

SERVICE MANUAL INFORMATION

Group:	SERVICE MANUAL UPDATE
Bulletin No:	SB-15-044
Issue Date:	11-17-2015

Subject: CORRECTION OF WORKSHOP MANUAL FOR HINO CONVENTIONAL Revision of Troubleshooting Procedure for P2214

RELEVANT MODEL: 15MY-16MY Conventional Trucks

The following is to inform you of the above caption. This service data should be attached to the relevant pages of the workshop manuals for maintenance and to use for servicing.

OVERVIEW:

In the event that a vehicle exhibits a P2214, an update is available to the current published diagnostic troubleshooting work procedure.

*All changes will be reflected in the 17MY Conventional Workshop Manual as well.

REVISED DIAGNOSTIC PROCEDURE

Inspect the NOx Sensor

Step 4(upstream) and Step 5(downstream) P2214



A Toyota Group Company

EN01H16F01030F03001155

SAPH16F010300920

- NOx sensor 2 (SCR downstream) confirms correct value by comparing with the actual NOx sensor 1 (SCR upstream) value, the NOx sensor 2 (SCR down stream) value and the NOx model value calculated by the ECU.
- NOx model value is calculated according to the engine's state and properties.

- Characteristics failure of NOx sensor 2 (SCR downstream) is detected.

2. DTC set condition

(1) DTC detection condition

- DPF active regeneration in process
- SCR catalyst temperature (from DCU) $\geq 440\text{ }^{\circ}\text{C}$ {824 $^{\circ}\text{F}$ } for 100 sec
- DPF upstream temperature $\geq 400\text{ }^{\circ}\text{C}$ {752 $^{\circ}\text{F}$ }
- $75\text{ kPa} \leq \text{Barometric pressure} \leq 112\text{ kPa}$
- $-7\text{ }^{\circ}\text{C}$ {19.4 $^{\circ}\text{F}$ } $\leq$ Intake air temperature (build-in air flow sensor) $\leq 49\text{ }^{\circ}\text{C}$ {120 $^{\circ}\text{F}$ }
- $55\text{ }^{\circ}\text{C}$ {131 $^{\circ}\text{F}$ } $\leq$ Engine coolant temperature $\leq 100\text{ }^{\circ}\text{C}$ {212 $^{\circ}\text{F}$ }
- NOx sensor (SCR upstream) is valid.
- NOx sensor (SCR downstream) is valid.

After above conditions are met, DEF dosing is stopped.

Cumulative NOx mass flow (calculated NOx) from DEF dosing stop $\geq 5.5\text{ g}$

Conditions below continue for 5 sec

- $100\text{ ppm} \leq \text{Calculated NOx (SCR upstream)} \leq 500\text{ ppm}$
- $|\Delta \text{Calculated NOx (SCR upstream)}| \leq 780\text{ ppm/sec}$
- $300\text{ kg/h} \leq \text{Exhaust gas mass flow} < 1,000\text{ kg/h}$
- Fuel injection quantity $\geq 5\text{ mm}^3/\text{st}$

(2) Judgement criteria

All of the three conditions described below are formed. (judgement time : 10 sec)

- Average actual NOx (from NOx sensor 1 (SCR upstream)) – Average calculated NOx (SCR upstream)
: Within range
- Average Actual NOx (from NOx sensor 2 (SCR downstream)) – Average calculated NOx (SCR upstream)
: Out of range
- Average Actual NOx (from NOx sensor 2 (SCR downstream)) – Average actual NOx (from NOx sensor 1 (SCR upstream))
: Out of range

3. Reset condition

- After normal operation is restored.

4. Indication, warning or system control regulation when the DTC is set.

- MIL: ON
- SVS light: OFF
- DEF injection is stopped.
- NOx purification function is stopped.

5. Symptoms on the vehicle when the DTC is set

<Symptoms on the vehicle due to backup control (fail safe function)>

- Exhaust gas purification function has deteriorated.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

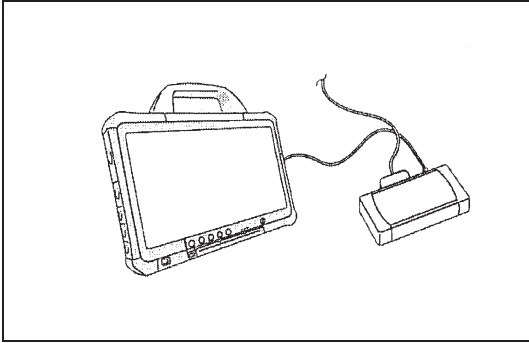
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- After starting the DPR automatic regeneration, form the DTC detection condition.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Failure of NOx sensor 1 (SCR upstream)
- NOx sensor 2 (SCR downstream) failure
 - Sensor internal circuit failure
 - NOx sensor controller failure
- Failure of sensor used in calculating model value:
 - Air flow sensor
 - Boost pressure sensor
 - Intake manifold temperature sensor
 - Engine coolant temperature sensor
 - EGR failure

INSPECTION PROCEDURE: P2214**1 Check the DTC detected [HINO DX II]**

SAPH16F010300921

1. Set the starter switch to the "LOCK" position.
2. Connect the diagnostic system (HINO DX II) to the vehicle.
3. Set the starter switch to the "ON" position.
4. Select [Engine] on the screen of HINO DX II and check if the DTC P2214 has been detected.

Has any DTC related to P2214 been detected?**YES**

Go to diagnosis procedure of the related DTC.
After repair, go to step 2.

NO

Go to step 2.

2 Inspect the DEF

1. Check the DEF concentration.

Standard values**31.8 – 33.2 % (DEF value (Brand new))****Are the measurements excessively different?****YES**

If the DEF concentration is excessively different from the reference value, replace the DEF. Leave the starter switch to the "ON" position, drain the DEF through the tank drain, and then refill the tank with at least 5 liters {1.3 gallons} of DEF. Afterward, drive the vehicle and confirm that the problem does not recur under driving conditions. Perform "After-inspection work" of INFORMATION section.

NOTICE

When changing the DEF, place (leave) the starter switch to the "ON" position.

NO

Go to step 3.

3 Inspect the exhaust gas leakage

1. Check the exhaust gas flow downstream of the turbocharger and confirm that there is no leakage of exhaust gas.

Was any failure found?

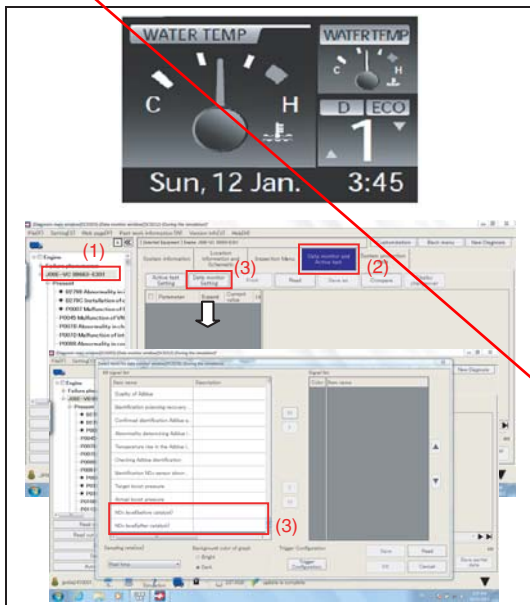
YES

Repair or replace the area where the leak is.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the NOx sensor 1 (SCR upstream) [HINO DX II]



SAPH16F010300922

Confirm the output waveform of NOx sensor by using Data monitor function of the HINO DX II.

1. Set the starter switch to the "ON" position.
2. Select [DCU] on the screen of HINO DX II.
3. Delete the past DTC detected in the DCU.
4. Start the engine. Begin warm-up operation while turning on the exhaust brake. Wait until the indicator on coolant temperature gauge goes up to the middle, as shown in the left picture.
5. Confirm that the output waveform of NOx sensor is being read out, by using HINO DX II Data monitoring function.
<Inspection procedure>
(1) Select [Engine] on the screen of HINO DX II.
(2) Select [Data monitor Setting and Active test Setting].
(3) Select the [NOx level (before catalyst)] on [Data monitor Setting] screen, and start data monitor.
6. If the level of NOx sensor is being read out, wait for three minutes, then turn off the exhaust brake while continued idling.
If the level of NOx sensor is not being read out, keep the exhaust brake turned on until the level of NOx sensor begins to be read out, wait for three minutes, then turn off the exhaust brake while continued idling.
7. Check the level of NOx sensor 5 minutes after having the exhaust brake turned.

NOTICE

Refer to the Failure Judgment Manual for NOx sensor.

Was any failure found?

SEE APPENDIX A

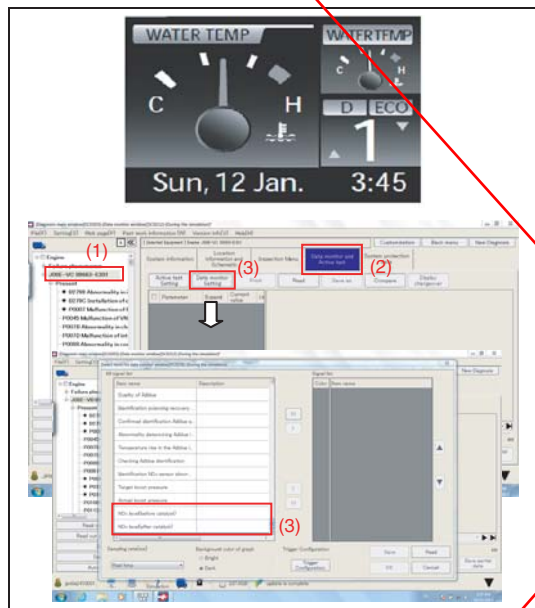
YES

Replace the NOx sensor 1 (SCR upstream)
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the NOx sensor 2 (SCR downstream) [HINO DX II]



SAPH16F010300923

Confirm the output waveform of NOx sensor by using Data Monitor function HINO DX II .

1. Delete past DTCs detected.
2. Start the engine. Begin warm-up operation while turning on the exhaust brake. Wait until the indicator on coolant temperature gauge goes up to the middle, as shown in the left picture.
3. Confirm that the output waveform of NOx sensor is being read out, by using HINO DX II Data monitoring function.
 <Inspection procedure>
 (1) Select [Engine] on the screen of HINO DX II .
 (2) Select [Data monitor Setting and Active test Setting].
 (3) Select the [NOx level (after catalyst)] on [Data monitor Setting] screen, and start data monitor.
4. If the level of NOx sensor is being read out, wait for three minutes, then turn off the exhaust brake while continued idling.
 If the level of NOx sensor is not being read out, keep the exhaust brake turned on until the level of NOx sensor begins to be read out, wait for three minutes, then turn off the exhaust brake while continued idling.
5. Check the level of NOx sensor five minutes after having the exhaust brake turned off.

NOTICE

Refer to the Failure Judgment Manual for NOx sensor.

Was any failure found?

YES

Replace the NOx sensor 2 (SCR downstream)
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the exhaust gas temperature sensor 3 (DOC outlet) connector

1. Check the connection of the exhaust gas temperature sensor 3 (DOC outlet) connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed.
Go to step 7.

NO

Go to step 7.

7 Inspect the exhaust gas temperature sensor 3 (DOC outlet)

1. Check the installation of the exhaust gas temperature sensor 3 (DOC outlet).
2. Make sure there is no dirt or damage to the exhaust gas temperature sensor 3 (DOC outlet).

Was any failure found?

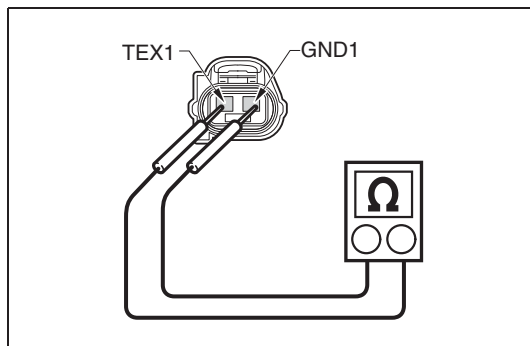
YES

Clean the exhaust gas temperature sensor 3 (DOC outlet) and install it properly.
If damaged, replace the exhaust gas temperature sensor 3 (DOC outlet).
Go to step 8.

NO

Go to step 8.

8 Inspect the exhaust gas temperature sensor 3 (DOC outlet) unit



SAPH16F010300924

1. Set the starter switch to the "LOCK" position.
2. Disconnect the exhaust gas temperature sensor 3 (DOC outlet) connector.
3. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor 3 (DOC outlet).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor 3 (DOC outlet) TEX1 – GND1	20 °C {68 °F}: 13.7 – 29.8 kΩ 50 °C {122 °F}: 7.13 – 13.7 kΩ 80 °C {176 °F}: 4.1 – 7.13 kΩ

Do the measurements meet the standard value?

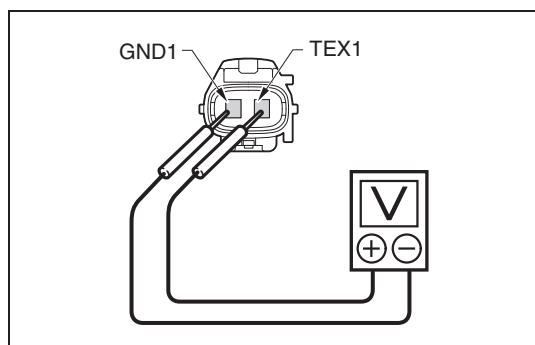
YES

Go to step 9.

NO

Replace the exhaust gas temperature sensor 3 (DOC outlet).
Go to step 9.

9 Inspect the sensor power supply



SAPH16F010300925

1. Set the starter switch to the "ON" position.
2. Use the electrical tester to measure the voltage between the terminals of the exhaust gas temperature sensor 3 (DOC outlet) vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Exhaust gas temperature sensor 3 (DOC outlet) vehicle-side connector TEX1 – GND1	4.5 – 5.5 V

Do the measurements meet the standard value?

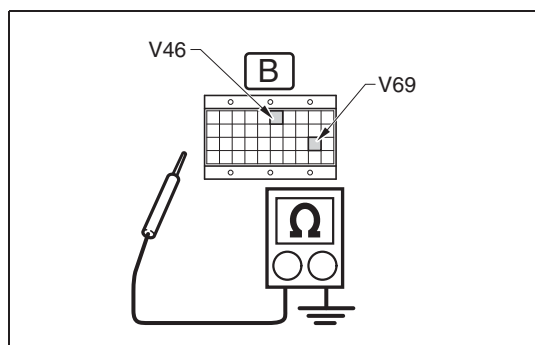
YES

Go to step 12.
If any failure was found at the step 6 - 8, perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect for short-circuit of the exhaust gas temperature sensor 3 (DOC outlet) harness



SAPH16F010300926

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU. (Do not connect harness to the ECU.)
3. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) AGD3(V46) – Ground ET3+(V69) – Ground	$\infty \Omega$

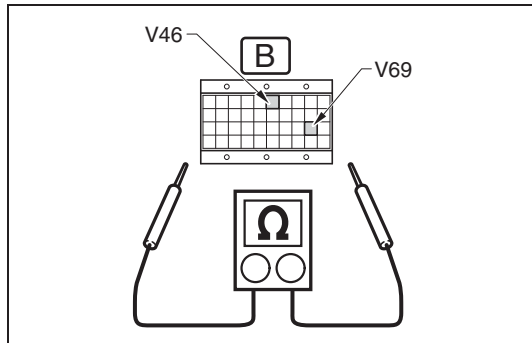
Do the measurements meet the standard value?

YES

Go to step 11.

NO

Repair or replace the harness.
Go to step 11.

11 Inspect disconnection of the exhaust gas temperature sensor 3 (DOC outlet) harness

1. Connect the exhaust gas temperature sensor 3 (DOC outlet) connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) AGD3(V46) – ET3+(V69)	20 °C {68 °F}: 13.7 – 29.8 kΩ 50 °C {122 °F}: 7.13 – 13.7 kΩ 80 °C {176 °F}: 4.1 – 7.13 kΩ

Do the measurements meet the standard value?

YES

Go to step 12.
If any failure was found at the step 6 - 10, perform "After-inspection work" of INFORMATION section.

NO

Repair or replace the harness.
Perform "After-inspection work" of INFORMATION section.

12 Inspect the exhaust gas temperature sensor (SCR inlet) connector

1. Check the connection of the exhaust gas temperature sensor (SCR inlet) connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed.
Go to step 13.

NO

Go to step 13.

13 Inspect the exhaust gas temperature sensor (SCR inlet)

1. Check the installation of the exhaust gas temperature sensor (SCR inlet).
2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (SCR inlet).

Was any failure found?

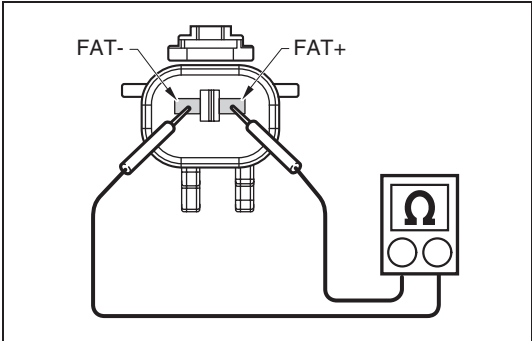
YES

Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (SCR inlet).
Go to step 14.

NO

Go to step 14.

14 Inspect the exhaust gas temperature sensor (SCR inlet) unit



SAPH16F010300928

1. Set the starter switch to the "LOCK" position.
2. Disconnect the exhaust gas temperature sensor (SCR inlet) connector.
3. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor (SCR inlet).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (SCR inlet) FAT+ – FAT-	20 °C {68 °F}: 220 Ω

Do the measurements meet the standard value?

YES

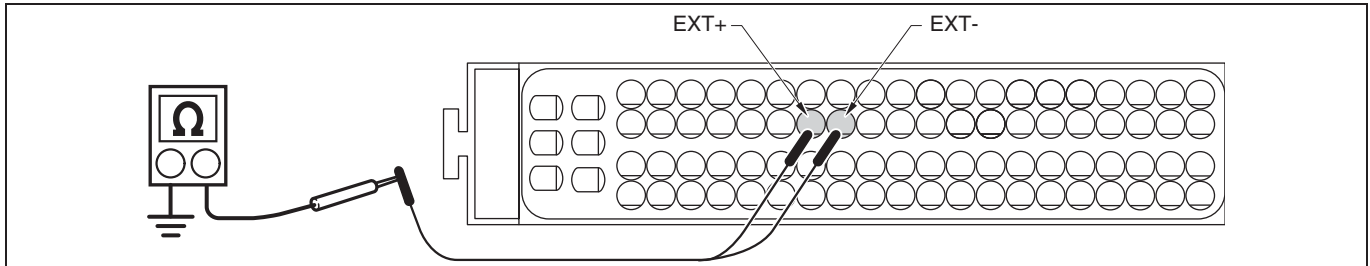
Go to step 15.

NO

Replace the exhaust gas temperature sensor (SCR inlet).
Go to step 15.

15 Inspect for short-circuit in the exhaust gas temperature sensor (SCR inlet) harness

1. Disconnect the DCU 86P connector.
2. Connect the signal check harness and use the electrical tester to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground.



SAPH16F010300929

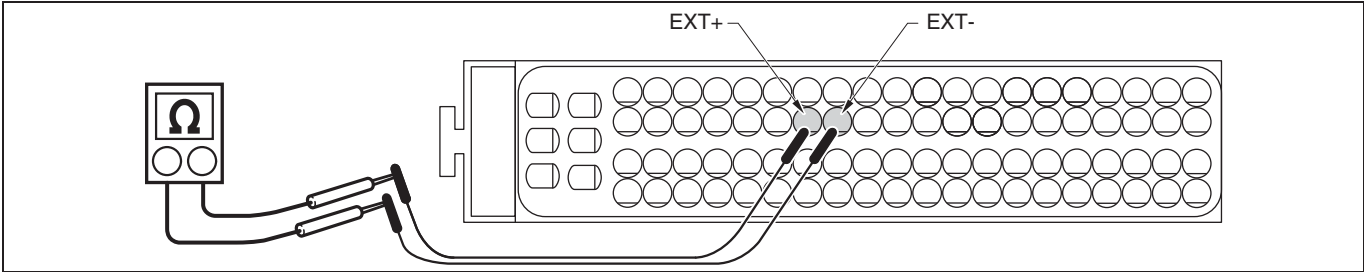
Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector EXT+ – Ground EXT- – Ground	$\infty \Omega$

Do the measurements meet the standard value?**YES****Go to step 16.****NO****Repair or replace the harness.
Go to step 16.**

16

Inspect disconnection of the exhaust gas temperature sensor (SCR inlet) harness

1.
- Connect the exhaust gas temperature sensor (SCR inlet) connector.
2.
- Connect the signal check harness and use the electrical tester to measure the resistance between the terminals of the DCU 86P vehicle-side connector.



SAPH16F010300930

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector EXT+ – EXT-	20 °C {68 °F}: 220 Ω

Do the measurements meet the standard value?

YES

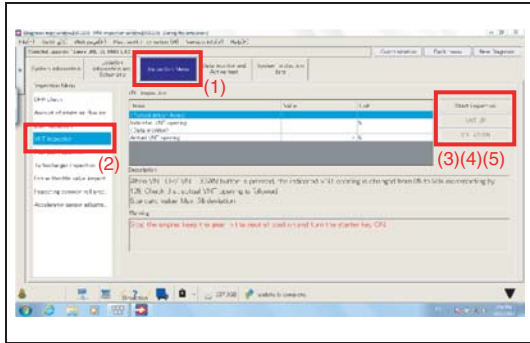
Go to step 17.
If any failure was found at the step 12 - 15, perform "After-inspection work" of INFORMATION section.

NO

Repair or replace the harness.
Perform "After-inspection work" of INFORMATION section.

17

Inspect the DEF injector [HINO DX II]



SAPH16F010300931

NOTICE

Prepare a beaker or similar, plus a larger measuring vessel for measuring the DEF to be injected, before perform this inspection. (If the vessel is small, there is dispersion at the time of injection from the injector, and the measuring quantity decreases.)

1. Set the starter switch to the "LOCK" position.
2. Remove the DEF injector from muffler.
3. Connect the vehicle to HINO DX II .
4. Set the starter switch to the "ON" position.
5. Select [DCU].
6. Select [Inspection Menu] and check the DEF injector actuation.
<Inspection procedure>
 - (1) Select [Inspection Menu].
 - (2) Select [DEF solution addition test].
 - (3) Perform additional tests as instructed on the HINO DX II screen. (Perform test patterns 1 – 3 and check the injection amount and spray condition.)

Is operation normal?

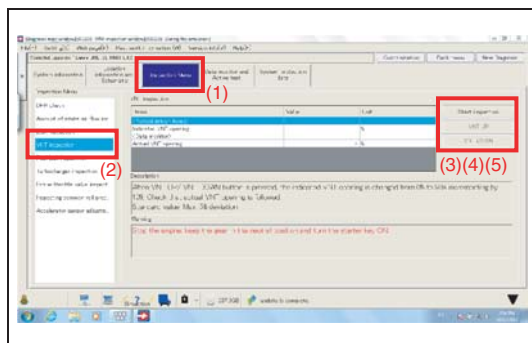
YES

Go to step 18.

NO

Replace the DEF injector.
Perform "After-inspection work" of INFORMATION section.

18 Check the response delay of the EGR valve [HINO DX II]



SAPH16F010300932

1. Select [Engine] on the screen of HINO DX II .
2. Check the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening by following procedure.

⚠ CAUTION

Perform the inspection while the engine is stopped to avoid engine damages.

<Inspection procedure>

- (1) Select [Inspection Menu].
- (2) Select [EGR inspection].
- (3) Click [Start inspection].
- (4) Click [EGR opening UP]:
- Check each step from 0 % – 90 % of the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening.
- (5) Click [EGR opening DOWN]:
- Check each step from 90 % – 0 % of the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening.

HINT

In EGR openings from 0 % – 90 %, 1 step corresponds to a 10 % change.

Standard values

The response delay should be less than 5 seconds.

Do the measurements meet the standard value?

YES

Go to step 19.

NO

Replace the EGR valve.
Perform "After-inspection work" of INFORMATION section.

19 Inspect the EGR valve [HINO DX II]

1. Set the starter switch to the "LOCK" position.
2. Remove the EGR valve.
3. Set the starter switch to ON position and select [Engine] on the screen of HINO DX II .
4. Perform [EGR inspection] in the same way as step 18.
Confirm the tracking properties of the EGR valve and make sure it closes tightly.

Are tracking and tightness normal?

YES**Go to step 20.****NO****Replace the EGR valve.
Perform "After-inspection work" of INFORMATION section.****20 Inspect the EGR cooler**

1. Check the condition of the tube coming out of the outlet side of the EGR cooler.
2. Check if the EGR cooler tube is clogged.

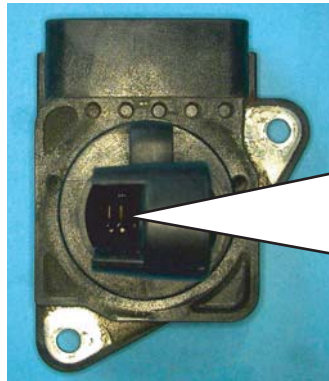
Is the tube clogged?**YES****Wash or replace the EGR cooler.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 21****21 Inspect the air flow sensor connector**

1. Check the connection of the air flow sensor (Looseness and poor contact).

Was any failure found?**YES****Connect securely, repair if needed.
Go to step 22.****NO****Go to step 22.**

22 Inspect the air flow sensor

1. Check the installation of the air flow sensor.
2. Make sure there is no dirt or damage to the air flow sensor.

Example↑
A

View-A



Sensing device
completely covered
by debris



New part

SAPH16F010300933

Was any failure found?**YES****Go to step 23.****NO****Go to step 24.**

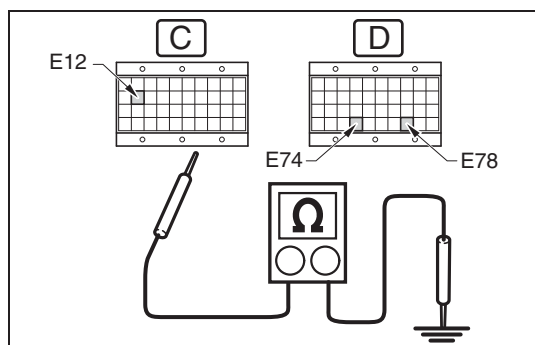
23**Inspect air flow sensor [HINO DX II]**

Prepare the new air flow sensor, and compare the air flow sensor characteristics between the sensor on the vehicle and new sensor by using HINO DX II .

1. Set the starter switch to the lock position and connect HINO DX II to the vehicle.
2. Reconnect the sensor to the vehicle.
3. Set the starter switch to ON position and select [Engine] on HINO DX II menu.
4. Select [Amount of intake air flow inspection] from [Inspection Menu] on HINO DX II .
5. Perform [Amount of intake air flow inspection] as instructed on the HINO DX II screen.
6. Perform the same inspection with the new sensor, and compare the characteristics between old and new.

Standard values**Performance error: less than 10 %****Do the measurements meet the standard value?****YES****Go to step 24.****NO****Install the new air flow sensor.
Go to step 24.**

24 Inspect for short-circuits in wire harness of air flow sensor



SAPH16F010300934

1. Set the starter switch to the "LOCK" position.
2. Disconnect the air flow sensor connector.
3. Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect harness to the ECU.)
4. Use the electrical tester to measure the resistance between the engine ECU (signal check harness) terminals and ground.

HINT**Measure while shaking the harness.**

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) AFVB(E12) – Ground AFSI(E74) – Ground AG4(E78) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

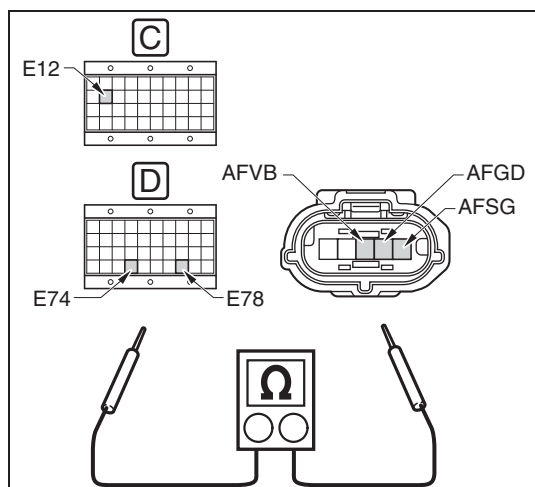
YES

Go to step 25.

NO

Repair or replace the harness.
Go to step 25.

25 Inspect for disconnection in wire harness of air flow sensor



SAPH16F010300935

1. Use the electrical tester to measure the resistance between the engine ECU (signal check harness) terminal and the air flow sensor vehicle-side connector terminal.

HINT**Measure while shaking the harness.**

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) – airflow sensor vehicle-side connector AFVB(E12) – AFVB AFSI(E74) – AFSG AG4(E78) – AFGD	1 Ω or less

Do the measurements meet the standard value?

YES

Go to step 26.

NO

Repair or replace the harness.
Go to step 26.

26 Inspect the air flow sensor [HINO DX II]

Prepare the new air flow sensor, and compare the air flow sensor characteristics between the sensor on the vehicle and new sensor by using HINO DX II .

1. Set the starter switch to the "LOCK" position and connect HINO DX II to the vehicle.
2. Set the starter switch to "ON" position and select [Engine] on HINO DX II menu.
3. Select [Amount of intake air flow inspection] from [Inspection Menu] on HINO DX II menu.
4. Perform [Amount of intake air flow inspection] as instructed on the HINO DX II screen.
5. Perform the same inspection with the new sensor, and compare the characteristics between old and new.

Standard values

Performance error: less than 10 %

Do the measurements meet the standard value?

YES

Go to step 27.
If any failure was found at the step 21 - 25, perform "After-inspection work" of INFORMATION section.

NO

Replace the air flow sensor.
Perform "After-inspection work" of INFORMATION section.

27 Inspect the boost pressure sensor connector

1. Check the connection of the boost pressure sensor connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed.
Go to step 28.

NO

Go to step 28.

28 Inspect the boost pressure sensor

1. Check the installation of the boost pressure sensor.
2. Make sure there is no dirt or damage to the boost pressure sensor.
3. Make sure there is no dirt, damage or clogging in the pipes or hoses unit of the boost pressure sensor.

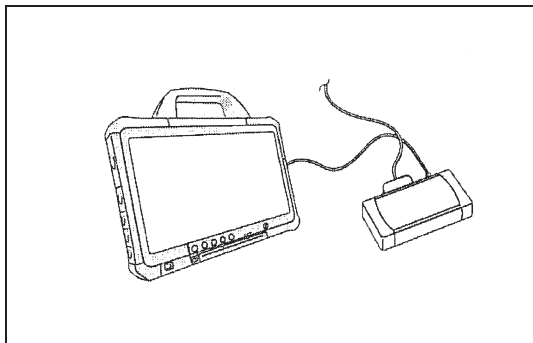
Was any failure found?

YES

If dirt, clogging or damage was found in sensing unit, replace the boost pressure sensor.
Go to step 29.

NO

Go to step 29.

29 Check the boost pressure sensor output signal [HINO DX II]

SAPH16F010300936

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to HINO DX II .
3. Start the engine.
4. Select [Engine] from the menu.
5. Select [Actual boost pressure] from the [Data monitor Setting] menu.
6. Race the engine from idle to NMR and verify that the boost pressure output signal varies.

Standard values
There is no abnormal change in the sensor output signal. (The pressure sensor signal response changes according to the engine speed)

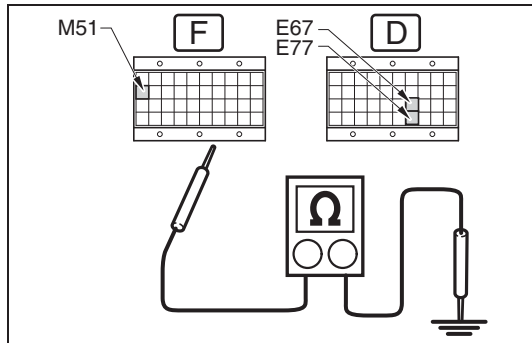
Was there no abnormal change in the sensor output signal?

YES

Go to step 33.
If any failure was found at the step 27, 28, perform "After-inspection work" of INFORMATION section.

NO

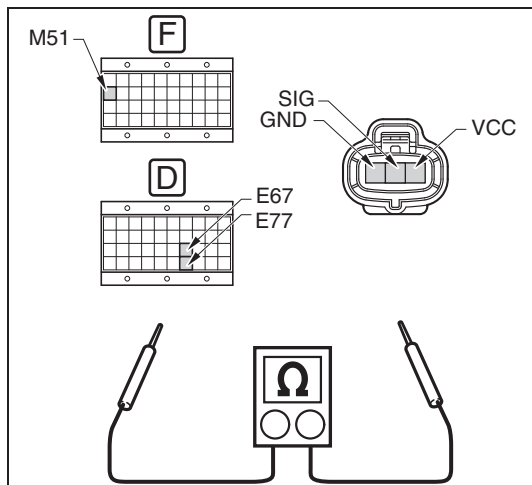
Replace the boost pressure sensor.
Perform "After-inspection work" of INFORMATION section.
Go to step 30.

30**Inspect for short-circuits in wire harness of boost pressure sensor**

SAPH16F010300937

1. Set the starter switch to the "LOCK" position.
2. Disconnect the boost pressure sensor connector.
3. Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect harness to the ECU.)
4. Use the electrical tester to measure the resistance between each terminal in the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) AV3(M51) – Ground PIM(E67) – Ground AG3(E77) – Ground	$\infty \Omega$

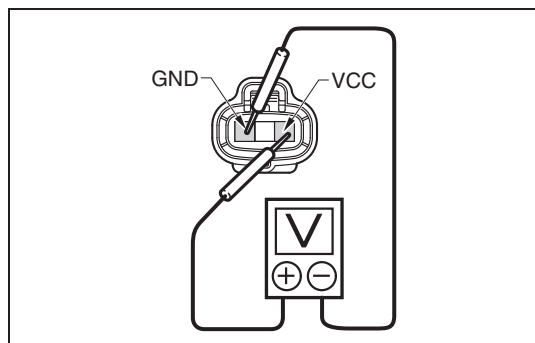
Do the measurements meet the standard value?**YES****Go to step 31.****NO****Repair or replace the harness.
Go to step 31.****31****Inspect for disconnection in wire harness of boost pressure sensor**

SAPH16F010300938

1. Use the electrical tester to measure the resistance between the engine ECU (signal check harness) and boost pressure sensor vehicle-side connector terminals.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) – boost pressure sensor vehicle-side connector AV3(M51) – VCC PIM(E67) – SIG AG3(E77) – GND	1Ω

Do the measurements meet the standard value?**YES****Go to step 32.****NO****Repair or replace the harness.
Go to step 32.**

32 Inspect the boost pressure sensor power supply

SAPH16F010300939

1. Connect the engine ECU vehicle-side harness to the engine ECU.
2. Set the starter switch to the "ON" position.
3. Use the electrical tester to measure the voltage between the terminals of the boost pressure sensor vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Boost pressure sensor vehicle-side connector VCC – GND	4.5 – 5.5 V

Do the measurements meet the standard value?

YES

Go to step 33.
If any failure was found at the step 27 - 31, perform "After-inspection work" of INFORMATION section.

NO

Replace the engine ECU.
Perform "After-inspection work" of INFORMATION section.

33 Inspect the intake air temperature sensor (intake manifold) connector

1. Check the connection of the intake air temperature sensor (intake manifold) connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed.
Go to step 34.

NO

Go to step 34.

34 Inspect the intake air temperature sensor (intake manifold)

1. Check the installation of the intake air temperature sensor (intake manifold).
2. Make sure there is no dirt or damage to the intake air temperature sensor (intake manifold).

Was any failure found?

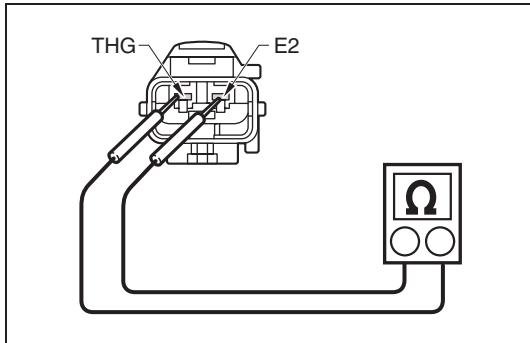
YES

Remove all contaminants and clogging.
Replace if damaged.
Go to step 35.

NO

Go to step 35.

35 Inspect the intake air temperature sensor (intake manifold) unit



SAPH16F010300940

1. Set the starter switch to the "LOCK" position.
2. Disconnect the intake air temperature sensor (intake manifold) connector.
3. Use the electrical tester to measure the resistance between the terminals of the intake air temperature sensor (intake manifold).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Intake air temperature sensor (intake manifold) THG – E2	20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 1.994 kΩ

Do the measurements meet the standard value?

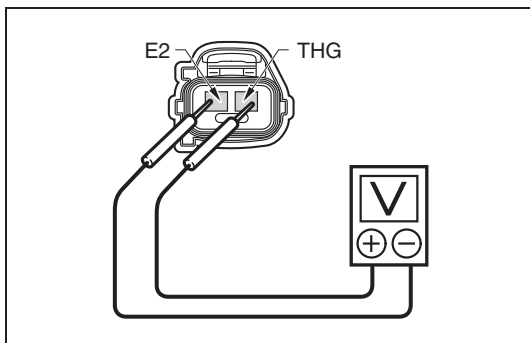
YES

Go to step 36.

NO

Replace the intake air temperature sensor (intake manifold).
Go to step 36.

36 Inspect the sensor power supply



SAPH16F010300941

1. Set the starter switch to the "ON" position.
2. Use the electrical tester to measure the voltage between the terminals of the intake air temperature sensor (intake manifold) vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Intake air temperature sensor (intake manifold) vehicle-side connector THG – E2	4.5 – 5.5 V

Do the measurements meet the standard value?

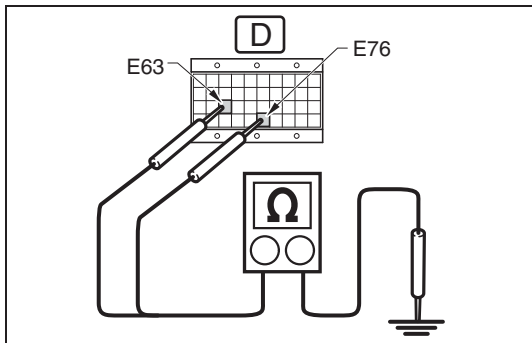
YES

Go to step 39.
If any failure was found at the step 33 - 35,
perform "After-inspection work" of INFOR-
MATION section.

NO

Go to step 37.

37 Inspect for short-circuit of the intake air temperature sensor (intake manifold) harness



1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU. (Do not connect the harness to the ECU.)
3. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) ATI+(E63) – Ground AGD2(E76) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

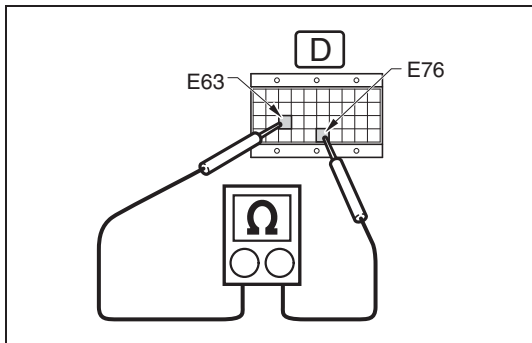
YES

Go to step 38.

NO

Repair or replace the harness.
Go to step 38.

38 Inspect disconnection of the intake air temperature sensor (intake manifold) harness



1. Connect the intake air temperature sensor (intake manifold) connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) ATI+(E63) – AGD2(E76)	20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 1.994 kΩ

Do the measurements meet the standard value?

YES

Go to step 39.
If any failure was found at the step 33 - 37,
perform "After-inspection work" of INFOR-
MATION section.

NO

Repair or replace the harness.
Perform "After-inspection work" of INFOR-
MATION section.

39 Inspect the engine coolant temperature sensor 1 connector

1. Check the connection of the engine coolant temperature sensor 1 connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed.
Go to step 40.

NO

Go to step 40.

40 Inspect the engine coolant temperature sensor 1

1. Check the installation of the engine coolant temperature sensor 1.
2. Make sure there is no dirt or damage to the engine coolant temperature sensor 1.

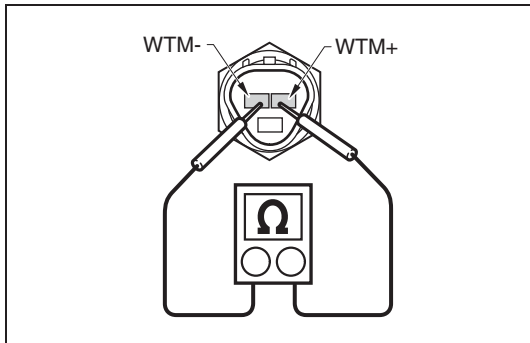
Was any failure found?

YES

Clean the engine coolant temperature sensor
1 and install it properly.
If damaged, replace the engine coolant tem-
perature sensor 1.
Go to step 41.

NO

Go to step 41.

41 Inspect the engine coolant temperature sensor 1 unit

SAPH16F010300944

1. Set the starter switch to the "LOCK" position.
2. Disconnect the engine coolant temperature sensor 1 connector.
3. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor 1.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine coolant temperature sensor 1 WTM+ – WTM-	20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ

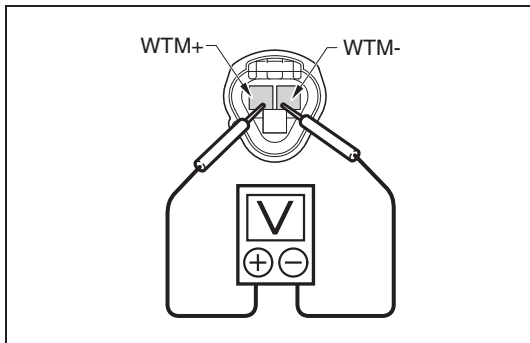
Do the measurements meet the standard value?

YES

Go to step 42.

NO

Replace the engine coolant temperature sensor 1.
Go to step 42.

42 Inspect the engine coolant temperature sensor 1 power supply

SAPH16F010300945

1. Set the starter switch to the "ON" position.
2. Use the electrical tester to measure the voltage between the terminals of the engine coolant temperature sensor 1 vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine coolant temperature sensor 1 vehicle-side connector WTM+ – WTM-	4.5 – 5.5 V

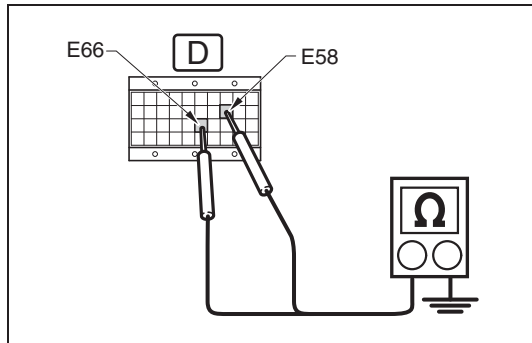
Do the measurements meet the standard value?

YES

Go to step 45.
If any failure was found at the step 39 - 41, perform "After-inspection work" of INFORMATION section.

NO

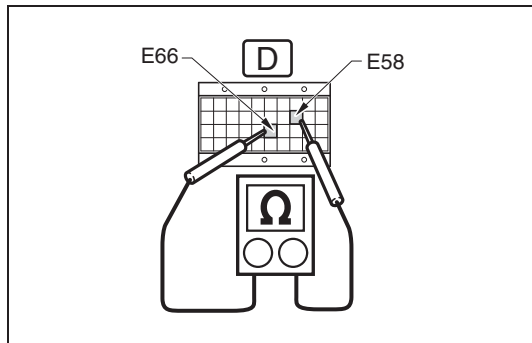
Go to step 43.

43 Inspect for short-circuit of the engine coolant temperature sensor 1 harness

SAPH16F010300946

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU. (Do not connect harness to the engine ECU.)
3. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) THW+(E66) – Ground AG5(E58) – Ground	$\infty \Omega$

Do the measurements meet the standard value?**YES****Go to step 44.****NO****Repair or replace the harness.
Go to step 44.****44 Inspect disconnection of the engine coolant temperature sensor 1 harness**

SAPH16F010300947

1. Connect the engine coolant temperature sensor 1 connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) THW+(E66) – AG5(E58)	20 °C {68 °F}: 2.59 – 2.32 k Ω 80 °C {176 °F}: 0.326 – 0.310 k Ω

Do the measurements meet the standard value?**YES****Go to step 45.
If any failure was found at the step 39 - 43,
perform "After-inspection work" of INFORMATION section.****NO****Repair or replace the harness.
Perform "After-inspection work" of INFORMATION section.**

45 Inspect the engine coolant temperature sensor 2 connector

1. Check the connection of the engine coolant temperature sensor 2 connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed.
Go to step 46.

NO

Go to step 46.

46 Inspect the engine coolant temperature sensor 2

1. Check the installation of the engine coolant temperature sensor 2.
2. Make sure there is no dirt or damage to the engine coolant temperature sensor 2.

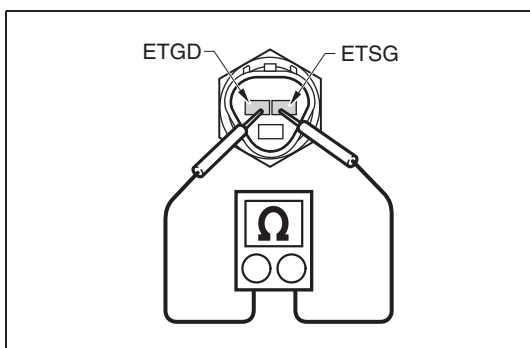
Was any failure found?

YES

Clean the engine coolant temperature sensor 2 and install it properly.
If damaged, replace the engine coolant temperature sensor 2.
Go to step 47.

NO

Go to step 47.

47 Inspect the engine coolant temperature sensor 2 unit

SAPH16F010300948

1. Set the starter switch to the "LOCK" position.
2. Disconnect the engine coolant temperature sensor 2 connector.
3. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor 2.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK]	Engine coolant temperature sensor 2 ETSG – ETGD	20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ

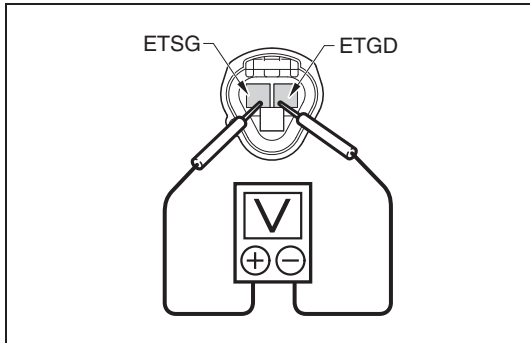
Do the measurements meet the standard value?

YES

Go to step 48.

NO

Replace the engine coolant temperature sensor 2.
Go to step 48.

48 Inspect the engine coolant temperature sensor 2 power supply

1. Set the starter switch to the "ON" position.
2. Use the electrical tester to measure the voltage between the terminals of the engine coolant temperature sensor 2 vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine coolant temperature sensor 2 vehicle-side connector ETSG – ETGD	4.5 – 5.5 V

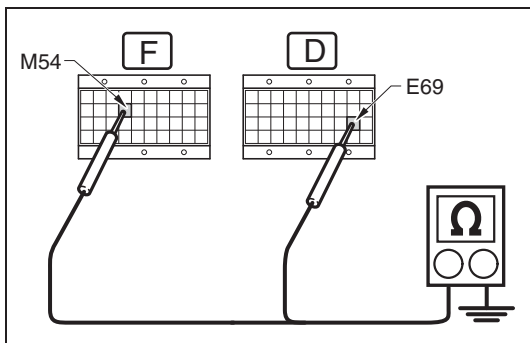
Do the measurements meet the standard value?

YES

Go to step 51.
If any failure was found at the step 45 - 47, perform "After-inspection work" of INFORMATION section.

NO

Go to step 49.

49 Inspect for short-circuit of the engine coolant temperature sensor 2 harness

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU. (Do not connect harness to the engine ECU.)
3. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) THW2(E69) – Ground AG6(M54) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

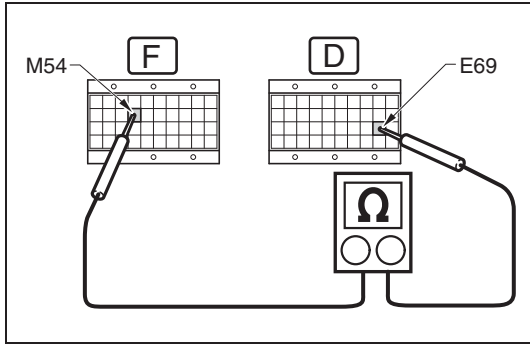
YES

Go to step 50.

NO

Repair or replace the harness.
Go to step 50.

50 Inspect disconnection of the engine coolant temperature sensor 2 harness



1. Connect the engine coolant temperature sensor 2 connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) THW2(E69) – AG6(M54)	20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ

Do the measurements meet the standard value?

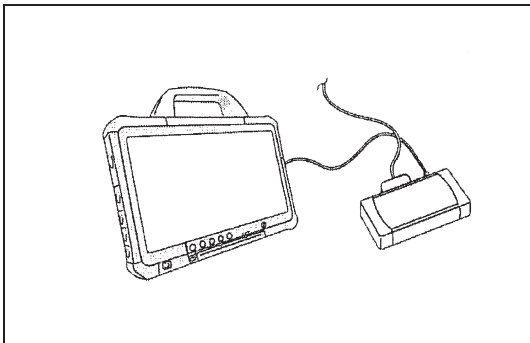
YES

Go to step 51.
If any failure was found at the step 45 - 49, perform "After-inspection work" of INFORMATION section.

NO

Repair or replace the harness.
Perform "After-inspection work" of INFORMATION section.

51 Check the DTC detected (Engine ECU) [HINO DX II]



1. Replace the NOx sensor1 (SCR upstream) and NOx sensor 2 (SCR downstream).
2. Perform "After-inspection work" of INFORMATION section.
3. Stop the engine and set the starter switch to the "LOCK" position.
4. Connect the vehicle to HINO DX II .
5. Set the starter switch to the "ON" position.
6. Select [Engine] and check if P2214 has been detected.

Has DTC P2214 been detected?

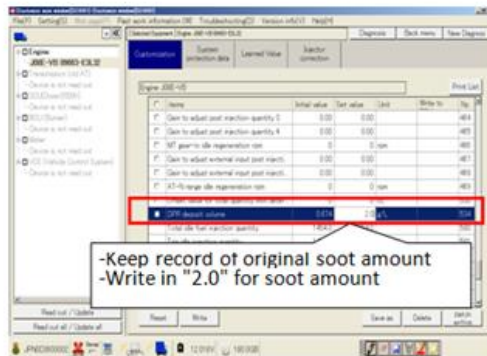
YES

Replace the engine ECU.
Perform "After-inspection work" of INFORMATION section.

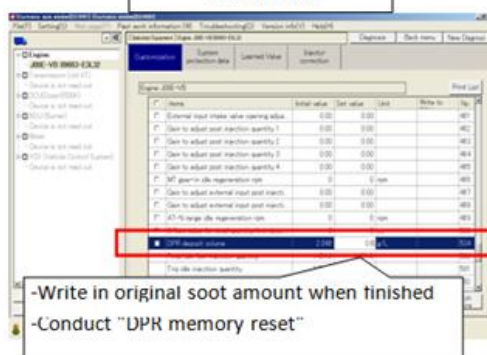
NO

Procedure completed.
Perform "After-inspection work" of INFORMATION section.

APPENDIX A



CAUTION



Check the output waveform of the NOx sensor in the Data Monitor in HINO DXII.

NOTICE: Update the engine ECU control software to the latest version using Auto-repro function of DXII before conducting this procedure.

- a. Turn the ignition key to "ON".
- b. Select [Engine] in the main screen of DX.
- c. Write in "2.0" for the soot amount in the "Customization" function of DX. (Keep the record of the original value)
- d. Select [NOx level (before catalyst)], [NOx level (after catalyst)] and the SCR catalyst temperature in the Data Monitor function of DX and start the monitoring.
DXII: [Data monitor Setting and Active test setting]
[Data monitor Setting] [NOx level (before catalyst)] and [NOx level (after catalyst)]
- e. Start the engine.
- f. Press the DPR manual regeneration switch and start the regeneration.

HINT: Perform DPR regeneration to increase the exhaust gas temperature as the waveform of the NOx sensor can only be detected when the exhaust gas temperature exceeds the specified value.

- h. Monitor the SCR temperature and the NOx levels (before and after catalyst) in the DX Data Monitor.
- i. Press the DPR button when the SCR catalyst temperature reaches 250°C, and cancel the regeneration process.
- j. Determine whether the NOx sensor is functioning properly based on the NOx sensor waveform recorded during monitoring as per the **Performance Verification Manual**.

<CAUTION>

1. Rewrite the soot amount back to the original upon completion of the troubleshooting.
2. Conduct DPR memory reset (DTC for abnormal DPR regeneration frequency will come on if not conducted)

Was any failure found?

YES

Replace the effected NOx sensor (1 or 2).
Perform the "After-inspection work" of the Information section

NO

Go to step 6.