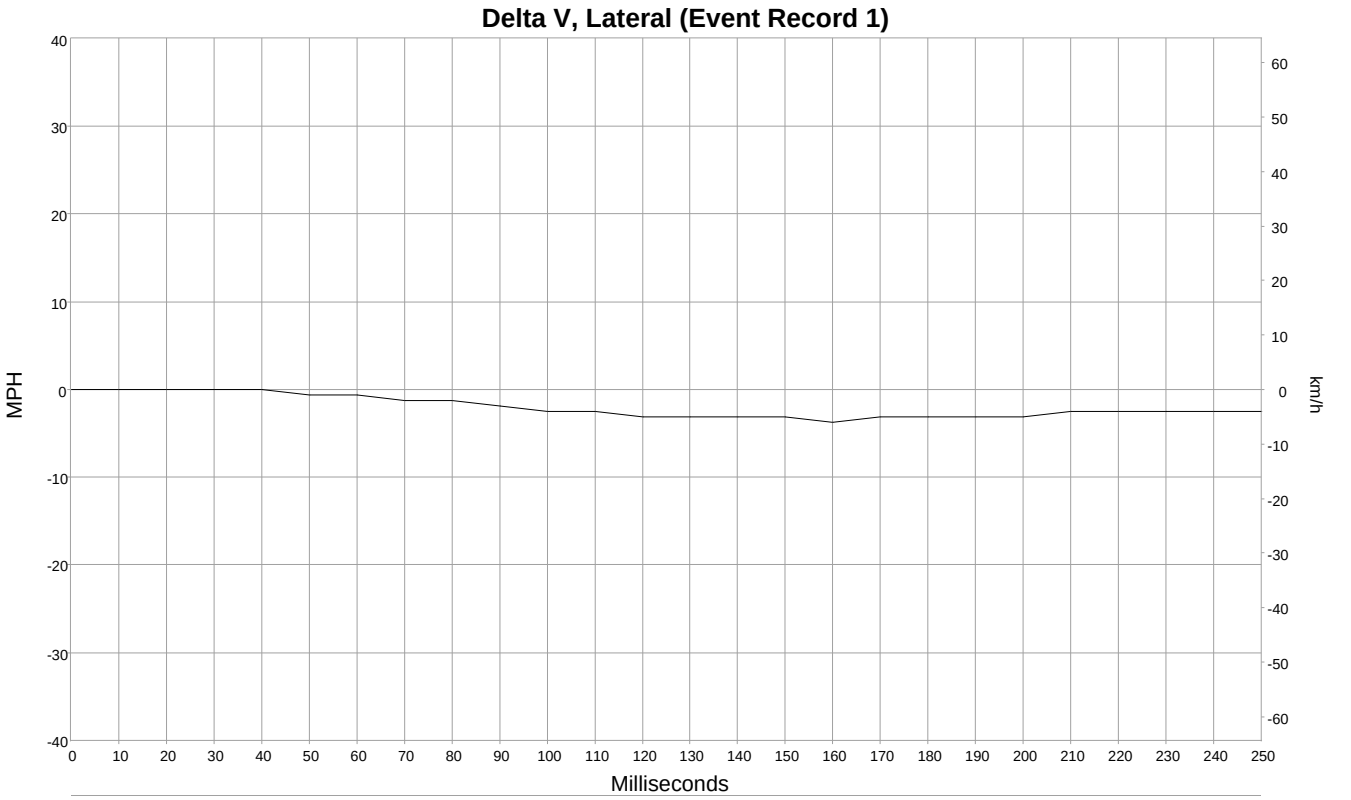
(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % full	Engine RPM	Motor RPM	Service Brake (On, Off)	Steering Input (deg)
-5.0	24 [39]	0	1000	1000	On (Brake Activated)	2.5
-4.5	22 [36]	0	1000	1000	On (Brake Activated)	2.5
-4.0	21 [33]	0	1000	1000	On (Brake Activated)	2.5
-3.5	19 [31]	0	1000	1000	On (Brake Activated)	-2.5
-3.0	17 [27]	0	900	900	On (Brake Activated)	-10
-2.5	14 [23]	0	1000	1000	On (Brake Activated)	-55
-2.0	12 [19]	0	1000	1000	On (Brake Activated)	-145
-1.5	9 [14]	0	1000	1100	On (Brake Activated)	-240
-1.0	8 [13]	0	1200	1100	On (Brake Activated)	-250 (clp)
-0.5	3 [5]	0	900	300	On (Brake Activated)	-187.5
0.0	0 [0]	0	600	0	On (Brake Activated)	-177.5



Longitudinal Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	0 [0]
20	0 [0]
30	0 [0]
40	0 [0]
50	0 [0]
60	1 [1]
70	1 [1]
80	1 [1]
90	1 [1]
100	1 [2]
110	1 [2]
120	1 [2]
130	2 [3]
140	2 [3]
150	2 [3]
160	2 [3]
170	2 [4]
180	2 [4]
190	2 [4]
200	2 [4]
210	2 [4]
220	2 [4]
230	2 [4]
240	2 [4]
250	2 [4]



Lateral Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	0 [0]
20	0 [0]
30	0 [0]
40	0 [0]
50	-1 [-1]
60	-1 [-1]
70	-1 [-2]
80	-1 [-2]
90	-2 [-3]
100	-2 [-4]
110	-2 [-4]
120	-3 [-5]
130	-3 [-5]
140	-3 [-5]
150	-3 [-5]
160	-4 [-6]
170	-3 [-5]
180	-3 [-5]
190	-3 [-5]
200	-3 [-5]
210	-2 [-4]
220	-2 [-4]
230	-2 [-4]
240	-2 [-4]
250	-2 [-4]

Hexadecimal Data

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DID    Data

2001  FF 90 1C 94 22 00 94 29 13 94 29 00 94 01 00 D0
      00 01 80 91 88 80 96 88 80 92 88 80 97 88 80 01
      13 80 10 13 94 31 13 94 30 13 94 33 13 94 34 13
      80 02 13 14 FF FF FF FF 00 05 20 EF

2002  D0 00 01 00 00 01 11 00 68 92 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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2003  80 A0 00 00 00 04 05 00 F8 16 00 00 94 22 00 00
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2006  FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF 4C
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      3C FF FF FF FF FF FF FF FF FF FF FF FF 3E 3E FF
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      00 00 00 00 00 00 FF FF FF FF FF FF 87 00 00 00
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      00 00 00 00 00 00 00 00

2019  00 00 00 01 00 00 00 01 00 00 00 01 00 00 00 01
      00 00 00 01 00 00 00 01 00 00 00 01 00 00 00 01
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201A  00 00 00 00 00 00 FF FF FF FF FE FE FE FD FD FD
      FD FC FC FC FC FC FC FC FC FC FC 63 00 27 00 24
      00 21 00 1F 00 1B 00 17 00 13 00 0E 00 0D 00 05
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 1F 26 1F 5B 00 01 FF FF 01 FF 00 00 01
      FF FF FF 3E FF 3E FF 4C 80 80 80 80 80 80 80 80
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201B  80 80 80 80 80 80 80 80 80 80 80 80 80 80 80 80
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201C  7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
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      7F 7F

201E  7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
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F1A0  20


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      01 00 09 D0 00 01 09 80 91 88 09 80 96 88 09 80
      92 88 09 80 97 88 09 80 01 13 09 80 10 13 09 94
      31 13 09 94 30 13 09 94 33 13 09 94 34 13 09 80
      02 13 09


      59 02 09 80 A0 00 08 94 22 00 09


      59 0F 08 D0 00 01 08


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      FF C3 FF 1F DF FF FF BF FF D7 FF 08 86 32 10 00
      00 3F FF FF FF FF 04 7F FF FF 00 FF FF FF FF FF
      FF FF FF FF
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