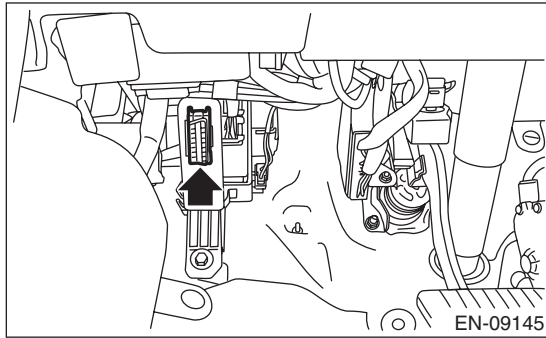


## 8. General Scan Tool

### A: OPERATION

#### 1. HOW TO USE GENERAL SCAN TOOL

- 1) Prepare a scan tool (general scan tool) required by SAE J1978.
- 2) Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on the driver's side).



- 3) Using the general scan tool, call up each data. General scan tool functions consist of:

- (1) MODE \$01: Current powertrain diagnostic data
- (2) MODE \$02: Powertrain freeze frame data
- (3) MODE \$03: Emission-related powertrain DTC
- (4) MODE \$04: Clear/Reset emission-related diagnostic information
- (5) MODE \$06: Request on-board monitoring test results for intermittently monitored systems
- (6) MODE \$07: Request on-board monitoring test results for continuously monitored systems
- (7) MODE \$08: Request control for on-board system, test, and component
- (8) MODE \$09: Request vehicle information

- 4) Read out the data according to repair procedures. (For detailed operation procedure, refer to the general scan tool operation manual.)

#### NOTE:

For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DO)(diag)-79, List of Diagnostic Trouble Code (DTC).>

# General Scan Tool

## ENGINE (DIAGNOSTICS)

### 2. MODE \$01: (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refer to data denoting the current operating condition of analog input/output, digital input/output or the powertrain system.

A list of the support data and PID (Parameter Identification) codes are shown in the following table.

| PID  | Data  | Unit of measure |
|------|---|-----------------|
| \$01 | Number of emission-related powertrain DTC, and malfunction indicator light status and diagnosis support information | —               |
| \$03 | Fuel system control status  | —               |
| \$04 | Calculated engine load value  | %               |
| \$05 | Engine coolant temperature  | °C              |
| \$06 | Short term fuel trim  | %               |
| \$07 | Long term fuel trim   | %               |
| \$0B | Intake manifold absolute pressure   | kPa             |
| \$0C | Engine speed  | rpm             |
| \$0D | Vehicle speed   | MPH             |
| \$0E | Ignition timing advance   | °               |
| \$0F | Intake air temperature  | °C              |
| \$10 | Intake air amount   | g/s             |
| \$11 | Throttle valve opening angle  | %               |
| \$13 | Air fuel ratio sensor   | —               |
| \$15 | Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (Bank 1 Sensor 2)               | V and %         |
| \$1C | Supporting OBD system   | —               |
| \$1F | Elapsed time after starting the engine  | sec             |
| \$21 | Travel distance after the malfunction indicator light illuminates   | miles           |
| \$24 | A/F value and A/F sensor output voltage (Bank 1 Sensor 1)   | — and V         |
| \$2C | Target EGR  | %               |
| \$2D | EGR deviation   | %               |
| \$2E | Evaporative purge   | %               |
| \$2F | Fuel level  | %               |
| \$30 | Number of warm ups after DTC clear  | —               |
| \$31 | Travel distance after DTC clear   | miles           |
| \$33 | Barometric pressure   | kPa             |
| \$34 | A/F value and A/F sensor current (Bank 1 Sensor 1)  | — and mA        |
| \$3C | Catalyst temperature #1   | °C              |
| \$41 | Diagnostic monitor of each drive cycle  | —               |
| \$42 | ECM power voltage   | V               |
| \$43 | Absolute load   | %               |
| \$44 | A/F target lambda   | —               |
| \$45 | Relative throttle opening angle   | %               |
| \$46 | Ambient temperature   | °C              |
| \$47 | Absolute throttle opening angle 2   | %               |
| \$49 | Absolute accelerator opening angle 1  | %               |
| \$4A | Absolute accelerator opening angle 2  | %               |
| \$4C | Target throttle opening angle   | %               |
| \$4D | Engine operating time while malfunction indicator lit   | min             |
| \$4E | Elapsed time after DTC clear  | min             |
| \$51 | Fuel used   | —               |
| \$5A | Relative accelerator opening angle  | %               |
| \$65 | Neutral status  | —               |

**NOTE:**

Refer to general scan tool manufacturer's operation manual to access current powertrain diagnostic data (MODE \$01).

**3. MODE \$02 (POWERTRAIN FREEZE FRAME DATA)**

Refer to data denoting the operating condition when trouble is detected by on-board diagnosis system.

A list of the support data and PID (Parameter Identification) codes are shown in the following table.

| PID  | Data  | Unit of measure |
|------|---|-----------------|
| \$02 | DTC that caused the freeze frame data storage required by CARB  | —               |
| \$03 | Fuel system control status  | —               |
| \$04 | Calculated engine load value  | %               |
| \$05 | Engine coolant temperature  | °C              |
| \$06 | Short term fuel trim (Bank 1 Sensor 1)  | %               |
| \$07 | Long term fuel trim (Bank 1 Sensor 1)   | %               |
| \$0B | Intake manifold absolute pressure   | kPa             |
| \$0C | Engine speed  | rpm             |
| \$0D | Vehicle speed   | MPH             |
| \$0E | Ignition timing advance   | °               |
| \$0F | Intake air temperature  | °C              |
| \$10 | Intake air amount   | g/s             |
| \$11 | Throttle valve opening angle  | %               |
| \$13 | Air fuel ratio sensor   | —               |
| \$15 | Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (Bank 1 Sensor 2) | V and %         |
| \$1C | Supporting OBD system   | —               |
| \$1F | Elapsed time after starting the engine  | sec             |
| \$2C | Target EGR  | %               |
| \$2D | EGR deviation   | %               |
| \$2E | Evaporative purge   | %               |
| \$2F | Fuel level  | %               |
| \$33 | Barometric pressure   | kPa             |
| \$42 | ECM power voltage   | V               |
| \$43 | Absolute load   | %               |
| \$44 | A/F target lambda   | —               |
| \$45 | Relative throttle opening angle   | %               |
| \$46 | Ambient temperature   | °C              |
| \$47 | Absolute throttle opening angle 2   | %               |
| \$49 | Absolute accelerator opening angle 1  | %               |
| \$4A | Absolute accelerator opening angle 2  | %               |
| \$4C | Target throttle opening angle   | %               |
| \$65 | Neutral status  | —               |

**NOTE:**

Refer to general scan tool manufacturer's instruction manual to access freeze frame data (MODE \$02).

**4. MODE \$03 (EMISSION-RELATED POWERTRAIN DTC)**

Refer to "List of Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. <Ref. to EN(H4DO)(diag)-79, List of Diagnostic Trouble Code (DTC).>

# General Scan Tool

## ENGINE (DIAGNOSTICS)

### 5. MODE \$04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refer to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

#### NOTE:

Refer to general scan tool manufacturer's instruction manual to clear the emission-related diagnostic information (MODE \$04).

### 6. MODE \$06

Refer to diagnostic value of troubleshooting and data of test limit indicated on the support data bit sequence table. A list of the support data is shown in the following table.

| OBDMID | TID  | SID  | Diagnostic item                                  |
|--------|------|------|--|
| \$01   | \$84 | \$1E | A/F sensor range failure (Bank 1 Sensor 1)       |
|        | \$85 | \$1E |  |
|        | \$86 | \$20 |  |
|        | \$91 | \$20 | A/F sensor response failure (Bank 1 Sensor 1)    |
|        | \$92 | \$10 |  |
|        | \$A3 | \$20 |  |
|        | \$A4 | \$10 |  |
|        | \$AC | \$10 |  |
|        | \$AD | \$10 |  |
|        | \$AE | \$10 |  |
|        | \$AF | \$10 |  |
|        | \$CD | \$20 |  |
|        | \$CF | \$20 |  |
| \$02   | \$07 | \$0B | Oxygen sensor drop failure (Bank 1 Sensor 2)     |
|        | \$08 | \$0B |  |
|        | \$A5 | \$0B |  |
|        | \$05 | \$10 | Oxygen sensor response failure (Bank 1 Sensor 2) |
|        | \$06 | \$10 |  |
|        | \$D1 | \$10 | Oxygen sensor delay abnormal (Bank 1 Sensor 2)   |
|        | \$D2 | \$01 |  |
| \$21   | \$89 | \$20 | Catalyst deterioration diagnosis (Bank 1)        |
| \$31   | \$8A | \$FD | EGR system diagnosis                             |
| \$35   | \$8B | \$9D | VVT monitor (Bank 1)                             |
|        | \$8C | \$9D |  |
|        | \$8D | \$9D |  |
|        | \$8E | \$9D |  |
|        | \$D3 | \$9D |  |
|        | \$D4 | \$9D |  |
|        | \$D5 | \$9D |  |
|        | \$D6 | \$9D |  |
| \$36   | \$8B | \$9D | VVT monitor (Bank 2)                             |
|        | \$8C | \$9D |  |
|        | \$8D | \$9D |  |
|        | \$8E | \$9D |  |
|        | \$D3 | \$9D |  |
|        | \$D4 | \$9D |  |
|        | \$D5 | \$9D |  |
|        | \$D6 | \$9D |  |

# General Scan Tool

ENGINE (DIAGNOSTICS)

| OBDMID | TID  | SID  | Diagnostic item  |
|--------|------|------|--|
| \$3C   | \$96 | \$FE | Evaporative emission control system (0.02 inch leak)           |
|        | \$C1 | \$FE |  |
|        | \$C2 | \$FE |  |
|        | \$C3 | \$FE |  |
|        | \$C4 | \$FE |  |
|        | \$C5 | \$FE |  |
|        | \$C6 | \$35 |  |
|        | \$C7 | \$FE |  |
|        | \$C8 | \$FE |  |
|        | \$C9 | \$FE |  |
|        | \$CA | \$FE |  |
| \$3D   | \$98 | \$FE | Evaporative emission control system (Purge flow)               |
|        | \$CB | \$35 | ELCM purge flow  |
|        | \$CC | \$FE |  |
| \$41   | \$9B | \$14 | A/F sensor heater characteristics failure (Bank 1 Sensor 1)    |
| \$42   | \$A2 | \$24 | Oxygen sensor heater characteristics failure (Bank 1 Sensor 2) |
| \$A1   | \$0B | \$24 | Misfire monitoring (All cylinders)                             |
|        | \$0C | \$24 |  |
| \$A2   | \$0B | \$24 | Misfire monitoring (#1 cylinder)                               |
|        | \$0C | \$24 |  |
| \$A3   | \$0B | \$24 | Misfire monitoring (#2 cylinder)                               |
|        | \$0C | \$24 |  |
| \$A4   | \$0B | \$24 | Misfire monitoring (#3 cylinder)                               |
|        | \$0C | \$24 |  |
| \$A5   | \$0B | \$24 | Misfire monitoring (#4 cylinder)                               |
|        | \$0C | \$24 |  |

## 7. MODE \$07

Refer to the data of DTC (pending code) for troubleshooting result about emission in the first time.

## 8. MODE \$09

Perform “Active Test” of the on-board system.

## 9. MODE \$09

Refer to data of vehicle specification (V.I.N., calibration ID, diagnosis frequency etc.).