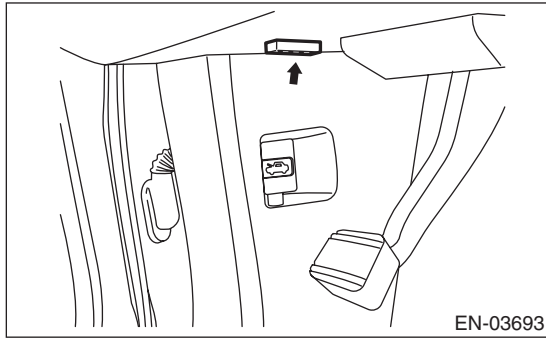


8. General Scan Tool

A: OPERATION

1. HOW TO USE GENERAL SCAN TOOL

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



- 3) Using the general scan tool, call up DTC and freeze frame 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 \$09: Request vehicle information

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

NOTE:

For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

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	ON/OFF
\$03	Fuel system control status	—
\$04	Calculated engine load value	%
\$05	Engine coolant temperature	°C
\$06	Short term fuel trim (Bank 1)	%
\$07	Long term fuel trim (Bank 1)	%
\$08	Short term fuel trim (Bank 2)	%
\$09	Long term fuel trim (Bank 2)	%
\$0B	Intake manifold absolute pressure	kPa
\$0C	Engine speed	rpm
\$0D	Vehicle speed	km/h
\$0E	Ignition timing advance	°
\$0F	Intake air temperature	°C
\$10	Air flow rate of manifold absolute pressure sensor	g/sec
\$11	Throttle valve opening angle	%
\$13	Check whether oxygen sensor is installed.	—
\$15	Oxygen sensor output voltage (Bank 1 Sensor 2)	V
\$15	Oxygen sensor compensation (Bank 1 Sensor 2)	%
\$19	Oxygen sensor output voltage (Bank 2 Sensor 2)	V
\$19	Oxygen sensor compensation (Bank 2 Sensor 2)	%
\$1C	On-board diagnostic system	—
\$1F	Elapsed time after starting the engine	sec
\$21	Elapsed time after MIL illuminating	km
\$24	A/F value and A/F sensor output voltage	— and V
\$28	A/F value and A/F sensor output voltage	— 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	km
\$32	Tank pressure	mmHg
\$33	Barometric pressure	mmHg
\$34	A/F sensor lambda value (Bank 1 Sensor 1)	—
\$34	A/F sensor current value (Bank 1 Sensor 1)	mA
\$38	A/F sensor lambda value (Bank 2 Sensor 1)	—
\$38	A/F sensor current value (Bank 2 Sensor 1)	mA
\$3C	Catalyst temperature (Bank 1)	°C
\$3D	Catalyst temperature (Bank 2)	°C
\$41	Diagnostic monitor of each drive cycle	—
\$42	ECM power voltage	V
\$43	Absolute load	%
\$44	A/F target lambda value	—
\$45	Relative throttle opening angle	%
\$46	Ambient temperature	°C
\$47	Absolute throttle opening angle 2	%

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ENGINE (DIAGNOSTICS)

PID	Data	Unit of measure
\$49	Absolute accelerator opening angle 1	%
\$4A	Absolute accelerator opening angle 2	%
\$4C	Target throttle opening angle	%
\$4D	Engine operation time during MIL on	min
\$4E	Elapsed time after DTC clear	min
\$51	Fuel used	—
\$5A	Relative accelerator opening angle	%

NOTE:

Refer to general scan tool manufacturer's operation manual to access generic OBD-II PIDs (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)	%
\$07	Long term fuel trim (Bank 1)	%
\$08	Short term fuel trim (Bank 2)	%
\$09	Long term fuel trim (Bank 2)	%
\$0B	Intake manifold absolute pressure	kPa
\$0C	Engine speed	rpm
\$0D	Vehicle speed	km/h
\$0E	Ignition timing advance	°
\$0F	Intake air temperature	°C
\$10	Air flow rate of manifold absolute pressure sensor	g/sec
\$11	Throttle valve opening angle	%
\$13	Air fuel ratio sensor	—
\$15	Oxygen sensor output voltage (Bank 1 Sensor 2)	V
\$15	Oxygen sensor compensation (Bank 1 Sensor 2)	%
\$19	Oxygen sensor output voltage (Bank 2 Sensor 2)	V
\$19	Oxygen sensor compensation (Bank 2 Sensor 2)	%
\$1C	On-board diagnostic system	—
\$1F	Elapsed time after starting the engine	sec
\$2C	Target EGR	%
\$2D	EGR deviation	%
\$2E	Evaporative purge	%
\$2F	Fuel level	%
\$32	Tank pressure	mmHg
\$33	Barometric pressure	mmHg
\$42	ECM power voltage	V
\$43	Absolute load	%
\$44	A/F target lambda value	—
\$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	%

NOTE:

Refer to general scan tool manufacturer's operation 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(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

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 operation manual to clear emission-related diagnostic information (MODE \$04).

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6. MODE \$06

Refer to test 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	Test value & Test specification
\$01	\$81	\$0A	A/F sensor conduction abnormal (Bank 1 Sensor 1)
	\$82	\$8D	A/F sensor conduction abnormal (Bank 1 Sensor 1)
	\$83	\$14	A/F sensor conduction abnormal (Bank 1 Sensor 1)
	\$84	\$1E	A/F sensor range abnormal (Bank 1 Sensor 1)
	\$85	\$1E	A/F sensor range abnormal (Bank 1 Sensor 1)
	\$84	\$1E	A/F sensor range abnormal (Bank 1 Sensor 1)
	\$86	\$20	A/F sensor response abnormal (Bank 1 Sensor 1)
\$02	\$87	\$0B	Oxygen sensor circuit abnormal (Bank 1 Sensor 2)
	\$88	\$0B	Oxygen sensor circuit abnormal (Bank 1 Sensor 2)
	\$07	\$0B	Oxygen sensor drop abnormal (Bank 1 Sensor 2)
	\$08	\$0B	Oxygen sensor drop abnormal (Bank 1 Sensor 2)
	\$A5	\$0B	Oxygen sensor drop abnormal (Bank 1 Sensor 2)
	\$05	\$10	Oxygen sensor response abnormal (Bank 1 Sensor 2)
	\$06	\$10	Oxygen sensor response abnormal (Bank 1 Sensor 2)
\$05	\$81	\$0A	A/F sensor conduction abnormal (Bank 2 Sensor 1)
	\$82	\$8D	A/F sensor conduction abnormal (Bank 2 Sensor 1)
	\$83	\$14	A/F sensor conduction abnormal (Bank 2 Sensor 1)
	\$84	\$1E	A/F sensor range abnormal (Bank 2 Sensor 1)
	\$85	\$1E	A/F sensor range abnormal (Bank 2 Sensor 1)
	\$84	\$1E	A/F sensor range abnormal (Bank 2 Sensor 1)
	\$86	\$20	A/F sensor response abnormal (Bank 2 Sensor 1)
\$06	\$87	\$0B	Oxygen sensor circuit abnormal (Bank 2 Sensor 2)
	\$88	\$0B	Oxygen sensor circuit abnormal (Bank 2 Sensor 2)
	\$07	\$0B	Oxygen sensor drop abnormal (Bank 2 Sensor 2)
	\$08	\$0B	Oxygen sensor drop abnormal (Bank 2 Sensor 2)
	\$A5	\$0B	Oxygen sensor drop abnormal (Bank 2 Sensor 2)
	\$05	\$10	Oxygen sensor response abnormal (Bank 2 Sensor 2)
	\$06	\$10	Oxygen sensor response abnormal (Bank 2 Sensor 2)
\$21	\$89	\$20	Catalyst degradation diagnosis (Bank 1)
\$31	\$8A	\$FD	EGR system diagnosis
\$39	\$93	\$FE	Evaporative emission control system leak detected (Fuel filler cap off)
\$3B	\$94	\$FE	Evaporative emission control system 0.04 inch leak
	\$95	\$FE	Evaporative emission control system 0.04 inch leak
\$3C	\$96	\$FE	Evaporative emission control system 0.02 inch leak
	\$97	\$FE	Evaporative emission control system 0.02 inch leak
\$3D	\$98	\$FE	Evaporative emission control system (Purge flow)
\$41	\$99	\$24	A/F sensor heater abnormal (Bank 1 Sensor 1)
	\$9A	\$24	A/F sensor heater abnormal (Bank 1 Sensor 1)
	\$9B	\$14	A/F sensor characteristics abnormal (Bank 1 Sensor 1)
\$42	\$9C	\$24	Oxygen sensor heater abnormal (Bank 1 Sensor 2)
	\$9D	\$24	Oxygen sensor heater abnormal (Bank 1 Sensor 2)
\$45	\$99	\$24	A/F sensor heater abnormal (Bank 2 Sensor 1)
	\$9A	\$24	A/F sensor heater abnormal (Bank 2 Sensor 1)
	\$9B	\$14	A/F sensor characteristics abnormal (Bank 2 Sensor 1)
\$46	\$9C	\$24	Oxygen sensor heater abnormal (Bank 2 Sensor 2)
	\$9D	\$24	Oxygen sensor heater abnormal (Bank 2 Sensor 2)

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ENGINE (DIAGNOSTICS)

OBDMID	TID	SID	Test value & Test specification
\$A1	\$0B	\$24	Misfire monitoring (All cylinders)
	\$0C	\$24	Misfire monitoring (All cylinders)
\$A2	\$0B	\$24	Misfire monitoring (#1 cylinder)
	\$0C	\$24	Misfire monitoring (#1 cylinder)
\$A3	\$0B	\$24	Misfire monitoring (#2 cylinder)
	\$0C	\$24	Misfire monitoring (#2 cylinder)
\$A4	\$0B	\$24	Misfire monitoring (#3 cylinder)
	\$0C	\$24	Misfire monitoring (#3 cylinder)
\$A5	\$0B	\$24	Misfire monitoring (#4 cylinder)
	\$0C	\$24	Misfire monitoring (#4 cylinder)
\$A6	\$1B	\$24	Misfire monitoring (#5 cylinder)
	\$1C	\$24	Misfire monitoring (#5 cylinder)
\$A7	\$1B	\$24	Misfire monitoring (#6 cylinder)
	\$1C	\$24	Misfire monitoring (#6 cylinder)

7. MODE \$07

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

8. MODE \$09

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