SURFACE VEHICLE RECOMMENDED PRACTICE

J1698™/2 JUL2023

Issued 2004-05
Reaffirmed 2018-03
Revised 2023-07

Superseding J1698/2 MAR2018

Event Data Recorder - Retrieval Tool Protocol

RATIONALE

This SAE Recommended Practice is being revised in order to referance SAE J3197. This change was based on recent discussions in the SAE EDR Committee.

1. SCOPE

This SAE Recommended Practice utilizes existing industry standards to identify a common physical interface and define the protocols necessary to retrieve records stored by light duty vehicle event data recorders (EDRs). To accomplish this, the SAE J1962 diagnostic connector is designated as the primary physical interface for EDR retrieval tools.

This SAE Recommended Practice is intended to be used for the development of EDR retrieval tools. Retrieval tools are intended to interface with light duty vehicles and to produce EDR record reports with data element formats specified by SAE J1698-1.

Limitations:

- This SAE Recommend Practice specifies how EDR records should be imaged, translated, and reported by EDR retrieval tools. It does not specify how EDR records are recorded and stored by individual vehicles.
- This SAE Recommended Practice addresses EDR record retrieval (including imaging and translating) via the connection to the vehicle's SAE J1962 connector or via direct connection to an electronic control unit (ECU) containing an EDR record. Direct connection to an ECU may require the use of specialized interface adapters.

1.1 Purpose

This SAE Recommended Practice defines a protocol for imaging, translating, and reporting EDR records from EDR-equipped motor vehicles. It specifies the means of connecting the tool to the vehicle. It is intended for use by those developing tools for the purpose of EDR record retrieval, as well as by those using such tools to retrieve EDR record reports.

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For more information on this standard, visit
https://www.sae.org/standards/content/J1698/2_202307/

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1698 Event Data Recorder

SAE J1698-1 Event Data Recorder - Output Data Definition

SAE J1962 Diagnostic Connector

SAE J3197 Automated Driving System Data Logger

2.1.2 NIST Publications

Available from NIST, 100 Bureau Drive, Stop 1070, Gaithersburg, MD 20899-1070, Tel: 301-975-6478, www.nist.gov.

SP 800-38C Recommended for CCM mode for authentication and encryption

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 Code of Federal Regulations (CFR) Publications

Available from the United States Government Printing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-1800, www.gpo.gov.

49 CFR Part 563 Event Data Recorders

3. DEFINITIONS

Refer to SAE J1698 for definitions.

4. DATA SECURITY

All imaged data retrieved from an EDR record and stored by or via an EDR retrieval tool shall be both authenticated and encrypted according to National Institute of Standards and Technology (NIST) SP 800-38C for counter with cipher block chaining message authentication code (CCM) mode for authentication and encryption or equivalent public authentication and encryption standard.

5. DATA INTEGRITY

In order to ensure that an EDR record can be consistently imaged by an EDR retrieval tool, the tool shall automatically image the EDR record at least three times and compare imaged records to ensure they are the same.

If the EDR records are not the same, the tool shall display a message to the user indicating an error and an explantation of the nature of the error. If an error is detected, the EDR retrieval tool shall not save or translate the EDR record.

6. DATA NEUTRALITY

The tool shall request data by such a way as to be as forensically neutral as possible. This practice recommends using diagnostic services, if supported by the ECU, that only request data without activating system diagnostics to suppress setting diagnostic trouble codes (DTCs) during the imaging process upon initial powering of the ECU.

7. PHYSICAL INTERFACE

7.1 On-Board EDR Record Retrieval

The SAE J1962 diagnostics connector shall be the designated interface to a vehicle for the purpose of EDR record retrieval. The tool shall accomodate different manufacturer's use of discretionary pins on the SAE J1962 connector, the vehicle-specific pin assignments and unique properties of differing electrical architectures (see Figure 1). For the purposes of on-board EDR record retrieval, it is assumed that the ECU is powered by the vehicle.

7.2 Off-Board EDR Record Retrieval

In order to retrieve an EDR record report directly from an ECU, the tool must be capable of supplying sufficient power to the ECU to enable EDR record retrieval. It is important to note that it is beyond the scope of this document to address all of the specific factors that must be taken into account in order to directly communicate with every ECU that may contain EDR records.

The following are some of the factors that may need to be taken into account when imaging EDR record(s) directly from an ECU:

a. The physical connector and pin assignments utilized by the ECU supplier and the likely need for adaptive connectors.

b. The electrical requirements for imaging an ECU when not electrically connected to the vehicle during retrieval.

c. A different network protocol and/or baud rate than that required for imaging through the SAE J1962 connector may be required to communicate directly with the ECU.

d. The data required to form a complete EDR record report may be distributed across multiple ECUs.

8. IN-VEHICLE EDR RETRIEVAL TOOL PROCESS OVERVIEW

See Figure 1.

8.1 EDR retrieval tool is connected to the vehicle's SAE J1962 connector.

8.2 EDR retrieval tool reads the VIN and the tool user confirms that the VIN read matches that of the vehicle to which the EDR retreival tool is connected. Alternatively, the tool user may enter the VIN manually in cases where the VIN is not able to be read by the tool.

8.3 The EDR retrieval tool uses the VIN to help select the correct communication protocol, physical IDs and the correct translation for the EDR record in question.

8.4 If the vehicle is supported by the EDR retrieval tool, it images and stores the data from the ECU(s).

8.5 If an error is encountered during the imaging process, the EDR retrieval tool displays an appropriate error message to the user (for example, "the vehicle is not supported" or "a communication error has occurred").

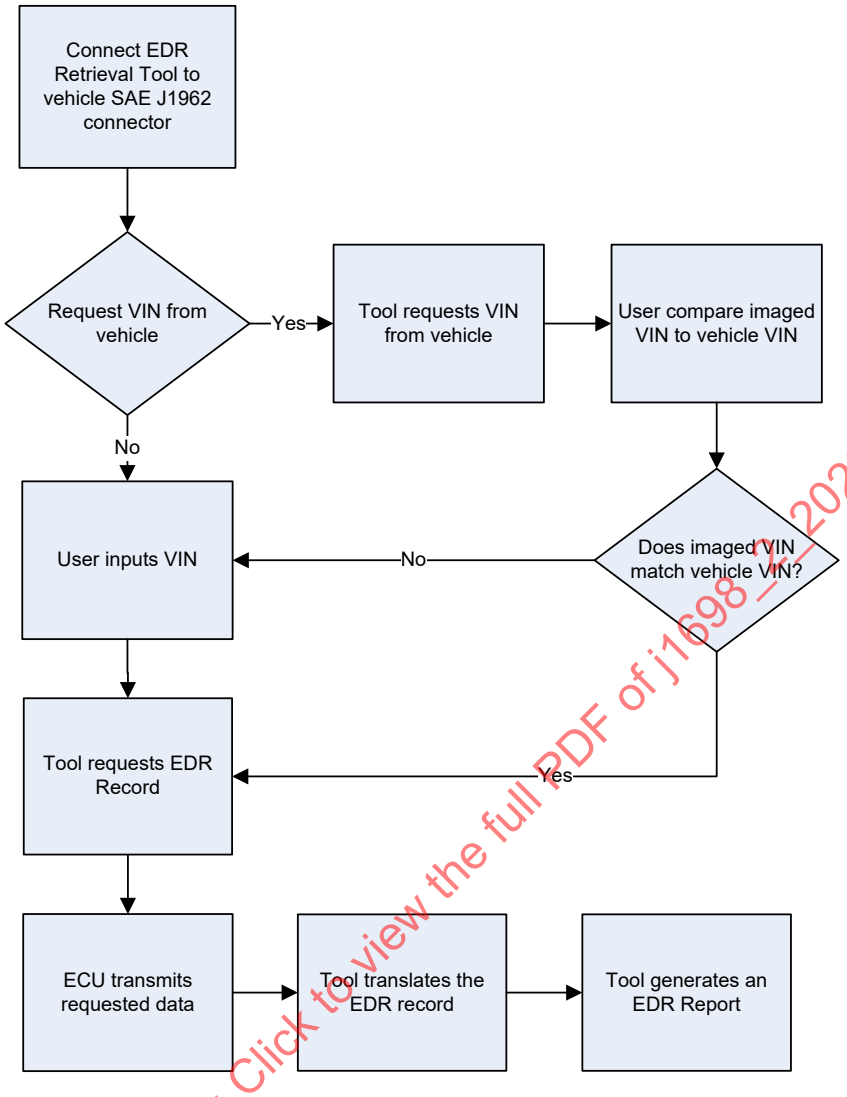

Figure 1 - In-vehicle EDR retrieval tool process

9. DATA COLLECTION GUIDE OVERVIEW

Follow the EDR retrieval tool manufacturer's recommendations.

When working with or around safety restraint systems, be sure to follow the vehicle manufacturer's safety recommendations.

9.1 Potential Steps to Perform to Download EDR Data from a Vehicle or ECU

See Figure 2.

a. Determine whether the vehicle is supported by the EDR retrieval tool.

b. Conduct a visual inspection of the vehicle to initially determine the best method of powering the vehicle or ECU.

   1. Verify the condition of the battery and associated wiring to determine if there is sufficient in-vehicle power and electrical continuity.

   2. Verify the condition of the data link connector (DLC) (SAE J1962 connector) and associated wiring.

   3. Conduct a visual inspection to determine if the ECU is securely mounted to the vehicle. If not, it may be necessary to securely mount the ECU to prevent it from being moved while attempting to collect EDR data.

c. Connect the EDR retrieval tool to the vehicle or ECU as needed.

d. Start the EDR retrieval tool.

e. Read VIN from vehicle or manually enter it as needed.

f. Enter any additional information as needed or prompted by the tool.

g. Attempt to collect EDR data.

h. Save any collected EDR data.

i. Disconnect any external power source from the vehicle or ECU.

j. Disconnect EDR retrieval tool from the vehicle or ECU.

NOTE: The preferred order of methods to be used when attempting to collect EDR data are:

i. Attempt to collect EDR data by connecting the EDR retrieval tool to the DLC.

(a) If the battery is discharged or disconnected, check for shorts to ground in the positive battery circuit before applying power to the vehicle.

(b) An alternative powering method may be needed.

ii. Attempt to collect EDR data by connecting the EDR retrieval tool directly to the ECU, while it is still mounted in the vehicle.

iii. Attempt to collect EDR data by connecting the EDR retrieval tool directly to the ECU, after it has been removed from the vehicle and securely mounted to a flat, level, rigid surface.

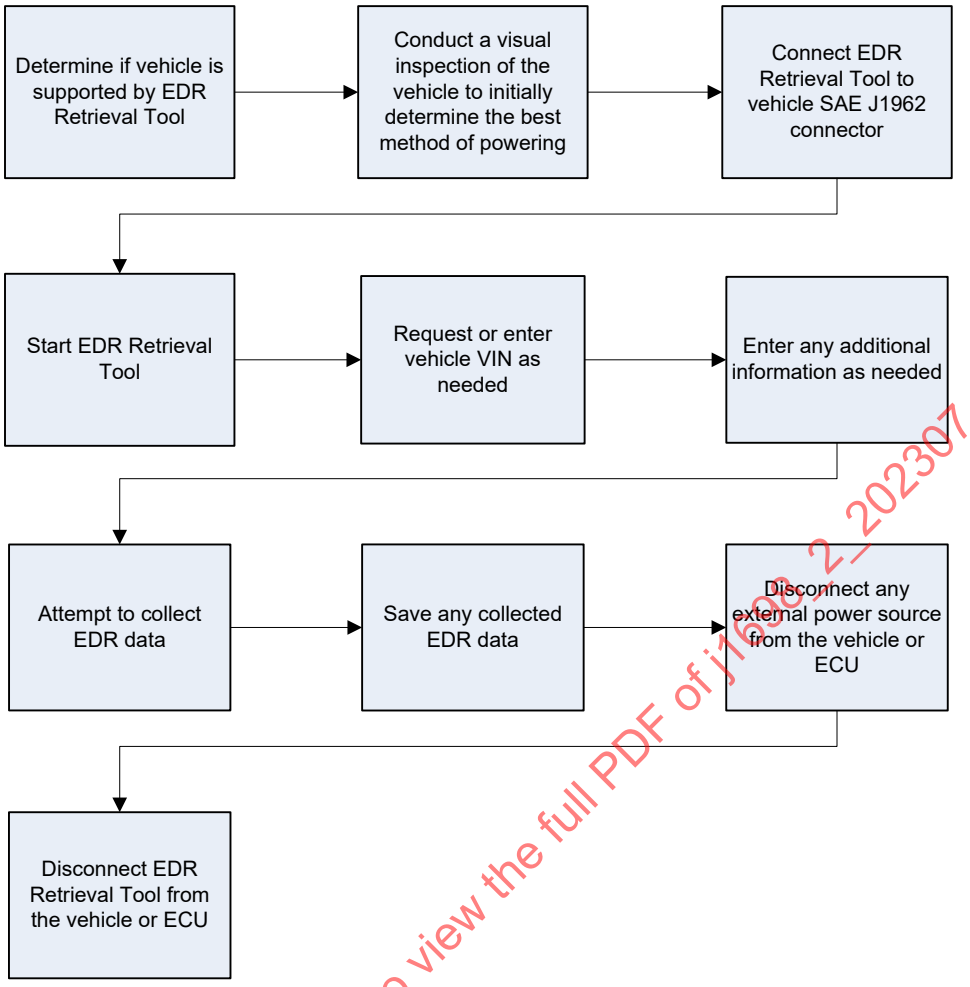

Figure 2 - Data collection guide overview

10. EDR REPORT

10.1 Report Header

The header information shown in Table 1 provides context for the EDR record. This information shall be displayed at the beginning of the EDR record report. Header information should be reported in the order listed in Table 1.