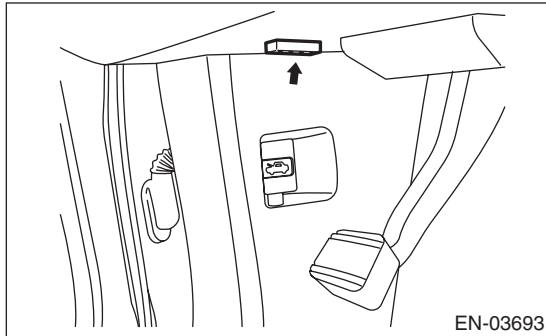# 8. General Scan Tool

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 data link connector located in the lower portion of the instrument panel (on the driver's side).

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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

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)-75, List of Diagnostic Trouble Code (DTC).>

General Scan Tool

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 revolution	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
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	Atmospheric 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	%
49	Absolute accelerator opening angle 1	%
4A	Absolute accelerator opening angle 2	%

PID	Data	Unit of measure
4C	Target throttle opening angle	%
4D	Engine operating time during MIL illuminates	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 CARB required freeze frame data storage	—
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
2E	Evaporative purge	%
2F	Fuel level	%
32	Tank pressure	mmHg
33	Atmospheric 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)-75, 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).

6. MODE $06

Refer to the test value of troubleshooting and data of test specification 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)
$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 leak detected (purge flow)

OBDMID	TID	SID	Test value & Test specification
$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)
$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 data of vehicle specification (V.I.N., calibration ID, diagnosis frequency etc.).