# 車載データ計測システム OwlTrace

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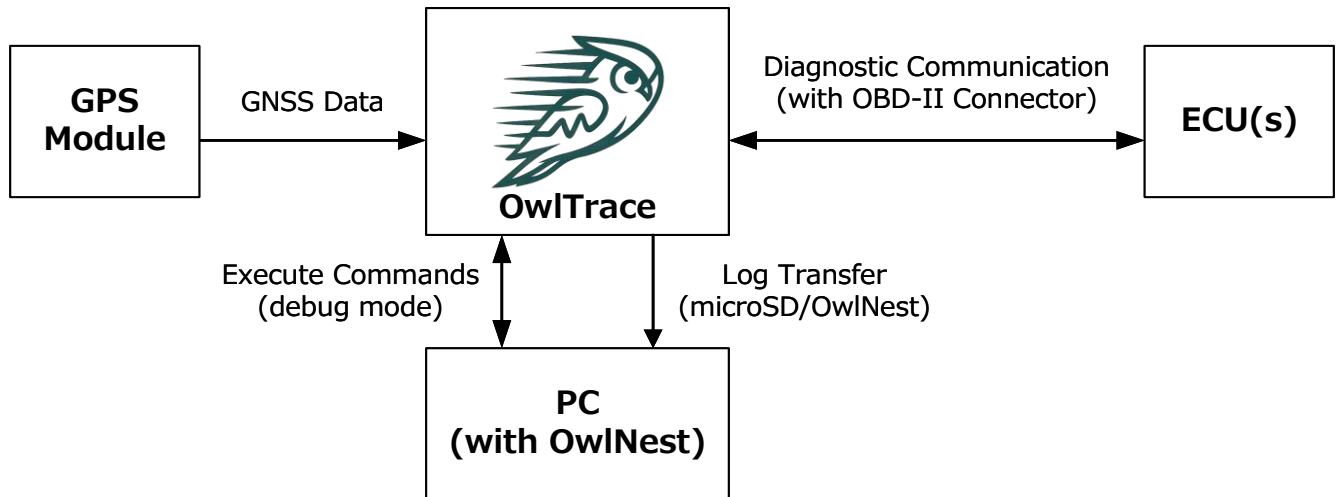
OwlTrace
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| 改訂番号 | 内容 | 日付 |
|---|---|---|
| Z0000 | 要件整理、システム概要作成 | 2025/07/20 |
| Z0001 | ログ情報整理・ログファイルv1内容記載 | 2025/07/28 |
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## 1. システム概要

OwlTraceは、OBD-IIコネクタを介した車載ネットワークへのアクセスとGPS通信により、車両走行時の各種車両データを計測するツールである。
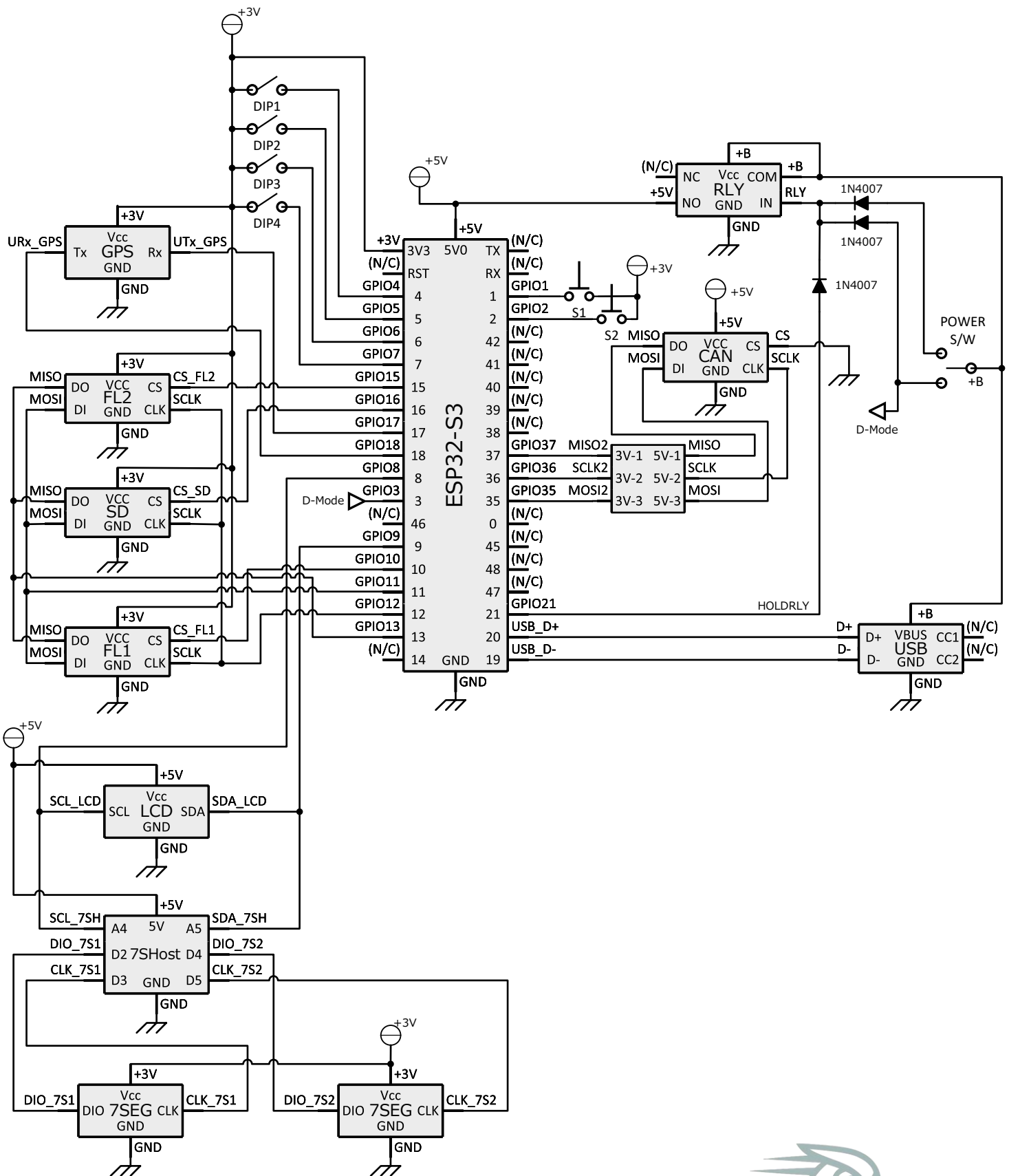
**システム概観図**



主な機能は以下の通り。

- UDS/OBD-II診断通信による車両ECUからの車両データの定周期取得
- GPSモジュールからの位置情報の定周期取得
- GPSおよびRTCモジュールによる計時
- ログデータの保存 (8MFLASH x2+microSD)

OwlTraceモジュールと連携するためのPCソフトウェア OwlNest についてもこの仕様書で述べる。
OwlNestの主な機能は以下の通り。

- OwlTraceからのログデータ取得
- OwlTraceログデータの成形・ファイル出力
- OwlTraceの各種機能のデバッグ・マニュアル操作 (コマンド実行)

## 1.1 OwlTrace 内部ブロック図

## 1.2 GPIOマッピング

### SPI Communication

| PIN No | PIN Name | Bus | Usage |
|---|---|---|---|
| 11 | GPIO11 | D-SPI<br>(Data SPI) | C-SPI MOSI (to CAN) |
| 13 | GPIO13 | | C-SPI MISO (to CAN) |
| 12 | GPIO12 | | C-SPI CLK (to CAN) |
| 10 | GPIO10 | | D-SPI CS (to FL1) |
| 15 | GPIO15 | | D-SPI CS (to FL2) |
| 16 | GPIO16 | | D-SPI CS (to SD) |
| 35 | GPIO35 | C-SPI<br>(CAN SPI) | D-SPI MOSI (to FL1/2, SD) |
| 37 | GPIO37 | | D-SPI MISO (to FL1/2, SD) |
| 36 | GPIO36 | | D-SPI CLK (to FL1/2, SD) |

### UART Communication

| PIN No | PIN Name | Bus | Usage |
|---|---|---|---|
| TX | GPIO43 | UART0<br>(Reserve) | UART0 Tx (to other Controller) |
| RX | GPIO44 | | UART0 Rx (to other Controller) |
| 17 | GPIO17 | UART1<br>(GPS) | UART1 Tx (to GPS) |
| 18 | GPIO18 | | UART1 Rx (to GPS) |

### I2C Communication

| PIN No | PIN Name | Bus | Usage |
|---|---|---|---|
| 8 | GPIO8 | I2C0 | I2C SDA (to LCD, 7SHost) |
| 9 | GPIO9 | | I2C SCL (to LCD, 7SHost) |

### Other Communication

| PIN No | PIN Name | Bus | Usage |
|---|---|---|---|
| 20 | USB_D+ | USB | USB B/O D+ |
| 19 | USB_D- | | USB B/O D- |

### A/D Input

| PIN No | PIN Name | Usage |
|---|---|---|
| 3 | GPIO3 | D-Mode (Hi/Lo) |
| 4 | GPIO4 | DIP1 (Hi/Lo) |
| 5 | GPIO5 | DIP2 (Hi/Lo) |
| 6 | GPIO6 | DIP3 (Hi/Lo) |
| 7 | GPIO7 | DIP4 (Hi/Lo) |
| 1 | GPIO1 | Button1 (Hi/Lo) |
| 2 | GPIO2 | Button2 (Hi/Lo) |

### A/D Output

| PIN No | PIN Name | Usage |
|---|---|---|
| 21 | GPIO21 | Hold Relay (Hi/Lo) |

### 7SHost

| PIN No | PIN Name | Bus | Usage |
|---|---|---|---|
| A4 | A4 | I2C0 | SCL (to OwlTrace) |
| A5 | A5 | | SDA (to OwlTrace) |
| D2 | D2 | OtC0<br>(7S1) | TM1637-1 DIO |
| D3 | D3 | | TM1637-1 CLK |
| D4 | D4 | OtC1<br>(7S2) | TM1637-2 DIO |
| D5 | D5 | | TM1637-2 CLK |

## 2. ログファイル形式

　OwlTraceのログファイルはヘッダとレコードから形成され、ヘッダのバージョンによってパースの仕方を規定する。
　このログファイルは8MFLASHにバッファリングされ、FLASHが1バンク埋まったときまたはシステム終了時にSDカードへ書き出される。
　また、1ファイルあたり128KB固定とし、128KBに満たないファイルが生成される場合は0パディングによりファイルサイズを揃えることとする。

## 2.1 ログファイルヘッダ

　OwlTraceのログファイルヘッダは必ずマジックナンバ 0xFF から始まり、次にASCII文字列「Owl」、更に0b0と続いてバージョン番号15bitが付加されるものとする。それ以降はバージョンに依り異なるものとする。

### OwlTraceログファイル v1.0 – HeaderSize: 128Bytes

| 開始byte.bit | byte.bit数 | 内容 |
|---|---|---|
| 0.0 | 1.0 | Magic Number (0xFF) |
| 1.0 | 3.0 | ASCII文字列「Owl」(0x4F776C) |
| 4.0 | 0.1 | Magic Number (0b0) |
| 4.1 | 1.7 | Log File Version (0x0100) |
| 6.0 | 3.0 | Spec Version (ASCII 1byte+UnsignedInt 2bytes) |
| 9.0 | 1.0 | Build Number (UnsignedInt 1byte) |
| 10.0 | 4.0 | Start Time (UNIXTIME JST、UnsignedInt 4bytes) |
| 14.0 | 17.0 | Vehicle Identification Number (ASCII 17bytes) |
| 31.0 | 1.0 | Diagnostic Protocol Type (UnsignedInt 1byte) |
| 32.0 | 4.0 | DataStream Support 1 (UnsignedInt 4bytes) |
| 36.0 | 4.0 | DataStream Support 1 CAN ID (UnsignedInt 4bytes) |
| 40.0 | 4.0 | DataStream Support 2 (UnsignedInt 4bytes) |
| 44.0 | 4.0 | DataStream Support 2 CAN ID (UnsignedInt 4bytes) |
| 48.0 | 4.0 | DataStream Support 3 (UnsignedInt 4bytes) |
| 52.0 | 4.0 | DataStream Support 3 CAN ID (UnsignedInt 4bytes) |
| 56.0 | 4.0 | DataStream Support 4 (UnsignedInt 4bytes) |
| 60.0 | 4.0 | DataStream Support 4 CAN ID (UnsignedInt 4bytes) |
| 64.0 | 4.0 | DataStream Support 5 (UnsignedInt 4bytes) |
| 68.0 | 4.0 | DataStream Support 5 CAN ID (UnsignedInt 4bytes) |
| 72.0 | 4.0 | DataStream Support 6 (UnsignedInt 4bytes) |
| 76.0 | 4.0 | DataStream Support 6 CAN ID (UnsignedInt 4bytes) |
| 80.0 | 4.0 | DataStream Support 7 (UnsignedInt 4bytes) |
| 84.0 | 4.0 | DataStream Support 7 CAN ID (UnsignedInt 4bytes) |
| 88.0 | 4.0 | DataStream Support 8 (UnsignedInt 4bytes) |
| 92.0 | 4.0 | DataStream Support 8 CAN ID (UnsignedInt 4bytes) |
| 96.0 | 0.3 | DataStream Support X1 Number (UnsignedInt 3bits) |
| 96.3 | 3.5 | DataStream Support X1 CAN ID (UnsignedInt 29bits) |
| 100.0 | 4.0 | DataStream Support X1 (UnsignedInt 4bytes) |
| 104.0 | 0.3 | DataStream Support X2 Number (UnsignedInt 3bits) |
| 104.3 | 3.5 | DataStream Support X2 CAN ID (UnsignedInt 29bits) |
| 108.0 | 4.0 | DataStream Support X2 (UnsignedInt 4bytes) |
| 112.0 | 0.3 | DataStream Support X3 Number (UnsignedInt 3bits) |
| 112.3 | 3.5 | DataStream Support X3 CAN ID (UnsignedInt 29bits) |
| 116.0 | 4.0 | DataStream Support X3 (UnsignedInt 4bytes) |
| 120.0 | 0.3 | DataStream Support X4 Number (UnsignedInt 3bits) |
| 120.3 | 3.5 | DataStream Support X4 CAN ID (UnsignedInt 29bits) |
| 124.0 | 4.0 | DataStream Support X4 (UnsignedInt 4bytes) |

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## 2.2 ログファイルレコード

OwlTraceのログファイルレコードはバージョンに依り異なるものとする。

### OwlTraceログファイル v1.0 – RecordSize: 64Bytes

| 開始byte.bit | byte.bit数 | 内容 |
|---|---|---|
| 0.0 | 2.0 | Sequence Number (UnsignedInt 2bytes) |
| 2.0 | 2.0 | Relative Time (factor 0.1sec, UnsignedInt 2bytes) |
| 4.0 | 4.0 | Latitude (offset 23deg, factor 1e-6deg, UnsignedInt 4bytes) |
| 8.0 | 4.0 | Longitude (offset 121deg, factor 1e-6deg, UnsignedInt 4bytes) |
| 12.0 | 2.0 | Altitude (factor 0.1m, SignedInt 2bytes) |
| 14.0 | 1.0 | Number of Stallites (UnsignedInt 1byte) |
| 15.0 | 2.0 | HDOP (factor 0.01, UnsignedInt 2bytes) |
| 17.0 | 2.0 | VDOP (factor 0.01, UnsignedInt 2bytes) |
| 19.0 | 2.0 | GPS Vehicle Course (factor 0.1deg, UnsignedInt 2bytes) |
| 21.0 | 1.0 | GPS Vehicle Speed (factor 1km/h, UnsignedInt 1byte) |
| 22.0 | 1.0 | Vehicle Speed Sensor (factor 1km/h, UnsignedInt 1byte) |
| 23.0 | 2.0 | Engine RPM (factor 1/4rpm, UnsignedInt 2bytes) |
| 25.0 | 1.0 | Calculated LOAD Value (factor 100/255%, UInt 1byte) |
| 26.0 | 1.0 | Engine Coolant Temp. (factor 1degC, offset -40, UInt 1byte) |
| 27.0 | 1.0 | Intake Manifold Absolute Pressure (factor 1kPaA, UInt 1byte) |
| 28.0 | 1.0 | Intake Air Temperature (factor 1degC, Offset -40, UInt 1byte) |
| 29.0 | 1.0 | Absolute Throttle Position (factor 100/255%, UInt 1byte) |
| 30.0 | 1.0 | O2 Sensor and SHRFT (factor 100/128%, Offset -128, UInt 1byte) |
| 31.0 | 2.0 | Time Since Engine Start (factor 1sec, UnsignedInt 2bytes) |
| 33.0 | 1.0 | Commanded EGR (factor 100/255%, UInt 1byte) |
| 34.0 | 1.0 | EGR Error (factor 100/255%, UInt 1byte) |
| 35.0 | 1.0 | Commanded Evaporative Purge (factor 100/255%, UInt 1byte) |
| 36.0 | 1.0 | Fuel Level Input (factor 100/255%, UInt 1byte) |
| 37.0 | 2.0 | Distance traveled since DTCs cleared (factor 1km, UInt 2bytes) |
| 39.0 | 1.0 | Barometric Pressure (factor 1kPaA, UInt 1byte) |
| 40.0 | 2.0 | Control module voltage (factor 0.001V, UInt 2bytes) |
| 42.0 | 2.0 | Absolute Load Value (factor 100/255%, UInt 2bytes) |
| 44.0 | 2.0 | Fuel/Air Commanded Equivalence Ratio (factor 0.0000305, UI 2bytes) |
| 46.0 | 1.0 | Hybrid Battery Pack Remaining Charge (factor 100/255%, UI 1byte) |
| 47.0 | 0.1 | Hybrid/EV Charging State (1bit) |
| 47.1 | 0.2 | Enhanced Hybrid/EV Charging State (2bits) |
| 47.3 | 0.5 | (0-padding) |
| 48.0 | 2.0 | Hybrid/EV Battery System Voltage (factor 0.015625V, UI 2bytes) |
| 50.0 | 2.0 | Hybrid/EV Battery System Current (factor 0.1A, **SigInt** 2bytes) |
| 52.0 | 10.0 | (Reserve) |
| 62.0 | 2.0 | CRC-16 (UInt 2bytes) |

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## 2.3 スタティックデータファイル

　OwlTraceのスタティックデータファイルは、通常起動後1回のみ作成される。このファイルは通常のログファイルと異なりファイルサイズは不定とするが内容はバージョンにより異なる。ただし、必ずマジックナンバ 0xFF から始まり、次にASCII文字列「OSt」、更に0b0と続いてバージョン番号15bitが付加されるものとする。

### OwlTraceログファイル v1.0 – FileSize: 592Bytes

| 開始byte.bit | byte.bit数 | 内容 |
|---|---|---|
| 0.0 | 1.0 | Magic Number (0xFF) |
| 1.0 | 3.0 | ASCII文字列「OSt」(0x4F5374) |
| 4.0 | 0.1 | Magic Number (0b0) |
| 4.1 | 1.7 | Log File Version (0x0100) |
| 6.0 | 17.0 | Vehicle Identification Number (ASCII 17bytes) |
| 23.0 | 4.0 | VIN Support Unit CAN ID (UnsignedInt 4bytes) |
| 27.0 | 16.0 | VIN Support Unit Calibration ID (ASCII 16bytes) |
| 43.0 | 4.0 | VIN Support Unit CVN (UnsignedInt 4bytes) |
| 47.0 | 20.0 | VIN Support Unit Name (ASCII 20bytes) |
| 67.0 | 4.0 | Other Unit 1 CAN ID (UnsignedInt 4bytes) |
| 71.0 | 16.0 | Other Unit 1 Calibration ID (ASCII 16bytes) |
| 87.0 | 4.0 | Other Unit 1 CVN (UnsignedInt 4bytes) |
| 91.0 | 20.0 | Other Unit 1 Name (ASCII 20bytes) |
| 111.0 | 4.0 | Other Unit 2 CAN ID (UnsignedInt 4bytes) |
| 115.0 | 16.0 | Other Unit 2 Calibration ID (ASCII 16bytes) |
| 131.0 | 4.0 | Other Unit 2 CVN (UnsignedInt 4bytes) |
| 135.0 | 20.0 | Other Unit 2 Name (ASCII 20bytes) |
| 155.0 | 4.0 | Other Unit 3 CAN ID (UnsignedInt 4bytes) |
| 159.0 | 16.0 | Other Unit 3 Calibration ID (ASCII 16bytes) |
| 175.0 | 4.0 | Other Unit 3 CVN (UnsignedInt 4bytes) |
| 179.0 | 20.0 | Other Unit 3 Name (ASCII 20bytes) |
| 199.0 | 4.0 | Other Unit 4 CAN ID (UnsignedInt 4bytes) |
| 203.0 | 16.0 | Other Unit 4 Calibration ID (ASCII 16bytes) |
| 219.0 | 4.0 | Other Unit 4 CVN (UnsignedInt 4bytes) |
| 223.0 | 20.0 | Other Unit 4 Name (ASCII 20bytes) |
| 243.0 | 4.0 | Other Unit 5 CAN ID (UnsignedInt 4bytes) |
| 247.0 | 16.0 | Other Unit 5 Calibration ID (ASCII 16bytes) |
| 263.0 | 4.0 | Other Unit 5 CVN (UnsignedInt 4bytes) |
| 267.0 | 20.0 | Other Unit 5 Name (ASCII 20bytes) |
| 287.0 | 4.0 | Other Unit 6 CAN ID (UnsignedInt 4bytes) |
| 291.0 | 16.0 | Other Unit 6 Calibration ID (ASCII 16bytes) |
| 307.0 | 4.0 | Other Unit 6 CVN (UnsignedInt 4bytes) |
| 311.0 | 20.0 | Other Unit 6 Name (ASCII 20bytes) |
| 331.0 | 4.0 | Other Unit 7 CAN ID (UnsignedInt 4bytes) |
| 335.0 | 16.0 | Other Unit 7 Calibration ID (ASCII 16bytes) |
| 351.0 | 4.0 | Other Unit 7 CVN (UnsignedInt 4bytes) |
| 355.0 | 20.0 | Other Unit 7 Name (ASCII 20bytes) |
| 375.0 | 4.0 | Other Unit 8 CAN ID (UnsignedInt 4bytes) |
| 379.0 | 16.0 | Other Unit 8 Calibration ID (ASCII 16bytes) |
| 395.0 | 4.0 | Other Unit 8 CVN (UnsignedInt 4bytes) |
| 399.0 | 20.0 | Other Unit 8 Name (ASCII 20bytes) |
| 419.0 | 4.0 | Other Unit 9 CAN ID (UnsignedInt 4bytes) |
| 423.0 | 16.0 | Other Unit 9 Calibration ID (ASCII 16bytes) |
| 439.0 | 4.0 | Other Unit 9 CVN (UnsignedInt 4bytes) |
| 443.0 | 20.0 | Other Unit 9 Name (ASCII 20bytes) |

## 2.3 スタティックデータファイル

### OwlTraceログファイル v1.0 – FileSize: 592Bytes

| 開始byte.bit | byte.bit数 | 内容 |
|---|---|---|
| 463.0 | 1.0 | has More Units (0xFF: True, 0x00: False) |
| 464.0 | 4.0 | VehicleInfo Support 1 (UnsignedInt 4bytes) |
| 468.0 | 4.0 | VehicleInfo Support 1 CAN ID (UnsignedInt 4bytes) |
| 472.0 | 4.0 | VehicleInfo Support 2 (UnsignedInt 4bytes) |
| 476.0 | 4.0 | VehicleInfo Support 2 CAN ID (UnsignedInt 4bytes) |
| 480.0 | 4.0 | VehicleInfo Support 3 (UnsignedInt 4bytes) |
| 484.0 | 4.0 | VehicleInfo Support 3 CAN ID (UnsignedInt 4bytes) |
| 488.0 | 4.0 | VehicleInfo Support 4 (UnsignedInt 4bytes) |
| 492.0 | 4.0 | VehicleInfo Support 4 CAN ID (UnsignedInt 4bytes) |
| 496.0 | 4.0 | VehicleInfo Support 5 (UnsignedInt 4bytes) |
| 500.0 | 4.0 | VehicleInfo Support 5 CAN ID (UnsignedInt 4bytes) |
| 504.0 | 4.0 | VehicleInfo Support 6 (UnsignedInt 4bytes) |
| 508.0 | 4.0 | VehicleInfo Support 6 CAN ID (UnsignedInt 4bytes) |
| 512.0 | 4.0 | VehicleInfo Support 7 (UnsignedInt 4bytes) |
| 516.0 | 4.0 | VehicleInfo Support 7 CAN ID (UnsignedInt 4bytes) |
| 520.0 | 4.0 | VehicleInfo Support 8 (UnsignedInt 4bytes) |
| 524.0 | 4.0 | VehicleInfo Support 8 CAN ID (UnsignedInt 4bytes) |
| 528.0 | 4.0 | OBDMonitor Support 1 (UnsignedInt 4bytes) |
| 532.0 | 4.0 | OBDMonitor Support 1 CAN ID (UnsignedInt 4bytes) |
| 536.0 | 4.0 | OBDMonitor Support 2 (UnsignedInt 4bytes) |
| 540.0 | 4.0 | OBDMonitor Support 2 CAN ID (UnsignedInt 4bytes) |
| 544.0 | 4.0 | OBDMonitor Support 3 (UnsignedInt 4bytes) |
| 548.0 | 4.0 | OBDMonitor Support 3 CAN ID (UnsignedInt 4bytes) |
| 552.0 | 4.0 | OBDMonitor Support 4 (UnsignedInt 4bytes) |
| 556.0 | 4.0 | OBDMonitor Support 4 CAN ID (UnsignedInt 4bytes) |
| 560.0 | 4.0 | OBDMonitor Support 5 (UnsignedInt 4bytes) |
| 564.0 | 4.0 | OBDMonitor Support 5 CAN ID (UnsignedInt 4bytes) |
| 568.0 | 4.0 | OBDMonitor Support 6 (UnsignedInt 4bytes) |
| 572.0 | 4.0 | OBDMonitor Support 6 CAN ID (UnsignedInt 4bytes) |
| 576.0 | 4.0 | OBDMonitor Support 7 (UnsignedInt 4bytes) |
| 580.0 | 4.0 | OBDMonitor Support 7 CAN ID (UnsignedInt 4bytes) |
| 584.0 | 4.0 | OBDMonitor Support 8 (UnsignedInt 4bytes) |
| 588.0 | 4.0 | OBDMonitor Support 8 CAN ID (UnsignedInt 4bytes) |

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## 2.4 エラーログファイル

OwlTraceのエラーログファイルは、日付毎に作成される。エラーログファイルはファイルヘッダとレコードから構成され、レコードはエラー発生時に追記されることとする。

### ファイルヘッダ – HeaderSize: 8Bytes

| 開始byte.bit | byte.bit数 | 内容 |
|---|---|---|
| 0.0 | 1.0 | Magic Number (0xFF) |
| 1.0 | 3.0 | ASCII文字列「Oer」(0x4F776C) |
| 4.0 | 4.0 | (Reserve) |

### レコード – RecordSize: 32Bytes

| 開始byte.bit | byte.bit数 | 内容 |
|---|---|---|
| 0.0 | 4.0 | Time (UNIXTIME JST、UnsignedInt 4bytes) |
| 4.0 | 2.0 | Relative Time (factor 0.1sec, UnsignedInt 2bytes) |
| 6.0 | 2.0 | Spec Version (ASCII 1byte+UnsignedInt 2bytes) |
| 8.0 | 1.0 | Build Number (UnsignedInt 1byte) |
| 9.0 | 3.0 | ErrorCode (コード表に依る、UnsignedInt 3Bytes) |
| 12.0 | 20.0 | 補足情報 (エラー内容に依る、20Bytes) |

### エラーコード表

| 1byte目 | 2-3byte | 内容 |
|---|---|---|
| 0x00 | | General Error |
| | 0x0000 | Undefined |
| | 0x0001 to 0xFFFF | (Reserve) |
| 0x01 to 0xFF | | (Reserve) |
| | 0x0001 to 0xFFFF | (Reserve) |