

MENU

FOREWORD

This workshop manual has been prepared to provide information regarding repair procedures on Hino Trucks.

Applicable for HINO 238, 258LP, 268, 338 series, equipped with J08E-VB and J08E-VC engine

When making any repairs on your vehicle, be careful not to be injured through improper procedures.

As for maintenance items, refer to the Driver's / Owner's Manual.

All information and specifications in this manual are based upon the latest product information available at the time of printing. Hino Motors Sales U.S.A., Inc. reserves the right to make changes at any time without prior notice.

Please note that the publications below have also been prepared as relevant workshop manuals for the components and systems in these vehicles.

Manual Name	Pub. No.
Chassis Workshop Manual	S1-UNAE10A 1/2 S1-UNAE10A 2/2
J08E-VB, VC Engine Workshop Manual	S5-UJ08E10A
Trouble Shooting Workshop Manual	S7-UNAE10C 1/4 S7-UNAE10C 3/4 S7-UNAE10C 4/4

Hino Motors Sales U.S.A. , Inc.

CHAPTER REFERENCES REGARDING THIS WORKSHOP MANUAL

Use this chart to the appropriate chapter numbers for servicing your particular vehicle.

CHAPTER	MANUAL NO.	S7-UNAE10C 2/4 (U.S.A.), S7-CNAE10C 2/4 (CANADA)					
	MODELS	HINO 238, 258LP, 268, 338, 358					
	Production Code	NE8J, NF8J, NJ8J, NV8J					
GENERAL INTRODUCTION	1-001						
TROUBLE SHOOTING - COMPONENTS	2-001						
TROUBLE SHOOTING - ELECTRICAL CONTROL SYSTEM	3-001						
ENGINE CONTROL SYSTEM (J08E)	4-001						
DEF SCR SYSTEM (DCU)	5-001						
BURNER CONTROL SYSTEM (BCU)	6-001						
BRAKE CONTROL SYSTEM	9-001 (ABS:HYDRAULIC (E VERSION))			9-002 (ABS:FULL AIR)			
VEHICLE CONTROL SYSTEM (VCS)	11-001						
CAN COMMUNICATION	12-001						
DX MANUAL	DX01-001	DX02-001	DX03-001	DX04-001	DX06-001	DX07-001	

This manual does not contain items on half-tone dot meshing.

HINO

WORKSHOP MANUAL

INDEX: TROUBLE SHOOTING

GENERAL INTRODUCTION

TROUBLE SHOOTING - COMPONENTS

**TROUBLE SHOOTING -
ELECTRICAL CONTROL SYSTEM**

ENGINE CONTROL SYSTEM (J08E)

DEF SCR SYSTEM (DCU)

BURNER CONTROL SYSTEM (BCU)

BRAKE CONTROL SYSTEM

VEHICLE CONTROL SYSTEM (VCS)

CAN COMMUNICATION

ENGINE CONTROL SYSTEM (J08E)

4-001

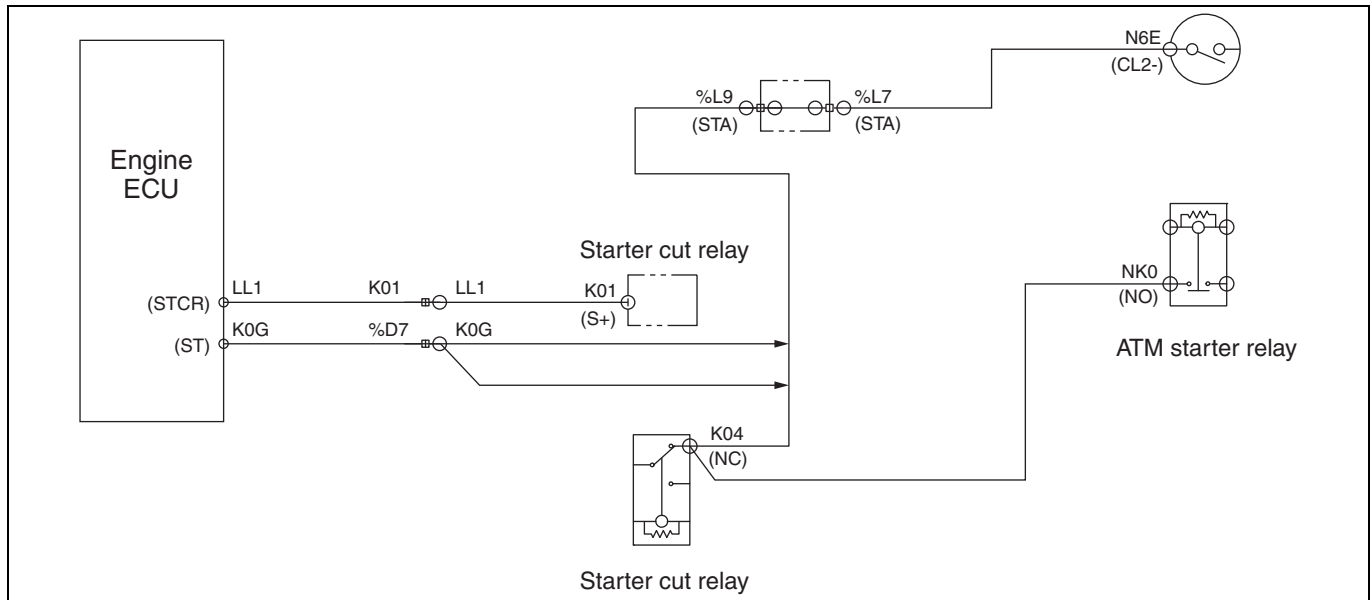
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DTC: P081A

EN01H16F01030F03001098

P081A: Starter Disable Circuit Low
INFORMATION

SAPH16F010300632

1. Technical description

- The starter cut relay prevents further rotations of the starter when the starter switch is turned after start of the engine.

<Description of malfunction>

- Harness GND short-circuit or disconnection and relay unit failure are detected.

2. DTC set condition

(1) Check conditions

- Engine speed of 500 r/min or more. (Request starter cut relay operation)
- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.

The conditions described above remain for 5 seconds or longer.

(2) Judgement criteria

- Output of the starter cut relay remains at 10 V or less for 3 seconds or longer.

3. Reset condition

- Just after restoration to normal condition.

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

- MIL: OFF
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

-

<Symptoms on the vehicle due to malfunction>

- Starter operates even when the engine is running.

6. Pre-inspection work

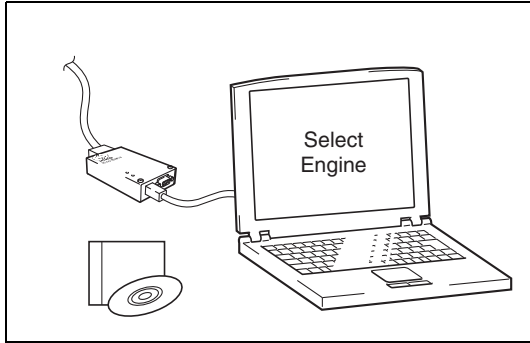
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- starter cut relay failure
- Engine ECU failure

INSPECTION PROCEDURE: P081A**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300633

1. Set the starter switch to the "LOCK" position.
2. Disconnect the starter cut relay.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P081A has been detected in [Fault Information].

Has DTC P081A been detected?**YES****Go to step 2.****NO**

**Replace the starter cut relay.
Perform "After-inspection work" of INFORMATION section.**

2 Inspect the starter cut relay connector

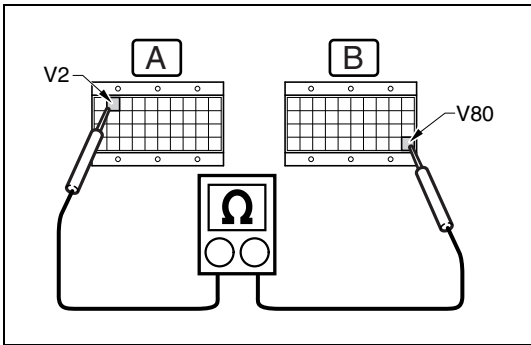
1. Check the connection of the starter cut relay connector (Looseness and poor contact).

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 3.**

3 Inspect for disconnection in wire harness of starter cut relay



SAPH16F010300634

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU.
3. Set the starter switch to the "ON" position.
4. 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: ON	Engine ECU (signal check harness) STCR(V2) – PGD4(V80)	$\infty \Omega$

Do the measurements meet the standard value?

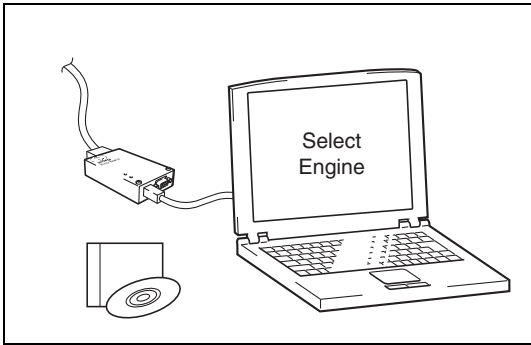
YES

Go to step 4.

NO

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

4 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300635

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P081A has been detected in [Fault Information].

Has DTC P081A been detected?

YES

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

NO

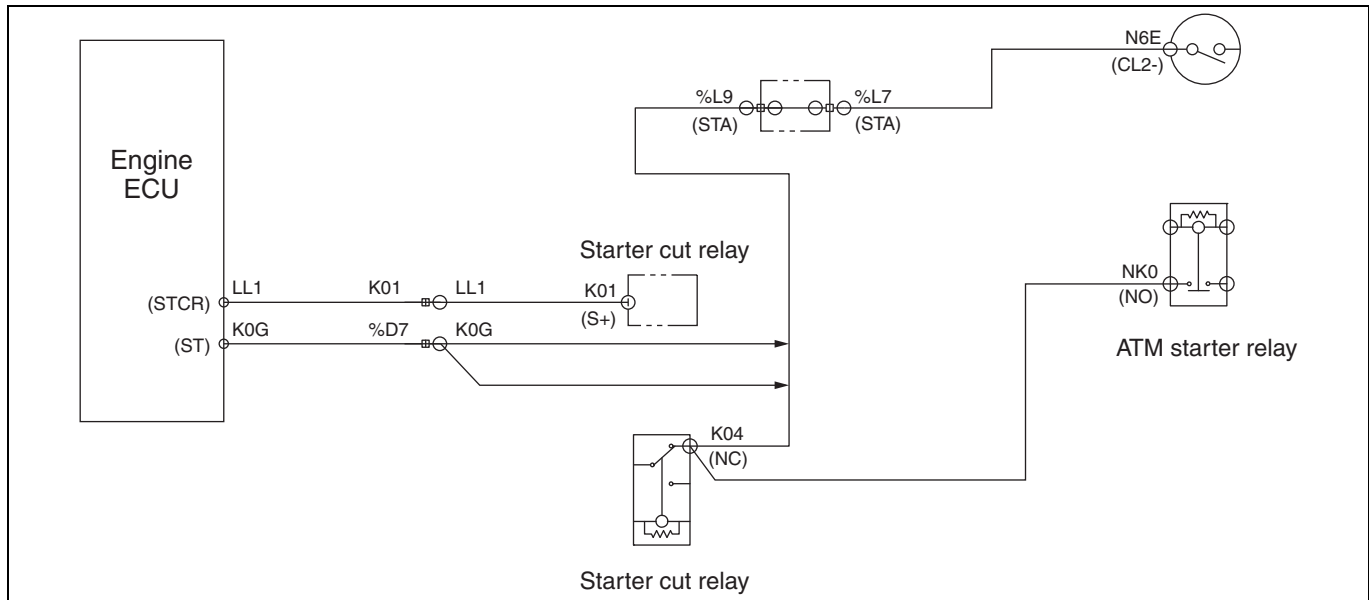
Procedure completed. Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P081A

DTC: P081A		Starter Disable Circuit Low		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	<ol style="list-style-type: none"> 1. Disconnect the starter cut relay. 2. Check if P081A has been detected in [Engine]. 	<p>DTC P081A has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Go to step 2.	Replace the starter cut relay. Perform "After-inspection work" of INFORMATION section.
2	Inspect the starter cut relay connector	Check the connection of the starter cut relay connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect for disconnection in wire harness of starter cut relay	<p>Connect the signal check harness to the engine ECU and measure the resistance between the terminals of the engine ECU (signal check harness).</p> <p><Tester connections> Engine ECU (signal check harness) STCR(V2) – PGD4(V80) <Standard values> $\infty \Omega$</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected (Engine ECU) [Hino-DX]	Check if P081A has been detected in [Engine].	<p>DTC P081A has been detected. Go to YES.</p> <p>No DTC has been detected. Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P081B

EN01H16F01030F03001099

P081B: Starter Disable Circuit High
INFORMATION

SAPH16F010300636

1. Technical description

- The starter cut relay prevents further rotations of the starter when the starter switch is turned after start of the engine.

<Description of malfunction>

- Harness +B short-circuit is detected.

2. DTC set condition**(1) DTC detection condition**

- Request for deactivation of starter block is in progress (while engine is stopped).
- Starter switch ON.
- Battery voltage is 10 V – 16 V.

Above conditions continue for at least 5 seconds.

(2) Judgement criteria

- Output of the starter cut relay remains at 10 V or more for 3 seconds or longer.

3. Reset condition

- After restoration to normal condition.

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

- MIL: OFF
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

-

<Symptoms on the vehicle due to malfunction>

- Starter may not turn over. (If the starter turns over it will not interfere with engine operation.)

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- Starter cut relay failure
- Engine ECU failure

INSPECTION PROCEDURE: P081B

1 Inspect the starter cut relay connector

1. Check the connection of the starter cut relay connector (Looseness and poor contact).

Was any failure found?

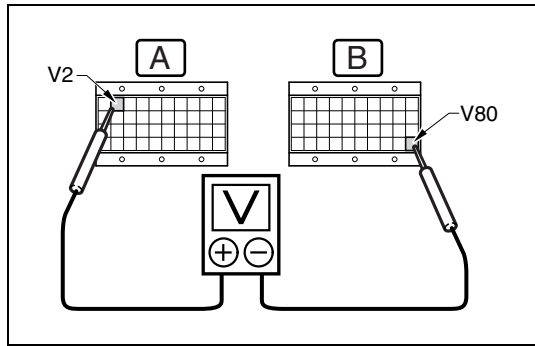
YES

NO

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect for disconnection in wire harness of starter cut relay



1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU.
3. Set the starter switch to the "ON" position.
4. 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: ON	Engine ECU (signal check harness) STCR(V2) – PGD4(V80)	3 V or less

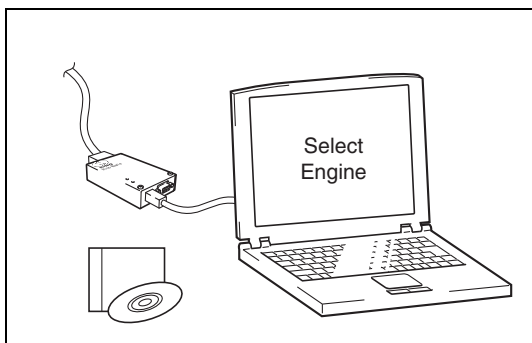
Do the measurements meet the standard value?

YES

NO

Go to step 3.

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

3 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300638

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P081B has been detected in [Fault Information].

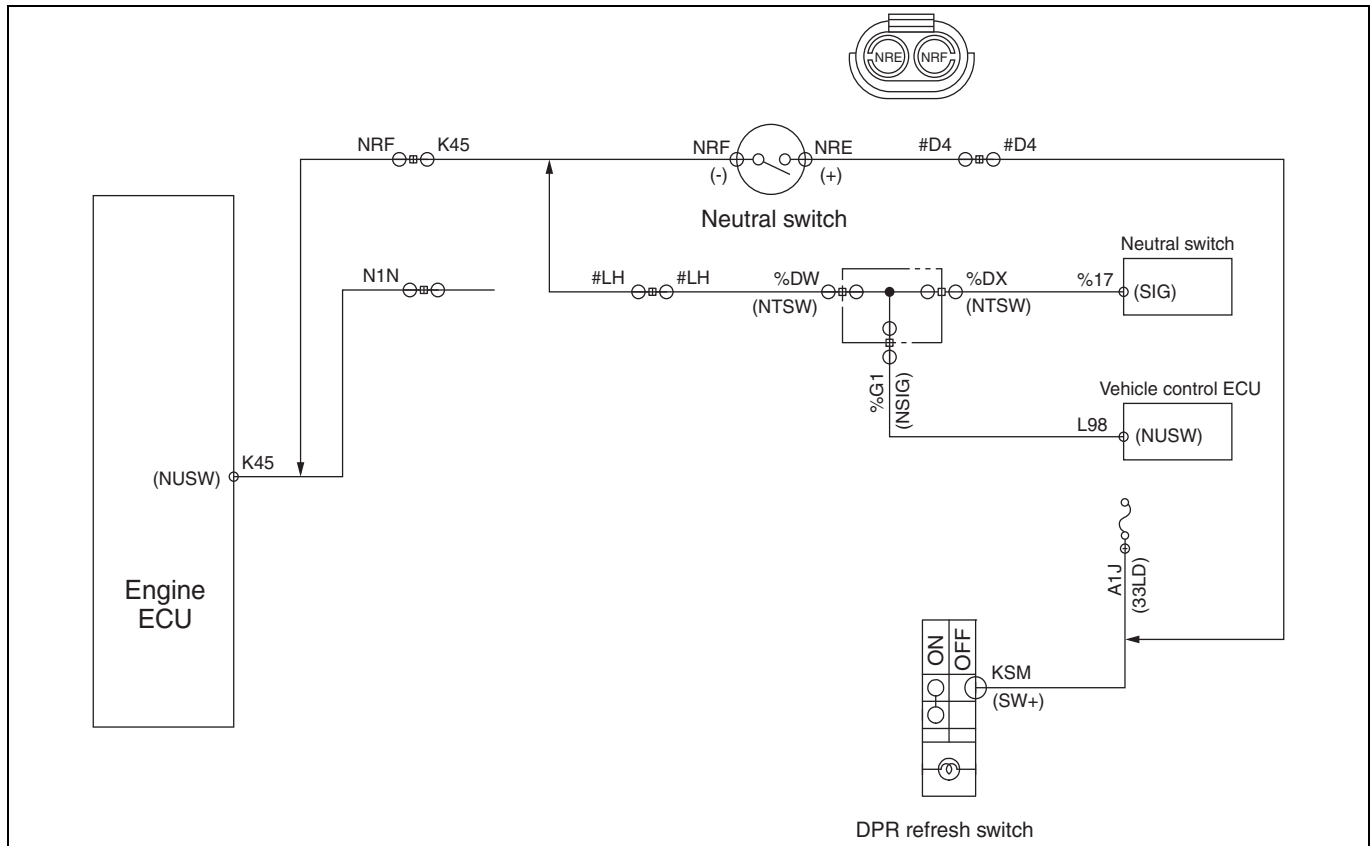
Has DTC P081B been detected?**YES****Replace the engine ECU.
Perform "After-inspection work" of INFORMATION section.****NO****Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P081B

DTC: P081B		Starter Disable Circuit High		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the starter cut relay connector	Check the connection of the starter cut relay connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect for disconnection in wire harness of starter cut relay	Connect the signal check harness to the engine ECU and measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) STCR(V2) – PGD4(V80) <Standard values> 3 V or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
3	Check the DTC detected (Engine ECU) [Hino-DX]	Check if P081B has been detected in [Engine].	DTC P081B has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P0850

EN01H16F01030F03001100

P850: Neutral switch - rationality
INFORMATION

SAPH16F010300639

1. Technical description

- Through the neutral switch, the ECU senses neutral signals when the transmission lever is in the P or N range.

<Description of malfunction>

- The neutral switch cannot correctly sense.

2. DTC set condition

(1) Check conditions

After the starter switch is set to ON position, the status described below remains for 10 seconds.

- Vehicle speed is 31.25 miles/h or higher.
- Battery voltage is in the range of 10 V to 16 V.
- After that, vehicle speed is 0 miles/h.

(2) Judgement criteria

- The neutral switch cannot be switched twice.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Cruise control is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Cruise control does not work.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Malfunction of neutral switch
- Malfunction of ECU

INSPECTION PROCEDURE: P0850**1 Inspect the neutral switch**

1. Check if the neutral switch is properly adjusted.

Was any failure found?

YES

Adjust the neutral switch.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the neutral switch connector

1. Check the connection of the neutral switch connector (Looseness and poor contact).

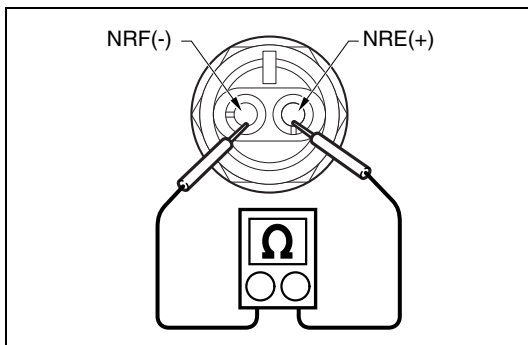
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the neutral switch unit

SAPH16F010300640

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Neutral switch NRE – NRF	Shift lever in N position: < 1 Ω Shift lever in any other position: ∞ Ω

Do the measurements meet the standard value?

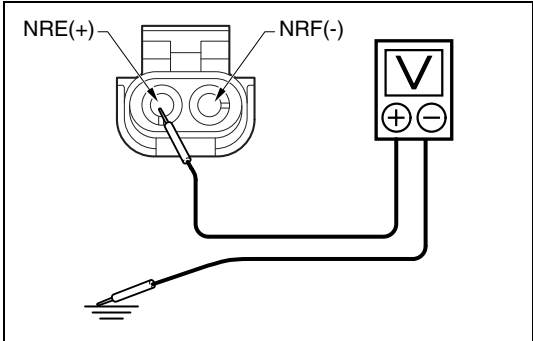
YES

NO

Go to step 4.

Replace the neutral switch.
Perform "After-inspection work" of INFORMATION section.

4 Inspect the power supply of the neutral switch



SAPH16F010300641

1. Set the starter switch to the "ON" position.
2. Use the electrical tester to measure the voltage between the NRE terminal in the neutral switch vehicle-side connector and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Neutral switch vehicle-side connector NRE – Ground	More than 10 V

Do the measurements meet the standard value?

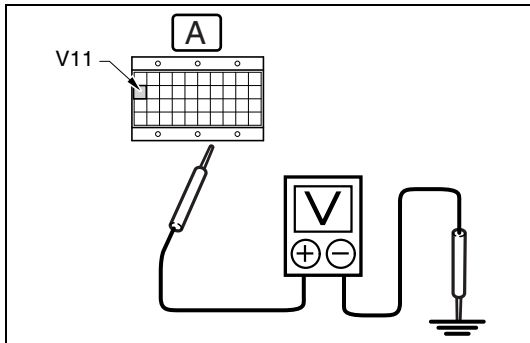
YES

NO

Go to step 5.

Repair the neutral switch power circuit.
Perform "After-inspection work" of INFORMATION section.

5 Inspect the neutral switch harness



SAPH16F010300642

1. Set the starter switch to the "LOCK" position.
2. Connect the neutral switch connector.
3. Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect the harness to the ECU.)
4. Set the starter switch to the "ON" position.
5. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) NUSW(V11) – Ground	Shift lever in N position: ≥ 10 V Shift lever in any other position: ≤ 0.5 V

Do the measurements meet the standard value?

YES

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

NO

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

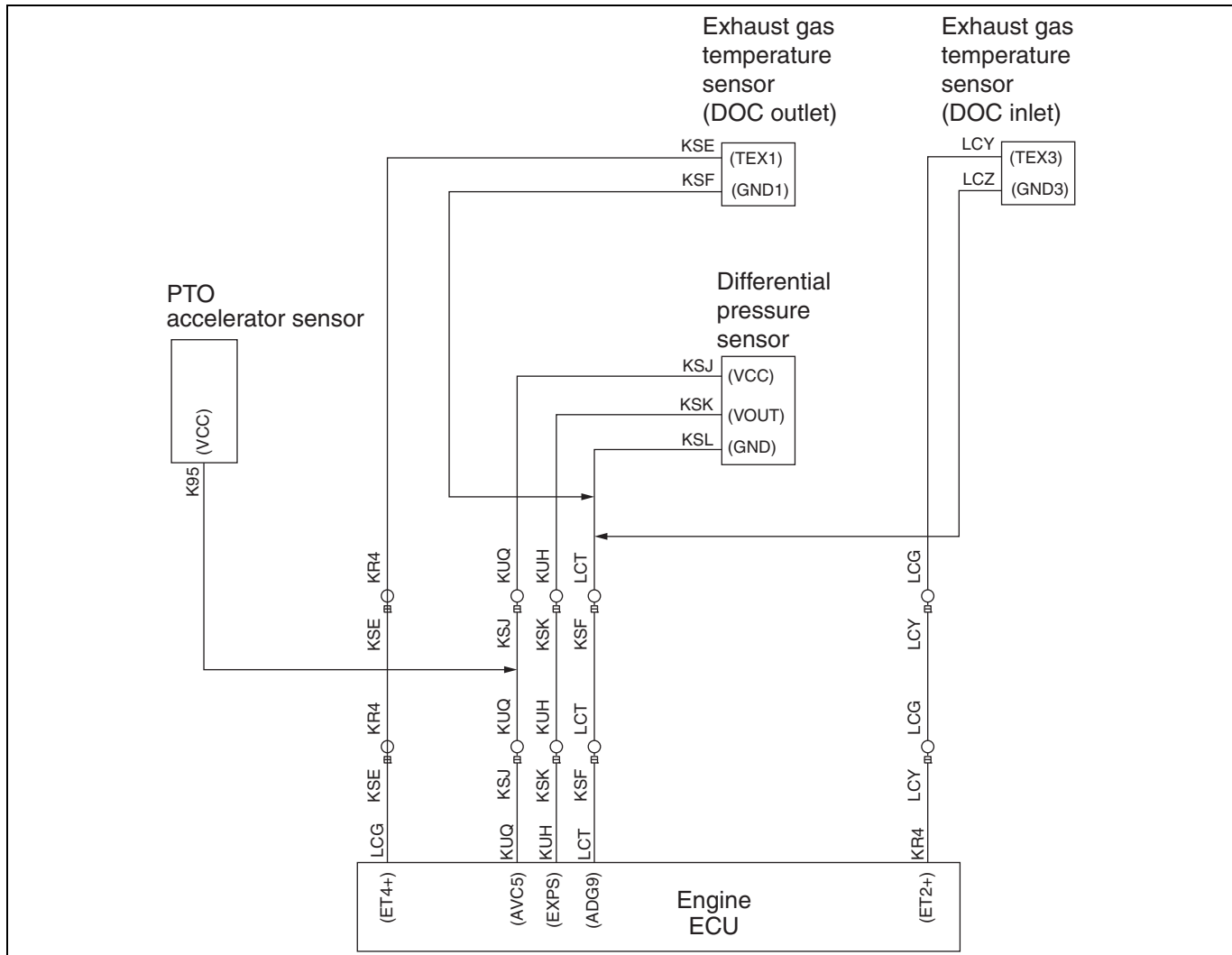
CHECKLIST: P0850

DTC: P0850		Neutral switch - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the neutral switch	Check if the neutral switch is properly adjusted.	Failure found: Go to YES. No failure found: Go to NO.		Adjust the neutral switch. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the neutral switch connector	Check the connection of the neutral switch connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the neutral switch unit	Measure the resistance between the terminals of the neutral switch. <Tester connections> Neutral switch NRE – NRF <Standard values> Shift lever in N position: < 1 Ω Shift lever in any other position: ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the neutral switch. Perform "After-inspection work" of INFORMATION section.
4	Inspect the power supply of the neutral switch	Measure the voltage between the NRE terminal in the neutral switch vehicle-side connector and ground. <Tester connections> Neutral switch vehicle-side connector NRE – Ground <Standard values> More than 10 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair the neutral switch power circuit. Perform "After-inspection work" of INFORMATION section.

DTC: P0850		Neutral switch - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the neutral switch harness	1. Connect the neutral switch connector. 2. Connect the signal check harness, and measure the voltage between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) NUSW(V11) – Ground <Standard values> Shift lever in N position: ≥ 10 V Shift lever in any other position: ≤ 0.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P1133

EN01H16F01030F03001101

P1133: PTO accelerator sensor (Hi)
INFORMATION

SAPH16F010300643

1. Technical description

- The operational accelerator sensor measures accelerator opening if PTO (power take off) is used. (This applies only to PTO-equipped vehicles.)

<Description of malfunction>

- The operational accelerator sensor cannot correctly sense.
- +B short-circuit is likely to have occurred.

2. DTC set condition

(1) Check conditions

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.

The conditions described above remain for 5 seconds or longer.

(2) Judgement criteria

- Sensor voltage remains at 4.82 V or higher for 3 seconds or longer.

3. Reset condition

- After normal operation is restored and starter switch is turned LOCK.

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

- MIL: OFF
- Diag lamp: OFF
- Body mounting control is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Body mounting control is not working.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Faulty harness (+B short-circuit)
- Malfunction of sensor
- Failure in engine ECU sensor power supply or internal circuit

INSPECTION PROCEDURE: P1133**1 Inspect the PTO accelerator sensor connector**

1. Check the connection of the PTO accelerator sensor connector (Looseness and poor contact).

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

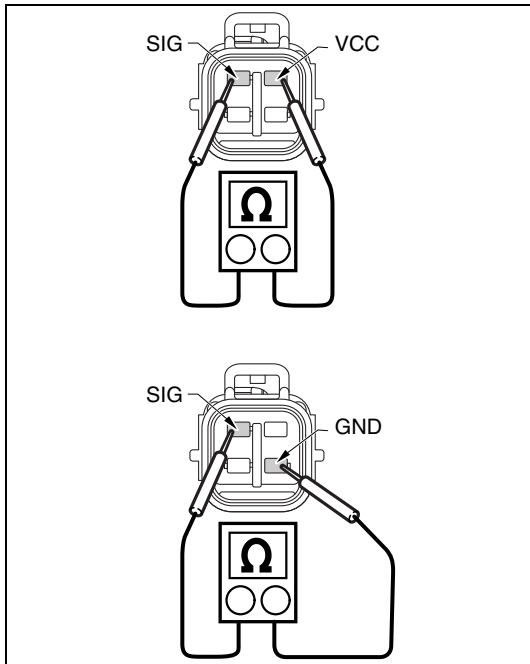
NO**Go to step 2.****2 Inspect the PTO accelerator sensor**

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

Was any failure found?**YES**

**Clean the PTO accelerator sensor and install it properly.
If damaged, replace the sensor.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 3.**

3 Inspect the PTO accelerator sensor unit

SAPH16F010300644

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	PTO accelerator sensor SIG – VCC SIG – GND	More than 2 Ω

Do the measurements meet the standard value?

YES

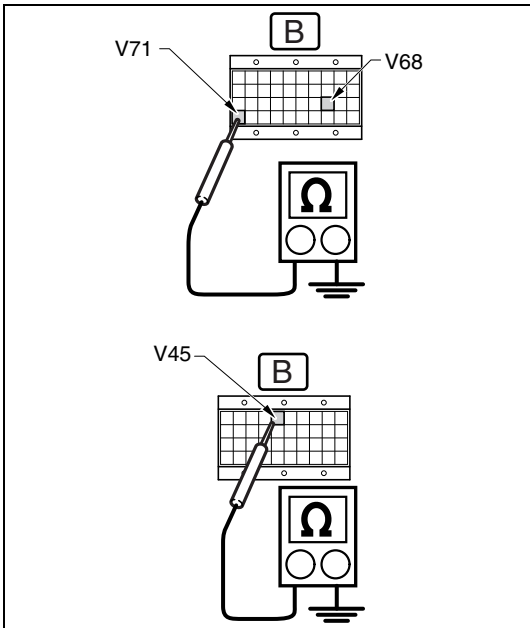
Go to step 4.

NO

Replace the PTO accelerator sensor.
Perform "After-inspection work" of INFORMATION section.

4 Inspect for short-circuit of the PTO accelerator sensor harness

1. Connect the signal check harness to the engine ECU. (Do not connect the harness to the ECU.)
2. Use the electrical tester to measure the resistance between the terminals of the engine ECU (signal check harness) and ground.



SAPH16F010300645

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) ASCS(V68) – Ground AVC5(V71) – Ground ADG7(V45) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

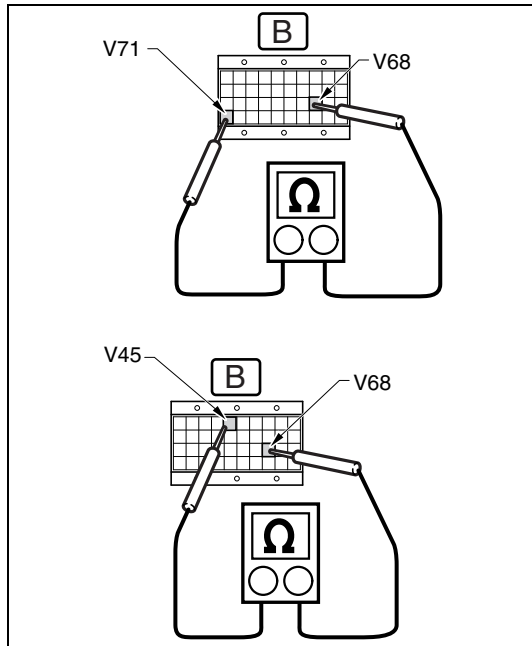
YES

Go to step 5.

NO

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

5 Inspect disconnection of the PTO accelerator sensor harness



SAPH16F010300646

1. Connect the PTO accelerator sensor 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) ASCS(V68) – AVC5(V71) ASCS(V68) – ADG7(V45)	More than 2 Ω

Do the measurements meet the standard value?

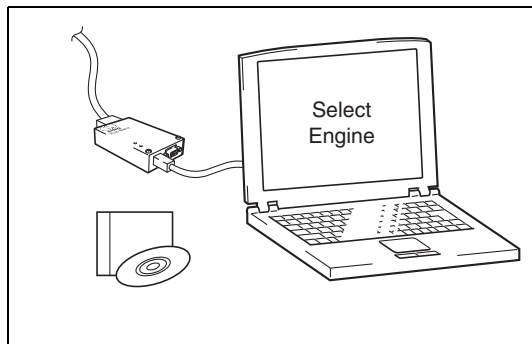
YES

Go to step 6.

NO

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

6 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300647

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if P1133 has been detected in [Fault Information].

Has DTC P1133 been detected?

YES

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

NO

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

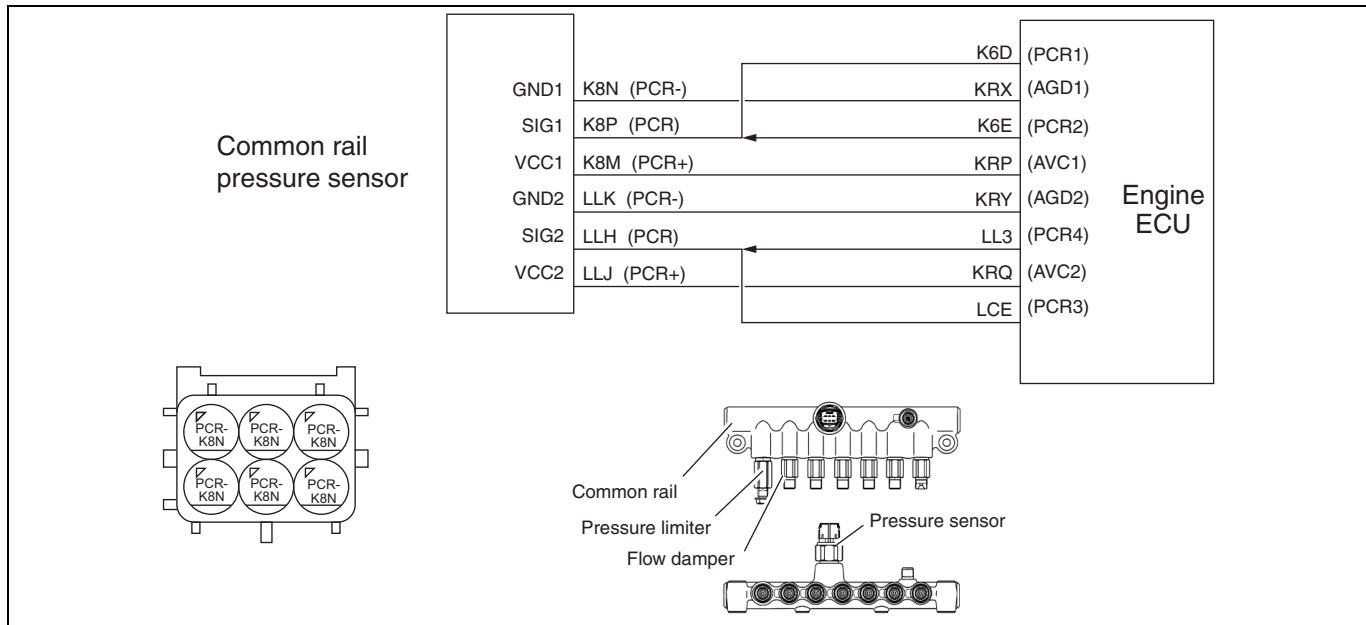
CHECKLIST: P1133

DTC: P1133		PTO accelerator sensor (Hi)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the PTO accelerator sensor connector	Check the connection of the PTO accelerator sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the PTO accelerator sensor	1. Check the installation of the PTO accelerator sensor. 2. Make sure there is no dirt or damage to the PTO accelerator sensor.	Failure found: Go to YES. No failure found: Go to NO.		Clean the PTO accelerator sensor and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the PTO accelerator sensor unit	Disconnect the PTO accelerator sensor connector and measure the resistance between the terminals of the PTO accelerator sensor. <Tester connections> PTO accelerator sensor SIG – VCC SIG – GND <Standard values> More than 2 Ω	The measurements meet the standard value: Go to YES.		Go to step 4.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
4	Inspect for short-circuit of the PTO accelerator sensor harness	Connect the signal check harness to the engine ECU. (Do not connect harness to the ECU.) Measure the resistance between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) ASCS(V68) – Ground AVC5(V71) – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P1133		PTO accelerator sensor (Hi)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect disconnection of the PTO accelerator sensor harness	Connect the PTO accelerator sensor connector and measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> ASCS(V68) – AVC5(V71) ASCS(V68) – ADG7(V45) <Standard values> More than 2 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Check the DTC detected (Engine ECU) [Hino-DX]	Check if P1133 has been detected in [Engine].	DTC P1133 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P119F

EN01H16F01030F03001102

P119F: Fuel rail pressure sensor - rationality
INFORMATION

SAPH16F010300648

1. Technical description

- The common rail pressure sensor consistently measures common rail pressure.

<Description of malfunction>

- Common rail pressure cannot be correctly sensed.
- Malfunction is likely to have occurred in the common rail pressure sensor.

2. DTC set condition**(1) Check conditions**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- The conditions described above remain for 5 seconds or longer.
- Common rail pressure is 220 MPa or less.
- No other diagnosis codes are present (the monitor disable DTC table can be referred to)

(2) Judgement criteria

P119F is detected under the conditions described below. 1 and 2 represent the order of priority.

- A difference in voltage remains higher than 1.06 V for 3 seconds or longer.
- A difference in voltage remains less than 0.04 V for 3 seconds or longer.

3. Reset condition

- After normal operation is restored and starter switch LOCK.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

-

<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

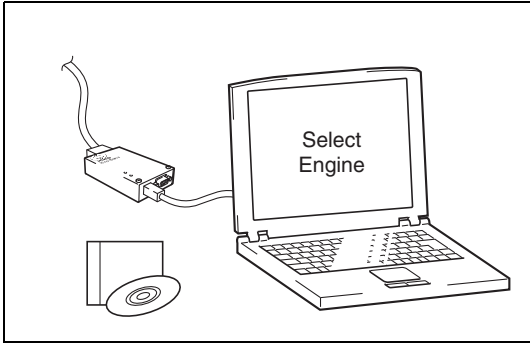
- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Sensor disconnected from measuring site
- Harness disconnection or short-circuit
- Abnormal resistance of sensor
- Malfunction of ECU

INSPECTION PROCEDURE: P119F

1 Check the DTC detected 1 (Engine ECU) [Hino-DX]



SAPH16F010300649

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P119F (for example, P0192, P0193) have been detected in [Fault Information].

Has a DTC other than P119F been detected?

YES

NO

Go to the diagnostic procedure of a related DTC.

Go to step 2.

2 Inspect the common rail pressure sensor connector

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

Was any failure found?

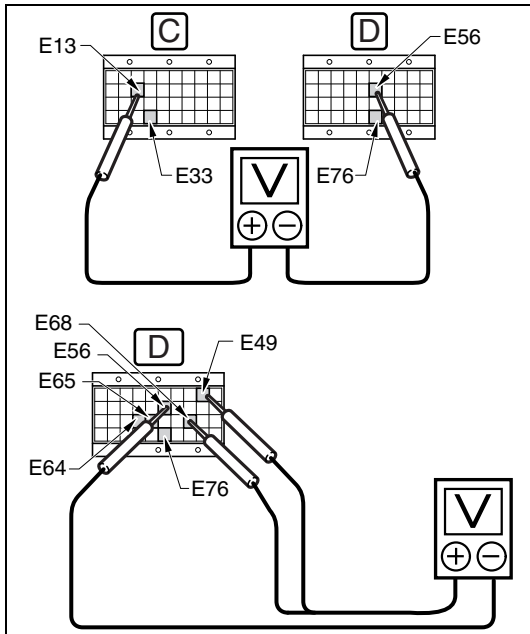
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 3.

3 Inspect the sensor power supply



1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU.
3. Disconnect the common rail pressure sensor connector.
4. Set the starter switch to the "ON" position.
5. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) AVC1(E13) – AGD1(E56) PCR1(E49) – AGD1(E56) PCR2(E68) – AGD1(E56) AVC2(E33) – AGD2(E76) PCR3(E64) – AGD2(E76) PCR4(E65) – AGD2(E76)	4.5 – 5.5 V

Do the measurements meet the standard value?

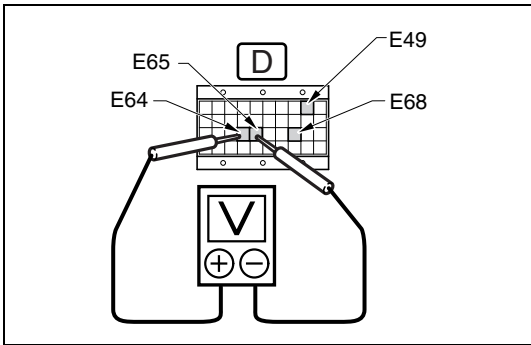
YES

Go to step 4.

NO

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

4 Inspect the signal of the common rail pressure sensor



SAPH16F010300651

1. Set the starter switch to the "LOCK" position.
2. Connect the common rail pressure sensor connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) PCR1(E49) – PCR3(E64) PCR1(E49) – PCR4(E65) PCR2(E68) – PCR3(E64) PCR2(E68) – PCR4(E65)	0.3 – 0.7 V

Do the measurements meet the standard value?

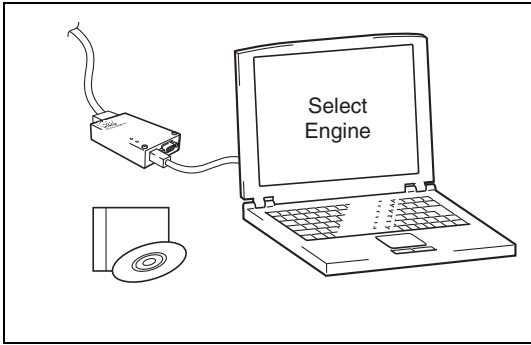
YES

Go to step 5.

NO

Replace the common rail pressure sensor. Perform "After-inspection work" of INFORMATION section.

5 Check the DTC detected 2(Engine ECU) [Hino-DX]



SAPH16F010300652

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "ON" position.
3. Select [Engine] and check if P119F has been detected in [Fault Information].

Has DTC P119F been detected?

YES

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

NO

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

CHECKLIST: P119F

DTC: P119F		Fuel rail pressure sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than P119F (for example P0192, P0193) has not been detected in [Engine].	DTC other than P119F has been detected: Go to YES. DTC other than P119F has not been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Inspect the common rail pressure sensor connector	Check the connection of the common rail pressure sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the sensor power supply	1. Connect the signal check harness to the engine and disconnect the common rail pressure sensor connector. 2. Measure the voltage between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) AVC1(E13) – AGD1(E56) PCR1(E49) – AGD1(E56) PCR2(E68) – AGD1(E56) AVC2(E33) – AGD2(E76) PCR3(E64) – AGD2(E76) PCR4(E65) – AGD2(E76) <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.

DTC: P119F		Fuel rail pressure sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the signal of the common rail pressure sensor	Connect the common rail pressure sensor connector and measure the voltage between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) PCR1(E49) – PCR3(E64) PCR1(E49) – PCR4(E65) PCR2(E68) – PCR3(E64) PCR2(E68) – PCR4(E65) <Standard values> 0.3 – 0.7 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
5	Check the DTC detected 2 (Engine ECU) [Hino-DX]	1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more) 2. Check if P119F has been detected in [Engine].	DTC P119F has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P141F

EN01H16F01030F03001103

P141F: Burner system malfunction INFORMATION

1. Technical description

- Malfunction in the burner system is diagnosed by BCU.
- Determine system in the BCU and diagnose malfunction on Hino-DX.

<Description of malfunction>

- BCU detects burner system failure.

2. DTC set condition

(1) Check conditions

- -

(2) Judgement criteria

- -

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

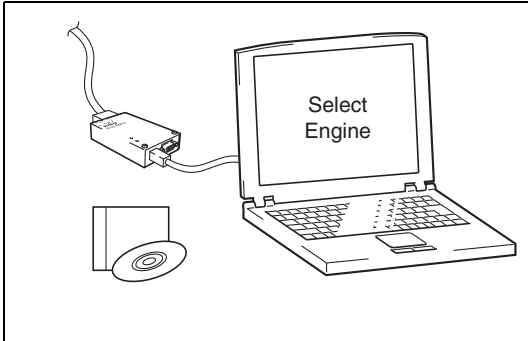
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- -

INSPECTION PROCEDURE: P141F**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300653

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P141F has been detected in [Fault Information].

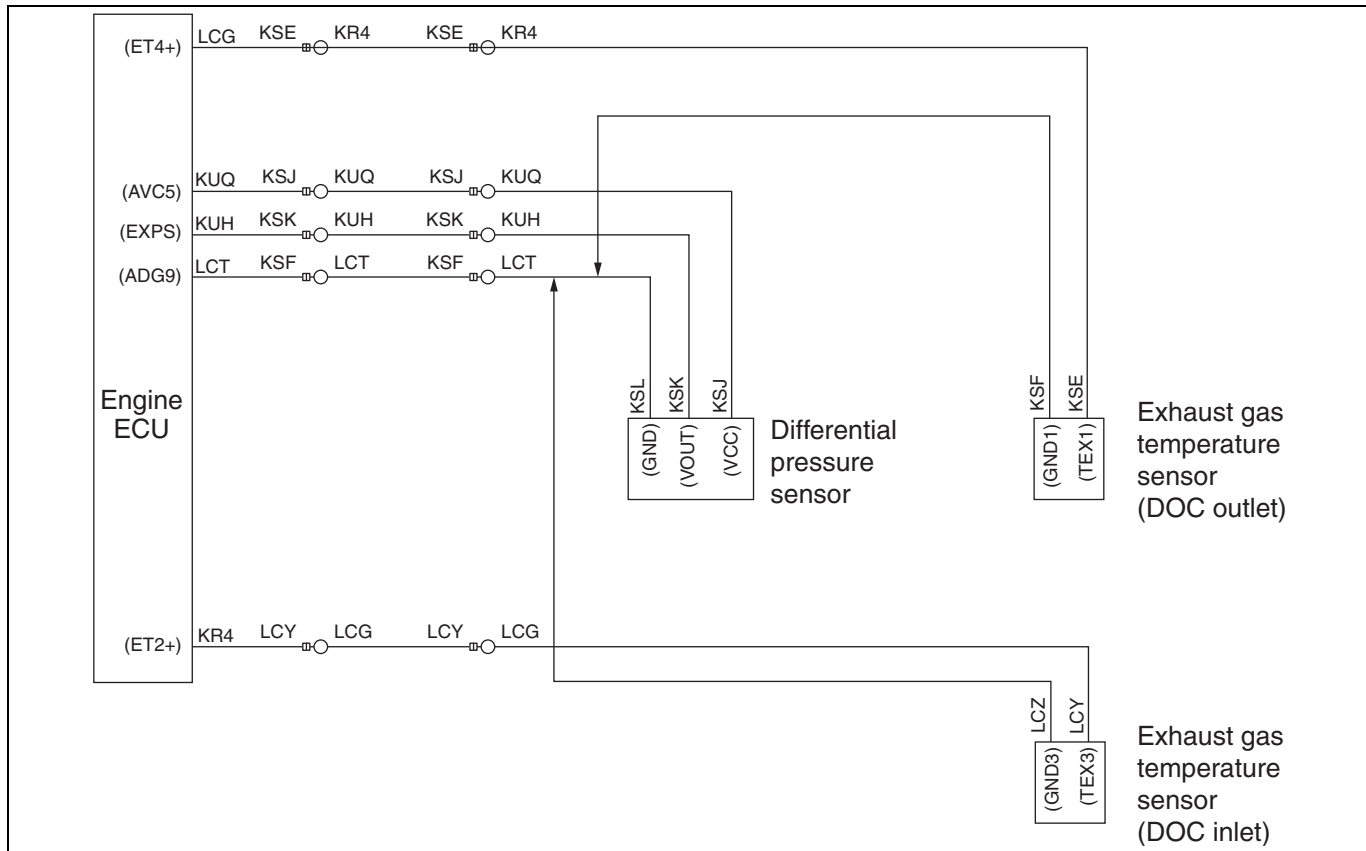
Has DTC P141F been detected?**YES****Go to DTC separate trouble diagnosis of the burner system (BCU).****NO****Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P141F

DTC: P141F		Burner system malfunction		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if P141F has been detected in [Engine].	DTC P141F has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to DTC separate trouble diagnosis of the burner system (BCU).	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P1426

EN01H16F01030F03001104

P1426: Differential pressure sensor - rationality
INFORMATION

SAPH16F010300654

1. Technical description

- It detects a difference between pressure at the inlet of the muffler and atmospheric pressure and monitors any failure or malfunction of the DPR.

<Description of malfunction>

- DPR differential pressure sensor is recognized as being stuck or in characteristics failure condition.

2. DTC set condition

(1) Check conditions

- Elapse of at least 2 seconds after engine stop
- No other DTCs are present.

(2) Judgement criteria

- Differential pressure remains less than -2 kPa {-0.3 psi} or higher than +2 kPa {+0.3 psi} for 2 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

-

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Loose/disconnected sensor and failure in sensing area (contamination or clogging)
- Abnormality in resistance of sensor
- Malfunction of engine ECU sensor power supply or internal circuit

INSPECTION PROCEDURE: P1426**1 Check the differential pressure hose and pipe**

1. Check if the differential pressure hose and pipe are cracked, bent, ruptured, or clogged.

Was any failure found?

YES

Clean or replace the differential pressure hose and pipe.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the differential pressure sensor connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the differential pressure sensor

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

Was any failure found?

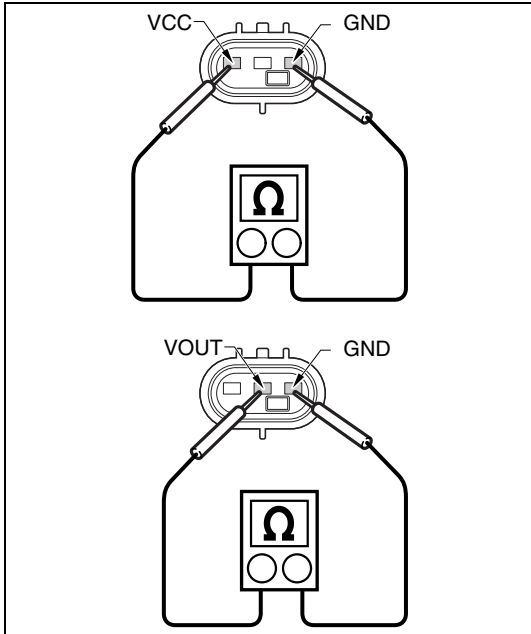
YES

Clean the differential pressure sensor and install it properly.
If damaged, replace the differential pressure sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the differential pressure sensor unit



SAPH16F010300655

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DPR differential pressure sensor connector.
3. Use the electrical tester to measure the resistance between the terminals of the differential pressure sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Differential pressure sensor VCC – GND VOUT – GND	2 – 15 kΩ

Do the measurements meet the standard value?

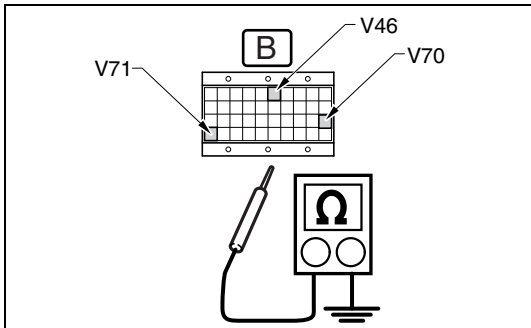
YES

NO

Go to step 5.

Replace the differential pressure sensor. Perform "After-inspection work" of INFORMATION section.

5 Inspect for short-circuit of the differential pressure sensor harness



SAPH16F010300656

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU vehicle-side harness. (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) AVC5(V71) – Ground EXPS(V70) – Ground AGD9(V46) – Ground	∞ Ω

Do the measurements meet the standard value?

YES

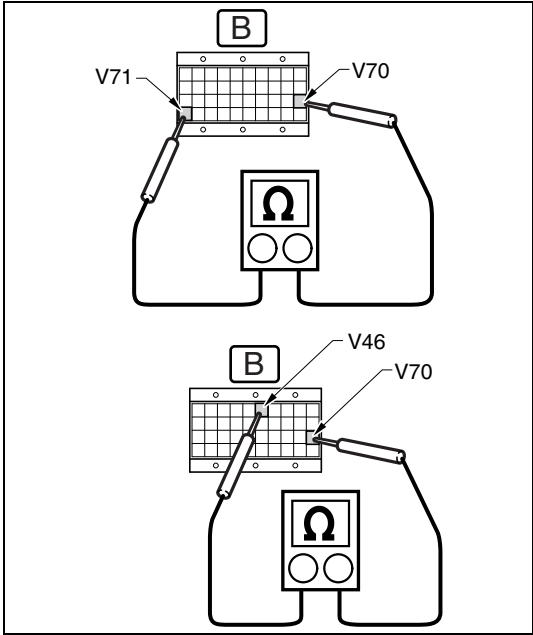
NO

Go to step 6.

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

6 Inspect disconnection of the differential pressure sensor harness

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



SAPH16F010300657

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) AVC5(V71) – EXPS(V70) AGD9(V46) – EXPS(V70)	2 – 15 kΩ

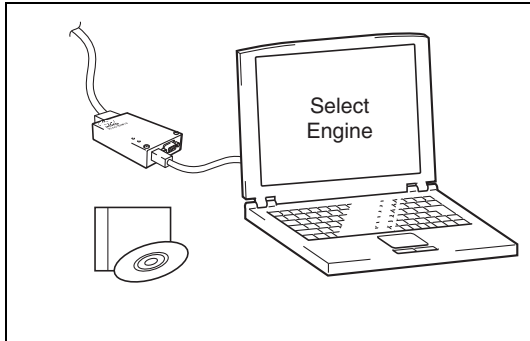
Do the measurements meet the standard value?

YES

NO

Go to step 7.

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

7 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300658

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if P1426 has been detected in [Fault Information].

Has DTC P1426 been detected?**YES**

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

NO

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

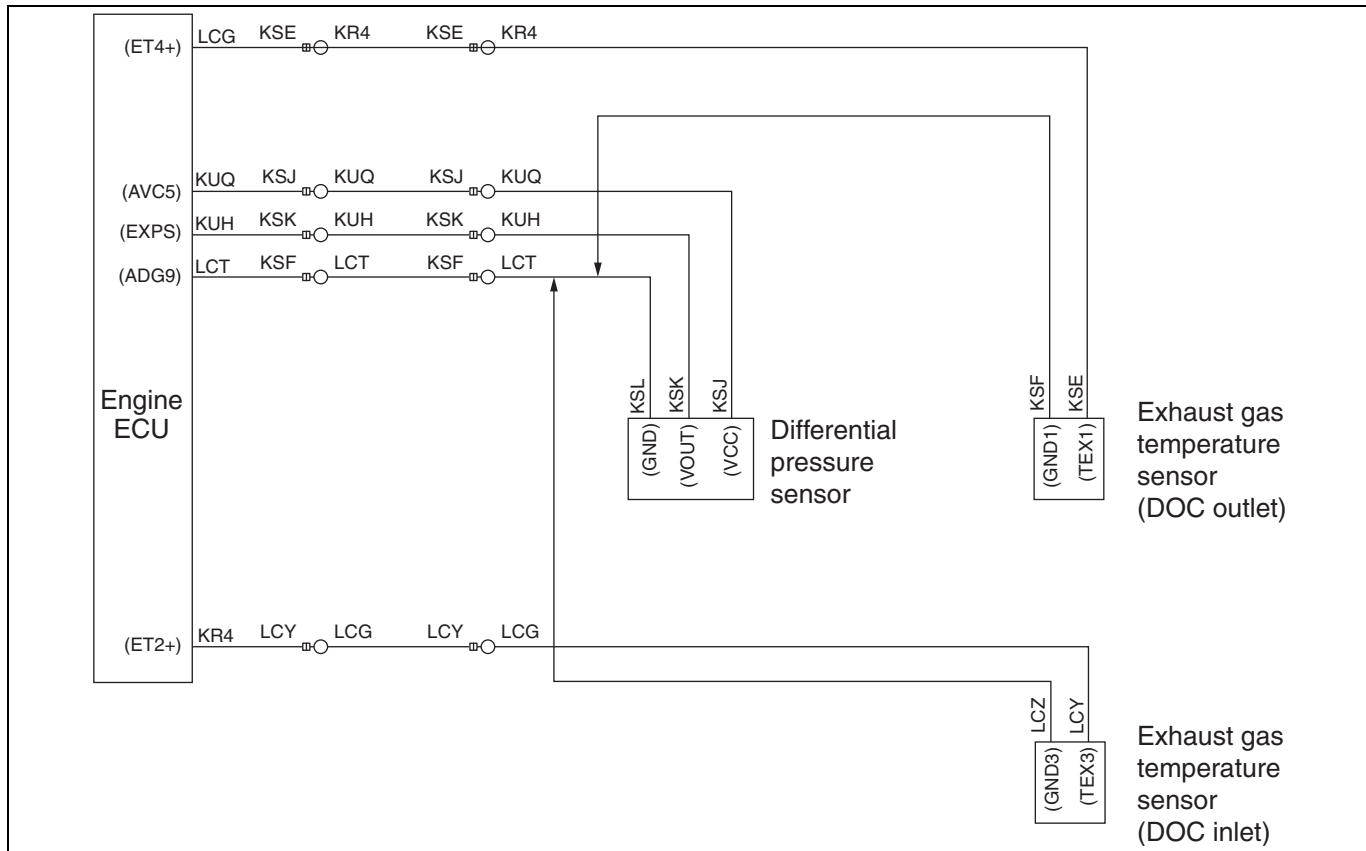
CHECKLIST: P1426

DTC: P1426		Differential pressure sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the differential pressure hose and pipe	Check if the differential pressure hose and pipe are cracked, bent, ruptured, or clogged.	Failure found: Go to YES. No failure found: Go to NO.		Clean or replace the differential pressure hose and pipe. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the differential pressure sensor connector	Check the connection of the differential pressure sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the differential pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the differential pressure sensor. 2. Make sure there is no dirt or damage to the differential pressure sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the differential pressure sensor and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the differential pressure sensor unit	Disconnect the DPR differential pressure sensor connector and measure the resistance between the terminals of the differential pressure sensor. <Tester connections> Differential pressure sensor VCC – GND VOUT – GND <Standard values> 2 – 15 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P1426		Differential pressure sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for short-circuit of the differential pressure sensor harness	<p>Connect the signal check harness to the engine ECU. (Do not connect harness to the ECU.) and measure the resistance between the terminals of the engine ECU (signal check harness) and ground.</p> <p><Tester connections> Engine ECU (signal check harness) AVC5(V71) – Ground EXPS(V70) – Ground AGD9(V46) – Ground</p> <p><Standard values> $\infty \Omega$</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the differential pressure sensor harness	<p>Connect the differential pressure sensor connector and measure the resistance between the terminals of the engine ECU (signal check harness).</p> <p><Tester connections> Engine ECU (signal check harness) AVC5(V71) – EXPS(V70) AGD9(V46) – EXPS(V70)</p> <p><Standard values> 2 – 15 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected. (Engine ECU) [Hino-DX]	<ol style="list-style-type: none"> 1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more) 2. Check if P1426 has been detected in [Engine]. 	<p>DTC P1426 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P1427

EN01H16F01030F03001105

P1427: Differential pressure sensor - out of range (Out of range low)**INFORMATION**

SAPH16F010300659

1. Technical description

- It detects a difference between pressure at the inlet of the muffler and atmospheric pressure and monitors any failure or malfunction of the DPR.

<Description of malfunction>

- Exhaust pressure cannot be correctly recognized.
- Possible DPR differential pressure sensor failure, harness disconnection, or GND short-circuit

2. DTC set condition**(1) Check conditions**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.

The conditions described above remain for 5 seconds or longer.

(2) Judgement criteria

- Output of the sensor remains less than 0.5 V (-6.41 kPa {-0.93 psi}) for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Abnormal resistance of sensor
- Harness disconnection or short-circuit
- Looseness or poor contact of connector.
- Malfunction of engine ECU sensor power supply or internal circuit.

INSPECTION PROCEDURE: P1427**1 Inspect the differential pressure sensor connector**

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

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

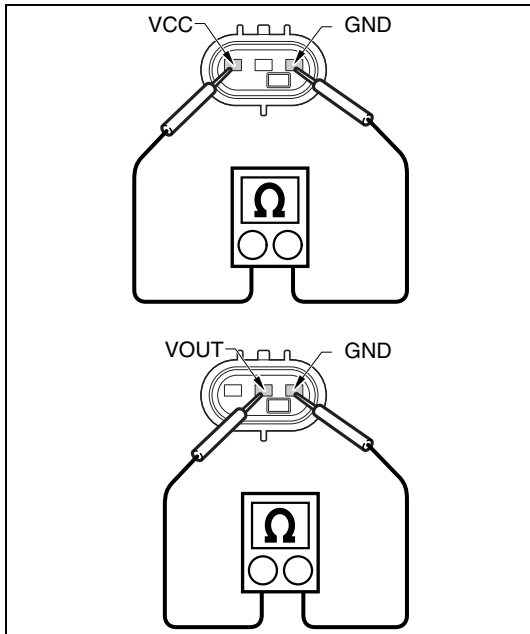
NO**Go to step 2.****2 Inspect the differential pressure sensor**

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

Was any failure found?**YES**

**Clean the differential pressure sensor and install it properly.
If damaged, replace the differential pressure sensor.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 3.**

3 Inspect the differential pressure sensor unit

SAPH16F010300660

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DPR differential pressure sensor connector.
3. Use the electrical tester to measure the resistance between the terminals of the differential pressure sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Differential pressure sensor VCC – GND VOUT – GND	2 – 15 k Ω

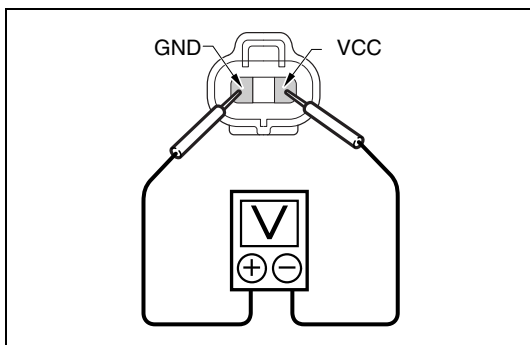
Do the measurements meet the standard value?

YES

NO

Go to step 4.

Replace the differential pressure sensor.
Perform "After-inspection work" of INFORMATION section.

4 Inspect the power supply of the differential pressure sensor

SAPH16F010300661

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

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

Do the measurements meet the standard value?

YES

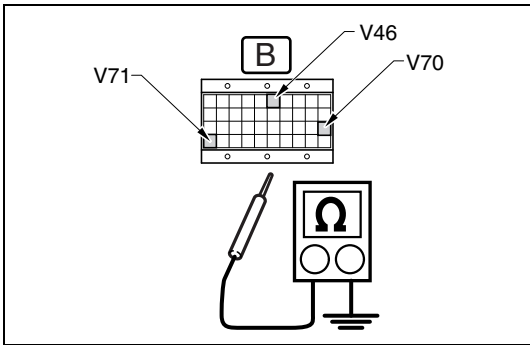
NO

Go to step 5.

Go to step 7.

5 Inspect for short-circuit of the differential pressure sensor harness

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU vehicle-side harness. (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.



SAPH16F010300662

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) AVC5(V71) – Ground EXPS(V70) – Ground ADG9(V46) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

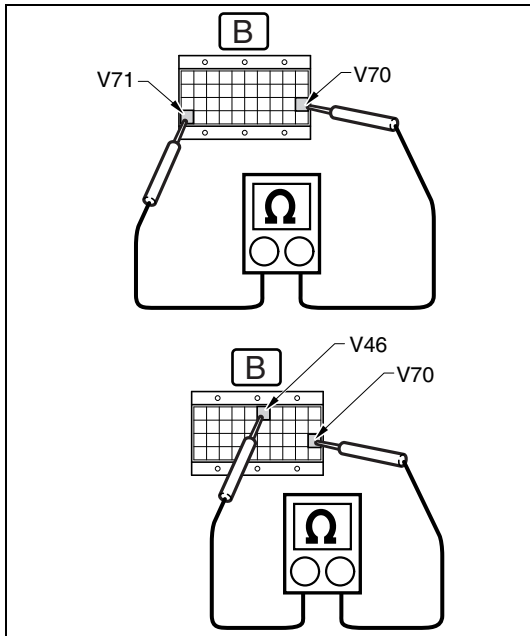
YES

Go to step 6.

NO

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

6 Inspect disconnection of the differential pressure sensor harness



SAPH16F010300663

1. Connect the differential pressure sensor 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) AVC5(V71) – EXPS(V70) ADG9(V46) – EXPS(V70)	2 – 15 kΩ

Do the measurements meet the standard value?

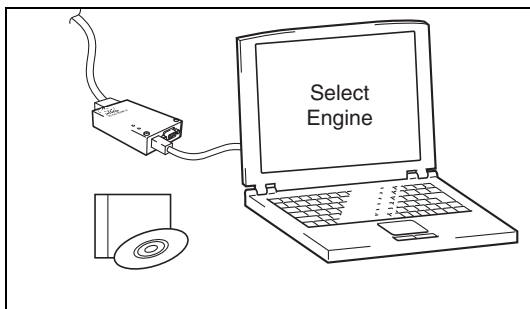
YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300664

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if P1427 have been detected in [Fault Information].

Has DTC P1427 been detected?

YES

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

NO

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

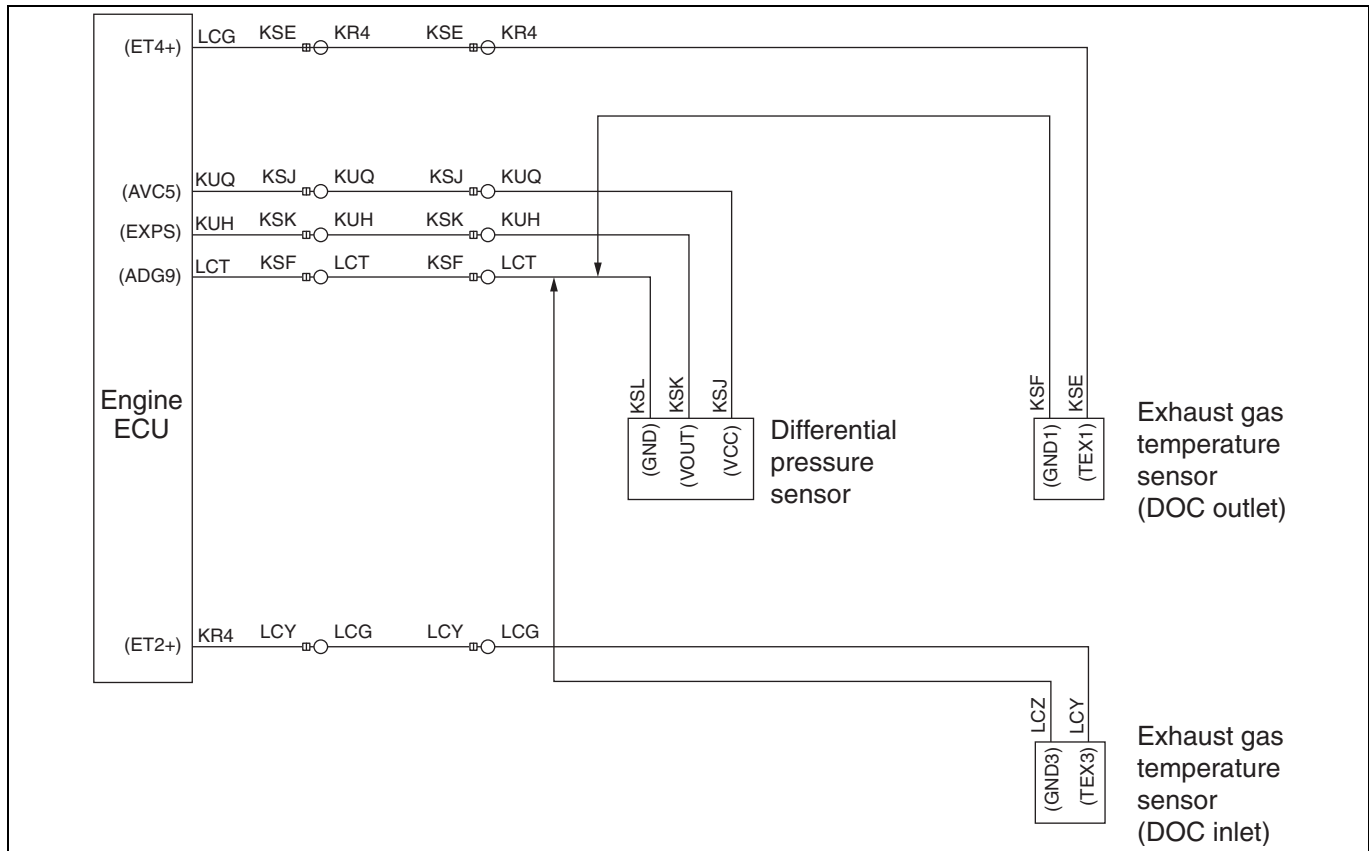
CHECKLIST: P1427

DTC: P1427		Differential pressure sensor - out of range (Out of range low)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the differential pressure sensor connector	Check the connection of the differential pressure sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the differential pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the differential pressure sensor. 2. Make sure there is no dirt or damage to the differential pressure sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the differential pressure sensor and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the differential pressure sensor unit	Measure the resistance between the terminals of the differential pressure sensor. <Tester connections> Differential pressure sensor VCC – GND VOUT – GND <Standard values> 2 – 15 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
4	Inspect the power supply of the differential pressure sensor	Measure the voltage between the terminals of the differential pressure sensor vehicle-side connector. <Tester connections> Differential pressure sensor vehicle-side connector VCC – GND <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Go to step 7.

DTC: P1427		Differential pressure sensor - out of range (Out of range low)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for short-circuit in wire harness of common rail pressure sensor	Connect the signal check harness, and measure the resistance between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) AVC5(V71) – Ground EXPS(V70) – Ground AGD9(V46) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the common rail pressure sensor harness	Connect the differential pressure sensor connector, and measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) AVC5(V71) – XPS(V70) ADG9(V46) – EXPS(V70) <Standard values> 2 – 15 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	Perform engine warm-up (engine coolant temperature: 60 °C {140 °F} or more), and check if P1427 has been detected in [Engine].	DTC P1427 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P1428

EN01H16F01030F03001106

P1428: Differential pressure sensor - out of range (Out of range high)
INFORMATION

SAPH16F010300665

1. Technical description

- It detects a difference between pressure at the inlet of the muffler and atmospheric pressure and monitors any failure or malfunction of the DPR.

<Description of malfunction>

- Exhaust pressure cannot be correctly recognized.
- Possible DPR differential pressure sensor failure or harness +B short

2. DTC set condition**(1) Check conditions**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.

The conditions described above remain for 5 seconds or longer.

(2) Judgement criteria

- Output of the sensor remains greater than 4.46 V (95.1 kPa {13.8 psi}) for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Abnormal resistance of sensor
- Harness disconnection or short-circuit
- Looseness or poor contact of connector.
- Malfunction of engine ECU sensor power supply or internal circuit

INSPECTION PROCEDURE: P1428**1 Inspect the differential pressure sensor connector**

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the differential pressure sensor

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

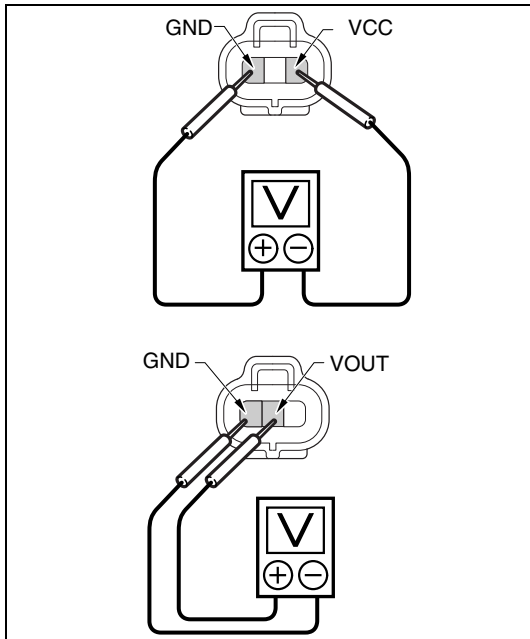
Was any failure found?

YES

Clean the differential pressure sensor and install it properly.
If damaged, replace the differential pressure sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the differential pressure sensor power supply

SAPH16F010300666

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

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

Do the measurements meet the standard value?

YES

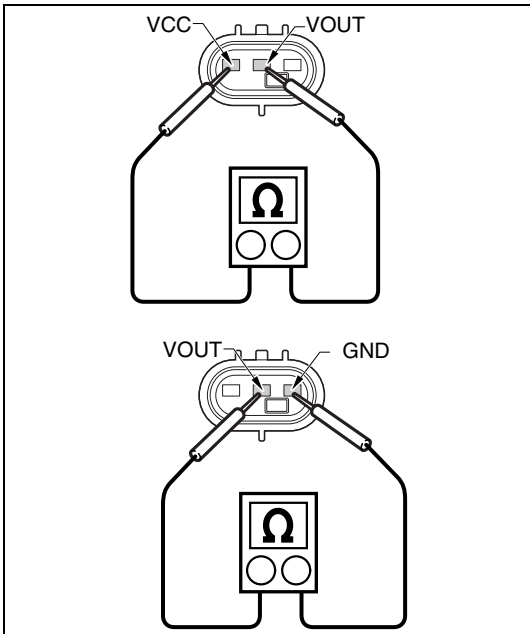
NO

Go to step 7.

Go to step 4.

4 Inspect the differential pressure sensor unit

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



SAPH16F010300667

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Differential pressure sensor connector VCC – VOUT VOUT – GND	2 – 15 kΩ

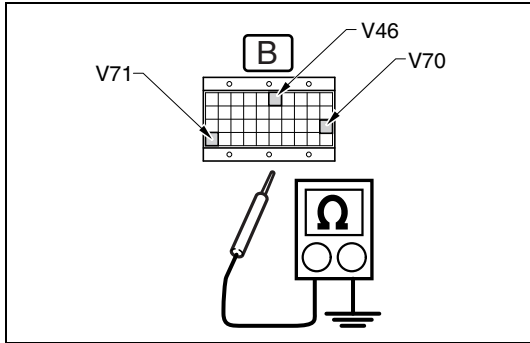
Do the measurements meet the standard value?

YES

NO

Go to step 5.

Replace the differential pressure sensor. Perform "After-inspection work" of INFORMATION section.

5 Inspect for short-circuit of the differential pressure sensor harness


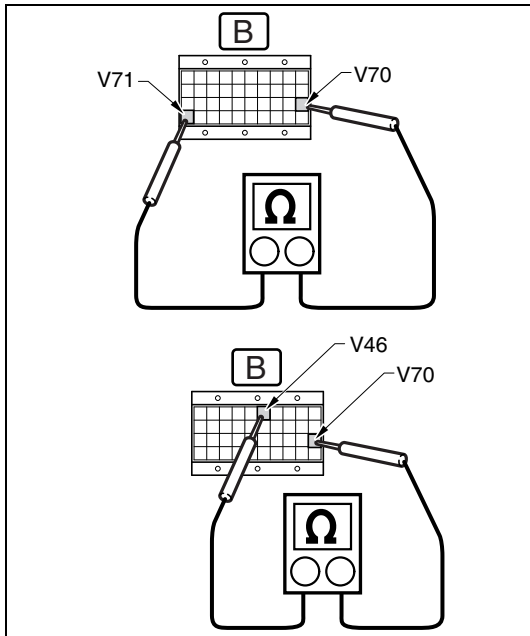
SAPH16F010300668

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU vehicle-side harness. (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) AVC5(V71) – Ground EXPS(V70) – Ground AGD9(V46) – Ground	$\infty \Omega$

Do the measurements meet the standard value?
YES
Go to step 6.
NO
**Repair or replace the harness.
Perform "After-inspection work" of INFORMATION section.**

6 Inspect disconnection of the differential pressure sensor harness



SAPH16F010300669

1. Connect the differential pressure sensor 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) AVC5(V71) – EXPS(V70) AGD9(V46) – EXPS(V70)	2 – 15 kΩ

Do the measurements meet the standard value?

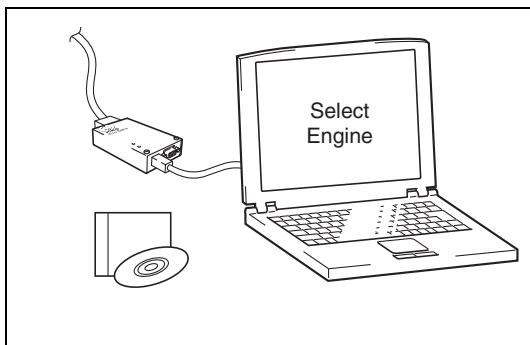
YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300670

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if P1428 has been detected in [Fault Information].

Has DTC P1428 been detected?

YES

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

NO

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

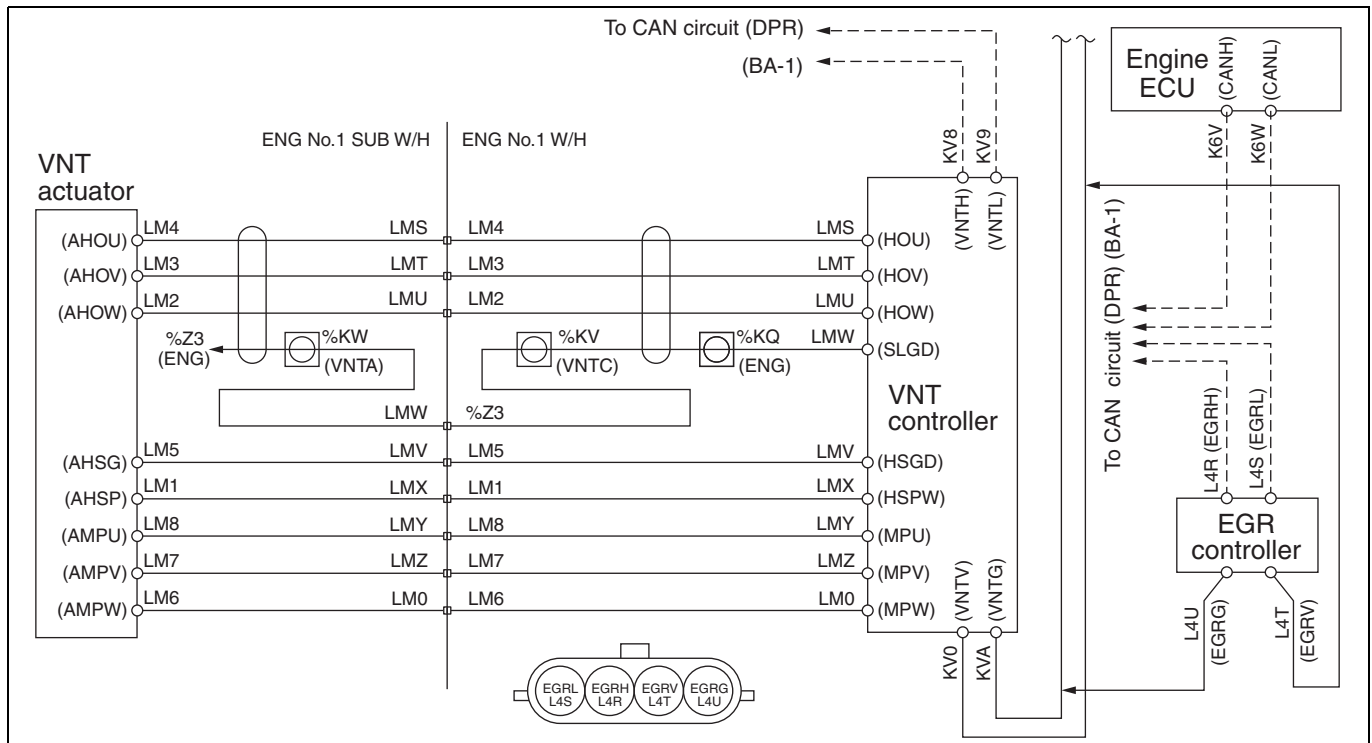
CHECKLIST: P1428

DTC: P1428		Differential pressure sensor - out of range (Out of range high)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the differential pressure sensor connector	Check the connection of the differential pressure sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the differential pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the differential pressure sensor. 2. Make sure there is no dirt or damage to the differential pressure sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the differential pressure sensor and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect of the differential pressure power supply	Measure the voltage between the terminals of the differential pressure sensor vehicle-side connector. <Tester connections> Differential sensor vehicle-side connector. VCC – GND VOUT – GND <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 4.
4	Inspect the differential pressure sensor unit	Disconnect the differential pressure sensor connector and measure the resistance between the terminals of the sensor. <Tester connections> DPR differential pressure sensor connector VCC – VOUT VOUT – GND <Standard values> 2 – 15 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P1428		Differential pressure sensor - out of range (Out of range high)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for short-circuit of the differential pressure sensor harness	Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect harness to the ECU.) and measure the resistance between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) AVC5(V71) – Ground EXPS(V70) – Ground AGD9(V46) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the differential pressure sensor harness	Connect the differential pressure sensor connector and measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) AVC5(V71) – EXPS(V70) AGD9(V46) – EXPS(V70) <Standard values> 2 – 15 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more) 2. Check if P1428 have been detected in [Engine].	DTC P1428 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P1458

EN01H16F01030F03001107

P1458: Valve position control failure - DC motor out of range, functional (EGR actuator over temp warning level)**INFORMATION**

SAPH16F010300671

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 } $^{\circ}\text{F}$).
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed)

(2) Judgement criteria

- Actual actuator temperature is 165 $^{\circ}\text{C}$ {329 } $^{\circ}\text{F}$, and this condition continues for 0.6 sec.

3. Reset condition

- Normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

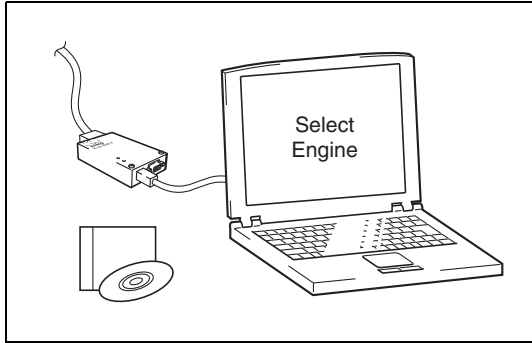
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Abnormal engine room interior temperature
- Abnormal heat rise in motor or element inside EGR actuator.
- Soot adhesion and damage due to hard foreign substances on EGR valve sealing face and gas passageway.
(Hardened carbon may peel off from EGR cooler upstream of EGR valve.)

INSPECTION PROCEDURE: P1458**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300672

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P1458 have been detected in [Fault Information].

Has a DTC other than P1458 been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 2.****2 Inspect the EGR valve**

1. Check the valve sealing face and gas passageway for soot accumulation and damage due to foreign substances.
2. Check if there is soot obstructing the exhaust gas passageway inlet or outlet.

Was any failure found?**YES**

**Remove foreign substances and clean the EGR valve.
Replace the EGR valve if it is damaged.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 3.**

3 Inspect the EGR valve connector

1. Check the connection of the EGR valve connector (Looseness and poor contact).

Was any failure found?

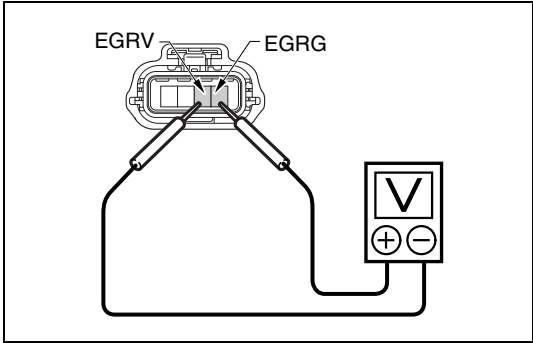
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 4.

4 Inspect the EGR power supply



SAPH16F010300673

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?

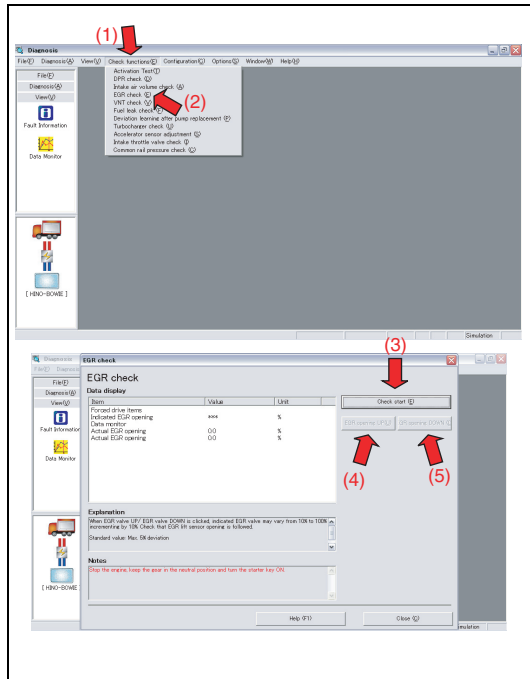
YES

NO

Go to step 5.

Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

5 Inspect the response delay of the EGR valve [Hino-DX]



SAPH16F010300674

1. Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.

⚠ CAUTION

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

<Inspection procedure>

(1) Select [Check functions].

(2) Select [EGR check].

(3) Click [Check start].

(4) Select [EGR opening UP]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %.

(5) Select [EGR opening DOWN]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %.

HINT

- The EGR opening position changes of around 10 % per step between 0 – 100 %.

Standard values

From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.

Do the measurements meet the standard value?

YES

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

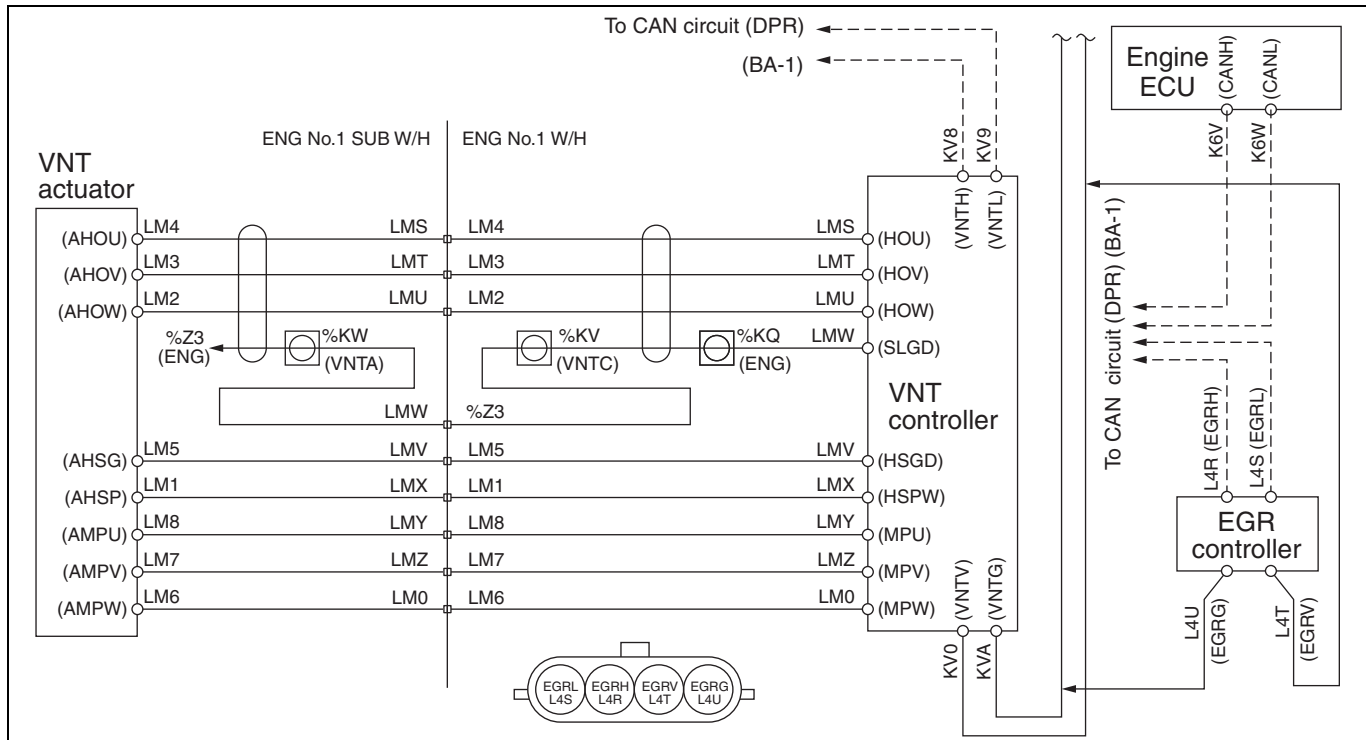
NO

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

CHECKLIST: P1458

DTC: P1458		Valve position control failure - DC motor out of range, functional (EGR actuator over temp warning level)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P1458 has been detected in [Engine].	DTC other than P1458 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve	<ol style="list-style-type: none"> Check the valve sealing face and gas passageway for soot accumulation and damage due to foreign substances. Check if there is soot obstructing the exhaust gas passageway inlet or outlet. 	Failure found: Go to YES. No failure found: Go to NO.		Remove foreign substances and clean the valve. Replace the EGR valve if it is damaged. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the EGR power supply	Disconnect the EGR valve connector, and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

DTC: P1458		Valve position control failure - DC motor out of range, functional (EGR actuator over temp warning level)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the response delay of the EGR valve [Hino-DX]	<p>Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.</p> <p>⚠ CAUTION Perform the inspection while the engine is stopped to avoid damages.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [EGR check]. (3) Click [Check start]. (4) Select [EGR opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %. <p>(5) Select [EGR opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %. <p>HINT The EGR opening position changes of around 10 % per step between 0 – 100 %.</p> <p><Standard values> From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Replace the EGR valve. Perform "After-inspection work" of INFORMATION section.

DTC: P1459**P1459: Controller high temperature (EGR actuator over temp severe level)****INFORMATION**

SAPH16F010300675

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 } $^{\circ}\text{F}$).
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed)

(2) Judgement criteria

- Actual actuator temperature is $150\text{ }^{\circ}\text{C}$ {302 } $^{\circ}\text{F}$ or greater and under $165\text{ }^{\circ}\text{C}$ {329 } $^{\circ}\text{F}$, and this condition continues for 0.6 sec.

3. Reset condition

- Normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

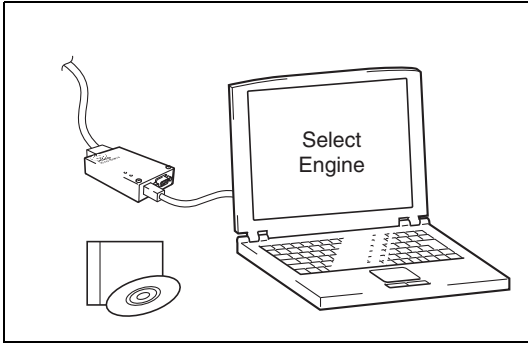
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Abnormal engine room interior temperature.
- Abnormal heat rise in motor or element inside EGR actuator.
- Soot adhesion and damage due to hard foreign substances on EGR valve sealing face and gas passageway (Hardened carbon may peel off from EGR cooler upstream of EGR valve.)

INSPECTION PROCEDURE: P1459**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300676

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P1459 has been detected in [Fault Information].

Has a DTC other than P1459 been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 2.****2 Inspect the EGR valve**

1. Check the valve sealing face and gas passageway for soot accumulation and damage due to foreign substances.
2. Check if there is soot obstructing the exhaust gas passageway inlet or outlet.

Was any failure found?**YES**

**Remove foreign substances and clean the EGR valve.
Replace the EGR valve if it is damaged.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 3.**

3 Inspect the EGR valve connector

1. Check the connection of the EGR valve connector (Looseness and poor contact).

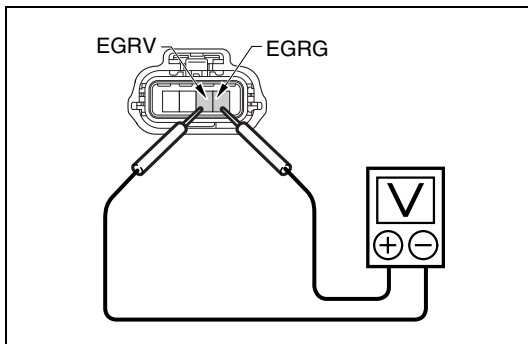
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Check the EGR valve power supply

SAPH16F010300677

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?

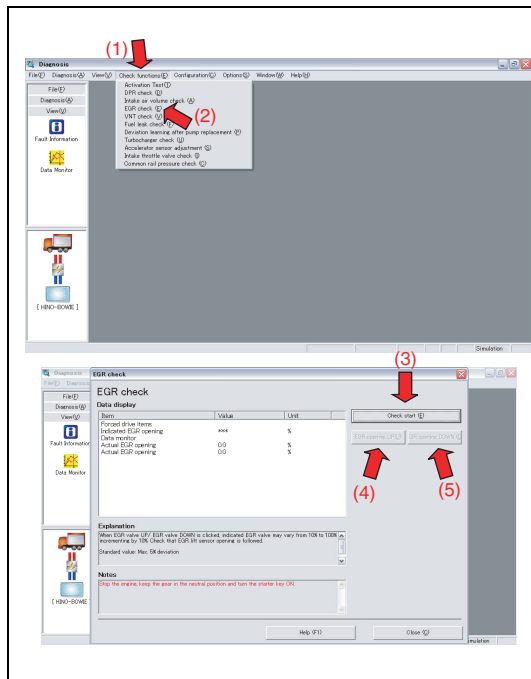
YES

Go to step 5.

NO

Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed.
Perform "After-inspection work" of INFORMATION section.

5 Inspect the response delay of the EGR valve [Hino-DX]



1. Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.

CAUTION

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

<Inspection procedure>

(1) Select [Check functions].

(2) Select [EGR check].

(3) Click [Check start].

(4) Select [EGR opening UP]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %.

(5) Select [EGR opening DOWN]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %.

HINT

- The EGR opening position changes of around 10 % per step between 0 – 100 %.

Standard values

From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.

Do the measurements meet the standard value?

YES

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

NO

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

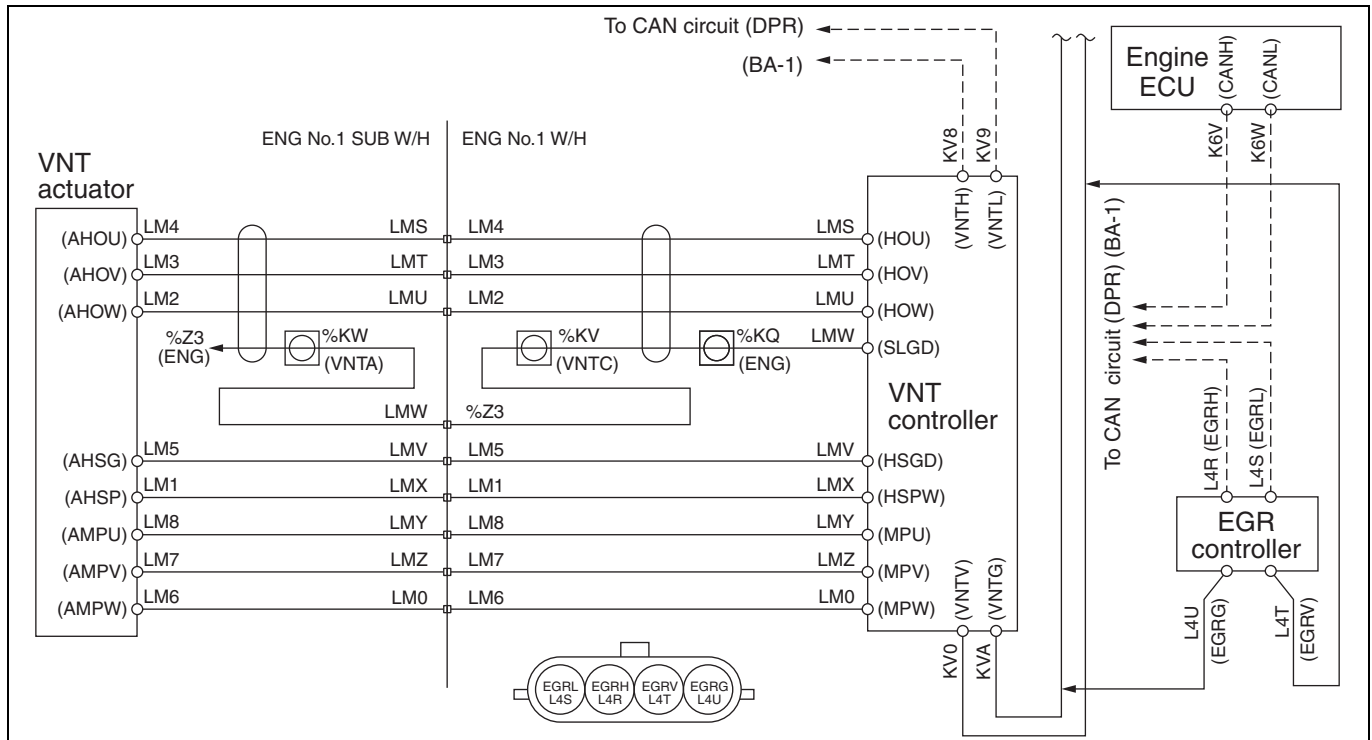
CHECKLIST: P1459

DTC: P1459		Controller high temperature (EGR actuator over temp severe level)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P1459 has been detected in [Engine].	DTC other than P1459 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve	<ol style="list-style-type: none"> 1. Check the valve sealing face and gas passageway for soot accumulation and damage due to foreign substances. 2. Check if there is soot obstructing the exhaust gas passageway inlet or outlet. 	Failure found: Go to YES. No failure found: Go to NO.		Remove foreign substances and clean the valve. Replace the EGR valve if it is damaged. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Check the EGR valve power supply	Disconnect the EGR valve connector, and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGR valve vehicle-side connector EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

DTC: P1459		Controller high temperature (EGR actuator over temp severe level)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the response delay of the EGR valve [Hino-DX]	<p>Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.</p> <p>⚠ CAUTION Perform the inspection while the engine is stopped to avoid damages.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [EGR check]. (3) Click [Check start]. (4) Select [EGR opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %. <p>(5) Select [EGR opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %. <p>HINT The EGR opening position changes of around 10 % per step between 0 – 100 %.</p> <p><Standard values> From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Replace the EGR valve. Perform "After-inspection work" of INFORMATION section.

DTC: P14B0

EN01H16F01030F03001109

P14B0: Controller store data error (EGR actuator abnormal information reading)
INFORMATION

SAPH16F010300679

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 °F})
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When data stored in actuator cannot be correctly read.

3. Reset condition

- When power is supplied again and judgment criteria are resolved.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

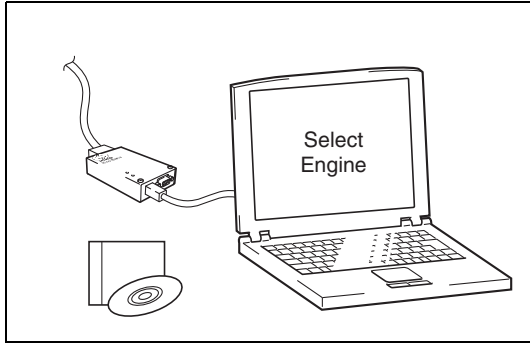
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Damaged element inside EGR valve actuator

INSPECTION PROCEDURE: P14B0**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300680

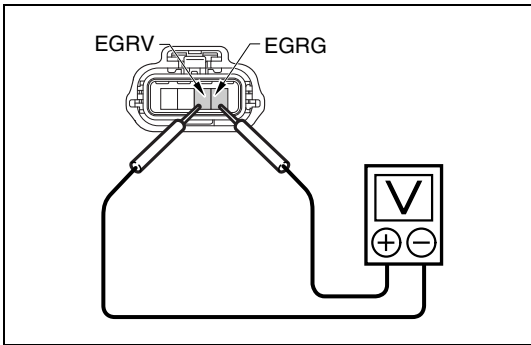
1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P14B0 have been detected in [Fault Information].

Has a DTC other than P14B0 been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 2.****2 Inspect the EGR valve connector**

1. Check the connection of the EGR valve connector (Looseness and poor contact).

Was any failure found?**YES****Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.****NO****Go to step 3.**

3 Inspect the EGR valve power supply



1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?

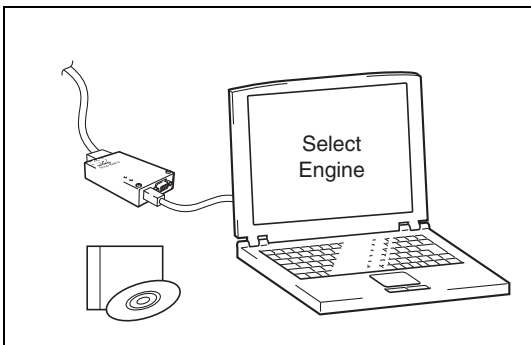
YES

Replace the EGR valve, go to step 4.

NO

Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

4 Check the DTC detected 2 (Engine ECU) [Hino-DX]



1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P14B0 have been detected in [Fault Information].

Has DTC P14B0 been detected?

YES

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

NO

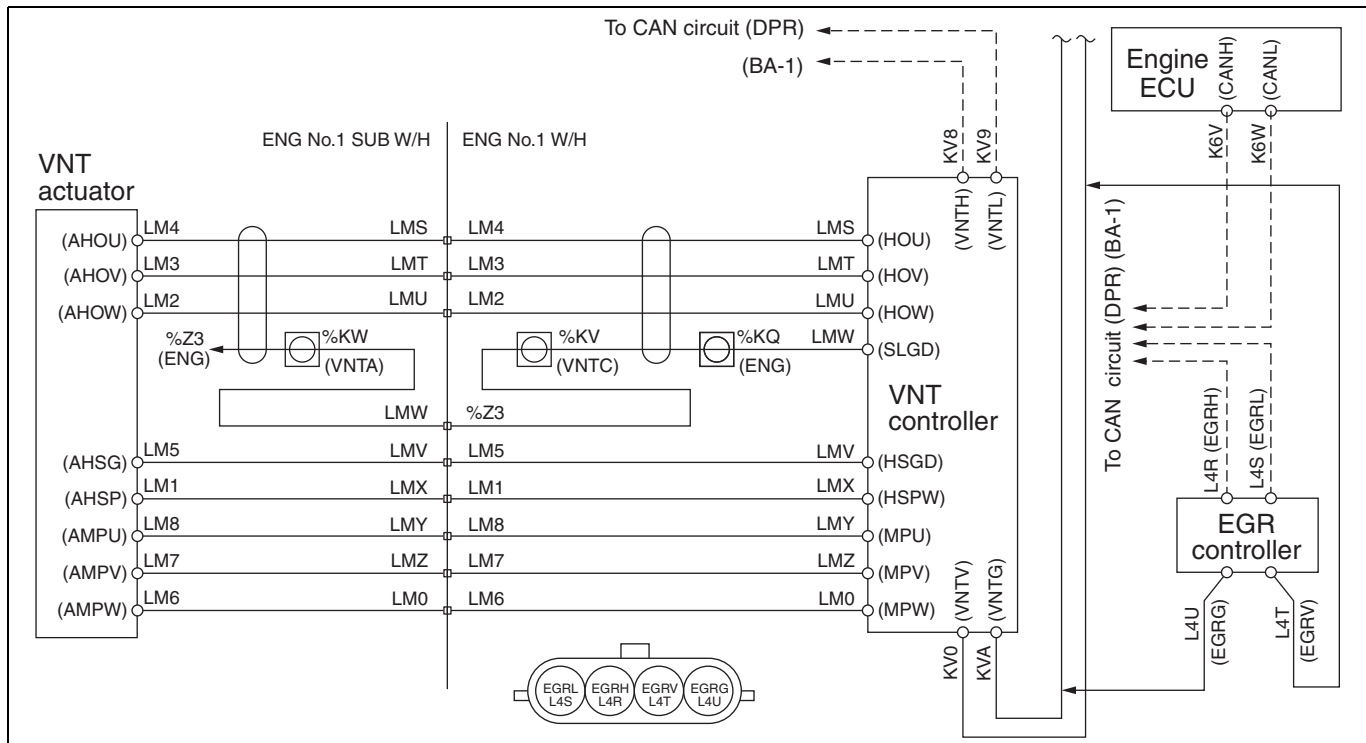
Procedure completed. Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P14B0

DTC: P14B0		Controller store data error (EGR actuator abnormal information reading)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than P14B0 has been detected in [Engine].	DTC other than P14B0 has been detected: Go to YES. No DTC has been detected. Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR valve power supply	Disconnect the EGR valve connector and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the EGR valve, go to step 4.	Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if P14B0 has been detected in [Engine].	DTC P14B0 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P14B2

EN01H16F01030F03001110

P14B2: EGR controller power supply open circuit (EGR actuator power supply open circuit)**INFORMATION**

SAPH16F010300683

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 °F})
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When difference in power supply voltage input with 2 systems is at least 1 V, and this condition continues for 1 second.

3. Reset condition

- Normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF

- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.

<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

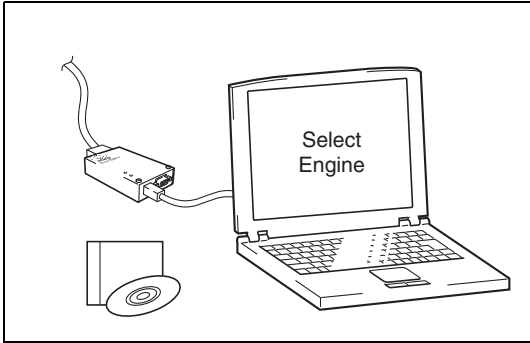
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Damaged substrate or element inside EGR valve actuator
- Abnormal battery voltage
- Faulty contact in EGR actuator connector
- Disconnection or short-circuit in sensor harness

INSPECTION PROCEDURE: P14B2

1 Check the DTC detected 1 (Engine ECU) [Hino-DX]



SAPH16F010300684

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P14B2 has been detected in [Fault Information].

Has a DTC other than P14B2 been detected?

YES

NO

Go to the diagnostic procedure of a related DTC.

Go to step 2.

2 Inspect the EGR valve connector

1. Check the connection of the EGR valve connector (Looseness and poor contact).

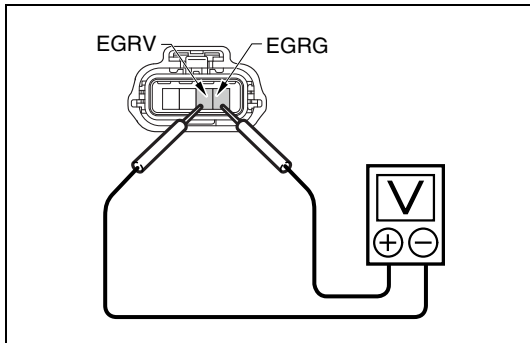
Was any failure found?

YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 3.

3 Inspect the EGR valve power supply

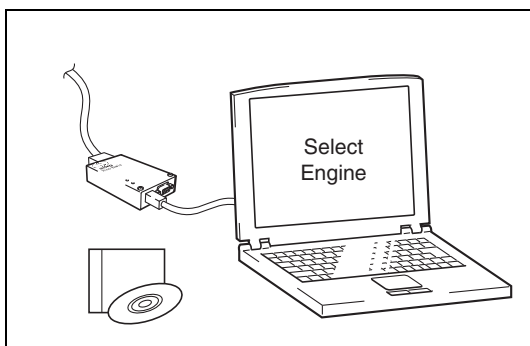
SAPH16F010300685

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?**YES****Replace the EGR valve, go to step 4.****NO**

Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

4 Check the DTC detected 2 (Engine ECU) [Hino-DX]

SAPH16F010300686

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P14B2 has been detected in [Fault Information].

Has DTC P14B2 been detected?**YES**

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

NO

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

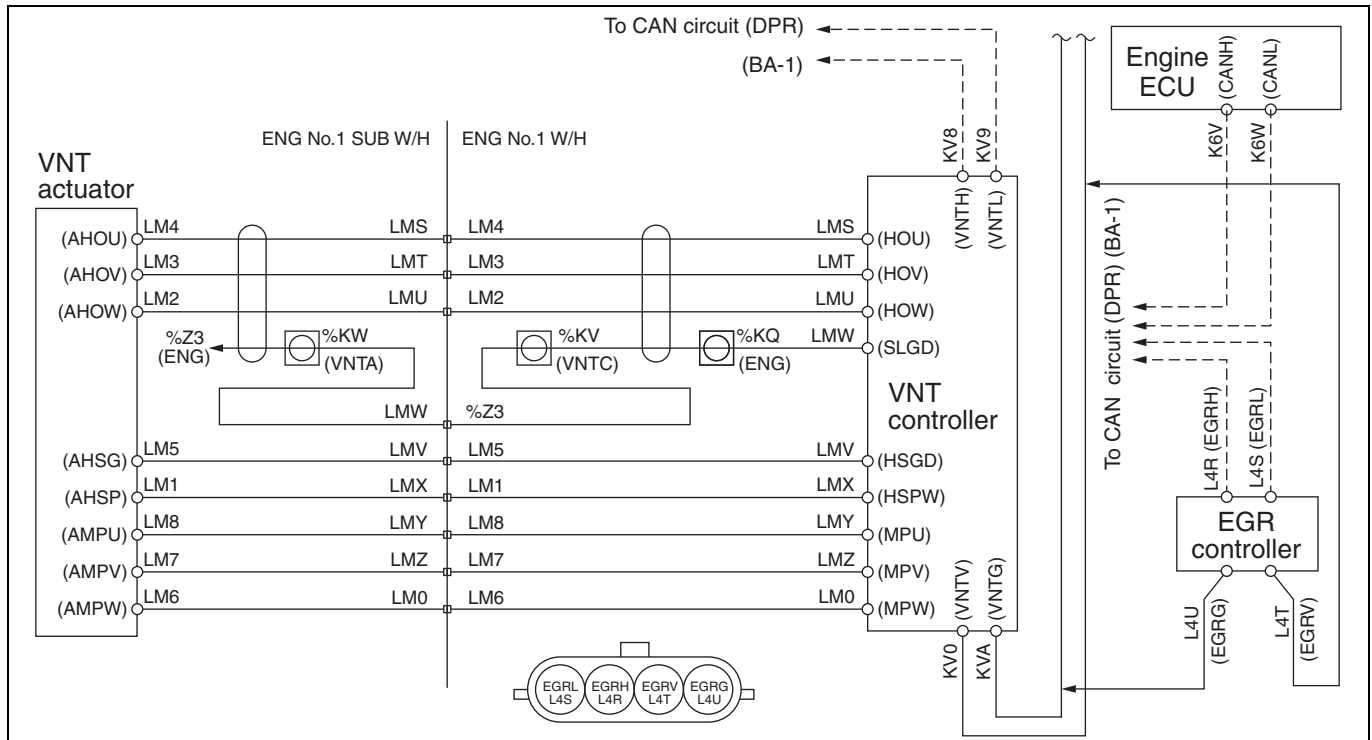
CHECKLIST: P14B2

DTC: P14B2		EGR controller power supply open circuit (EGR actuator power supply open circuit)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than P14B2 has been detected in [Engine].	DTC other than P14B2 has been detected: Go to YES. No DTC has been detected. Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR valve power supply	Disconnect the EGR valve connector and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGR valve vehicle-side connector EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the EGR valve, go to step 4.	Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if P14B2 has been detected in [Engine].	DTC P14B2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P14B3 and P14B4

EN01H16F01030F03001111

P14B3: Battery voltage (high) (EGR actuator power supply too high) INFORMATION



SAPH16F010300687

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 } $^{\circ}\text{F}$)
- Wiping operation from "fully open \rightarrow fully closed" is conducted as an EGR valve surface cleaning operation when the starter switch is LOCK.

<Description of malfunction>

- Failure message is received from EGR controller.

2. DTC set condition

(1) DTC detection condition

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When power supply voltage is 7 V or less, and this condition continues for 1 second.

3. Reset condition

- After restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

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

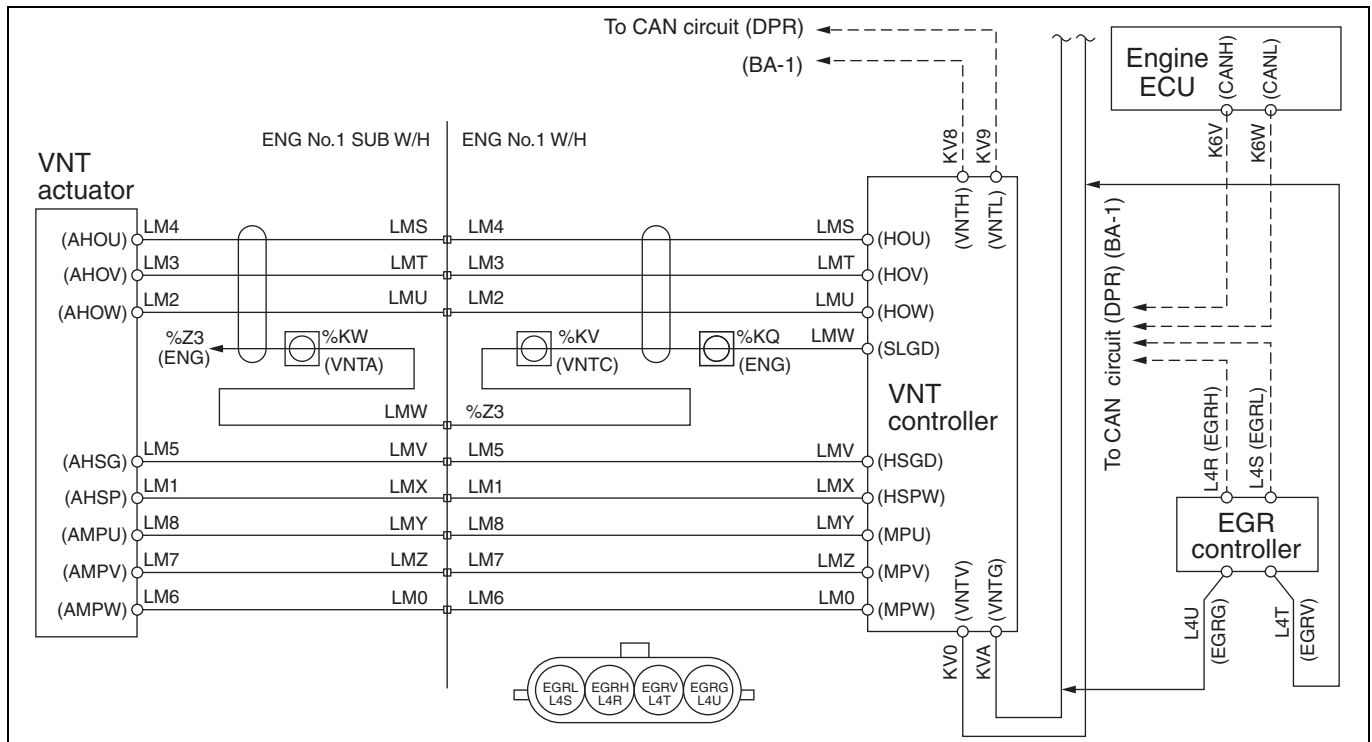
7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Abnormal battery voltage.
- Faulty contact in EGR actuator connector.
- Harness disconnection or short-circuit.

P14B4: Battery voltage (low) (EGR actuator power supply too low) INFORMATION



SAPH16F010300688

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 °F})
- Wiping operation from "fully open \rightarrow fully closed" is conducted as an EGR valve surface cleaning operation when the starter switch is LOCK.

<Description of malfunction>

- Failure message is received from EGR controller.

2. DTC set condition

(1) DTC detection condition

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When power supply voltage is 7 V or less, and this condition continues for 60 ms.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

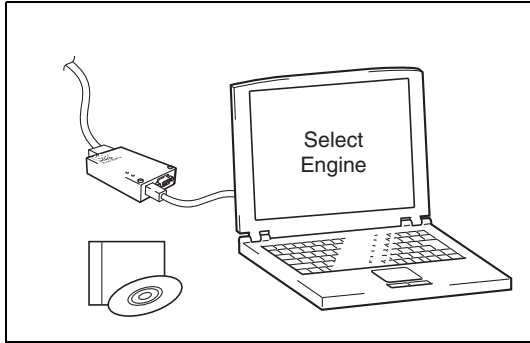
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Abnormal battery voltage.
- Faulty contact in EGR actuator connector.
- Disconnection or short-circuit in sensor harness.

INSPECTION PROCEDURE: P14B3 and P14B4**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300689

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than DTC (P14B3 or P14B4) has been detected in [Fault Information].

Has a DTC other than DTC (P14B3 or P14B4) been detected?

YES

Go to diagnosis procedure of a related DTC.

NO

Go to step 2.

2 Inspect the EGR valve connector

1. Check the connection of the EGR valve connector (Looseness and poor contact).

Was any failure found?

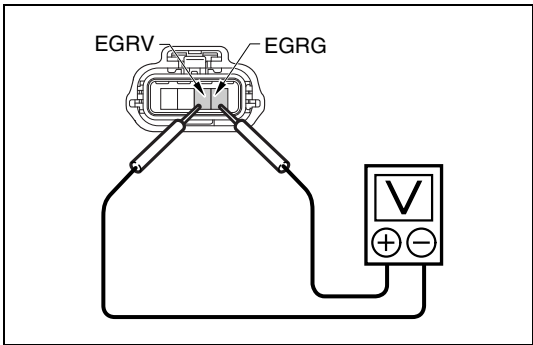
YES

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 3.

3 Inspect the EGR valve power supply



SAPH16F010300690

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?

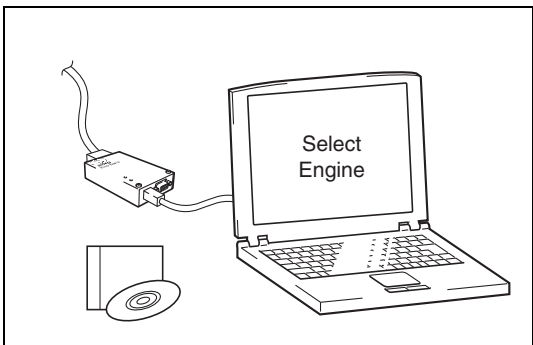
YES

Replace the EGR valve, and go to step 4.

NO

Check the wire harness (actuator power supply and ground). Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

4 Check the DTC detected 2 (Engine ECU) [Hino-DX]



SAPH16F010300691

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if the DTC (P14B3 or P14B4) has been detected in [Fault Information].

Has DTC (P14B3 or P14B4) been detected?

YES

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

NO

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

CHECKLIST: P14B3 and P14B4

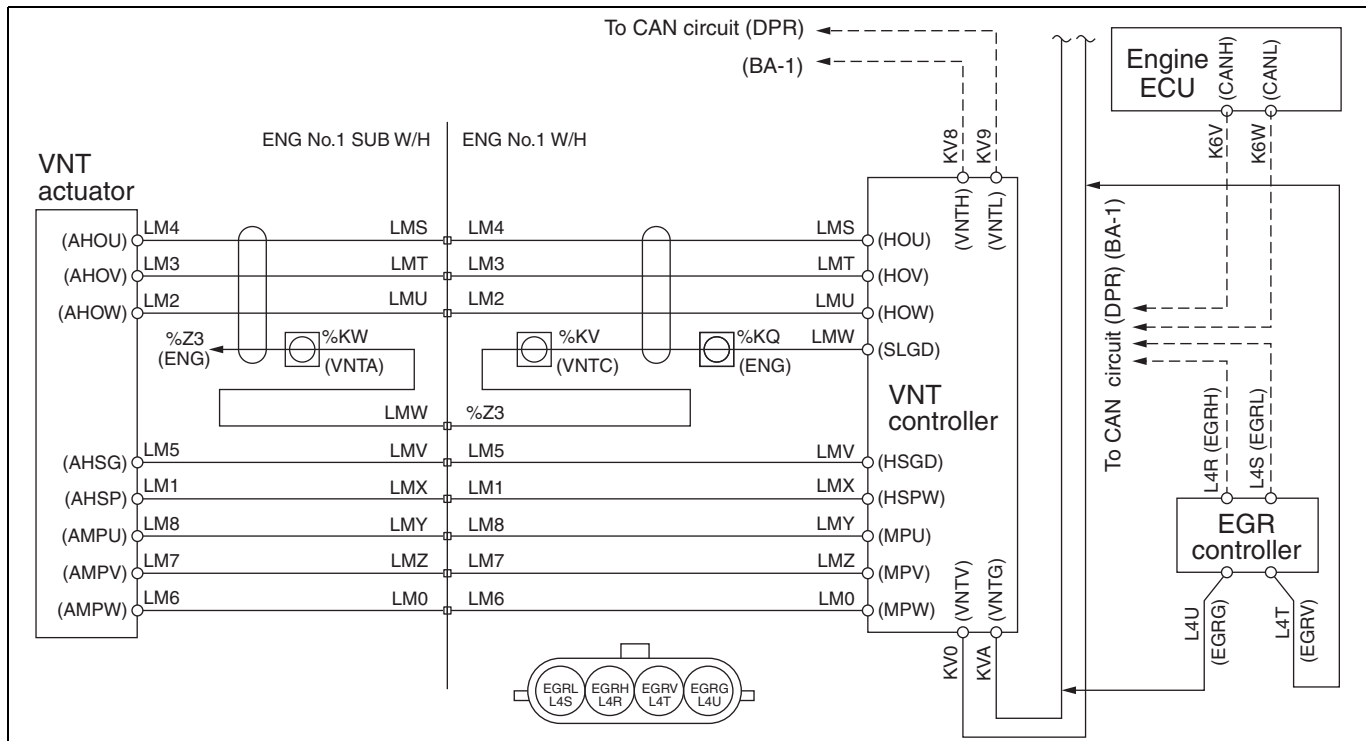
DTC: P14B3		Battery voltage (high) (EGR actuator power supply too high)		Inspection procedure		
DTC: P14B4		Battery voltage (low) (EGR actuator power supply too low)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than DTC (P14B3 or P14B4) has been detected in [Engine].	DTC other than DTC (P14B3 or P14B4) has been detected: Go to YES. No DTC has been detected. Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR valve power supply	Disconnect the EGR valve connector and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the EGR valve, and go to step 4.	Check the wire harness (actuator power supply and ground). Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if the DTC (P14B3 or P14B4) has been detected in [Engine].	DTC (P14B3 or P14B4) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P14B7 and P14B8

EN01H16F01030F03001112

P14B7: EGR valve controller temperature sensor 1 (Signal too low) (EGR actuator temp sensor 1 signal too low)

INFORMATION



SAPH16F010300692

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 °F})
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition

(1) DTC detection condition

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When temperature of temperature sensor 1 (FET side) inside actuator is $-50\text{ }^{\circ}\text{C}$ { $-58\text{ }^{\circ}\text{F}$ } or less, and this condition continues for 1 second.

3. Reset condition

- Normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF

- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.

<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

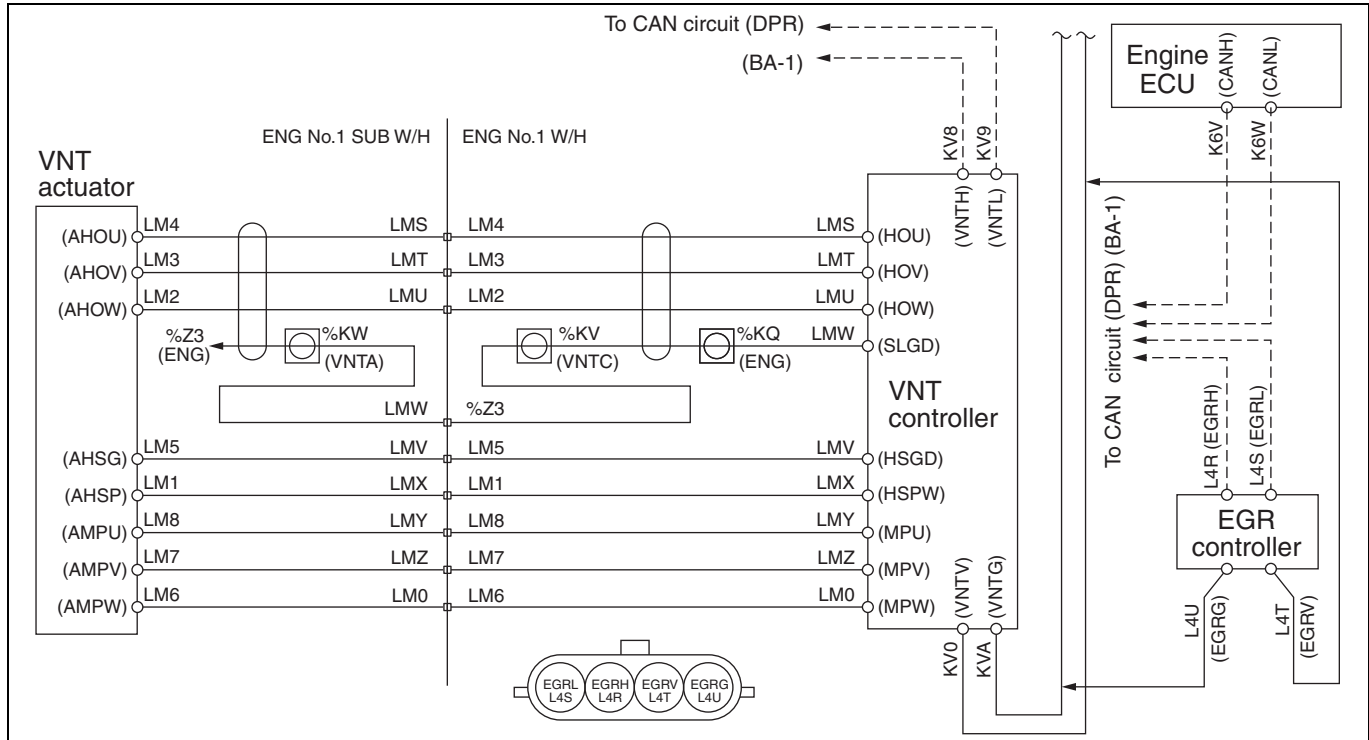
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Damaged element inside EGR valve actuator

P14B8: EGR valve controller temperature sensor 1 (Signal too high) (EGR actuator temp. sensor 1 signal too high)

INFORMATION



SAPH16F010300693

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 } $^{\circ}\text{F}$)
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition

(1) DTC detection condition

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When temperature of temperature sensor 1 (FET side) inside actuator is at least $200\text{ }^{\circ}\text{C}$ {392 } $^{\circ}\text{F}$, and this condition continues for 1 second.

3. Reset condition

- Normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

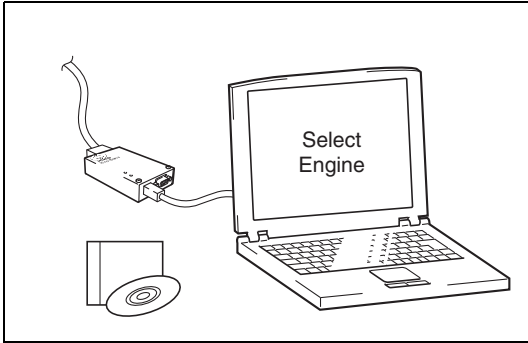
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Damaged element inside EGR valve actuator

INSPECTION PROCEDURE: P14B7 and P14B8**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300694

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than DTC (P14B7 or P14B8) has been detected in [Fault Information].

Has a DTC other than DTC (P14B7 or P14B8) been detected?

YES

Go to the diagnostic procedure of a related DTC.

NO

Go to step 2.

2 Inspect the EGR valve connector

1. Check the connection of the EGR valve connector (Looseness and poor contact).

Was any failure found?

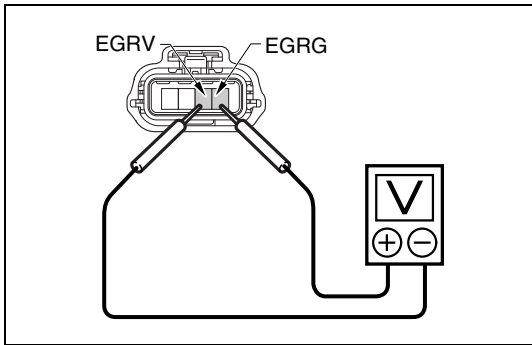
YES

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Check the EGR valve power supply



SAPH16F010300695

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?

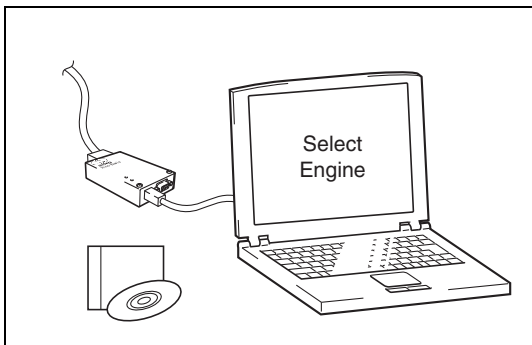
YES

Replace the EGR valve, go to step 4.

NO

Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

4 Check the DTC detected 2 (Engine ECU) [Hino-DX]



SAPH16F010300696

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if the DTC (P14B7 or P14B8) has been detected in [Fault Information].

Has DTC (P14B7 or P14B8) been detected?

YES

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

NO

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

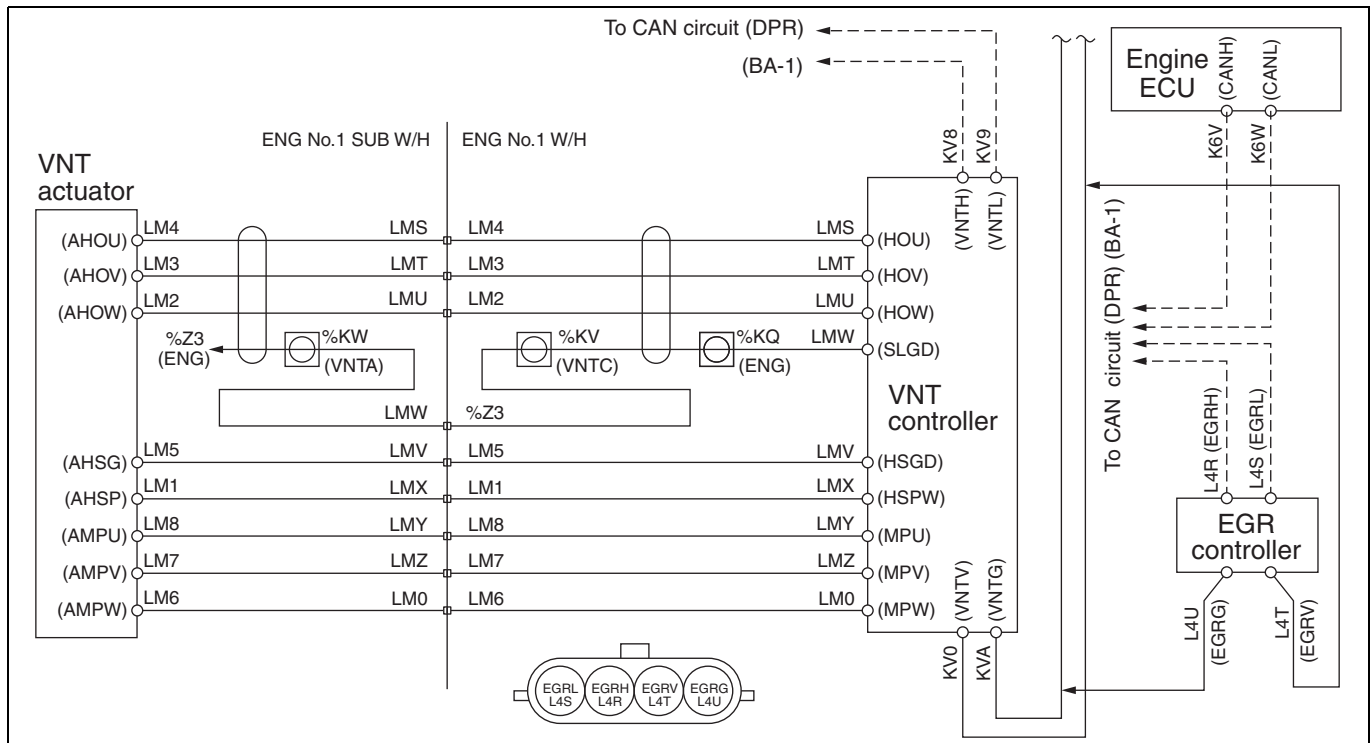
CHECKLIST: P14B7 and P14B8

DTC: P14B7		EGR valve controller temperature sensor 1 (Signal too low) (EGR actuator temp. sensor 1 signal too low)		Inspection procedure		
DTC: P14B8		EGR valve controller temperature sensor 1 (Signal too high) (EGR actuator temp. sensor 1 signal too high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than (P14B7 or P14B8) has been detected in [Engine].	DTC other than DTC (P14B7 or P14B8) has been detected: Go to YES. No DTC has been detected. Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Check the EGR valve power supply	Disconnect the EGR valve connector and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the EGR valve, go to step 4.	Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if the DTC (P14B7 or P14B8) has been detected in [Engine].	DTC (P14B7 or P14B8) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P14BC and P14BD

EN01H16F01030F03001113

P14BC: EGR valve controller temperature sensor 2 (Signal too low) (EGR actuator temp. sensor 2 signal too low) INFORMATION



SAPH16F010300697

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 } $^{\circ}\text{F}$)
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition

(1) DTC detection condition

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When temperature of temperature sensor 2 (CPU side) inside actuator is $-50\text{ }^{\circ}\text{C}$ {-58 } $^{\circ}\text{F}$ or less, and this condition continues for 1 second.

3. Reset condition

- Normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF

- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.

<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

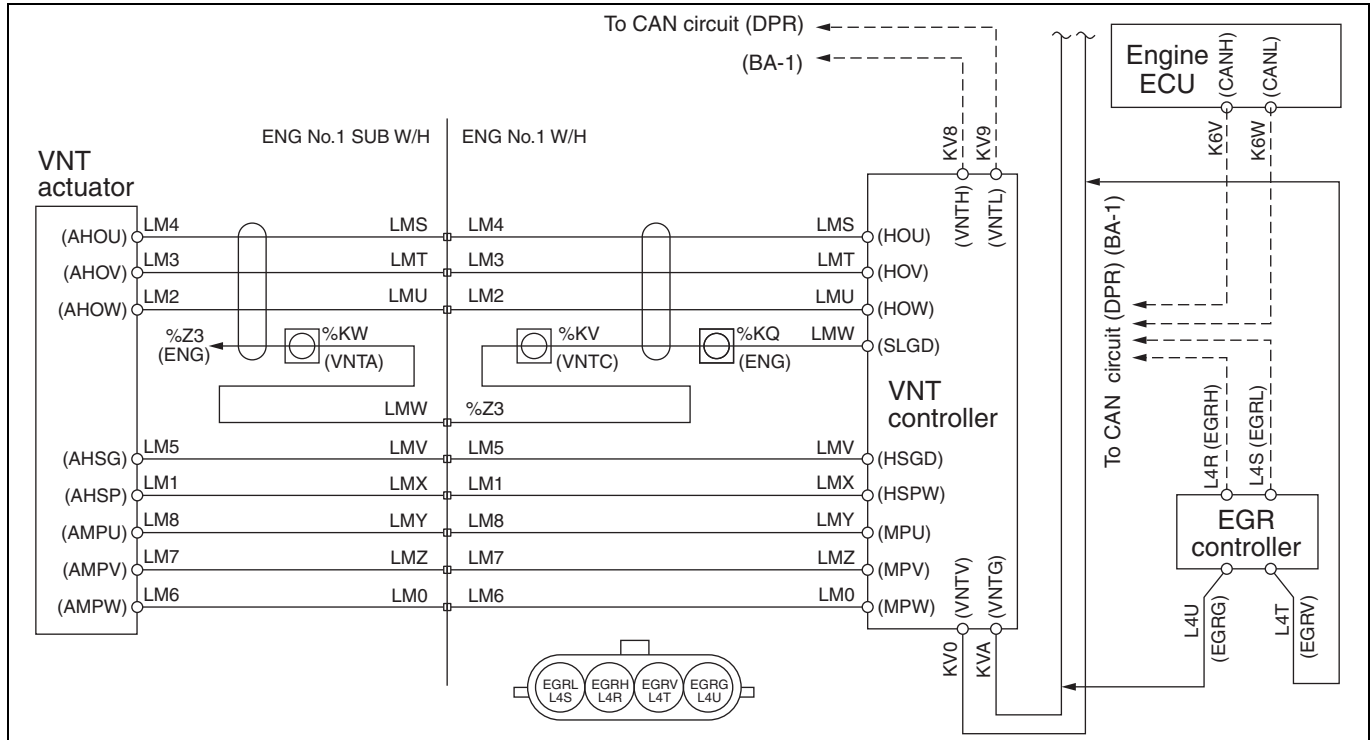
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Damaged element inside EGR valve actuator

P14BD: EGR valve controller temperature sensor 2 (Signal too high) (EGR actuator temp. sensor 2 signal too high)

INFORMATION



SAPH16F010300698

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 } $^{\circ}\text{F}$)
- DTC is issued when failure message is received from EGR actuator unit.

<Description of malfunction>

- EGR actuator system is malfunctioning.

2. DTC set condition

(1) DTC detection condition

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When temperature of temperature sensor 2 (CPU side) inside actuator is at least $200\text{ }^{\circ}\text{C}$ {392 } $^{\circ}\text{F}$, and this condition continues for 1 second.

3. Reset condition

- Normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

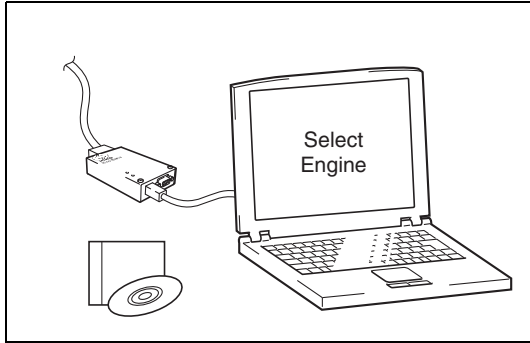
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Damaged element inside EGR valve actuator

INSPECTION PROCEDURE: P14BC and P14BD**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300699

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than DTC (P14BC or P14BD) has been detected in [Fault Information].

Has a DTC other than DTC (P14BC or P14BD) been detected?

YES

Go to the diagnostic procedure of a related DTC.

NO

Go to step 2.

2 Inspect the EGR valve connector

1. Check the connection of the EGR valve connector (Looseness and poor contact).

Was any failure found?

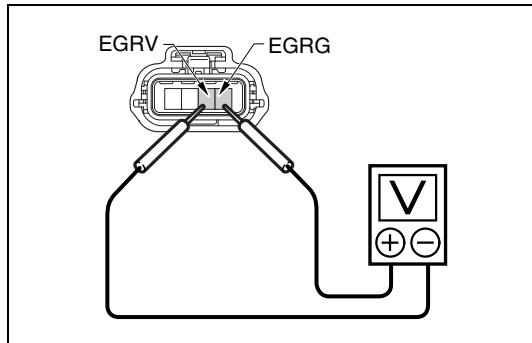
YES

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the EGR valve power supply



SAPH16F010300700

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?

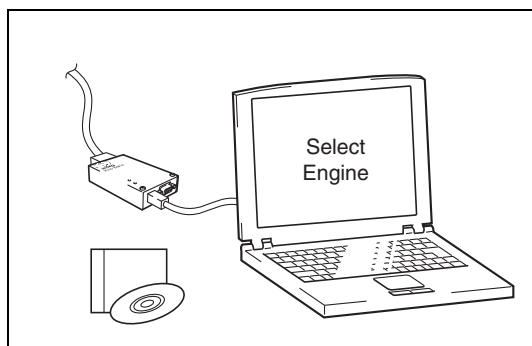
YES

Replace the EGR valve, go to step 4.

NO

Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

4 Check the DTC detected 2 (Engine ECU) [Hino-DX]



SAPH16F010300701

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if the DTC (P14BC or P14BD) has been detected in [Fault Information].

Has DTC (P14BC or P14BD) been detected?

YES

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

NO

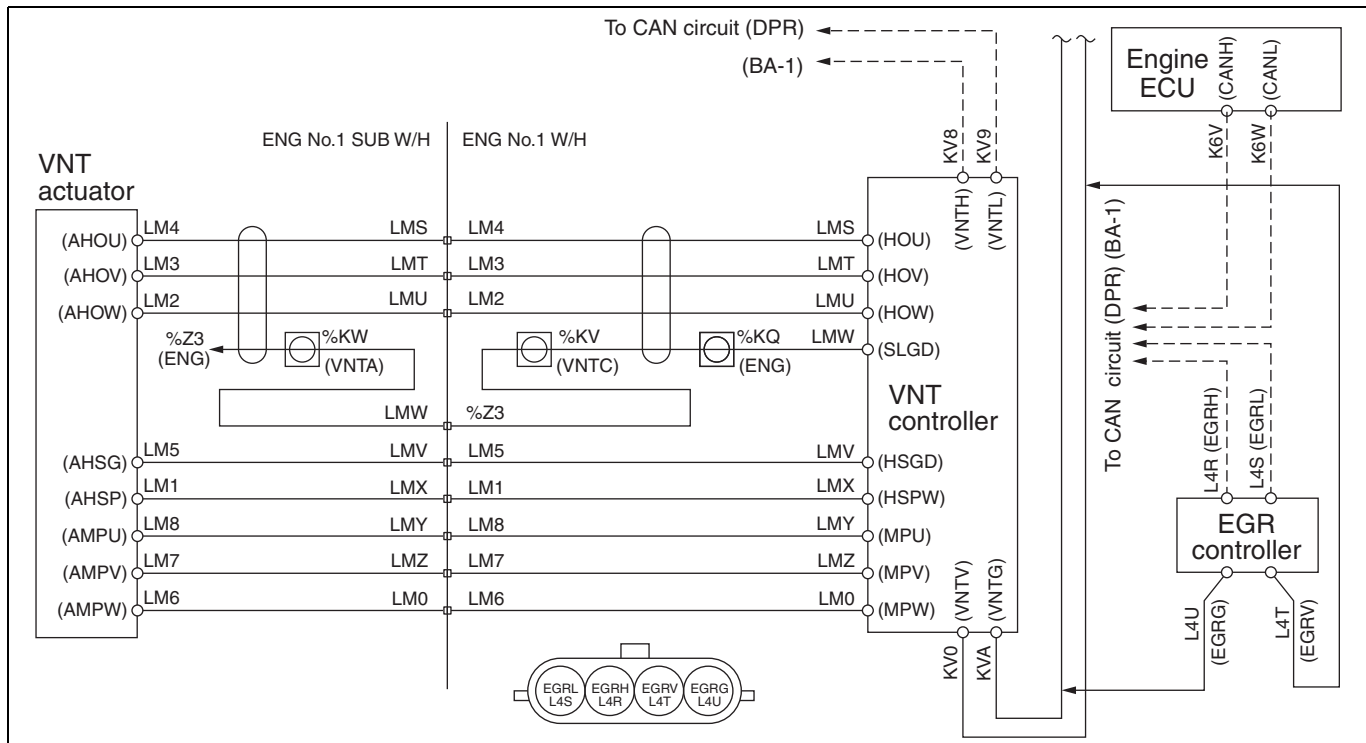
Procedure completed. Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P14BC and P14BD

DTC: P14BC		EGR valve controller temperature sensor 2 (Signal too low) (EGR actuator temp. sensor 2 signal too low)		Inspection procedure		
DTC: P14BD		EGR valve controller temperature sensor 2 (Signal too high) (EGR actuator temp. sensor 2 signal too high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than DTC (P14BC or P14BD) has been detected in [Engine].	DTC other than DTC (P14BC or P14BD) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR valve power supply	Disconnect the EGR valve connector and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGR valve vehicle-side connector EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the EGR valve, go to step 4.	Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if the DTC (P14BC or P14BD) has been detected in [Engine].	DTC (P14BC or P14BD) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P14BF

EN01H16F01030F03001114

P14BF: EGR valve controller temperature sensor 1, 2 - rationality (EGR actuator temp sensor 1 performance invalid)**INFORMATION**

SAPH16F010300702

1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 } $^{\circ}\text{F}$)
- Wiping operation from "fully open \rightarrow fully closed" is conducted as an EGR valve surface cleaning operation when the starter switch is LOCK.

<Description of malfunction>

- Failure message is received from EGR controller.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 8 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Starter switch ON. (Not related to engine speed.)

(2) Judgement criteria

- When temperature of temperature sensor 1 inside actuator is between $-20\text{ }^{\circ}\text{C}$ { $-4\text{ }^{\circ}\text{F}$ } and $170\text{ }^{\circ}\text{C}$ { $338\text{ }^{\circ}\text{F}$ }, and difference between temperature sensors 1 and 2 is at least $30\text{ }^{\circ}\text{C}$ { $86\text{ }^{\circ}\text{F}$ }, this condition continues for 1 second.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON

- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

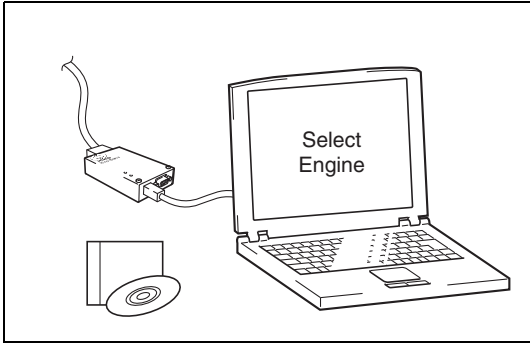
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Damaged element inside EGR valve actuator
- Soot adhesion to EGR valve sealing face and gas passageway, and motor abnormal heat rise due to damage caused by hard foreign substances (Hardened carbon may peel off from EGR cooler upstream of EGR valve.)
 - *1. If there is no problem with the above, foreign substance damage occurred when the MIL was ON, but at present the foreign substances are thought to have dropped off and normal operation restored.
 - *2. This DTC may be detected because there is freezing inside the EGR valve when the outside temperature is low. When the interior thaws, however, normal operation will be restored.

INSPECTION PROCEDURE: P14BF**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300703

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P14BF has been detected in [Fault Information].

Has a DTC other than P14BF been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 2.****2 Inspect the EGR valve**

1. Check the valve sealing face and gas passageway for soot buildup or damage due to foreign substances.
2. Check if there is soot obstructing the exhaust gas passageway inlet or outlet.

Was any failure found?**YES****Removing foreign matter and clean.
If damaged, replace the EGR valve.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 3.**

3 Inspect the EGR valve connector

1. Check the connection of the EGR valve connector (Looseness and poor contact).

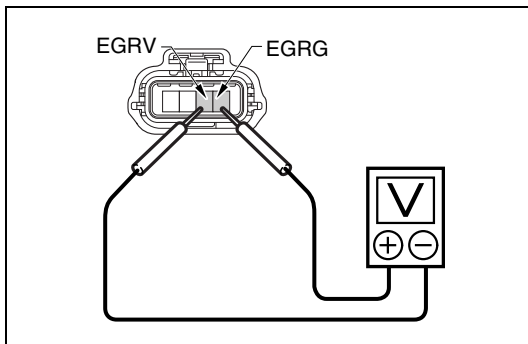
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the EGR valve power supply

SAPH16F010300704

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR valve connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the EGR valve vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	EGR valve vehicle-side connector EGRV – EGRG	8 – 16 V

Do the measurements meet the standard value?

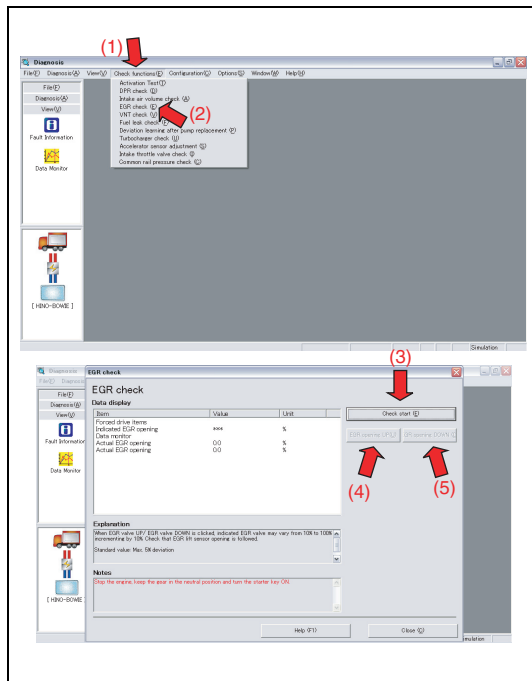
YES

Go to step 5.

NO

Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed.
Perform "After-inspection work" of INFORMATION section.

5 Check the response delay of the EGR valve [Hino-DX]



1. Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.

CAUTION

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

<Inspection procedure>

(1) Select [Check functions].

(2) Select [EGR check].

(3) Click [Check start].

(4) Select [EGR opening UP]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %.

(5) Select [EGR opening DOWN]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %.

HINT

- The EGR opening position changes of around 10 % per step between 0 – 100 %.

Standard values

From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.

Do the measurements meet the standard value?

YES

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

NO

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

CHECKLIST: P14BF

DTC: P14BF		EGR valve controller temperature sensor 1, 2 - rationality (EGR actuator temp. sensor 1 performance invalid)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P14BF has been detected in [Engine].	DTC other than P14BF has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Inspect the EGR valve	<ol style="list-style-type: none"> 1. Check the valve sealing face and gas passageway for soot buildup or damage due to foreign substances. 2. Check if there is soot obstructing the exhaust gas passageway inlet or outlet. 	Failure found: Go to YES. No failure found: Go to NO.		Removing foreign matter and clean. If damaged, replace the EGR valve. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR valve connector	Check the connection of the EGR valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the EGR valve power supply	Disconnect the EGR valve connector and measure the voltage between the terminals of the EGR valve vehicle-side connector. <Tester connections> EGRV – EGRG <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Check the wire harness (actuator power supply and ground) and battery voltage. Repair or replace parts as needed. Perform "After-inspection work" of INFORMATION section.

DTC: P14BF		EGR valve controller temperature sensor 1, 2 - rationality (EGR actuator temp. sensor 1 performance invalid)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the response delay of the EGR valve [Hino-DX]	<p>Select [Check functions] and then [EGR check] from Hino-DX menu, then inspect the response delay at the Target EGR position and Actual EGR position.</p> <p>⚠ CAUTION Perform the inspection while the engine is stopped to avoid damages.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [EGR check]. (3) Click [Check start]. (4) Select [EGR opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %. <p>(5) Select [EGR opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %. <p>HINT The EGR opening position changes of around 10 % per step between 0 – 100 %.</p> <p><Standard values> From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Replace the EGR valve. Perform "After-inspection work" of INFORMATION section.

DTC: P1515

EN01H16F01030F03001115

P1515: Charge air undercooling INFORMATION

1. Technical description

- The intercooler cooling efficiency is monitored by comparing the intake temperature and intercooler outlet temperature measured by the air flow sensor.

<Description of malfunction>

- Intercooler cooling efficiency drop is detected.

2. DTC set condition

(1) DTC detection condition

- Engine is running (not stopped).

(2) Judgement criteria

- The intake temperature is $-15\text{ }^{\circ}\text{C}$ $\{5\text{ }^{\circ}\text{F}\}$ and the intercooler outlet temperature is $\geq 74\text{ }^{\circ}\text{C}$ $\{165\text{ }^{\circ}\text{F}\}$.
- The intake temperature is $65\text{ }^{\circ}\text{C}$ $\{149\text{ }^{\circ}\text{F}\}$ and the intercooler outlet temperature is $\geq 146\text{ }^{\circ}\text{C}$ $\{295\text{ }^{\circ}\text{F}\}$.

3. Reset condition

- Just after restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

1. Insufficient cooling air

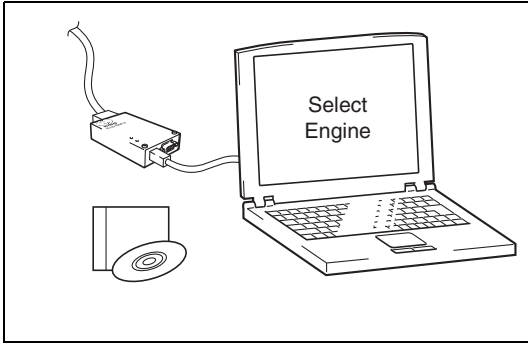
- Foreign substance clogging intercooler outer fins
- Foreign substance clogging radiator outer fins
- Deformed or clogged intercooler outer fin
- Deformed or clogged radiator outer fin
- Foreign substance clogging air inlet at front of vehicle

2. Faulty intercooler

- Tube abnormal swelling or cracking

3. Faulty part other than intercooler

- Engine cooling fan failure
- Fan clutch failure
- Clogged air cleaner

INSPECTION PROCEDURE: P1515**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300706

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if any DTC other than P1515 (for example P0096, P0106, P011C, P2227, P0101, P2457) have been detected in [Fault Information].

Has a DTC other than P1515 (for example P0096, P0106, P011C, P2227, P0101, P2457) been detected?

YES

NO

Go to diagnosis procedure of a related DTC.

Go to step 2.

2 Inspect the radiator curtain

1. Check if the radiator curtain is closed.

Was any failure found?

YES

NO

**Open the radiator curtain.
Perform "After-inspection work" of INFORMATION section.**

Go to step 3.

3 Inspect the air cleaner element

1. Check there is no dirt, damage or clogging in the air cleaner element.

Was any failure found?

YES

NO

**Clean or replace the air cleaner element.
Perform "After-inspection work" of INFORMATION section.**

Go to step 4.

4 Inspect the radiator fan

1. Check that the radiator fan (fan blades) was damaged

Was any failure found?

YES

Replace the radiator fan.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the fan clutch

1. Check if silicone oil is leaking from the fan clutch.

Was any failure found?

YES

Replace the fan clutch.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the intercooler

1. Check that the intercooler outer fin was clogged or damaged.

Was any failure found?

YES

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

NO

Go to step 7.

7 Inspect the intercooler tube

1. Check if the intercooler tubes are abnormally swollen or cracked.

Was any failure found?

YES

Replace the intercooler tube.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 8.

8 Inspect the radiator

1. Check if the radiator outer fins are clogged or damaged.

Was any failure found?

YES

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

NO

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

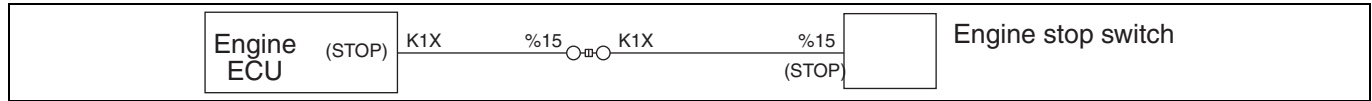
CHECKLIST: P1515

DTC: P1515		Charge air undercooling		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P1515 (for example P0096, P0106, P011C, P2227, P0101, P2457) have been detected in [Engine].	DTC other than P1515 has been detected: Go to YES. No DTC has been detected. Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the radiator curtain	Check if the radiator curtain is closed.	Failure found: Go to YES. No failure found: Go to NO.		Open the radiator curtain. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the air cleaner element	Check there is no dirt, damage or clogging in the air cleaner element.	Failure found: Go to YES. No failure found: Go to NO.		Clean or replace the air cleaner element. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the radiator fan	Check that the radiator fan (fan blades) was damaged	Failure found: Go to YES. No failure found: Go to NO.		Replace the radiator fan. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the fan clutch	Check if silicone oil is leaking from the fan clutch.	Failure found: Go to YES. No failure found: Go to NO.		Replace the fan clutch. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the intercooler	Check that the intercooler outer fin was clogged or damaged.	Failure found: Go to YES. No failure found: Go to NO.		Replace the intercooler. Perform "After-inspection work" of INFORMATION section.	Go to step 7.

DTC: P1515		Charge air undercooling		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
7	Inspect the intercooler tube	Check if the intercooler tubes are abnormally swollen or cracked.	Failure found: Go to YES. No failure found: Go to NO.		Replace the intercooler tube. Perform "After-inspection work" of INFORMATION section.	Go to step 8.
8	Inspect the radiator	Check if the radiator outer fins are clogged or damaged.	Failure found: Go to YES. No failure found: Go to NO.		Replace the radiator. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P1530

EN01H16F01030F03001116

P1530: Engine stop switch malfunction
INFORMATION

SAPH16F010300707

1. Technical description

- Through the engine stop switch, the ECU senses engine stop signals.

<Description of malfunction>

- The engine stop switch cannot correctly sense.

2. DTC set condition**(1) Check conditions**

- Battery voltage is in the range of 10 V to 16 V.

(2) Judgement criteria

- At a vehicle speed of 30 km/h, the stop switch remains in ON position for 1 second or longer.

3. Reset condition

- After normal operation is restored and starter switch LOCK.

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

- MIL: OFF
- Diag lamp: OFF
- Engine stop switch is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine stop switch cannot be used.

<Symptoms on the vehicle due to malfunction>

- Engine cannot start.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Irregular contact (disconnection or poor fit of connector)
- Malfunction of switch (Stuck on ON)
- Malfunction of ECU

INSPECTION PROCEDURE: P1530**1 Inspect the engine stop switch**

1. Check the installation of the engine stop switch.

Was any failure found?

YES

Install the engine stop switch correctly.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the engine stop switch connector

1. Check the connection of the engine stop switch connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the engine stop switch unit

1. Set the starter switch to the "LOCK" position.
2. Disconnect the engine stop switch connector.
3. Use the electrical tester to perform a unit test of the engine stop switch.

Was any failure found?

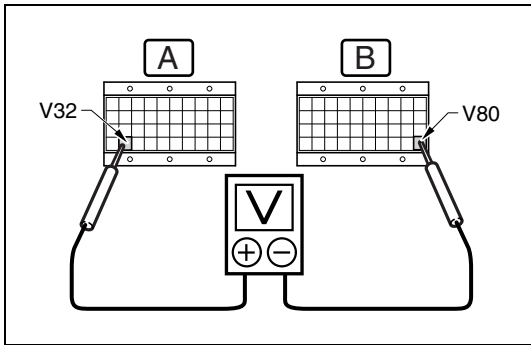
YES

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

NO

Go to step 4.

4 Inspect for power supply short-circuit in the wire harness of the engine stop switch



SAPH16F010300708

1. Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect the harness to the ECU.)
2. Set the starter switch to the "ON" position.
3. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) STOP(V32) – PGD4(V80)	Less than 1 V

Do the measurements meet the standard value?

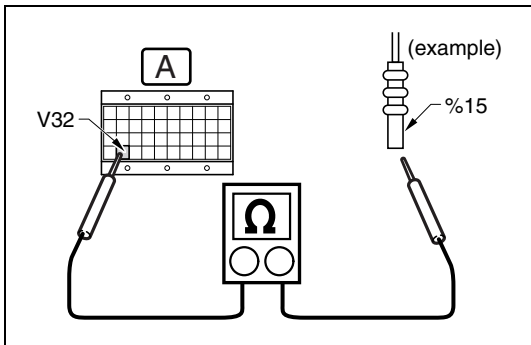
YES

Go to step 5.

NO

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

5 Inspect for disconnection in the wire harness of the engine stop switch



SAPH16F010300709

1. Set the starter switch to the "LOCK" position.
2. Use the electrical tester to measure the resistance between the STOP(V32) terminal in the engine ECU (signal check harness) and the STOP(%15) terminals in the engine stop switch vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) STOP(V32) – STOP(%15) Engine stop switch vehicle-side connector	Less than 1 Ω

Do the measurements meet the standard value?

YES

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

NO

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

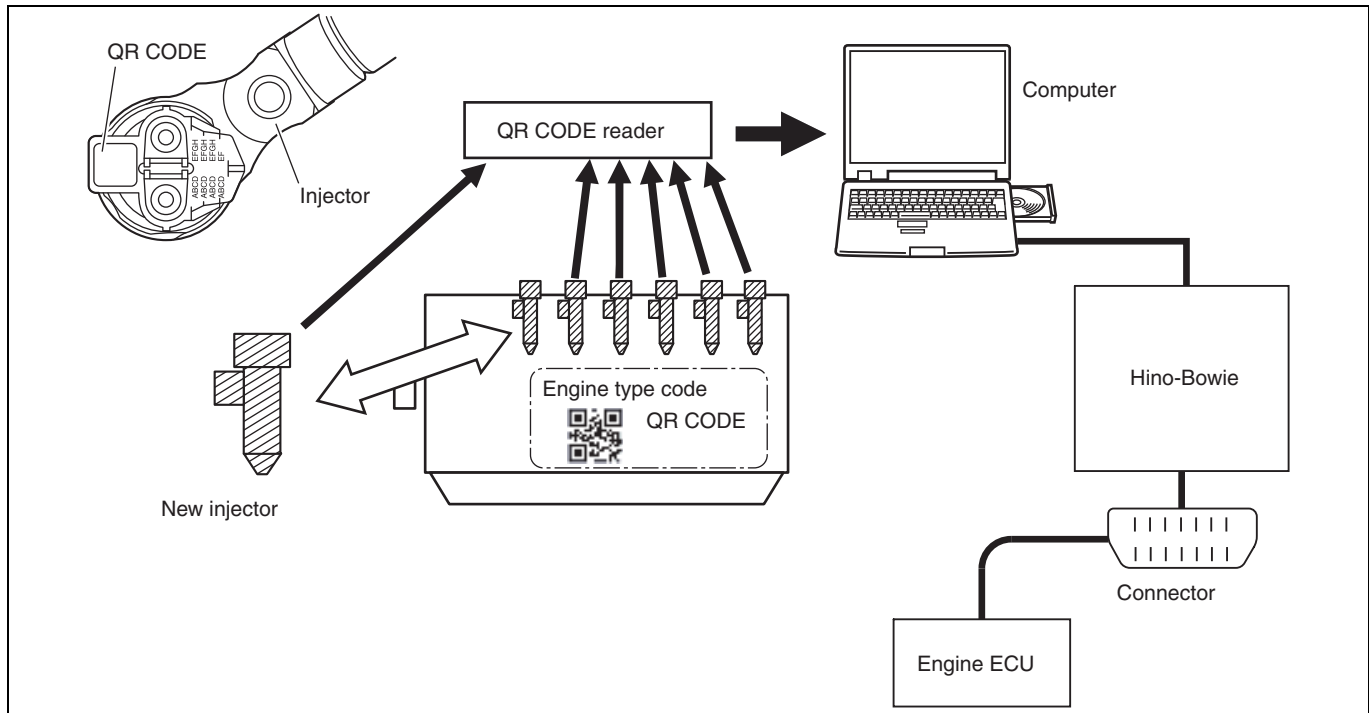
CHECKLIST: P1530

DTC: P1530		Engine stop switch malfunction		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the engine stop switch	Check the installation of the engine stop switch.	Failure found: Go to YES. No failure found: Go to NO.		Install the engine stop switch correctly. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the engine stop switch connector	Check the connection of the engine stop switch connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the engine stop switch unit	Disconnect the engine stop switch connector to perform a unit test of the engine stop switch.	Failure found: Go to YES. No failure found: Go to NO.		Replace the engine stop switch. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect for power supply short-circuit in the wire harness of the engine stop switch	Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect harness to the ECU.) and measure the voltage between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) STOP(V32) – PGD4(V80) <Standard values> Less than 1 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P1530		Engine stop switch malfunction		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for disconnection in the wire harness of the engine stop switch	<p>Measure the resistance between the STOP(V32) terminal in the engine ECU (signal check harness) and the terminals in the engine stop switch vehicle-side connector.</p> <p><Tester connections> Engine ECU (signal check harness) STOP (V32) terminal – Engine stop switch vehicle-side connector</p> <p><Standard values> Less than 1 V</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P1601

EN01H16F01030F03001117

P1601: Fuel injector adjustment data error
INFORMATION

SAPH16F010300710

1. Technical description

- The fuel injection rate is controlled by operation of the injector magnetic valve according to the injector valve-opening interval instructions from the engine ECU. In order to correct for injector manufacturing variations, however, a variation correction value (injector correction value) is measured, and written into the engine ECU, during the injector manufacturing process.

<Description of malfunction>

- Faulty injector correction value is detected.

2. DTC set condition**(1) DTC detection condition**

- Calibration data (QR codes) are not written.
- Calibration data are 127 or more.
- Calibration data are -128 or less.
- Improper checksum of calibration data
- EEPROM memory failure

(2) Judgement criteria

- Either of these conditions described above remains for 3 seconds or longer.

3. Reset condition

- After restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- –

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Inconsistent with calibration data (QR codes) stored in the server.
- Malfunction of ECU

INSPECTION PROCEDURE: P1601**1 Check the injector replaced record**

1. Check the injector replaced record.

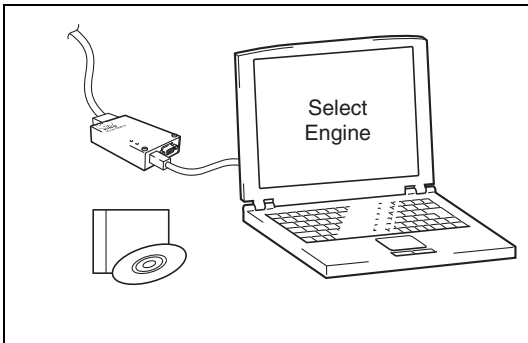
Has the injector been replaced in the past? (Replacement history exists or is unclear.)

YES

Go to step 3.

NO

**(No replacement history)
Go to step 2.**

2 Check the injector calibration data (QR CODE) 1 [Hino-DX]

SAPH16F010300711

1. Re-input the registration injector calibration data (QR CODE) of the service server.
2. Erase the DTC memory, and check again DTC code. Check that DTC code P1601 is not displayed.

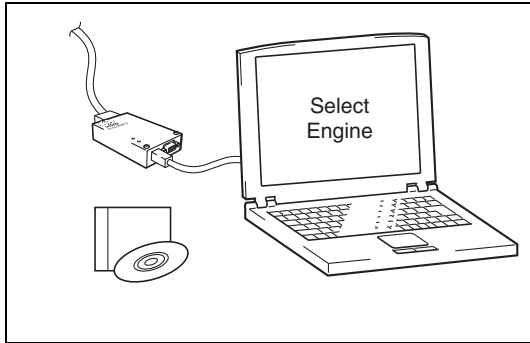
Has DTC P1601 been detected?

YES

Go to step 3.

NO

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

3 Check the injector calibration data (QR CODE) 2 [Hino-DX]

SAPH16F010300712

1. Read the injector calibration data (QR CODE) of the injectors using Hino-DX, re-input injector calibration data (QR CODE).
2. Erase the DTC memory, and check again DTC code. Check that DTC code P1601 is not displayed.

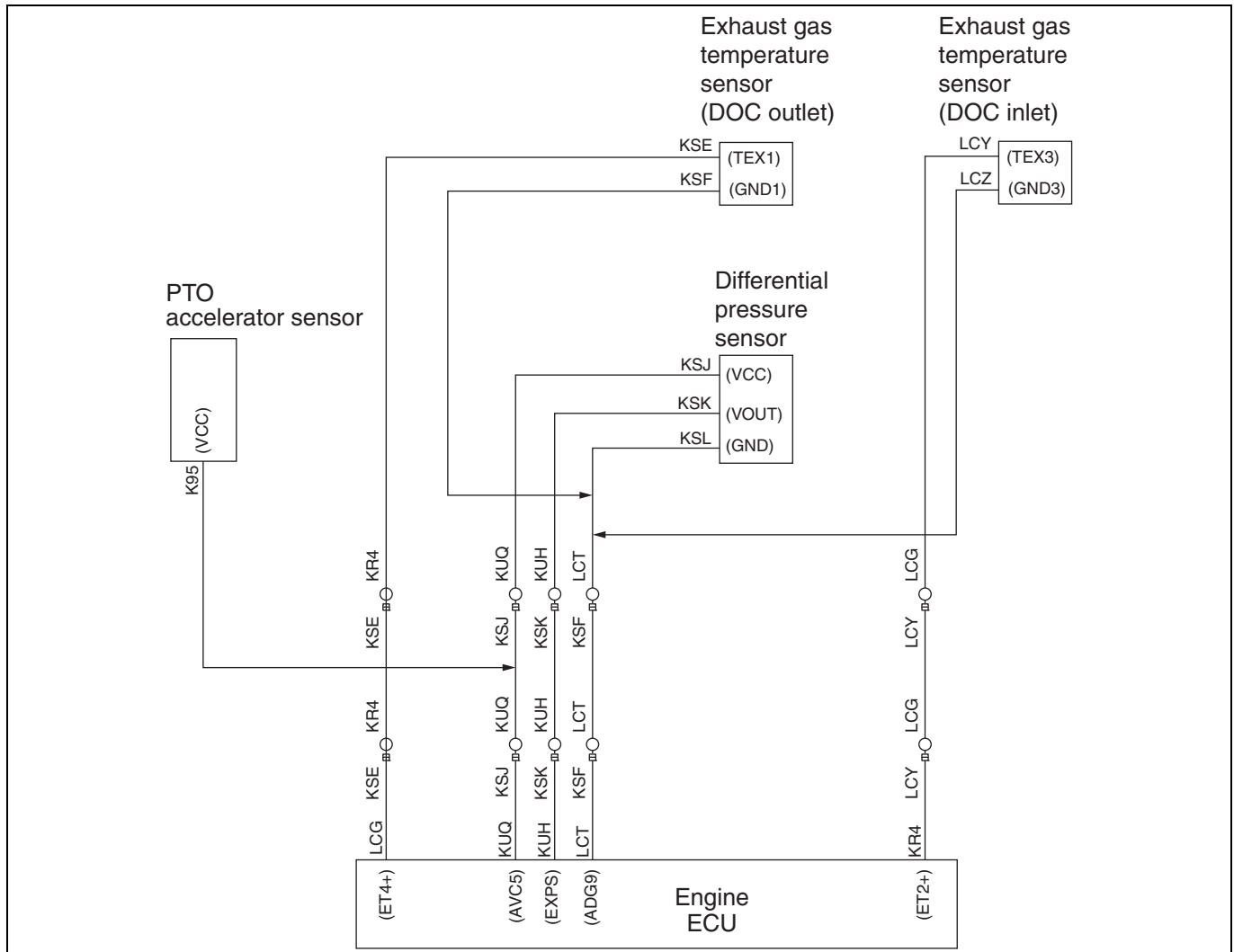
Has DTC P1601 been detected?**YES****Replace the engine ECU.
Perform "After-inspection work" of INFORMATION section.****NO****Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P1601

DTC: P1601		Fuel injector adjustment data error		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the injector replace record	Check injector replaced record.	Replacement history exists: Go to YES. No replacement history: Go to NO.		Go to step 3.	Go to step 2.
2	Check the injector calibration data (QR CODE) 1 [Hino-DX]	<ol style="list-style-type: none"> 1. Re-input the registration injector calibration data (QR CODE) of the service server. 2. Erase the DTC memory and check again DTC code. Check that DTC code P1601 is not displayed. 	DTC P1601 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Check the injector calibration data (QR CODE) 2 [Hino-DX]	<ol style="list-style-type: none"> 1. Read the injector calibration data (QR CODE) of the injectors using Hino-DX, re-input injector calibration data (QR CODE). 2. Erase the DTC memory, and check again DTC code. Check that DTC code P1601 is not displayed. 	DTC P1601 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P200C

EN01H16F01030F03001118

**P200C: DPF over temperature
INFORMATION**

SAPH16F010300713

1. Technical description

- ECU constantly calculate and accumulate the amount of soot deposit from the engine. The burner will start increasing temperature of the DPR filter when the regeneration mode is selected based on this value to start regeneration.

<Description of malfunction>

- If an excessively high temperature is detected by the exhaust temperature sensor located in the downstream of DPR, it will be judged as an error.

2. DTC set condition**(1) DTC detection condition**

- The engine must not be stopped.

(2) Judgement criteria

- Judge a reading taken by the DPR downstream (DOC outlet) exhaust gas temperature sensor by referencing to a value specified below.
- Immediately judge when 965 °C {1,769 °F} is exceeded for continuous 5 minutes.

3. Reset condition

- After restoration to normal condition and DPR-related memory is reset.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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

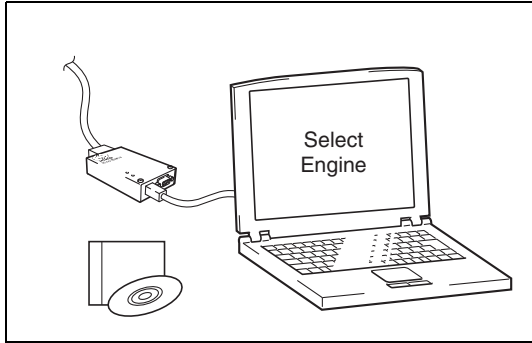
- Clear all past DTCs.
- Check that no DTC is stored after test drive.
- Clear history of highest temperatures stored in engine ECU.
(Hino-DX system protection data: Maximum exhaust temperature 1 (2) for monitor)

8. Estimated failure factors (If malfunction in the burner system also exists)

- Abnormal control of the burner system temperature
- Judged by the abnormal temperature rise at regeneration due to excessive soot emission.
Injector: Characteristic abnormality of injection volume
SCV: Faulty control of common rail pressure
EGR valve: Faulty control of EGR opening angle
Diesel throttle valve: Faulty control of Diesel throttle valve opening angle
Turbocharger: Faulty control of VNT
Refer to "ENGINE BASIC INSPECTION SHEET (ENGINE INSPECTION CHECK SHEET)" on this manual for above inspection.

[Confirmation points for judgment]

- Fault in DPR downstream (DOC outlet) exhaust temperature sensor.
Check whether the abnormal temperature is detected due to falsely-recognized by the sensor, or not.

INSPECTION PROCEDURE: P200C**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300714

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P200C (for example P2470, P2471) has been detected in [Fault Information].

HINT

Due to sensor failures or for other reasons, P200C may have been detected.

First perform the diagnostics related to the other DTCs, such as sensors and engine related DTCs (Refer to "Estimated failure factors" in the previous pages).

Has a DTC other than P200C been detected?

YES

Go to diagnosis procedure of a related DTC.

NO

Go to step 2.

2 Inspect the exhaust pipe

1. Check for dirt or soot in the exhaust pipe.

Was any failure found?

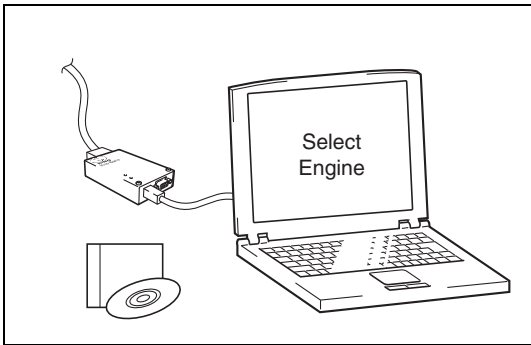
YES

Go to step 3.

NO

Go to step 6.

3 Inspection of the exhaust gas temperature [Hino-DX]



SAPH16F010300715

1. Set the starter switch to the "LOCK" position.
 2. Replace the DPR filter
- HINT**
When replacing the DPR filter, replace the burner nozzle and clean the igniter.
3. Connect the vehicle to Hino-DX. Select [Engine] then set up [Exhaust Temp. (OUT)] from the [Data Monitor] menu.
 4. Perform DPR manual regeneration and measure (monitor) the exhaust gas temperature.

Standard values
Exhaust gas temperature: below 800°C {1,472°F}

Do the measurements meet the standard value?

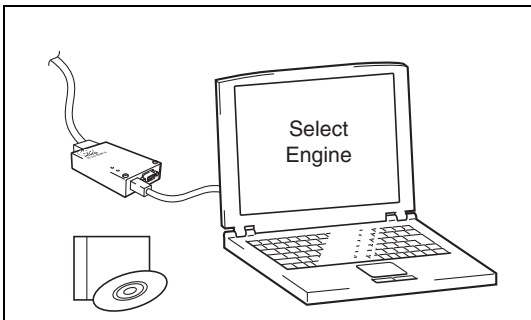
YES

NO

Go to step 4.

Go to step 10.

4 Inspect the injector [Hino-DX]



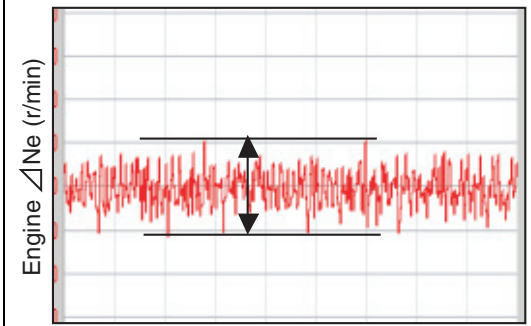
SAPH16F010300716

Check the injection quantity and the rotational fluctuation.

1. Start the engine.
2. Select [Injection quantity] from the [Data Monitor] menu and measure the injection quantity.
3. Select [Engine speed] from the [Data Monitor] menu and measure the rotational fluctuation.

Measurement conditions
Engine speed: 1,500 r/min No-load, T/M shift lever: Neutral position, A/C off and Air compressor un-operating. Engine coolant temperature: more than 80 °C {176 °F}

△ NE Rotational fluctuation
 @ 1,500 r/min (measurement by Hino-DX)



SAPH16F010300716

Standard values		
Type of	Q (mm ³ /st)	△Ne (r/min)
MT	5.0q ≤	≤ 26
Allison®2200	6.0q ≤	
Allison®2500		
Allison®3500		

Do the measurements meet the standard value?
(Both the injection quantity and the rotational fluctuation are within the standard values)

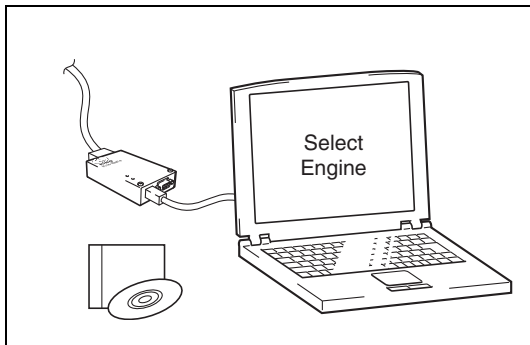
YES

Go to step 5.

NO

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

5 Perform engine basic inspection [Hino-DX]



SAPH16F010300718

1. Based on the Engine basic inspection sheet, inspect each engine part and system.

HINT

Inspect each engine system and check for anything that may deteriorate the exhaust gas properties.

Was any failure found?

YES

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

NO

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

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

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 7.

7 Inspect the outside of the exhaust gas temperature sensor (DOC outlet)

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

Was any failure found?

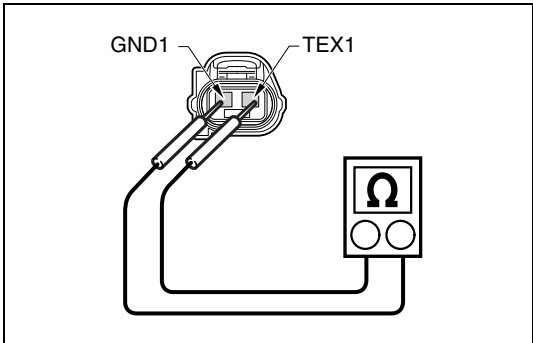
YES

NO

Clean the exhaust gas temperature sensor (DOC outlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (DOC outlet). Perform "After-inspection work" of INFORMATION section.

Go to step 8.

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



SAPH16F010300719

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (DOC outlet) TEX1 – GND1	50 °C {122 °F}: 7.4 – 19.6 kΩ 100 °C {212 °F}: 3.0 – 6.2 kΩ

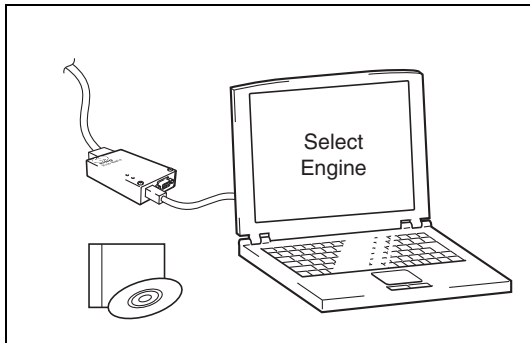
Do the measurements meet the standard value?

YES

NO

Go to step 9.

Replace the exhaust gas temperature sensor (DOC outlet). Perform "After-inspection work" of INFORMATION section.

9 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300720

1. Perform DPR manual regeneration.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if P200C has been detected in [Fault Information].

Has DTC P200C been detected ?**YES****Go to step 3.****NO****Procedure completed.
Perform "After-inspection work" of INFORMATION section.****10 Inspect the exhaust gas temperature sensor (burner outlet) connector**

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

Was any failure found?**YES****Connect securely. Repair if needed.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 11.**

11 Inspect the exhaust gas temperature sensor (burner outlet)

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

Was any failure found?

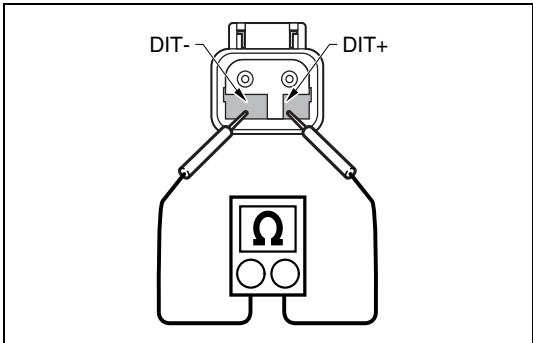
YES

Clean the exhaust gas temperature sensor (burner outlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (burner outlet). Perform "After-inspection work" of INFORMATION section.

NO

Go to step 12.

12 Inspect the exhaust gas temperature sensor (burner outlet) unit



SAPH16F010300721

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (burner outlet) DIT+ – DIT-	0.3 – 1.8 Ω

Do the measurements meet the standard value?

YES

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

NO

Replace the exhaust gas temperature sensor (burner outlet). Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P200C

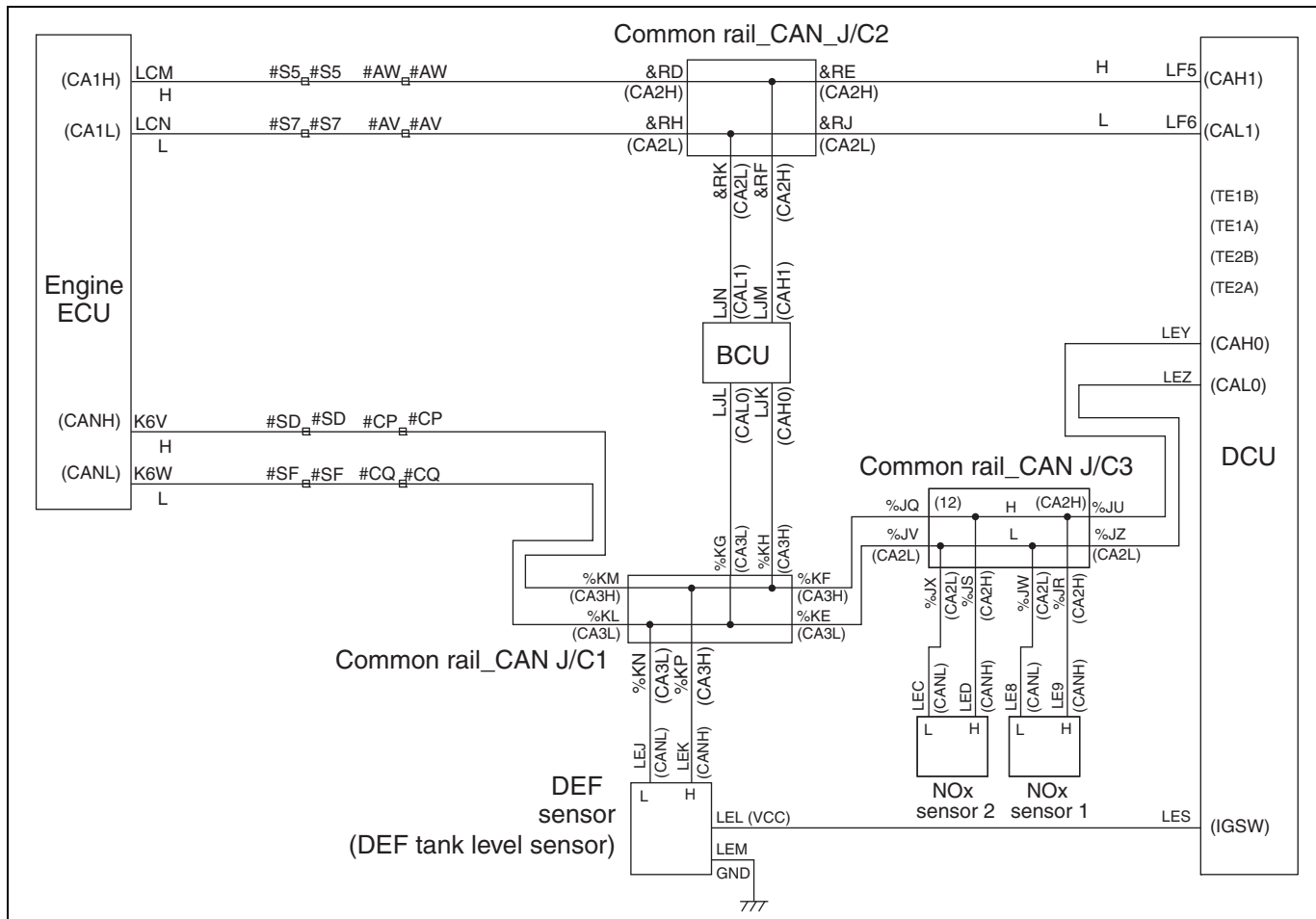
DTC: P200C		DPF over temperature		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P200C (for example P2470,P2471) has been detected in [Engine].	DTC other than P0263 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the exhaust pipe	Check for dirt or soot in the exhaust pipe.	Failure found: Go to YES. No failure found: Go to NO.		Go to step 3.	Go to step 6.
3	Inspect the exhaust gas temperature [Hino-DX]	After replacing the filter DPR and performing DPR manual regeneration, select [(OUT) Exhaust Temperature] from the [Data Monitor] Hino-DX menu, and measure the exhaust gas temperature. HINT When replacing the DPR filter, replace the burner nozzle and clean the igniter. When replacing the DPR filter, replace the burner nozzle and clean the igniter. <Standard values> Exhaust gas temperature: below 800 °C	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Go to step 10.
4	Inspect the injector [Hino-DX]	Start the engine and select [Injection quantity] from the [Data Monitor] Hino-DX menu, and measure the amount of fuel injection. <Measurement conditions> Engine speed: 1,500 r/min (No load) Temperature: More than 80 °C <Standard values> Injection quantity (mm ³ /st): 5.0q or more for MT vehicles , 6.0q or more for Allison® 2200, 2500, 3500 vehicles. Engine rotation fluctuation (r/min): 26 or less (for all type of transmission vehicles).	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the injector. Perform "After-inspection work" of INFORMATION section.

DTC: P200C		DPF over temperature		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Perform engine basic inspection [Hino-DX]	Based on the basic engine check sheet, check [Data Monitor] and [Activation Test] of Hino-DX and perform the basic engine inspection.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
6	Inspect the exhaust gas temperature sensor (DOC outlet) connector	Check the connection of the exhaust gas temperature sensor (DOC outlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Inspect the outside of the exhaust gas temperature sensor (DOC outlet)	<ol style="list-style-type: none"> 1. Check the installation of the exhaust gas temperature sensor (DOC outlet). 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (DOC outlet). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (DOC outlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 8.
8	Inspect the exhaust gas temperature sensor (DOC outlet) unit	Disconnect the connector of the exhaust gas temperature sensor (DOC outlet) and measure the resistance between the terminals of the exhaust gas temperature sensor (DOC outlet). (TEX1 – GND1) <Standard values> 50 °C {122 °F}: 7.4 – 19.6 kΩ 100 °C {212 °F}: 3.0 – 6.2 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 9.	Replace the exhaust gas temperature sensor (DOC outlet). Perform "After-inspection work" of INFORMATION section.
9	Check the DTC detected (Engine ECU) [Hino-DX]	<ol style="list-style-type: none"> 1. Perform DPR manual regeneration. 2. Check if P200C has been detected in [Engine]. 	DTC P200C has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P200C		DPF over temperature		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
10	Inspect the exhaust gas temperature sensor (burner outlet) connector	Check the connection of the exhaust gas temperature sensor (burner outlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 11.
11	Inspect the exhaust gas temperature sensor (burner outlet)	<ol style="list-style-type: none"> 1. Check the installation of the exhaust gas temperature sensor (burner outlet). 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (burner outlet). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (burner outlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 12.
12	Inspect the exhaust gas temperature sensor (burner outlet) unit	Disconnect the connector of the exhaust gas temperature sensor (burner outlet) and measure the resistance between the terminals of the sensor. (DIT+ – DIT-) <Standard values> 0.3 – 1.8 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the BCU. Perform "After-inspection work" of INFORMATION section.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P203F

EN01H16F01030F03001119

**P203F: Empty reductant tank
INFORMATION**

SAPH16F010300722

1. Technical description

- The amount of DEF solution remaining in the tank is detected to the 10 % level by the DEF tank level sensor, and in the 10 % → 0 % range, the amount of DEF solution to be added is calculated and detected in the engine ECU.

<Description of malfunction>

- Remaining DEF level of 5 % or less in DEF tank is detected.

2. DTC set condition**(1) DTC detection condition**

- Remaining DEF level ≤ 10 %

(2) Judgement criteria

- Remaining DEF level (=DEF tank level - (Calculated Accumulated DEF dosing amount (=Σ (DEF dosing quantity (from DCU))))/DEF tank volume) ≤ 5 %

3. Reset condition

- Just after restoration to normal condition.

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

- Diag lamp: ON (Remaining DEF level lamp)
- Engine output is restricted.
- Vehicle speed is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Vehicle does not speed up.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Remaining DEF level is low.
- DEF tank level sensor failure

INSPECTION PROCEDURE: P203F

1 Inspect the DEF tank

1. Fill the DEF tank to the Full mark.

Did the DEF level indicator indicate 100 %?

YES

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

NO

Go to step 2.

2 Inspect the DEF tank level sensor connector

1. Check the connection of the DEF tank level sensor connector (Looseness and poor contact).

Was any failure found?

YES

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 3.

3 Inspect the DEF tank level sensor

1. Check if the DEF tank level sensor float is disconnected, stuck, or damaged.

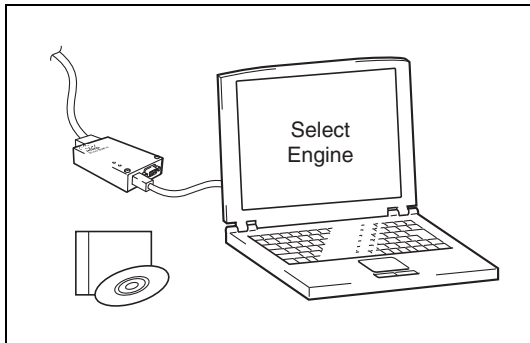
Was any failure found?

YES

**Replace the DEF tank level sensor.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 4.

4 Check the DTC detected (Engine) [Hino-DX]

SAPH16F010300723

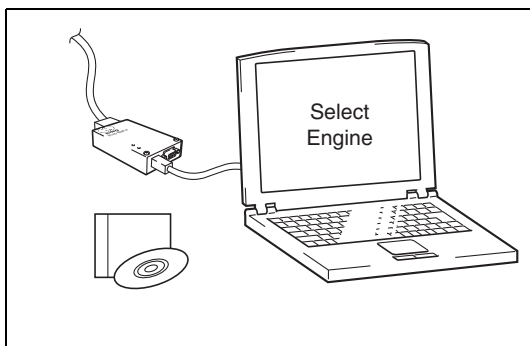
1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

Had DTC U02A2 been detected?**YES**

Go to the diagnostic procedure of a related DTC.

NO

Replace the DEF tank level sensor, and go to step 5.

5 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300724

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if P203F has been detected in [Fault Information].

Has DTC P203F been detected?**YES**

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

NO

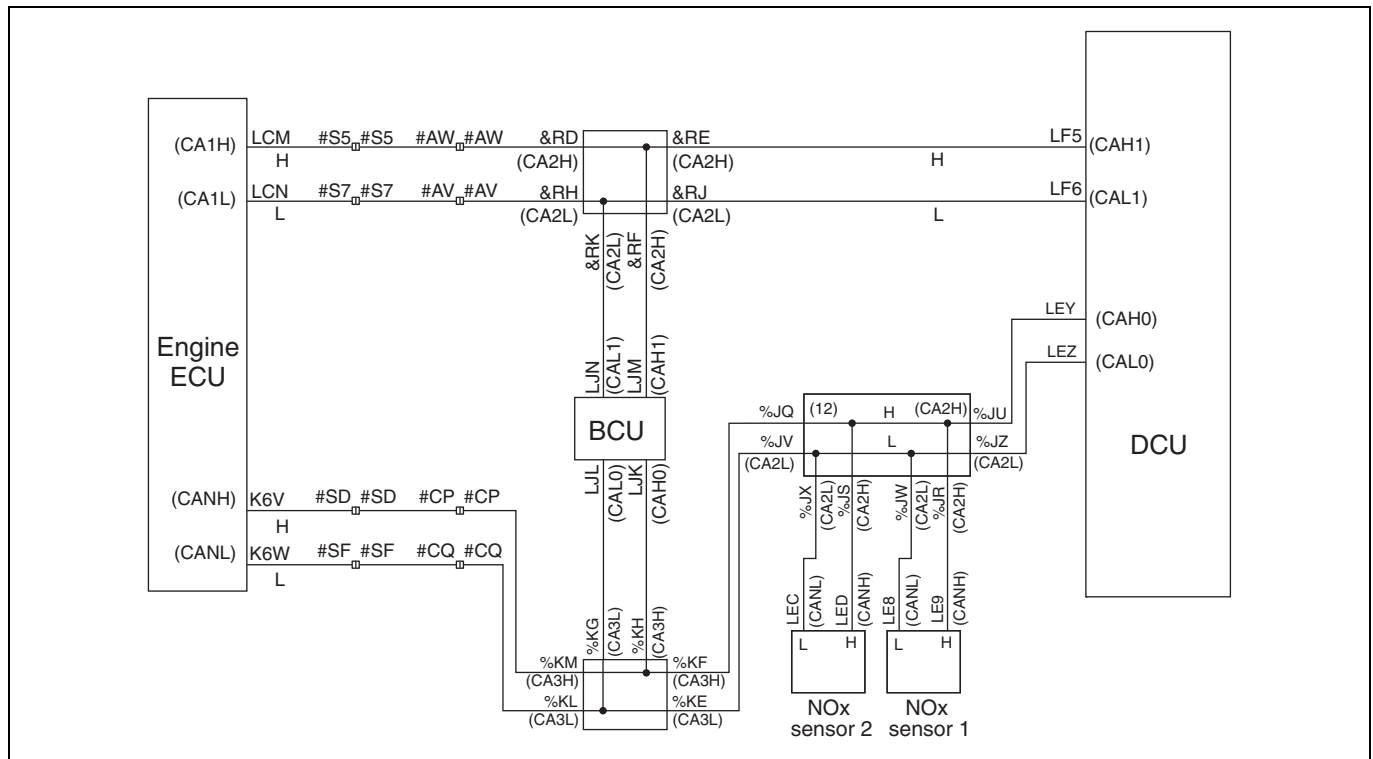
**Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P203F

DTC: P203F		Empty reductant tank		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF tank	Fill the DEF tank to the Full mark.	DEF indicator indicates 100 %: Go to YES. DEF indicator does not indicate 100 %: Go to NO.		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF tank level sensor connector	Check the connection of the DEF tank level sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the DEF tank level sensor	Check if the DEF tank level sensor float is disconnected, stuck, or damaged.	Failure found: Go to YES. No failure found: Go to NO.		Replace the DEF tank level sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Check the DTC detected (Engine) [Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF tank level sensor, and go to step 5.
5	Check the DTC detected (Engine ECU) [Hino-DX]	Check if P203F has been detected in [Engine].	DTC P203F has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P204F

EN01H16F01030F03001120

P204F: Reductant System Performance
INFORMATION

SAPH16F010300725

1. Technical description

- DEF SCR system failures are diagnosed with the DCU (Dosing Control Unit).
- Determine system in the DCU and diagnose malfunction with Hino-DX.

<Description of malfunction>

- -

2. DTC set condition

(1) DTC detection condition

- -

(2) Judgement criteria

- -

3. Reset condition

- -

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Vehicle speed is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Vehicle does not speed up.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

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

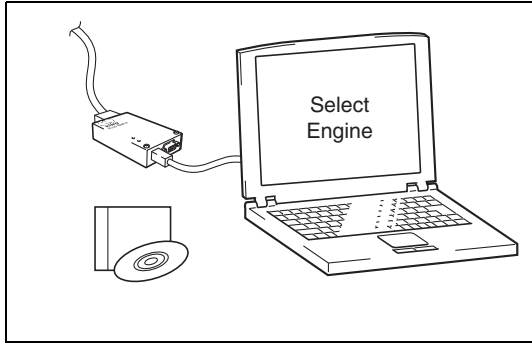
7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

When a malfunction of the DEF-SCR system has occurred repeatedly, "P204F" may not extinguish when executing a standard DTC Clear, even when a normal fault recovery has been performed.

In such a case, perform a DTC Clear after setting "Release repeat offense" in "Activation Test" to "Release".

INSPECTION PROCEDURE: P204F**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300726

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P204F has been detected in [Fault Information].

Has DTC P204F been detected?**YES**

Go to the DTC separate diagnosis of the DEF SCR system (DCU).

NO

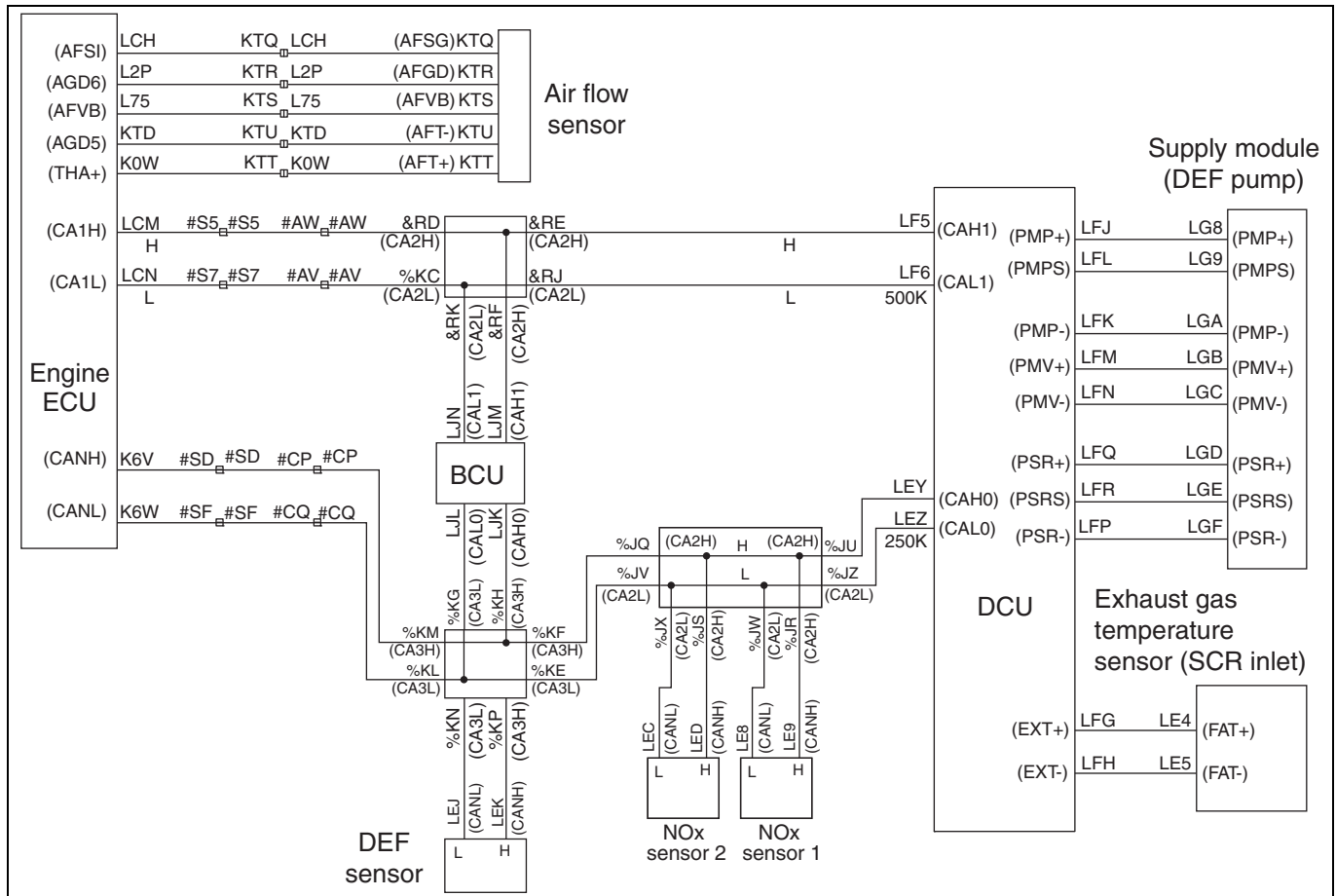
**Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P204F

DTC: P204F		Reductant System Performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if P204F has been detected in [Engine].	<p>DTC P204F has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Go to the DTC separate diagnosis of the DEF SCR system (DCU).	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P207F

EN01H16F01030F03001121

**P207F: Improper reductant
INFORMATION**

SAPH16F010300727

1. Technical description

- Judge deterioration of DEF by observing a drop in purification efficiency.
- Use the NOx sensors installed in the upstream and downstream of the SCR catalyst to calculate purification efficiency.
- Besides other factors, purification efficiency may drop due to the increase or decrease of DEF amount supplied to the sensing unit.

<Description of malfunction>

- Poor DEF solution quality is detected.

2. DTC set condition**(1) DTC detection condition**

Conditions below continues 60 seconds

500 kg/h ≤ Exhaust gas flow < 1,000 kg/h

280 °C {536 °F} ≤ SCR catalyst temperature. < 320 °C {608 °F}

0ppm ≤ NOx concentration (upstream.) < 200 ppm

(NOx (SCR upstream.) stable, and NOx (SCR downstream.) stable)

Burner deactivated

(2) Judgement criteria

1. Calculate Average NOx conversion efficiency from NOx sensor (upstream.) and (downstream.) and Exhaust gas mass flow

- Target NOx conversion efficiency (from DCU) – Average NOx conversion efficiency ≥ 0.457

2. Catalyst heat up (NH3 slip monitoring)

- Average NOx conversion efficiency (during catalyst heat up) > 0

3. Reset condition

- Immediately after normal operation is restored and SCR-related memory is reset.

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

- MIL: ON
- Diag lamp: ON (Poor DEF quality lamp)
- Engine output is restricted.
- Vehicle speed is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Vehicle does not speed up.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

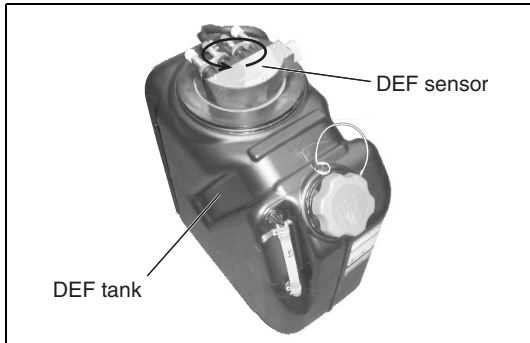
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- DEF: Improper reductant
- Malfunction of NOx sensor
- Malfunction of air flow sensor
- Malfunction of exhaust gas temperature sensor (SCR inlet)

INSPECTION PROCEDURE: P207F**1 Inspect the DEF concentration**

SAPH16F010300728

1. Measure DEF concentration.

Standard values**32.5 ± 2.5 %****Do the measurements meet the standard value?****YES****Go to step 2.****NO****Replace the DEF solution.**

If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, 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.

2 Perform a basic engine check

1. Perform a basic engine check using the ENGINE BASIC INSPECTION SHEET.

HINT

Refer to "ENGINE INSPECTION CHECK SHEET".

Was any failure found?**YES**

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

NO**Go to step 3.****3 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.

Was any failure found?

YES

NO

If damaged, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.

Go to step 4.

4 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

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 5.

5 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).

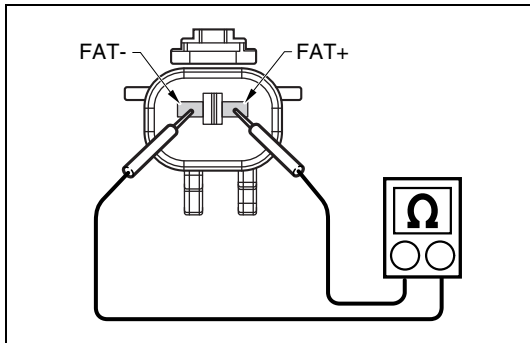
Was any failure found?

YES

NO

Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. Perform "After-inspection work" of INFORMATION section.

Go to step 6.

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

SAPH16F010300729

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 7.

NO

Replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

7 Check the DEF pipe (pump ↔ injector)

1. Check the DEF pipe (pressure line) and verify that there are no disconnections, clogging, corrosion, or cracks.

Was any failure found?

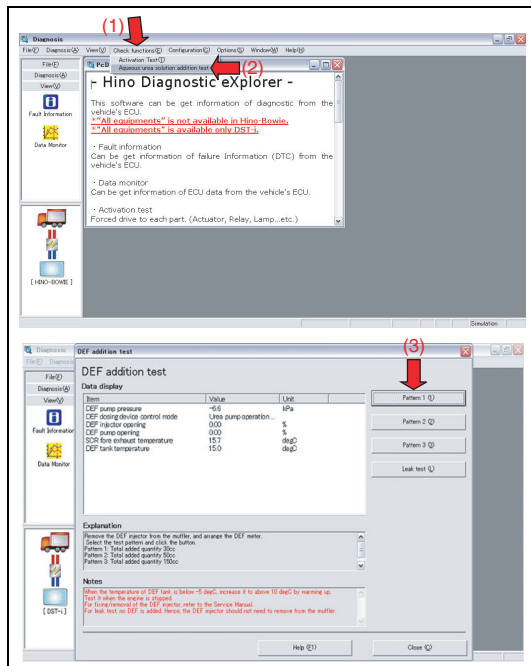
YES

Repair the faulty part.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 8.

8 Inspect the DEF injector 1 [Hino-DX]



SAPH16F010300730

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 the muffler.

HINT

Refer to the section "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.

3. Set the starter switch to the "ON" position.
4. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector.
<Inspection procedure>
(1) Select [Check functions].
(2) Select [DEF addition test].
(3) Perform addition test as instructed on the Hino-DX screen.
(Perform all three patterns)

NOTICE

When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.

HINT

Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.

Is operation normal?

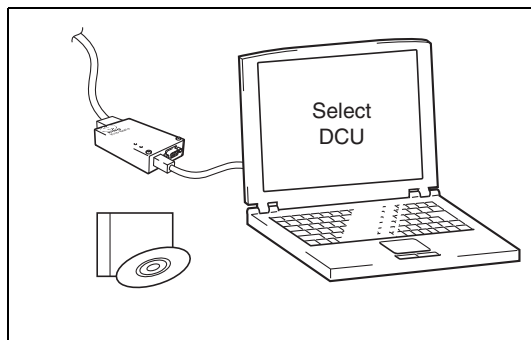
YES

Re-install the DEF injector onto the muffler.
Go to step 10.

NO

Go to step 9.

9 Inspect the DEF injector 2 [Hino-DX]



SAPH16F010300731

1. Set the starter switch to the "LOCK" position.
2. Replace the DEF injector with a new one. (Do not install it on the muffler.)
3. Set the starter switch to the "ON" position.
4. Perform DEF addition test as same as step 8.

Is operation normal?

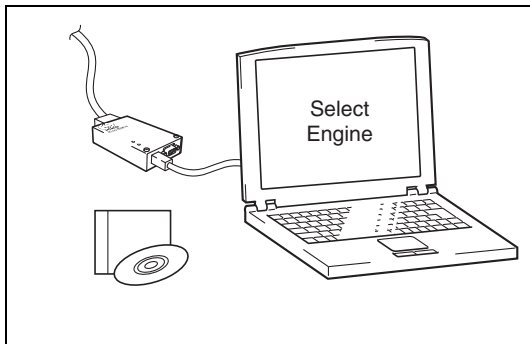
YES

Install the new injector on the muffler and complete the check.
After installing the injector, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.
Perform "After-inspection work" of INFORMATION section.

NO

Replace the DEF pipe (pressure line).
After replacing the pipe, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.
Perform "After-inspection work" of INFORMATION section.

10 Inspect the NOx sensor [Hino-DX]



SAPH16F010300732

1. Set the starter switch to the "LOCK" position.
2. Replace NOx sensor 1 and NOx sensor 2 with new sensors.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history.
5. Execute a forced DPR regeneration.
6. Select [Engine] and check if P207F has been detected in [Fault Information].

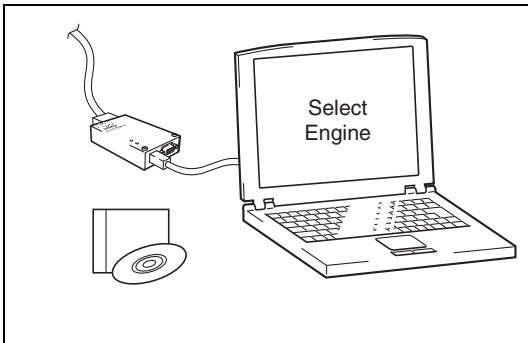
Has DTC P207F been detected?

YES

Go to step 11.

NO

Procedure completed.
(NOx sensor 1 and NOx sensor 2 are faulty.)
Perform "After-inspection work" of INFORMATION section.

11 Inspect the SCR catalyst [Hino-DX]

SAPH16F010300733

1. Set the starter switch to the "LOCK" position.
2. Replace the SCR catalyst.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history.
5. Execute a forced DPR regeneration.
6. Select [Engine] and check if P207F has been detected in [Fault Information].

Has DTC P207F been detected?**YES**

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

NO

**Procedure completed.
(SCR catalyst is faulty.)
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P207F

DTC: P207F		Improper reductant		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF concentration	Measure DEF concentration. <Standard values> 32.5 ± 2.5 %	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 2.	Replace the DEF solution. If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, 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.
2	Perform a basic engine check	Perform a basic engine check using the Engine Basic Check-sheet. HINT Refer to "ENGINE INSPECTION CHECK SHEET".	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	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.	Failure found: Go to YES. No failure found: Go to NO.		If damaged, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.

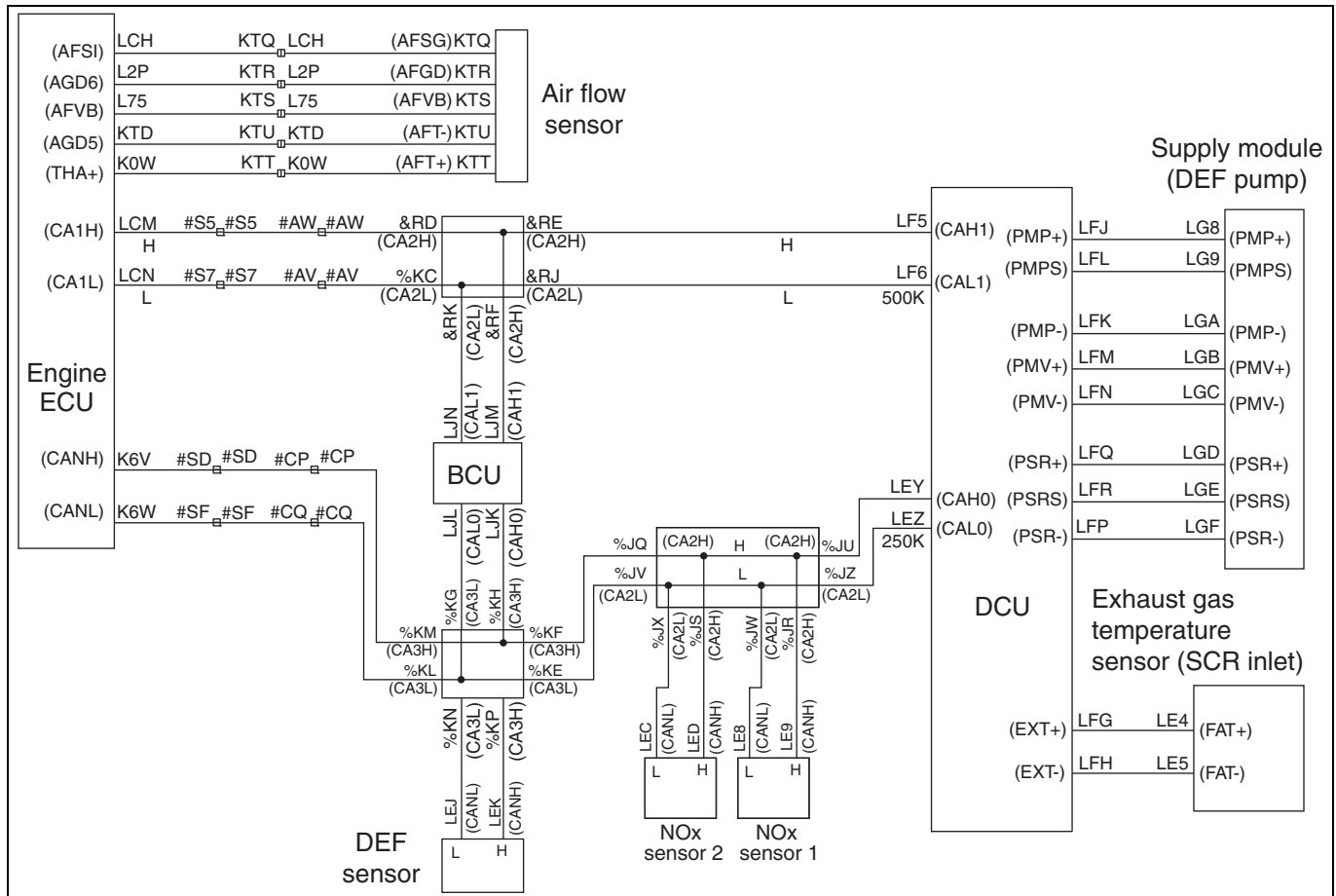
DTC: P207F		Improper reductant		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector. (Looseness and poor contact)	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 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). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the exhaust gas temperature sensor (SCR inlet) unit	Disconnect the exhaust gas temperature sensor (SCR inlet) connector and measure the resistance between the terminals of the sensor. (FAT+ – FAT-) <Standard values> 20 °C {68 °F}: 220 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
7	Check the DEF pipe (pump ↔ injector)	Check the DEF pipe (pressure line) and verify that there are no disconnections, clogging, corrosion, or cracks.	Failure found: Go to YES. No failure found: Go to NO.		Repair the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 8.

DTC: P207F		Improper reductant		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the DEF injector 1 [Hino-DX]	<p>Remove the DEF injector from the muffler and select [Check functions] on Hino-DX menu and check the operation of the DEF injector.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [DEF addition test]. (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)</p> <p>NOTICE When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.</p> <p>HINT Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.</p>	<p>Operation normal: Go to YES.</p> <p>Operation not normal: Go to NO.</p>		<p>Re-install the DEF injector onto the muffler. Go to step 10.</p>	<p>Go to step 9.</p>
9	Inspect the DEF injector 2 [Hino-DX]	<p>Replace the DEF injector with a new one (Do not install it on the muffler.) and perform DEF addition test as same as step 8.</p>	<p>Operation normal: Go to YES.</p> <p>Operation not normal: Go to NO.</p>		<p>Install the new injector on the muffler and complete the check. After installing the injector, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.</p>	<p>Re-install the DEF injector and replace the DEF pipe (pressure line). After replacing the pipe, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P207F		Improper reductant		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
10	Inspect the NOx sensor [Hino-DX]	Replace NOx sensor 1 and NOx sensor 2 with new sensors and erase the trouble history and execute a forced DPR regeneration. Check if P207F has been detected in [Engine].	DTC P207F has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 11.	Procedure completed. (NOx sensor 1 and NOx sensor 2 are faulty.) Perform "After-inspection work" of INFORMATION section.
11	Inspect the SCR catalyst [Hino-DX]	Replace the SCR catalyst and erase the trouble history and execute a forced DPR regeneration. Check if P207F has been detected in [Engine].	DTC P207F has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. (SCR catalyst is faulty.) Perform "After-inspection work" of INFORMATION section.

DTC: P20EE

EN01H16F01030F03001122

P20EE: NOx converting catalyst conversion efficiency
INFORMATION

SAPH16F010300734

1. Technical description

- Deterioration of SCR catalyst is determined by a drop in the purification efficiency.
- Purification efficiency is calculated by upstream and downstream NOx sensors.
- Besides other factors, purification efficiency may drop due to the increase or decrease of DEF amount supplied to the sensing unit.

<Description of malfunction>

- Deterioration of DEF SCR catalyst is detected.

2. DTC set condition**(1) DTC detection condition**

Conditions below continue for 60 seconds

500 kg/h ≤ Exhaust gas mass flow < 1,000 kg/h

210 °C {410 °F} ≤ SCR catalyst temperature < 260 °C {500 °F}, and

0 ppm ≤ NOx (SCR upstream) < 200 ppm

(NOx sensor (SCR upstream) stable and NOx sensor (SCR downstream) stable)

Burner deactivated

(2) Judgement criteria

- Calculate Average NOx conversion efficiency from NOx sensor (upstream.) and (downstream.) and Exhaust gas mass flow

Target NOx conversion efficiency (from DCU) – Average NOx conversion efficiency ≥ 1.0 (at SCR catalyst temperature = 200 °C {392 °F})

3. Reset condition

- Immediately after normal operation is restored and SCR-related memory is reset.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Faulty DEF solution reduction
- Harness disconnection or short-circuit
- NOx sensor failure
- Air flow sensor failure
- Exhaust gas temperature sensor (SCR inlet) failure
- SCR catalyst: miscalculation of adsorption amount or HC poisoning

INSPECTION PROCEDURE: P20EE

1	Check the DEF solution
----------	-------------------------------

1. Check the DEF solution concentration.

Standard values
32.5 ± 2.5 %

Do the measurements meet the standard value?

YES

Go to step 2.

NO

Replace the DEF solution.
If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, 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.

2	Perform a basic engine check [Hino-DX]
----------	---

1. Perform a basic engine check using the ENGINE BASIC INSPECTION SHEET (ENGINE INSPECTION CHECK SHEET).

Was any failure found?

YES

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

NO

Go to step 3.

3	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.

Was any failure found?

YES

If damaged, replace the air flow sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 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.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 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).

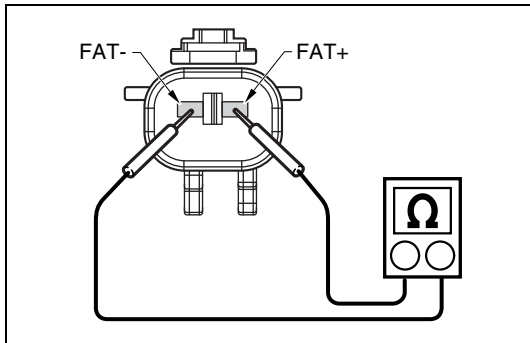
Was any failure found?

YES

Clean the exhaust gas temperature sensor (SCR inlet) and install it properly.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

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

SAPH16F010300735

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 7.

NO

Replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

7 Check the DEF pipe (pump ↔ injector)

1. Check the DEF pipe (pressure line) and verify that there are no disconnections, clogging, corrosion, or cracks.

Was any failure found?

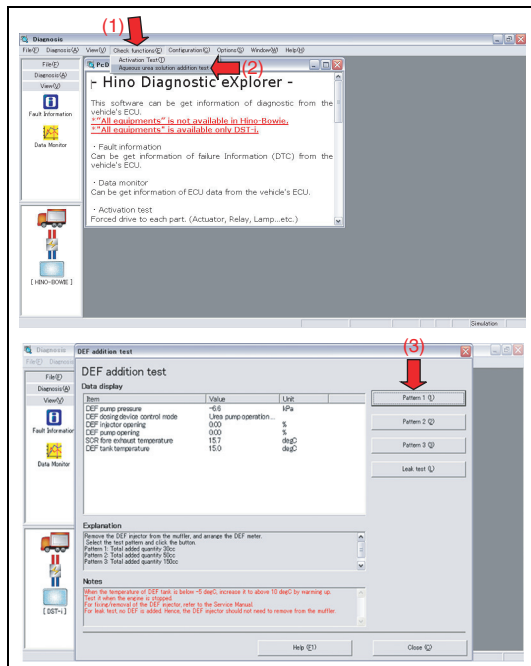
YES

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

NO

Go to step 8.

8 Inspect the DEF injector 1 [Hino-DX]



SAPH16F010300736

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 the muffler.

HINT

Refer to the section "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.

3. Set the starter switch to the "ON" position.
4. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector.
<Inspection procedure>
(1) Select [Check functions].
(2) Select [DEF addition test].
(3) Perform addition test as instructed on the Hino-DX screen.
(Perform all three patterns)

NOTICE

When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.

HINT

Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.

Is operation normal?

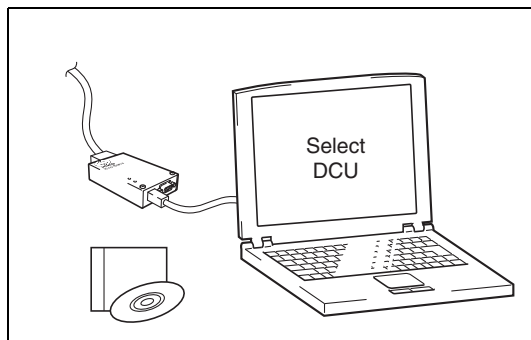
YES

Re-install the DEF injector on the muffler.
Go to step 10.

NO

Go to step 9.

9 Inspect the DEF injector 2 [Hino-DX]



SAPH16F010300737

1. Set the starter switch to the "LOCK" position.
2. Replace the DEF injector with a new one. (Do not install it on the muffler.)
3. Set the starter switch to the "ON" position.
4. Perform DEF addition test as same as step 8.

Is operation normal?

YES

Install the new injector on the muffler and complete the check.
After installing the injector, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.
Perform "After-inspection work" of INFORMATION section.

NO

Re-install the DEF injector and replace the DEF pipe (pressure line).
After replacing the pipe, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.
Perform "After-inspection work" of INFORMATION section.

10 Inspect the exhaust pipe

1. Make sure there is no soot leakage from the exhaust pipe outlet.

Was any failure found?

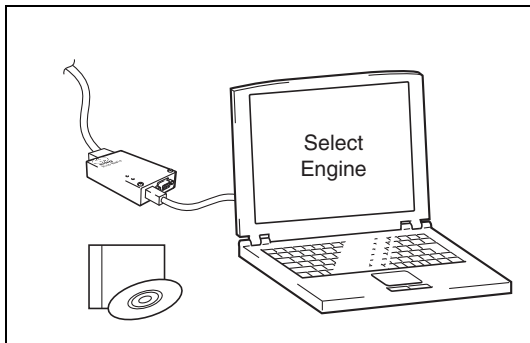
YES

Replace the DPR filter
After replacing the filter, execute a DPR manual regeneration and check if no DTC (P20EE) is detected.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

11 Inspect the NOx sensor [Hino-DX]



SAPH16F010300738

1. Set the starter switch to the "LOCK" position.
2. Replace NOx sensor 1 and NOx sensor 2 with new sensors.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history.
5. Execute a forced DPR regeneration.
6. Select [Engine] and check if P20EE has been detected in [Fault Information].

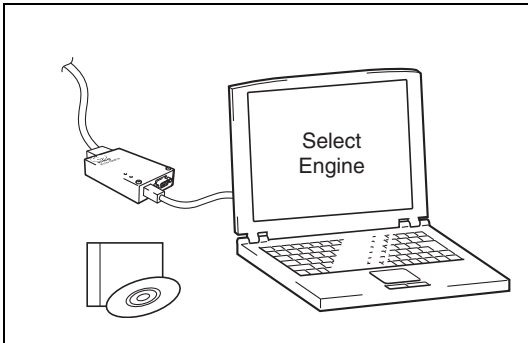
Has DTC P20EE been detected?

YES

Go to step 12.

NO

Procedure completed.
 (NOx sensor 1 and NOx sensor 2 are faulty.)
 Perform "After-inspection work" of INFORMATION section.

12 Inspect the SCR catalyst [Hino-DX]


SAPH16F010300739

1. Set the starter switch to the "LOCK" position.
2. Replace the SCR catalyst.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history.
5. Execute a forced DPR regeneration.
6. Select [Engine] and check if P20EE has been detected in [Fault Information].

Has DTC P20EE been detected?

YES

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

NO

Procedure completed.
 (SCR catalyst is faulty.)
 Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P20EE

DTC: P20EE		NOx converting catalyst conversion efficiency		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF	Measure DEF concentration. <Standard values> 32.5 ± 2.5 %	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 2.	Replace the DEF solution. If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, 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.
2	Perform a basic engine check [Hino-DX]	Perform a basic engine check using the Engine Basic Check-sheet.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	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.	Failure found: Go to YES. No failure found: Go to NO.		If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.

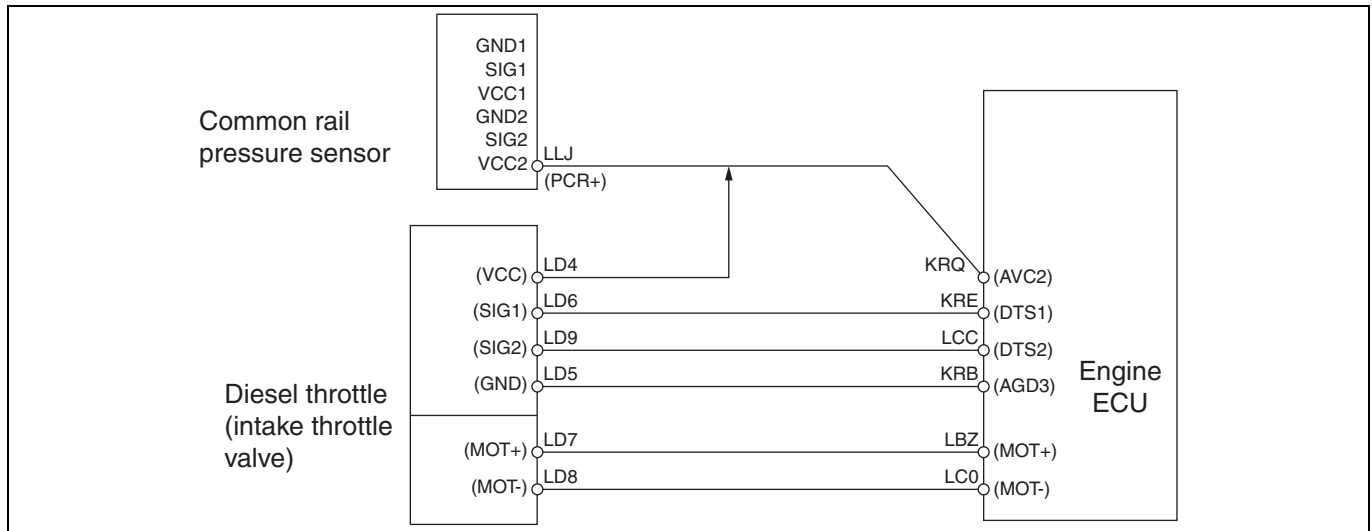
DTC: P20EE		NOx converting catalyst conversion efficiency		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 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). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the exhaust gas temperature sensor (SCR inlet) unit	Disconnect the exhaust gas temperature sensor (SCR inlet) connector and measure the resistance between the terminals of the sensor (FAT+ – FAT). <Standard values> 20 °C {68 °F}: 220 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
7	Check the DEF pipe (pump ↔ injector)	Check the DEF pipe (pressure line) and verify that there are no disconnections, clogging, corrosion, or cracks.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 8.

DTC: P20EE		NOx converting catalyst conversion efficiency		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the DEF injector 1 [Hino-DX]	<p>Replace the DEF injector with a new one (Do not install it on the muffler.) and re-select [Check functions] on Hino-DX menu and check the operation of the DEF injector.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [DEF addition test]. (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)</p> <p>NOTICE When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.</p> <p>HINT Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.</p>	<p>Operation normal: Go to YES.</p> <p>Operation not normal: Go to NO.</p>		<p>Install the new injector on the muffler. Go to step 10.</p>	<p>Go to step 9.</p>
9	Inspect the DEF injector 2 [Hino-DX]	<p>Replace the DEF injector with a new one (Do not install it on the muffler.) and perform DEF addition test as same as step 8.</p>	<p>Operation normal: Go to YES.</p> <p>Operation not normal: Go to NO.</p>		<p>Install the new injector on the muffler and complete the check. After installing the injector, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.</p>	<p>Re-install the DEF injector and replace the DEF pipe (pressure line). After replacing the pipe, idle the engine (for about 10 min.) and on Hino-DX (Data Monitor) verify that the DEF solution is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P20EE		NOx converting catalyst conversion efficiency		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
10	Inspect the exhaust pipe	Make sure there is no soot leakage from the exhaust pipe outlet.	Failure found: Go to YES. No failure found: Go to NO.		Replace the DPR filter. After replacing the filter, execute a DPR manual regeneration and check if no DTC (P20EE) is detected. Perform "After-inspection work" of INFORMATION section.	Go to step 11.
11	Inspect the NOx sensor [Hino-DX]	<ol style="list-style-type: none"> 1. Replace NOx sensor 1 and NOx sensor 2 with new sensors and erase the trouble history and execute a forced DPR regeneration. 2. Check if P20EE has been detected in [Engine]. 	DTC P20EE has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 12.	Procedure completed. (NOx sensor 1 and NOx sensor 2 are faulty.) Perform "After-inspection work" of INFORMATION section.
12	Inspect the SCR catalyst [Hino-DX]	<ol style="list-style-type: none"> 1. Replace the SCR catalyst and erase the trouble history and execute a forced DPR regeneration. 2. Check if P20EE has been detected in [Engine]. 	DTC P20EE has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. (SCR catalyst is faulty.) Perform "After-inspection work" of INFORMATION section.

DTC: P2100

EN01H16F01030F03001123

P2100: DC motor for intake throttle valve - circuit (Open circuit (circuit low))
INFORMATION

SAPH16F010300740

1. Technical description

- The diesel throttle (intake throttle) is of the butterfly type by DC motor driving.

<Description of malfunction>

- Possible diesel throttle unit failure or harness GND short-circuit/disconnection

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 8 V to 16 V.
- There must be no disconnection in the harness connecting to the diesel throttle (intake throttle).

(2) Judgement criteria

- The diesel throttle (intake throttle) drive current has continued to be below 0.3 A for six seconds.

3. Reset condition

- After normal operation is restored and engine is restarted after engine stall.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Abnormality of the battery or relay.
- Looseness or unsteady movement of diesel throttle connector.
- Harness disconnection/GND short-circuit between diesel throttle and engine ECU.

HINT

You can check the diesel throttle (intake throttle) for mechanical damage by checking if the diesel throttle (intake throttle valve) is actuated when starter switch is turned ON and then LOCK without starting the engine.

INSPECTION PROCEDURE: P2100

1 Inspect the diesel throttle connector

1. Check the connection of the diesel throttle connector (Looseness and poor contact).

Was any failure found?

YES

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the diesel throttle

1. Disconnect the diesel throttle from the vehicle and confirm that there is no damage due to snagging or incursion of foreign substances.

Was any failure found?

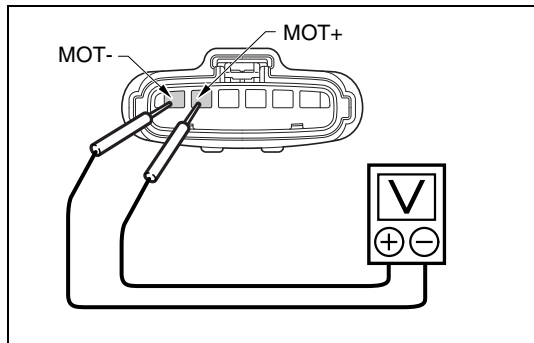
YES

Clean the diesel throttle. If necessary, replace it. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the diesel throttle power supply



SAPH16F010300741

1. Set the starter switch to the "LOCK" position.
2. Disconnect the diesel throttle connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage of the diesel throttle vehicle-side connector terminals.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Diesel throttle vehicle-side connector MOT+ – MOT-	8 – 16 V

Do the measurements meet the standard value?

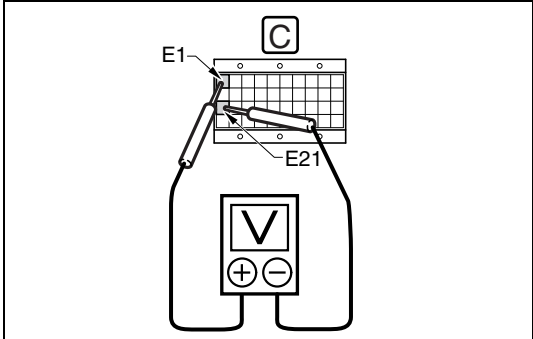
YES

NO

Go to step 5.

Go to step 4.

4 Inspect the diesel throttle power supply harness



SAPH16F010300742

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) MOT+(E1) – MOT-(E21)	8 – 16 V

Do the measurements meet the standard value?

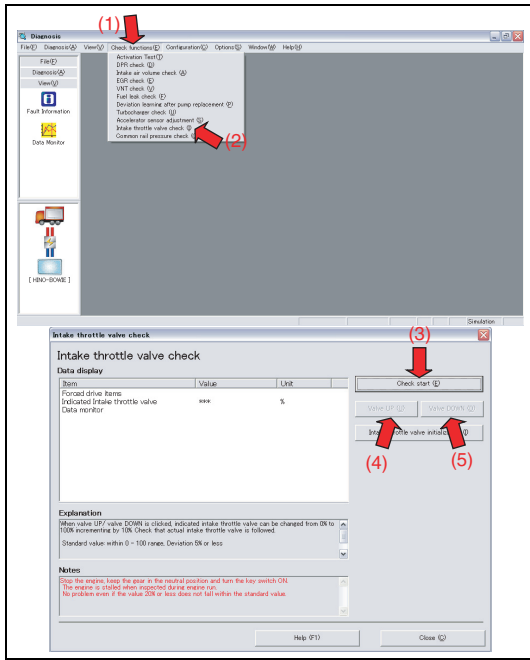
YES

NO

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

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

5 Check the operation of the diesel throttle [Hino-DX]



SAPH16F010300743

1. Connect the diesel throttle connector.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Check functions] from the menu and check the operation of the diesel (intake) throttle valve.

CAUTION

- **Make sure the engine is stopped; otherwise, the engine may be damaged.**

<Inspection procedure>

- (1) Select [Check functions].
 - (2) Select [Intake throttle valve check].
 - (3) Click [Check start].
 - (4) Select [Valve UP].
 - (5) Select [Valve DOWN].
- Check the operation of the throttle valve.
 - Check the operation of the throttle valve.

HINT

- **The throttle valve opening position changes of around 10 % per step between 0 – 100 %.**

Is the throttle valve operating normally?

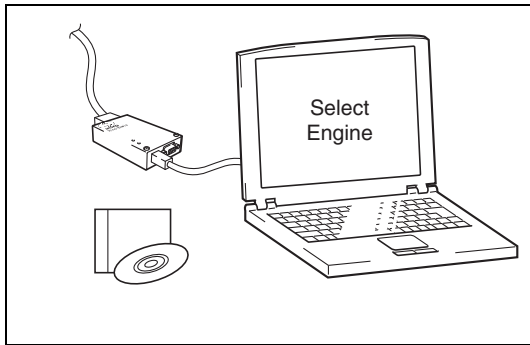
YES

Go to step 6.

NO

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

6 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300744

1. Warm-up the engine (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine.
3. Select [Engine] and check if P2100 has been detected in [Fault Information].

Has DTC P2100 been detected?

YES

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

NO

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

CHECKLIST: P2100

DTC: P2100		DC motor for intake throttle valve - circuit (Open circuit (circuit low))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the diesel throttle connector	Check the connection of the diesel throttle connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the diesel throttle	Disconnect the diesel throttle from the vehicle and confirm that there is no damage due to snagging or incursion of foreign substances.	Failure found: Go to YES. No failure found: Go to NO.		Clean the diesel throttle. If necessary, replace it. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the diesel throttle power supply	Measure the voltage of the diesel throttle vehicle-side connector terminals MOT+ and MOT-. <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Go to step 4.
4	Inspect the diesel throttle power supply harness	Measure the voltage between the terminals MOT+ and MOT- of the engine ECU (signal check harness). <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.	Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.

DTC: P2100		DC motor for intake throttle valve - circuit (Open circuit (circuit low))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the operation of the diesel throttle [Hino-DX]	<p>Select [Check functions] in Hino-DX menu and check the operation of the diesel (intake) throttle valve.</p> <p>⚠ CAUTION Make sure the engine is stopped; otherwise, the engine may be damaged.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [Intake throttle valve check]. (3) Click [Check start]. (4) Select [Valve UP]:</p> <ul style="list-style-type: none"> • Check the operation of the throttle valve. <p>(5) Select [Valve DOWN]:</p> <ul style="list-style-type: none"> • Check the operation of the throttle valve. <p>HINT The throttle valve opening position changes of around 10 % per step between 0 – 100 %.</p>	<p>Operation normal: Go to YES.</p> <p>Operation not normal: Go to NO.</p>		Go to step 6.	Replace the diesel throttle. Perform "After-inspection work" of INFORMATION section.
6	Check the DTC detected (Engine ECU) [Hino-DX]	Perform engine warm-up (engine coolant temperature: 60 °C {140 °F} or more), and check if P2100 has been detected in [Engine].	<p>DTC P2100 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2101

EN01H16F01030F03001124

P2101: Intake throttle valve - functional INFORMATION

1. Technical description

- Increase temperature during DPR automatic regeneration by throttling intake air utilizing Intake throttle.
- Assist engine stop by closing when starter switch is off.

<Description of malfunction>

- Stuck diesel throttle is detected.

2. DTC set condition

(1) DTC detection condition

- Stable operational condition
 - Engine revolution fluctuation range less than 20 r/min
 - Engine injection quantity fluctuation range less than 2 mm³/st. cyl
- Normal intake throttle circuit
- Continuation of the above condition for 10 seconds

(2) Judgement criteria

- Difference between Actual and Target is more than $\pm 10\%$ for 80 seconds

3. Reset condition

- After normal operation is restored and engine is restarted after engine stall.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Idling stop system is not available.
- Cruise control function is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.
- Idling stop system does not work.
- Cruise control does not work.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

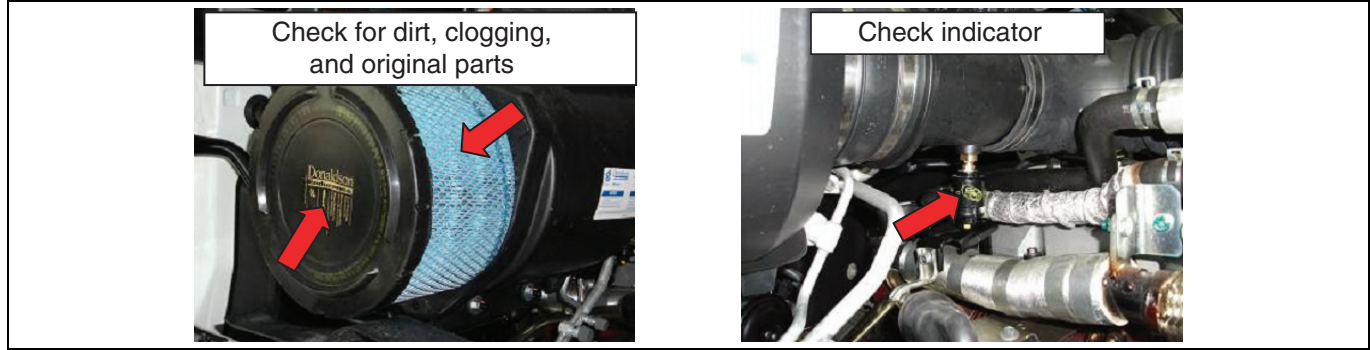
- Air cleaner: Restricted
- Air hose:
 - Collapsed
 - Loose or leaking
- Body of throttle:
 - Excessive dirt inside body of diesel throttle

- Throttle valve malfunction
- Battery: Decrease in voltage
- Harnesses:
 - Decrease in source voltage
 - Short-circuit to GND

INSPECTION PROCEDURE: P2101

1 Inspect the air cleaner element

1. Check the air cleaner element for dirt or damage, and make sure the replacement period has not expired.



SAPH16F010300745

Was any failure found?

YES

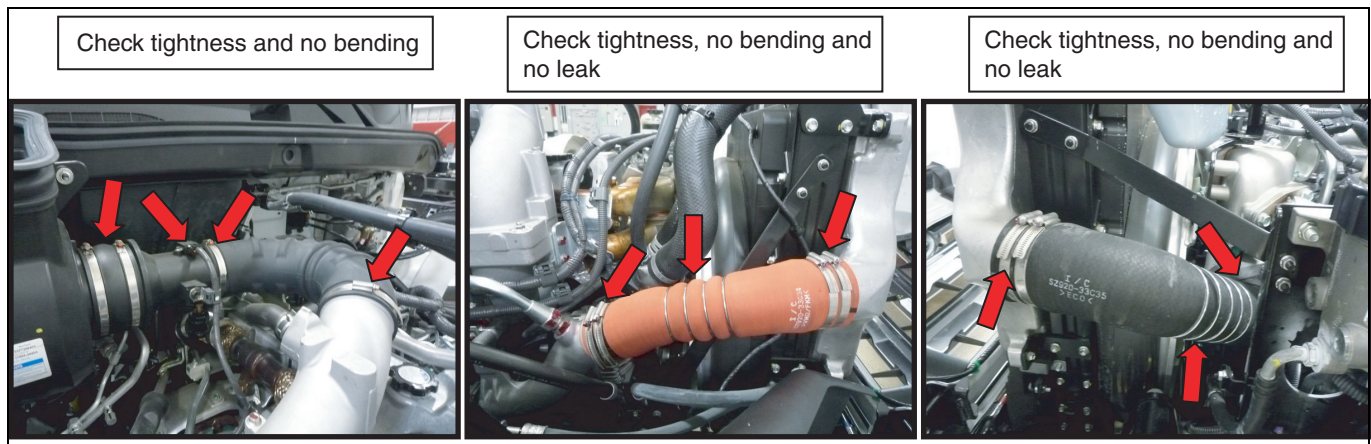
NO

Clean or replace the air cleaner element. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the air hose and air pipe

1. Check that the air hose and pipe have no disconnections, clogging, ruptures, or cracks.



SAPH16F010300746

Was any failure found?

YES

Repair or replace the air hose and air pipe.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the exhaust muffler (exhaust pipe)

1. Check that the exhaust muffler (exhaust pipe) has not disconnections, clogging, ruptures, or cracks.

Was any failure found?

YES

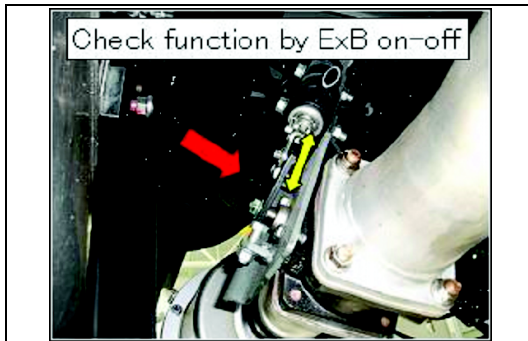
Repair or replace the muffler (pipe).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the exhaust brake valve

1. Make sure the exhaust brake valve does not snag or stick.



SAPH16F010300747

Was any failure found?

YES

Clean the exhaust brake valve. If necessary, replace the exhaust brake valve.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the diesel throttle

1. Make sure there are no foreign substances (oil, soot, etc.) stuck to the interior of the intake air passageway.

Was any failure found?

YES

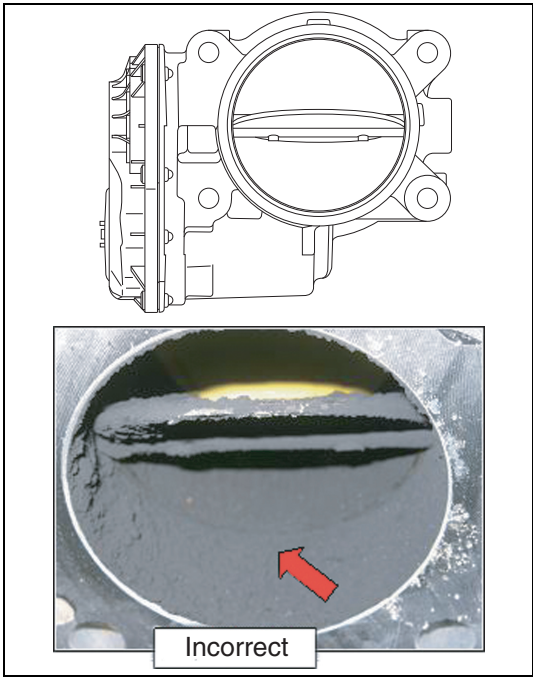
NO

Clean the intake passage. Perform "After-inspection work" of INFORMATION section.

Go to step 6.

6 Inspect the diesel throttle

1. Disconnect the diesel throttle from the vehicle and confirm that it does not snag or is damaged due to the incursion of foreign substances. (The throttle valve can be manually moved when it is not energized.)
2. Make sure there is no looseness between the throttle valve and shaft.



SAPH16F010300748

Was any failure found?

YES

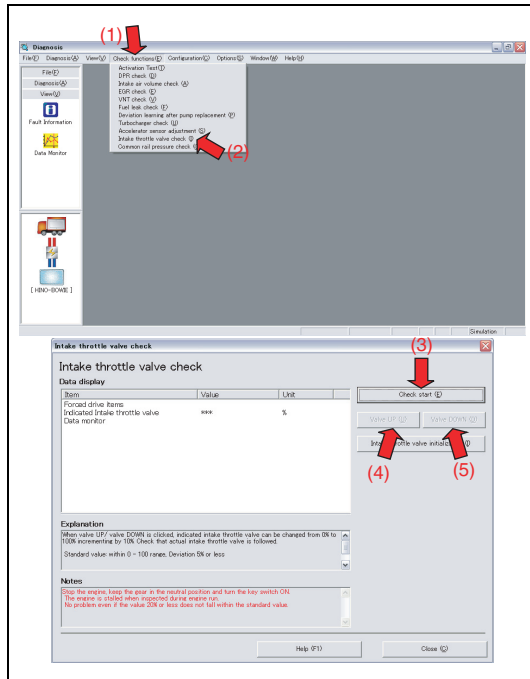
NO

Clean the diesel throttle. If necessary, replace the diesel throttle. Perform "After-inspection work" of INFORMATION section.

Go to step 7.

7

Check the operation of the diesel throttle valve [Hino-DX]



SAPH16F010300749

1. Select [Check functions] from the menu and check the operation of the diesel (intake) throttle valve.

⚠ **CAUTION**

- Make sure the engine is stopped; otherwise, the engine may be damaged.

<Inspection procedure>

- (1) Select [Check functions].
- (2) Select [Intake throttle valve check].
- (3) Click [Check start].
- (4) Select [Valve UP].
 - Check the operation of the throttle valve.
- (5) Select [Valve DOWN].
 - Check the operation of the throttle valve.

HINT

- The throttle valve opening position changes of around 10 % per step between 0 – 100 %.

Is the throttle valve operating normally?

YES

Check that again that P2101 is not detected to complete the inspection procedure. Perform "After-inspection work" of INFORMATION section.

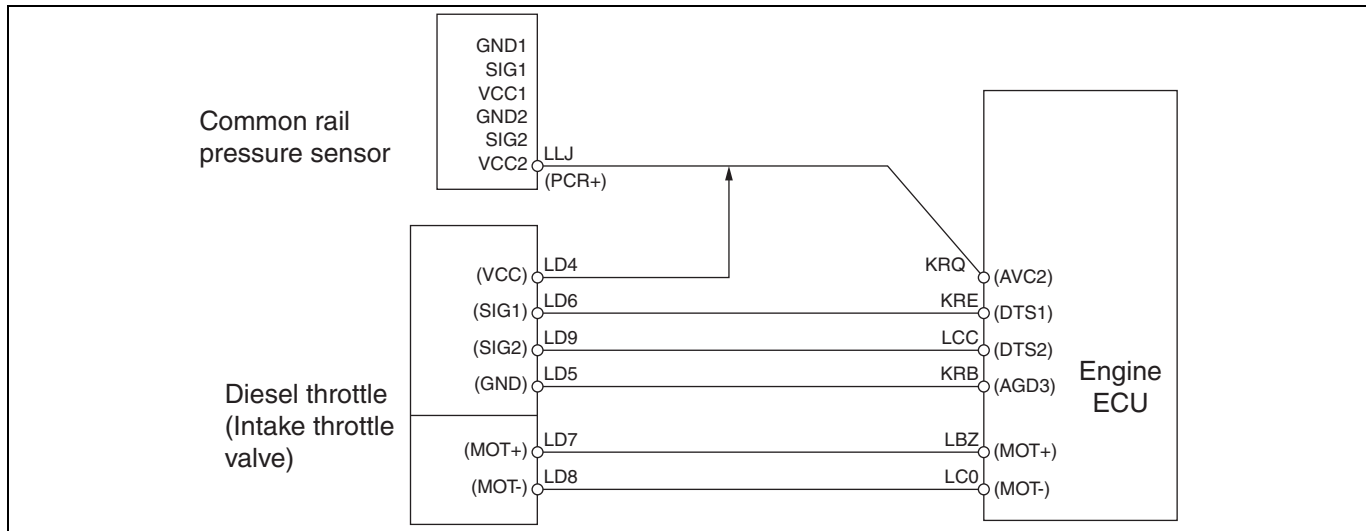
NO

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

CHECKLIST: P2101

DTC: P2101		Intake throttle valve - functional		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the air cleaner element	Check the air cleaner element for dirt or damage, and make sure the replacement period has not expired.	Failure found: Go to YES. No failure found: Go to NO.		Clean or replace the air cleaner element. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the air hose and air pipe	Check that the air hose and pipe have no disconnections, clogging, ruptures, or cracks.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the air hose and air pipe. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the exhaust muffler (exhaust pipe)	Check that the air hose and pipe have no disconnections, clogging, ruptures, or cracks.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the muffler (pipe). Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the exhaust brake valve	Make sure the exhaust brake valve does not snag or stick.	Failure found: Go to YES. No failure found: Go to NO.		Clean the valve. If necessary, replace the valve. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the diesel throttle	Make sure there are no foreign substances (oil, soot, etc.) stuck to the interior of the intake air passageway.	Failure found: Go to YES. No failure found: Go to NO.		Clean the intake passage. Perform "After-inspection work" of INFORMATION section.	Go to step 6.

DTC: P2101		Intake throttle valve - functional		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
6	Inspect the diesel throttle	<ol style="list-style-type: none"> 1. Disconnect the diesel throttle from the vehicle and confirm that it does not snag or is damaged due to the incursion of foreign substances. (The throttle valve can be manually moved when it is not energized.) 2. Make sure there is no looseness between the throttle valve and shaft. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the diesel throttle. If necessary, replace the diesel throttle. Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Check the operation of the diesel throttle valve [Hino-DX]	<p>Select [Check functions] in Hino-DX menu and check the operation of the diesel (intake) throttle valve.</p> <p>⚠ CAUTION Make sure the engine is stopped; otherwise, the engine may be damaged.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [Intake throttle valve check]. (3) Click [Check start]. (4) Select [Valve UP]:</p> <ul style="list-style-type: none"> • Check the operation of the throttle valve. <p>(5) Select [Valve DOWN]:</p> <ul style="list-style-type: none"> • Check the operation of the throttle valve. <p>HINT The throttle valve opening position changes of around 10 % per step between 0 – 100 %.</p>	<p>Throttle valve operation normal: Go to YES.</p> <p>Operation not normal: Go to NO.</p>		Check that again that P2101 is not detected to complete the inspection procedure. Perform "After-inspection work" of INFORMATION section.	Replace the diesel throttle valve. Perform "After-inspection work" of INFORMATION section.

DTC: P2103**P2103: DC motor for intake throttle valve - circuit (Short circuit (circuit high))****INFORMATION**

SAPH16F010300750

1. Technical description

- The diesel throttle (intake throttle) is of the butterfly type by DC motor driving.

<Description of malfunction>

- Detection of +B short-circuit in the diesel throttle harness.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 8 V to 16 V.
- There must be no disconnection in the harness that is connected to the intake throttle.

(2) Judgement criteria

- The diesel throttle (intake throttle) drive current has continued to be above 12 A for 112 msec.

3. Reset condition

- After normal operation is restored and engine is restarted after engine stall.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

Overvoltage applied to diesel throttle (intake throttle)

Abnormality in battery voltage

Water intrusion inside the harness between the diesel throttle and the engine ECU.

Extra electronic hardware is connected.

HINT

You can check the diesel throttle for mechanical damage by checking if the diesel throttle (intake throttle valve) is actuated when starter switch is turned ON and then LOCK without starting the engine.

INSPECTION PROCEDURE: P2103

1 Inspect the diesel throttle connector

1. Check the connection of the diesel throttle connector (Looseness and poor contact).

Was any failure found?

YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the diesel throttle

1. Disconnect the diesel throttle from the vehicle and confirm that there is no damage due to snagging or incursion of foreign substances.

Was any failure found?

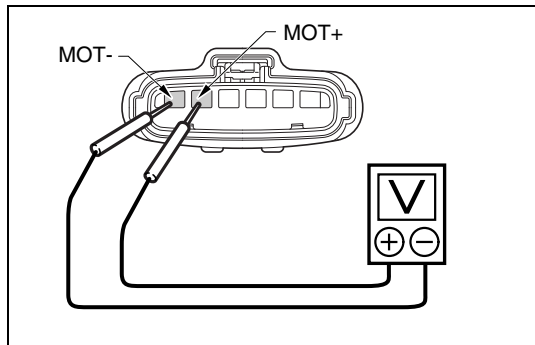
YES

NO

Clean the diesel throttle. If necessary, replace the diesel throttle. Perform "After-inspection work" of INFORMATION section.

Go to step 3.

3 Inspect the diesel throttle power supply



SAPH16F010300751

1. Set the starter switch to the "LOCK" position.
2. Disconnect the diesel throttle connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage of the diesel throttle vehicle-side connector terminals.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Diesel throttle vehicle-side connector MOT+ – MOT-	8 – 16 V

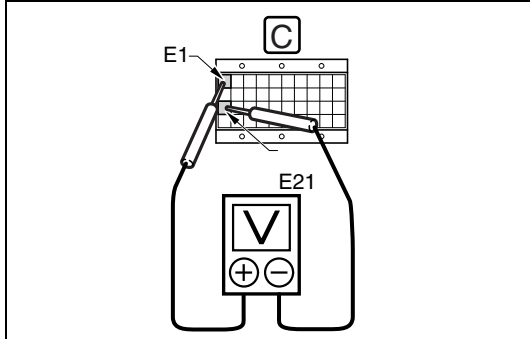
Do the measurements meet the standard value?

YES

Go to step 5.

NO

Go to step 4.

4 Inspect the diesel throttle power supply harness

SAPH16F010300752

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the engine ECU (signal check harness) terminals.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) MOT+(E1) – MOT-(E21)	8 – 16 V

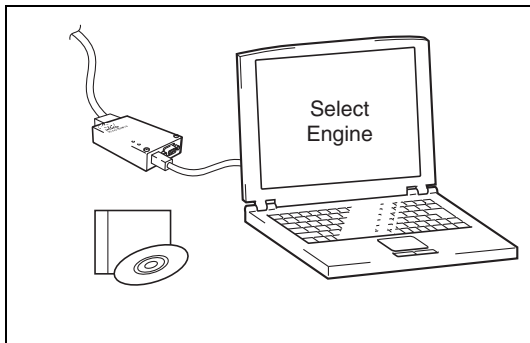
Do the measurements meet the standard value?

YES

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

NO

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

5 Check the operation of the diesel throttle [Hino-DX]

SAPH16F010300753

1. Connect the diesel throttle.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Activation Test] and check the operation of the diesel throttle valve.

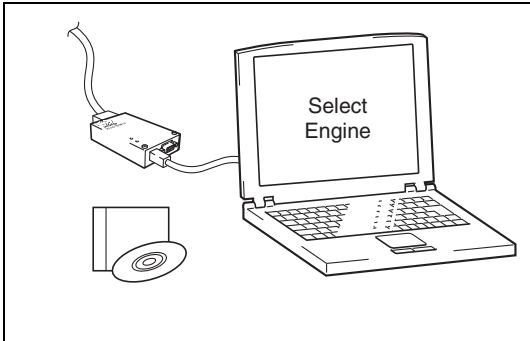
Did the diesel throttle activate properly?

YES

Go to step 6.

NO

Replace the diesel throttle.
Perform "After-inspection work" of INFORMATION section.

6 Inspect the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300754

1. Warm-up the engine (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine.
3. Select [Engine] and check if P2103 has been detected in [Fault Information].

Has DTC P2103 been detected?**YES**

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

NO

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

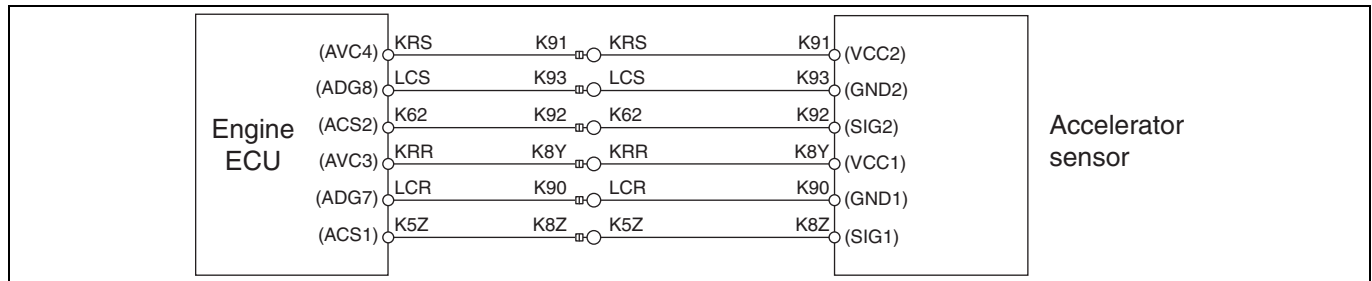
CHECKLIST: P2103

DTC: P2103		DC motor for intake throttle valve - circuit (Short-circuit (circuit high))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the diesel throttle connector	Check the connection of the diesel throttle connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the diesel throttle	Disconnect the diesel throttle from the vehicle and confirm that there is no damage due to snagging or incursion of foreign substances.	Failure found: Go to YES. No failure found: Go to NO.		Clean the diesel throttle. If necessary, replace the diesel throttle. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the diesel throttle power supply	Disconnect the diesel throttle connector and measure the voltage of the diesel throttle vehicle-side connector terminals. (MOT+ – MOT-) <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Go to step 4.
4	Inspect the diesel throttle power supply harness	Connect the signal check harness to the engine ECU and measure the voltage between the engine ECU (signal check harness) terminals. {MOT+(E1) – MOT-(E21)} <Standard values> 8 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.	Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.
5	Check the operation of the diesel throttle [Hino-DX]	Connect the diesel throttle and select [Activation Test] and check the operation of the diesel throttle valve.	Operation normal: Go to YES. Operation not normal: Go to NO.		Go to step 6.	Replace the diesel throttle. Perform "After-inspection work" of INFORMATION section.

DTC: P2103		DC motor for intake throttle valve - circuit (Short-circuit (circuit high))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
6	Inspect the DTC detected (Engine ECU) [Hino-DX]	<ol style="list-style-type: none"> 1. Warm-up the engine (engine coolant temperature: 60 °C {140 °F} or more) 2. Check if P2103 has been detected in [Engine]. 	<p>DTC P2103 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2120

EN01H16F01030F03001126

**P2120: Throttle/Pedal Position Sensor/Switch "D" Circuit
INFORMATION**

SAPH16F010300755

1. Technical description

- -

<Description of malfunction>

- Neither of accelerator sensors are properly functioning.

2. DTC set condition**(1) DTC detection condition**

- Engine ECU power supply voltage is in the range of 10 V to 16 V.
- Starter switch ON.
- Engine running or starter LOCK

(2) Judgement criteria

- Both sensors are out of order at the same time.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Cruise control function is not available.
- Idling stop system is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Cruise control does not work.
- Idling stop system does not work.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

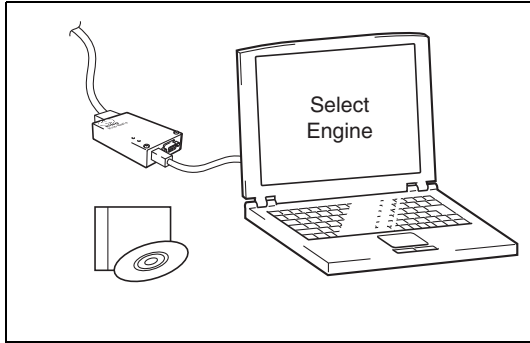
7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

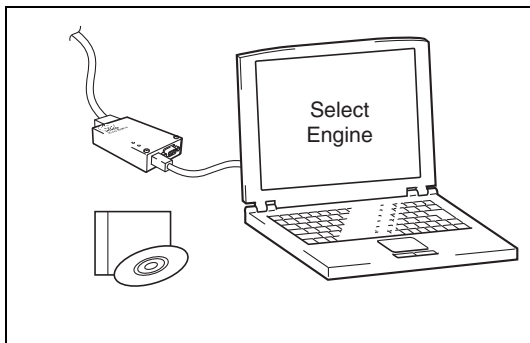
- Malfunction of both sensors
- Malfunction of engine ECU

- Harness disconnection or short-circuit

INSPECTION PROCEDURE: P2120**1 Check the DTC detected (Engine ECU) 1 [Hino-DX]**

SAPH16F010300756

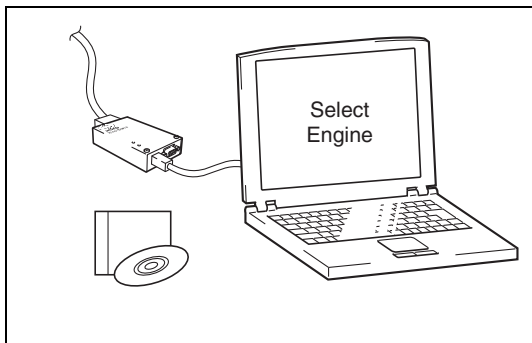
1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if P2120 (for example, P2122, P2123, P2127, P2128) has been detected in [Fault Information].

Has a DTC other than P2120 been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 2.****2 Check the DTC detected (Engine ECU) 2 [Hino-DX]**

SAPH16F010300757

1. Set the starter switch to the "LOCK" position.
2. Replace a new accelerator sensor.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P2120 has been detected in [Fault Information].

Has DTC P2120 been detected?**YES****Restore the accelerator sensor to its original condition and then go to step 3.****NO****Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

3 Check the DTC detected (Engine ECU) 3 [Hino-DX]

SAPH16F010300758

1. Set the starter switch to the "LOCK" position.
2. Replace a new engine ECU.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P2120 has been detected in [Fault Information].

Has DTC P2120 been detected?**YES**

**Inspect the accelerator sensor harness.
Perform "After-inspection work" of INFORMATION section.**

NO

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

CHECKLIST: P2120

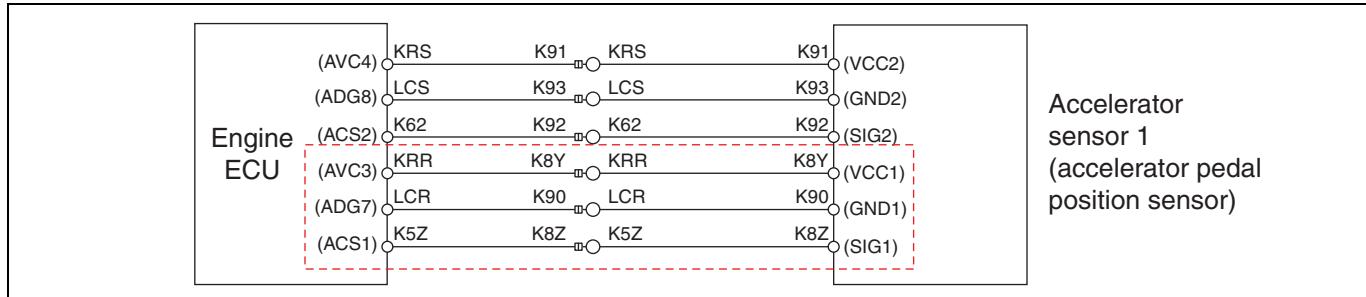
DTC: P2120		Throttle/Pedal Position Sensor/Switch "D" Circuit		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) 1 [Hino-DX]	Check if any DTC other than P2120 (for example P2122, P2123, P2127, P2128) has been detected in [Engine].	DTC other than P2120 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Check the DTC detected (Engine ECU) 2 [Hino-DX]	Replace the accelerator sensor with a new one, and check if P2120 detected in [Fault Information].	DTC P2120 has been detected: Go to YES. No DTC has been detected: Go to NO.		Restore the accelerator sensor to its original condition and then go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Check the DTC detected (Engine ECU) 3 [Hino-DX]	Replace the engine ECU with a new one, and check if P2120 detected in [Fault Information].	DTC P2120 has been detected: Go to YES. No DTC has been detected: Go to NO.		Inspect the accelerator sensor harness. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2122 and P2123

EN01H16F01030F03001127

P2122: Accelerator pedal position sensor 1 - out of range (Out of range low)

INFORMATION



SAPH16F010300759

1. Technical description

- -

<Description of malfunction>

- The accelerator sensor 1 cannot correctly sense.

2. DTC set condition

(1) Check conditions

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped (stalled) or runs at 500 r/min or higher for continuous 5 seconds or longer.

(2) Judgement criteria

- Accelerator sensor 1 (accelerator pedal position sensor) voltage ≤ 0.6 V (-15.4 %)
- Failure timer ≥ 1 second

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Cruise control function is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Cruise control does not work.

<Symptoms on the vehicle due to malfunction>

- Cruise control does not work.

6. Pre-inspection work

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

7. After-inspection work

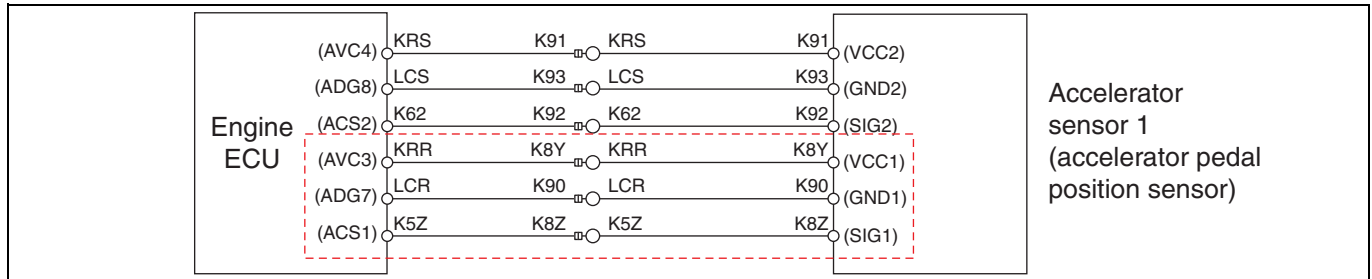
- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Malfunction of sensor 1
- Malfunction of engine ECU

P2123: Accelerator pedal position sensor 1 - out of range (Out of range high)

INFORMATION



SAPH16F010300760

1. Technical description

- -

<Description of malfunction>

- The accelerator sensor 1 cannot correctly sense.

2. DTC set condition

(1) Check conditions

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.

(2) Judgement criteria

- Accelerator sensor 1 (accelerator pedal position sensor) voltage ≥ 4.1 V (147 %)
- Failure timer ≥ 1 second

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Cruise control function is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Cruise control does not work.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Malfunction of sensor 1
- Malfunction of engine ECU

INSPECTION PROCEDURE: P2122 and P2123

1 Inspect the accelerator sensor 1 connector

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

Was any failure found?

YES

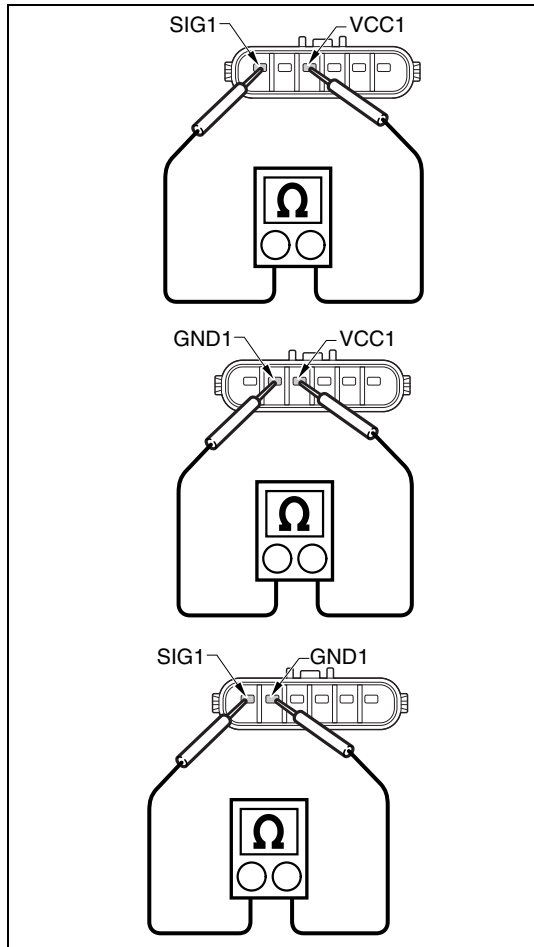
NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the accelerator sensor 1 unit

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



SAPH16F010300761

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Accelerator sensor 1 VCC1 – SIG1 VCC1 – GND1 SIG1 – GND1	2 Ω

Do the measurements meet the standard value?

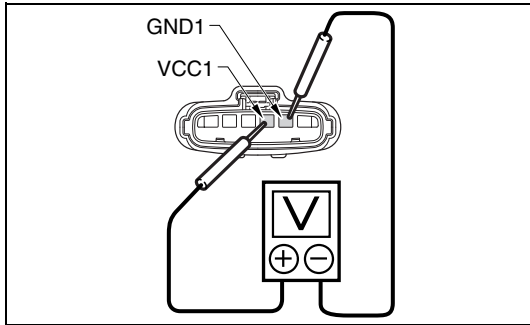
YES

NO

Go to step 3.

Replace the accelerator sensor 1. Perform "After-inspection work" of INFORMATION section.

3 Inspect the power supply of the accelerator sensor 1



SAPH16F010300762

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

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Accelerator sensor 1 vehicle-side connector VCC1 – GND1	4.5 – 5.5 V

Do the measurements meet the standard value?

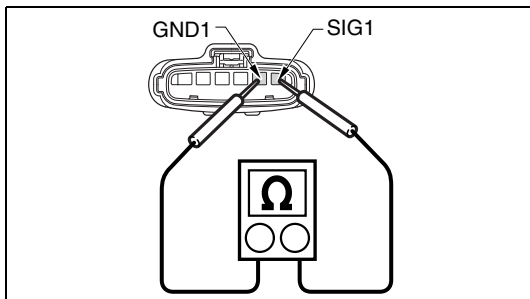
YES

NO

Go to step 4.

Go to step 5.

4 Inspect the signal circuit of the accelerator sensor 1



SAPH16F010300763

1. Set the starter switch to the "LOCK" position.
2. Use the electrical tester to measure the resistance the terminals of the accelerator sensor vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Accelerator sensor 1 vehicle-side connector SIG1 – GND1	25 – 35 kΩ

Do the measurements meet the standard value?

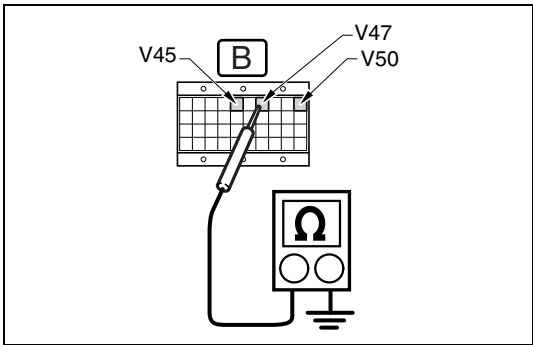
YES

NO

Go to step 7.

Go to step 5.

5 Inspect for short-circuit of the accelerator sensor 1 harness



SAPH16F010300764

1. Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect the harness to the ECU.)
2. 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) ADG7(V45) – Ground ACS1(V47) – Ground AVC3(V50) – Ground	$\infty \Omega$

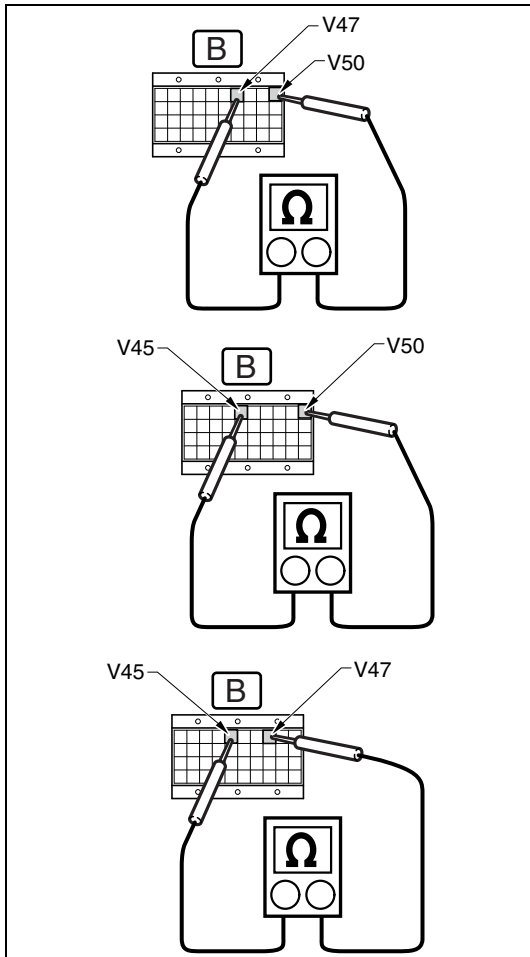
Do the measurements meet the standard value?

YES

Go to step 6.

NO

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

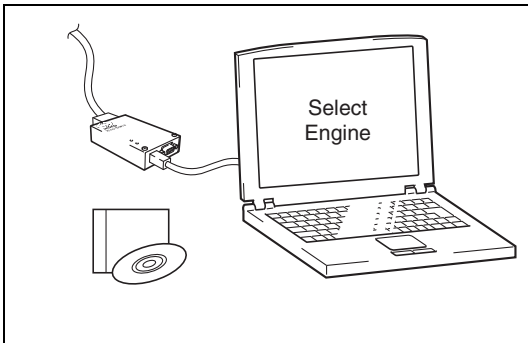
6 Inspect disconnection of the accelerator sensor 1 harness


SAPH16F010300765

1. Connect the accelerator sensor 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) AVC3(V50) – ACS1(V47) AVC3(V50) – ADG7(V45) ACS1(V47) – ADG7(V45)	2 Ω

Do the measurements meet the standard value?
YES
Go to step 7.
NO
**Repair or replace the harness.
Perform "After-inspection work" of INFORMATION section.**

7 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300766

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if the DTC (P2122 or P2123) has been detected in [Fault Information].

Has DTC (P2122 or P2123) been detected?**YES**

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

NO

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

CHECKLIST: P2122 and P2123

DTC: P2122		Accelerator pedal position sensor 1 - out of range (Out of range low)		Inspection procedure		
DTC: P2123		Accelerator pedal position sensor 1 - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the accelerator sensor 1 connector	Check the connection of the accelerator sensor 1 connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the accelerator sensor 1 unit	Measure the resistance between the terminals of the accelerator sensor 1. <Tester connections> Accelerator sensor 1 VCC1 – SIG1 VCC1 – GND1 SIG1 – GND1 <Standard values> 2 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
3	Inspect the power supply of the accelerator sensor 1	Measure the voltage between the terminals of the accelerator sensor 1 vehicle-side connector. <Tester connections> Accelerator sensor vehicle-side connector 1 VCC1 – GND1 <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Go to step 5.
4	Inspect the sensor signal circuit of the accelerator sensor 1	Measure the resistance the terminals of the accelerator sensor 1 vehicle-side connector. <Tester connections> Accelerator sensor 1 vehicle-side connector SIG1 – GND1 <Standard values> 25 – 35 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 5.

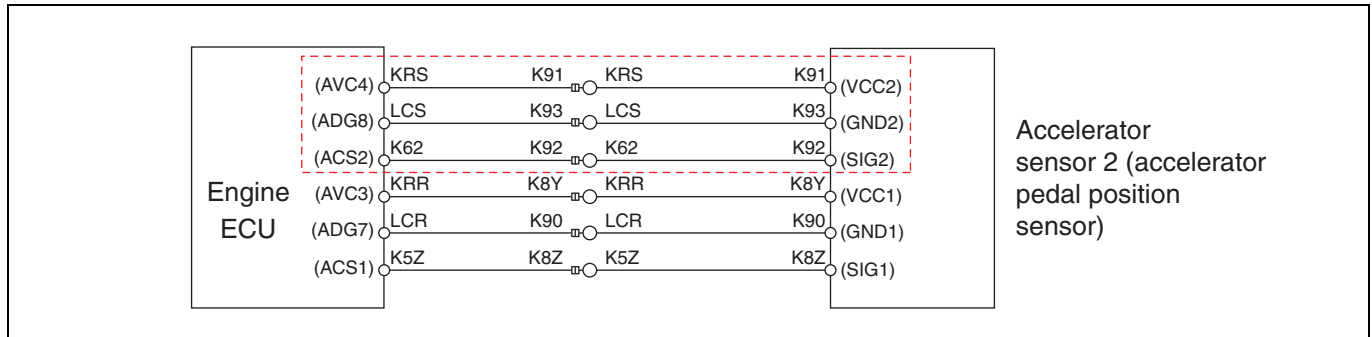
DTC: P2122		Accelerator pedal position sensor 1 - out of range (Out of range low)		Inspection procedure		
DTC: P2123		Accelerator pedal position sensor 1 - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for short-circuit of the accelerator sensor 1 harness	Connect the signal check harness, and measure the resistance between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) ADG7(V45) – Ground ACS1(V47) – Ground AVC3(V50) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the accelerator sensor 1 harness	Connect the accelerator sensor connector, measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) AVC3(V50) – ACS1(V47) AVC3(V50) – ADG7(V45) ACS1(V47) – ADG7(V45) <Standard values> 2Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	Check if the DTC (P2122 or P2123) has been detected in [Engine].	DTC (P2122 or P2123) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2127 and P2128

EN01H16F01030F03001128

P2127: Accelerator pedal position sensor 2 - out of range (Out of range low)

INFORMATION



SAPH16F010300767

1. Technical description

- -

<Description of malfunction>

- The accelerator sensor 2 (accelerator pedal position sensor) cannot correctly sense.

2. DTC set condition

(1) Check conditions

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped (stalled) or runs at 500 r/min or higher for continuous 5 seconds or longer.

(2) Judgement criteria

- Accelerator sensor 2 (accelerator pedal position sensor) voltage ≤ 1.4 V (-15.4 %)
- Failure timer ≥ 1 second

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Cruise control is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Cruise control does not work.

<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

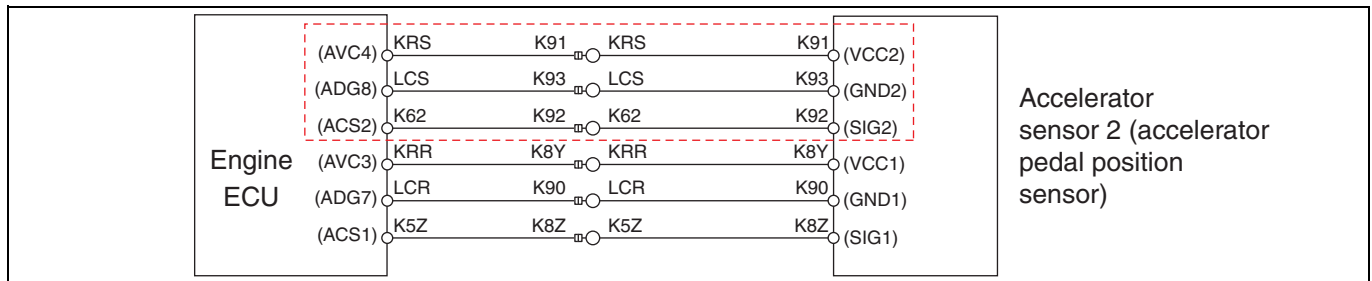
- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit

- Malfunction of sensor 2
- Malfunction of engine ECU

P2128: Accelerator pedal position sensor 2 - out of range (Out of range high) INFORMATION



SAPH16F010300768

1. Technical description

- -

<Description of malfunction>

- The accelerator sensor 2 (accelerator pedal position sensor) cannot correctly sense.

2. DTC set condition

(1) Check conditions

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.

(2) Judgement criteria

- Accelerator sensor 2 (accelerator pedal position sensor) voltage ≥ 4.9 V (147 %)
- Failure timer ≥ 1 second

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Cruise control is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Cruise control does not work.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Malfunction of sensor 2
- Malfunction of engine ECU

INSPECTION PROCEDURE: P2127 and P2128

1 Inspect the accelerator sensor connector

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

Was any failure found?

YES

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 2.

2 Inspect the accelerator sensor

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

Was any failure found?

YES

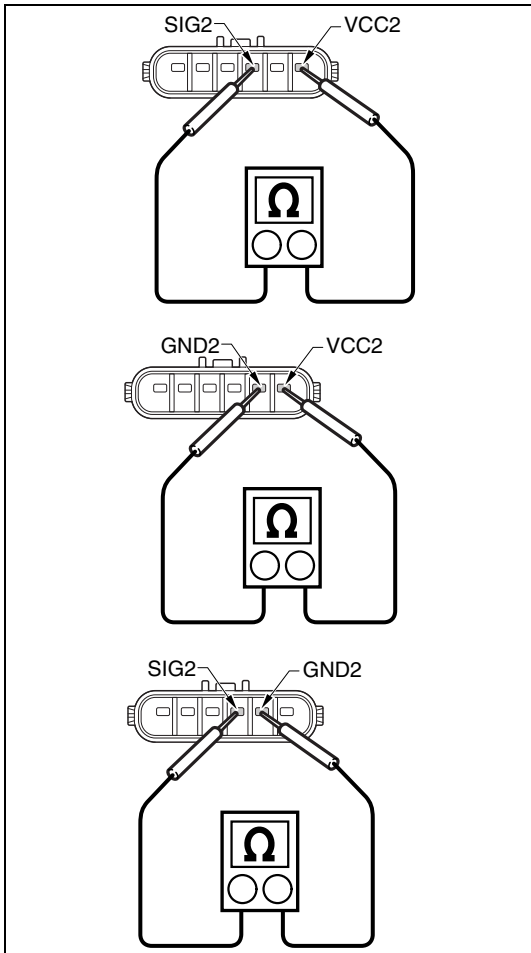
**Clean the accelerator sensor and install it properly.
If damaged, replace the accelerator sensor.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 3.

3 Inspect the accelerator sensor unit

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



SAPH16F010300769

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Accelerator sensor VCC2 – SIG2 VCC2 – GND2 SIG2 – GND2	2 Ω

Do the measurements meet the standard value?

YES

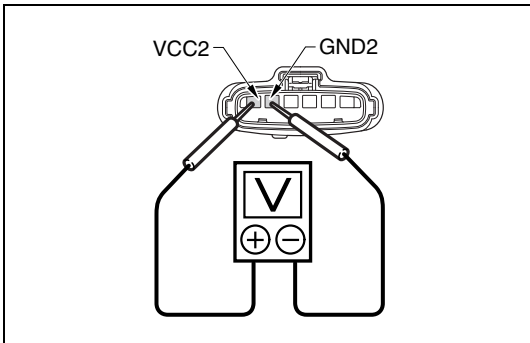
Go to step 4.

NO

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

4 Inspect the power supply of the accelerator sensor

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



SAPH16F010300770

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Accelerator sensor vehicle-side connector VCC2 – GND2	4.5 – 5.5 V

Do the measurements meet the standard value?

YES

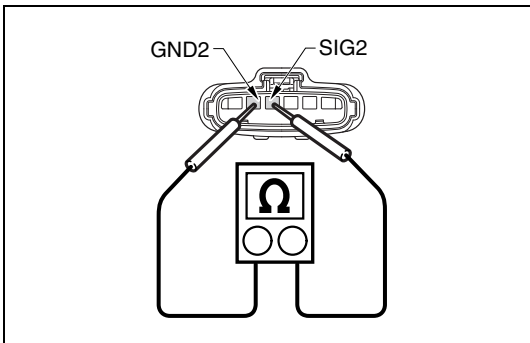
NO

Go to step 5.

Go to step 6.

5 Inspect the signal circuit of the accelerator sensor

1. Set the starter switch to the "LOCK" position.
2. Use the electrical tester to measure the resistance the terminals of the accelerator sensor vehicle-side connector.



SAPH16F010300771

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Accelerator sensor vehicle-side connector SIG2 – GND2	25 – 35 kΩ

Do the measurements meet the standard value?

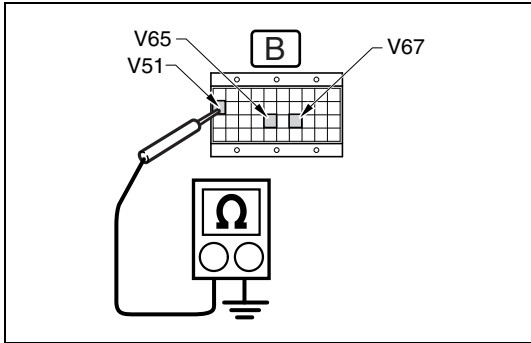
YES

NO

Go to step 8.

Go to step 6.

6 Inspect for short-circuit of the accelerator sensor harness



SAPH16F010300772

1. Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect the harness to the ECU.)
2. 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) AVC4(V51) – Ground ADG8(V65) – Ground ACS2(V67) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

YES

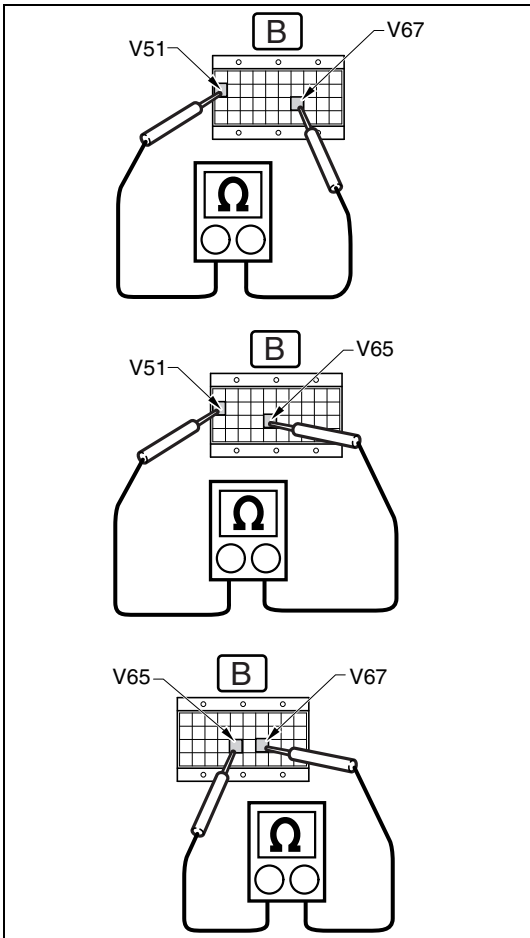
Go to step 7.

NO

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

7 Inspect disconnection of the accelerator sensor harness

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



SAPH16F010300773

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) AVC4(V51) – ACS2(V67) AVC4(V51) – ADG8(V65) ACS2(V67) – ADG8(V65)	2 Ω

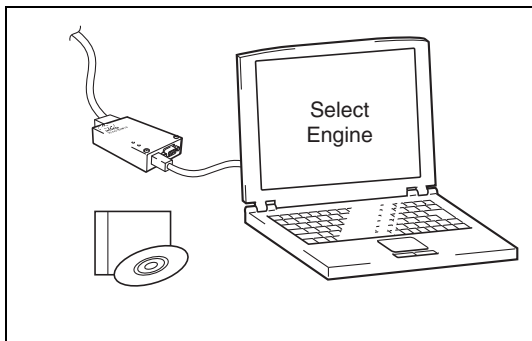
Do the measurements meet the standard value?

YES

NO

Go to step 8.

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

8 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300774

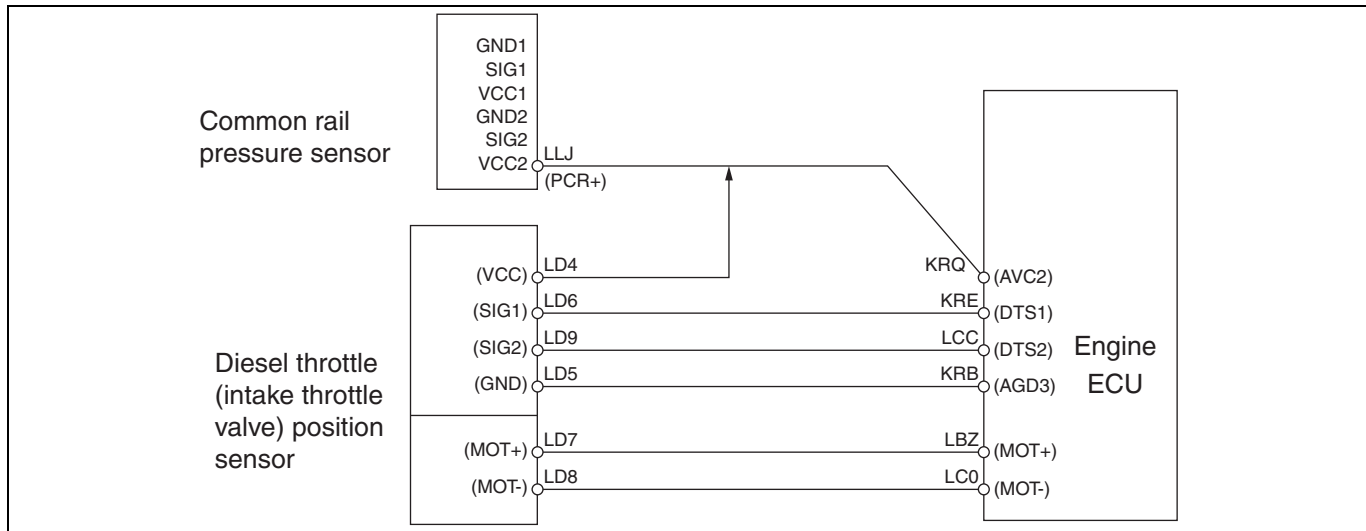
1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if the DTC (P2127 or P2128) has been detected in [Fault Information].

Has DTC (P2127 or P2128) been detected?**YES****Replace the engine ECU.
Perform "After-inspection work" of INFORMATION section.****NO****Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P2127 and P2128

DTC: P2127		Accelerator pedal position sensor 2 - out of range (Out of range low)		Inspection procedure		
DTC: P2128		Accelerator pedal position sensor 2 - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the accelerator sensor connector	Check the connection of the accelerator sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the accelerator sensor	<ol style="list-style-type: none"> 1. Check the installation of the accelerator sensor. 2. Make sure there is no dirt or damage to the accelerator sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the accelerator sensor and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the accelerator sensor unit	Measure the resistance between the terminals of the accelerator sensor. <Tester connections> Accelerator sensor VCC2 – SIG2 VCC2 – GND2 SIG2 – GND2 <Standard values> 2 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
4	Inspect the power supply of the accelerator sensor	Measure the voltage between the terminals of the accelerator sensor vehicle-side connector. <Tester connections> Accelerator sensor vehicle-side connector VCC2 – GND2 <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Go to step 6.

DTC: P2127		Accelerator pedal position sensor 2 - out of range (Out of range low)		Inspection procedure		
DTC: P2128		Accelerator pedal position sensor 2 - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the signal circuit of the accelerator sensor	Measure the resistance the terminals of the accelerator sensor vehicle-side connector. <Tester connections> Accelerator sensor vehicle-side connector SIG2 – GND2 <Standard values> 25 – 35 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 8.	Go to step 6.
6	Inspect for short-circuit of the accelerator sensor harness	Connect the signal check harness, and measure the resistance between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) AVC4(V51) – Ground ADG8(V65) – Ground ACS2(V67) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Inspect disconnection of the accelerator sensor harness	Connect the accelerator sensor connector, measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) AVC4(V51) – ACS2(V67) AVC4(V51) – ADG8(V65) ACS2(V67) – ADG8(V65) <Standard values> 2 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 8.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
8	Check the DTC detected (Engine ECU) [Hino-DX]	Check if the DTC (P2127 or P2128) has been detected in [Engine].	DTC (P2127 or P2128) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2135**P2135: Intake throttle valve position sensor - rationality**
INFORMATION

SAPH16F010300775

1. Technical description

- The diesel throttle (intake throttle) controls throttle valves steplessly to control boost pressure and intake air volume.
- Inside the diesel throttle (intake throttle), a sensor designed to detect a travel of the valve consistently monitors an actual opening to compare with command value.

<Description of malfunction>

- Diesel throttle (intake throttle valve) position sensor is recognized as being stuck or in characteristics failure condition

2. DTC set condition

(1) Check conditions

- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped or runs at 500 r/min or higher for continuous 5 seconds.

(2) Judgement criteria

- A difference between throttle position sensors 1 and 2 remains at 5 degrees or greater for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

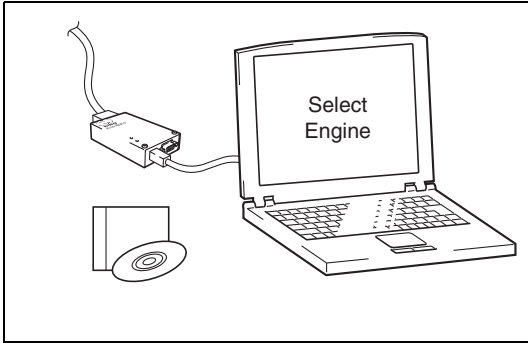
7. After-inspection work

- Clear all past DTCs.

- Check that no DTC is stored after test drive.

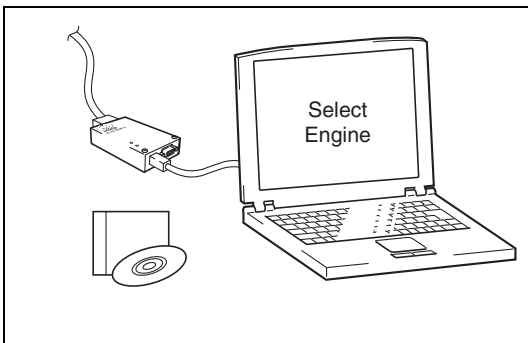
8. Estimated failure factors

- Harness disconnection or short-circuit
- Irregular contact (disconnection or poor fit of connector)
- Malfunction of diesel throttle (throttle position sensor).
- Malfunction of engine ECU sensor power supply

INSPECTION PROCEDURE: P2135**1 Check the DTC detected (Engine ECU) 1 [Hino-DX]**

SAPH16F010300776

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if any DTC other than P2135 (for example, P0122, P0123, P0222, P0223) has been detected in [Fault Information].

Has a DTC other than P2135 been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 2.****2 Check the DTC detected (Engine ECU) 2 [Hino-DX]**

SAPH16F010300777

1. Set the starter switch to the "LOCK" position.
2. Disconnect the boost pressure sensor and common rail pressure sensor connectors.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P2135 has been detected in [Fault Information].

Has a DTC other than P2135 been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 3.**

3 Inspect the intake throttle valve position sensor connector

1. Check the connection of the intake throttle valve position sensor connector (Looseness and poor contact).

Was any failure found?

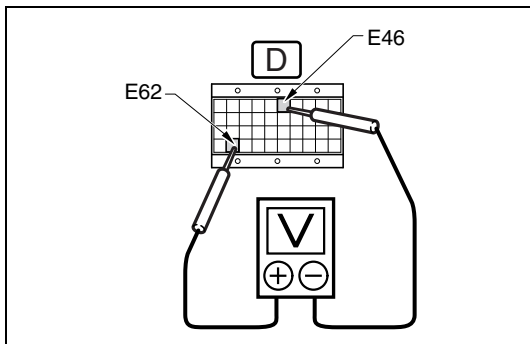
YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the signal wire harness of the diesel throttle



SAPH16F010300778

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) DTS1(E62) – DTS2(E46)	0.2 V

Do the measurements meet the standard value?

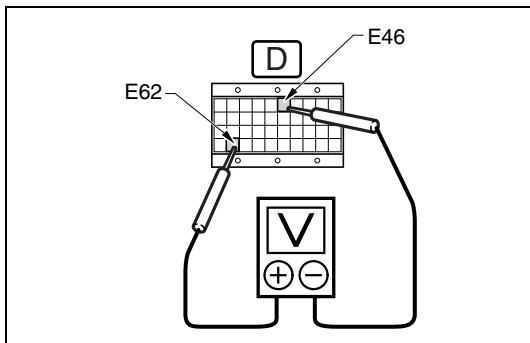
YES

Go to step 5.

NO

Replace the diesel throttle.
Perform "After-inspection work" of INFORMATION section.

5 Inspect the engine ECU



SAPH16F010300779

1. Set the starter switch to the "LOCK" position.
2. Disconnect the diesel throttle connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness).

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) DTS1(E62) – DTS2(E46)	0 V

Do the measurements meet the standard value?

YES

Procedure completed.
Clear and check again the DTC.
Perform "After-inspection work" of INFORMATION section.

NO

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

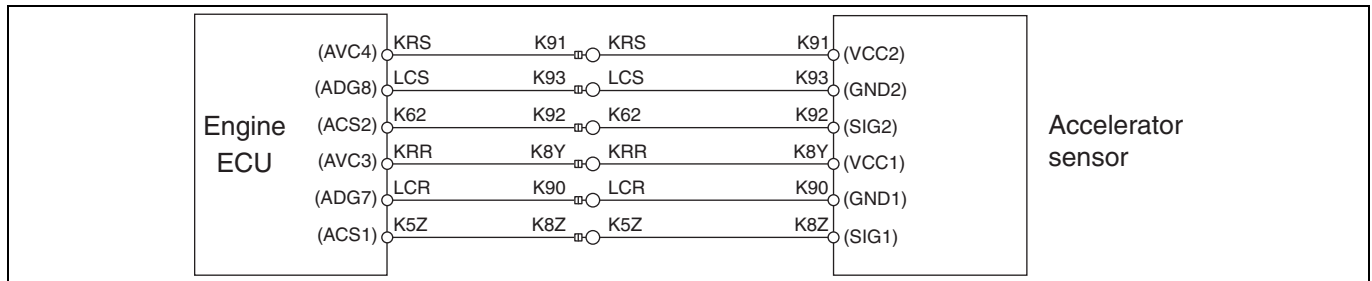
CHECKLIST: P2135

DTC: P2135		Intake throttle valve position sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) 1 [Hino-DX]	Check if any DTC other than P2135 (for example, P0122, P0123, P0222, P0223) has been detected in [Engine].	DTC other than P2135 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Check the DTC detected (Engine ECU) 2 [Hino-DX]	Disconnect the connector of the common rail pressure sensor and boost pressure sensor, and check if DTC has been detected in [Engine].	DTC other than P2135 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 3.
3	Inspect the intake throttle valve position sensor connector	Check the connection of the intake throttle valve position sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the signal wire harness of the diesel throttle	Connect the signal check harness, and measure the voltage between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) DTS1(E62) – DTS2(E46) <Standard values> 0.2 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the diesel throttle. Perform "After-inspection work" of INFORMATION section.

DTC: P2135		Intake throttle valve position sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the engine ECU	Disconnect the diesel throttle connector and measure the voltage between the terminals of the engine ECU (signal check harness). DTS1(E62) – DTS2(E46) <Standard values> 0 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Procedure completed. Clear and check again the DTC. Perform "After-inspection work" of INFORMATION section.	Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.

DTC: P2138

EN01H16F01030F03001130

P2138: Accelerator pedal position sensor - rationality
INFORMATION

SAPH16F010300780

1. Technical description**<Description of malfunction>**

- Abnormal characteristics or stuck sensing of accelerator sensor

2. DTC set condition

(1) Check conditions

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped (stalled) or runs at 500 r/min or higher for continuous 5 seconds or longer.

(2) Judgement criteria

Comparison of sensor voltage between sensor 1 and sensor 2

- Accelerator pedal position sensor 2 voltage – Accelerator pedal position sensor 1 voltage. ≤ 0 V or ≥ 1.6 V
- Failure timer ≥ 3 seconds

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Cruise control function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Cruise control does not work.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

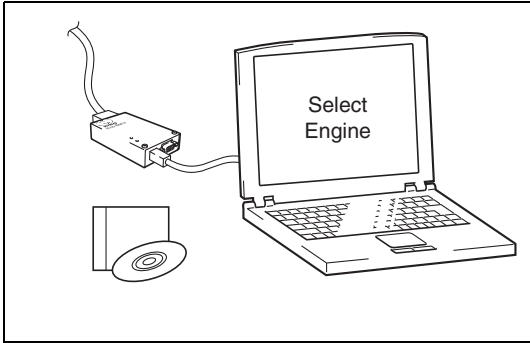
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Malfunction of accelerator sensor
- Malfunction of engine ECU

INSPECTION PROCEDURE: P2138**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300781

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if any DTC other than P2138 (for example, P2122, P2123, P2127, P2128) has been detected in [Fault Information].

Has a DTC other than P2138 been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Go to step 2.****2 Inspect the PTO accelerator sensor**

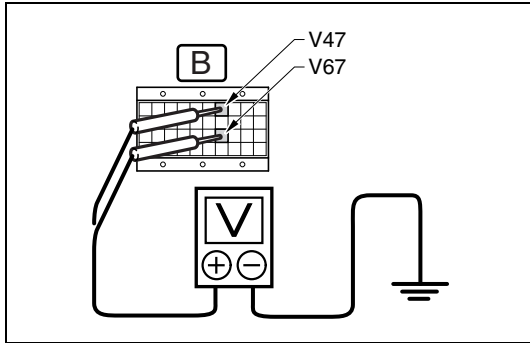
1. Check that the GND circuit of the PTO accelerator sensor is connected to the appropriate harness.

Was any failure found?**YES****Repair the GND circuit of the PTO accelerator sensor.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 3.****3 Inspect the accelerator sensor connector**

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

Was any failure found?**YES****Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 4.**

4 Inspect the accelerator sensor signal



SAPH16F010300782

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
<ul style="list-style-type: none"> • Starter switch: ON • Depress the accelerator pedal (from 0 % to 100 %) 	Engine ECU (signal check harness) ACS1(V47) – Ground ACS2(V67) – Ground	Difference in voltage between terminals: 0.4 – 1.2 V

Do the measurements meet the standard value?

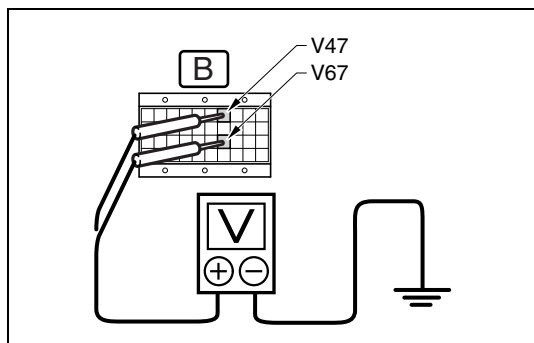
YES

Go to step 5.

NO

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

5 Inspect the engine ECU



SAPH16F010300783

1. Set the starter switch to the "LOCK" position.
2. Disconnect the accelerator sensor connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) ACS1(V47) – Ground ACS2(V67) – Ground	0 V

Do the measurements meet the standard value?

YES

Procedure completed.
Clear and check again the DTC.
Perform "After-inspection work" of INFORMATION section.

NO

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

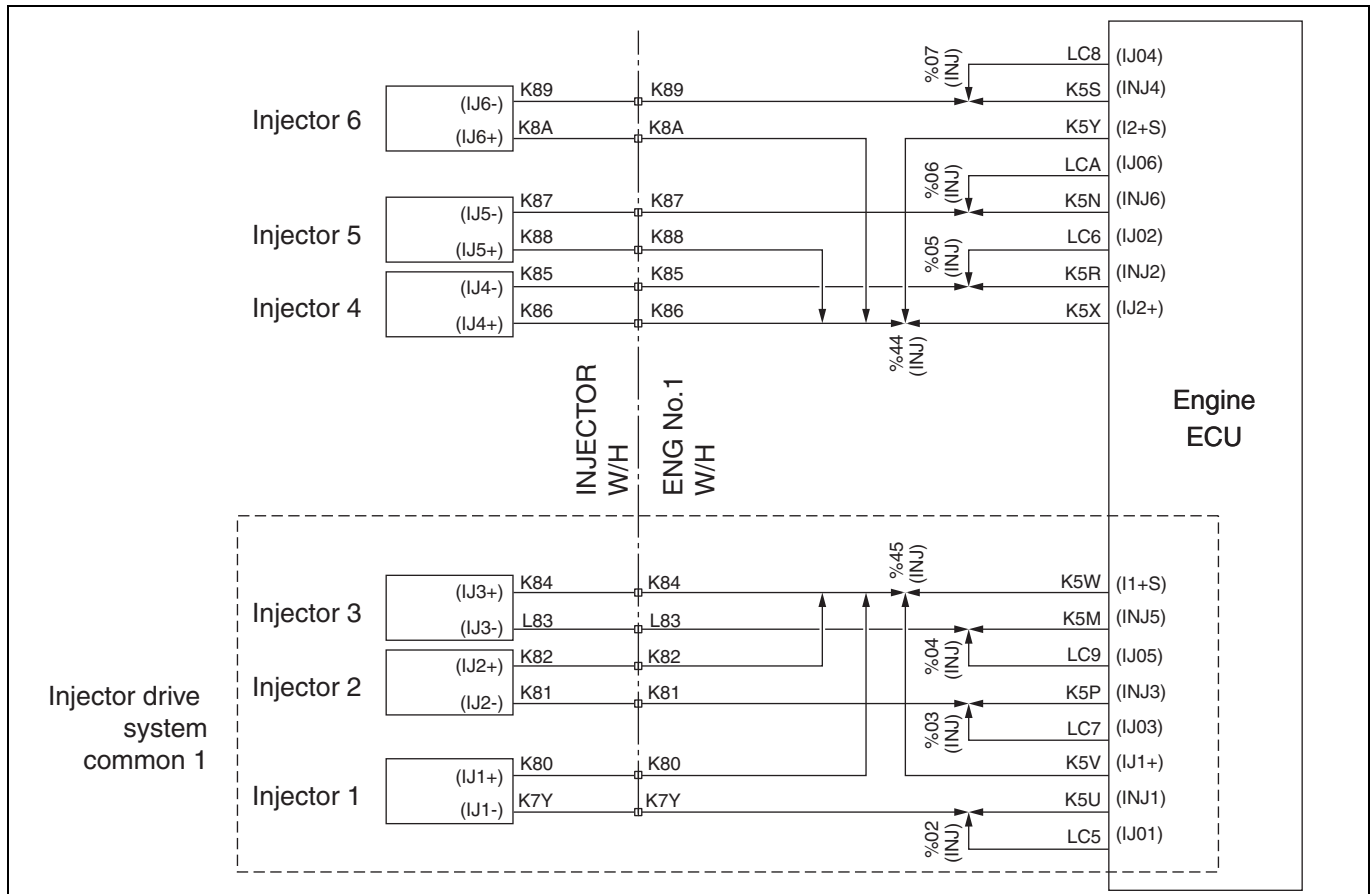
CHECKLIST: P2138

DTC: P2138		Accelerator pedal position sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P2138 (for example, P2122, P2123, P2127, P2128) has been detected in [Engine].	DTC other than P2138 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 2.
2	Inspect the PTO accelerator sensor	Check that the GND circuit of the PTO accelerator sensor is connected to the appropriate harness.	Failure found: Go to YES. No failure found: Go to NO.		Repair the GND circuit of the PTO accelerator sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the accelerator sensor connector	Check the connection of the accelerator sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the accelerator sensor signal	Connect the signal check harness, and measure the voltage between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) ACS1(V47) – Ground ACS2(V67) – Ground <Standard values> Difference in voltage between terminals: 0.4 – 1.2 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2138		Accelerator pedal position sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the engine ECU	Disconnect the accelerator sensor connector, and measure the voltage between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) ACS1(V47) – Ground ACS2(V67) – Ground <Standard values> 0 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Procedure completed. Clear and check again the DTC. Perform "After-inspection work" of INFORMATION section.	Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.

DTC: P2146

EN01H16F01030F03001131

P2146: Fuel injector driver circuit 1 - circuit (circuit open)**INFORMATION**

SAPH16F010300784

1. Technical description

- The engine ECU controls the fuel injection rate according to the injector valve-open interval.
- The valve-open interval is adjusted by the magnetic valve.

<Description of malfunction>

- Injector drive system common 1 is not working properly.
- Minus side harness may be in short-circuit.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- Injector is in operation.
- Engine speed is higher than 0 r/min.

(2) Judgement criteria

- When the injector drive system circuit 1 current value is smaller than 16 A, the fail count is detected with the full count. (When the engine speed is 750 r/min: 0.6 seconds * Varies according to engine speed)

3. Reset condition

- After normal operation is restored and engine is restarted after having stalled.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- Injector internal coil disconnection
- Engine ECU failure

INSPECTION PROCEDURE: P2146**1 Inspect the injector connector**

1. Check the connection of the injector connector (Looseness and poor contact).

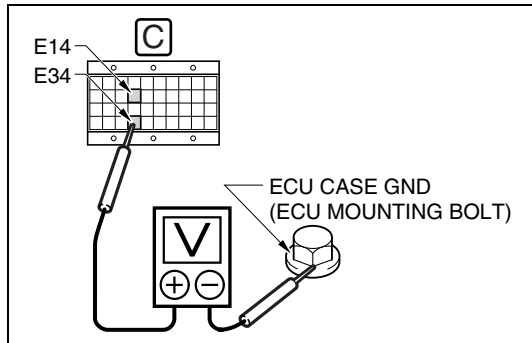
Was any failure found?

YES

Connect securely, repair or replace if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the injector power supply

SAPH16F010300785

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between each terminal in the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) I1+(E14) – Ground I1+S(E34) – Ground	At least 3/4 of battery voltage

Do the measurements meet the standard value?

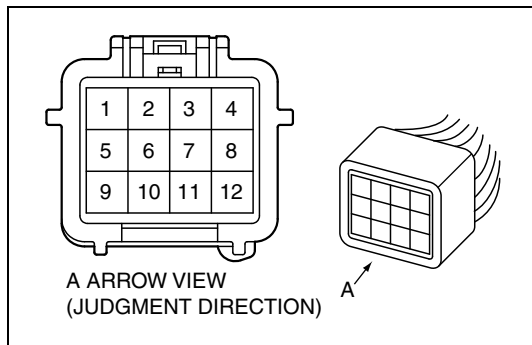
YES

Go to step 3.

NO

Go to step 7.

3 Inspect the injector wire harness power supply (engine ECU – injector linked-up connector)



SAPH16F010300786

1. Set the starter switch to the "LOCK" position.
2. Disconnect the injector linked-up connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between each terminal in the injector linked-up connector (ECU side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Injector linked-up connector (ECU side): #1 injector: 11 terminal – Ground #2 injector: 3 terminal – Ground #3 injector: 6 terminal – Ground	8 V or less

Do the measurements meet the standard value?

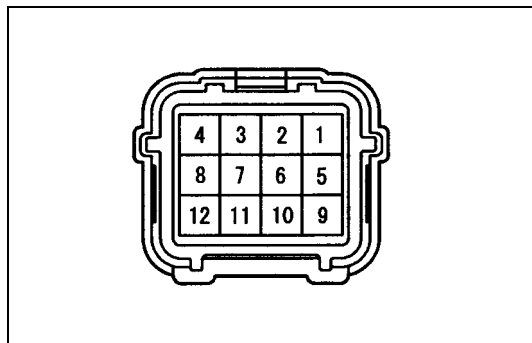
YES

Go to step 4.

NO

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

4 Inspect for short-circuit of the injector wire harness (between injector linked-up connector and injector harness connector)



SAPH16F010300787

1. Set the starter switch to the "LOCK" position.
2. Disconnect the injector harness connector.
3. Use the electrical tester to measure the resistance between each terminal in the injector linked-up connector (engine side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Injector linked-up connector (engine side) #1 injector: 11 terminal – Ground #2 injector: 3 terminal – Ground #3 injector: 6 terminal – Ground	$\infty \Omega$

Do the measurements meet the standard value?

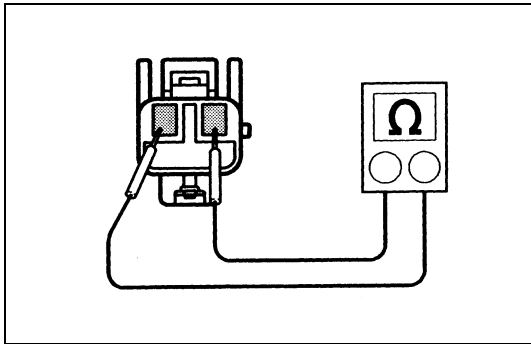
YES

Go to step 5.

NO

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

5 Inspect disconnection of injector wire harness



SAPH16F010300788

1. Disconnect the injector harness connector.
2. Use the electrical tester to measure the resistance between the terminals of the #1, #2 and #3 injector harness connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Injector harness connector terminals #1 IJ1+ – IJ1- #2 IJ2+ – IJ2- #3 IJ3+ – IJ3-	20 °C {68 °F}: 0.37 – 0.57 Ω

Do the measurements meet the standard value?

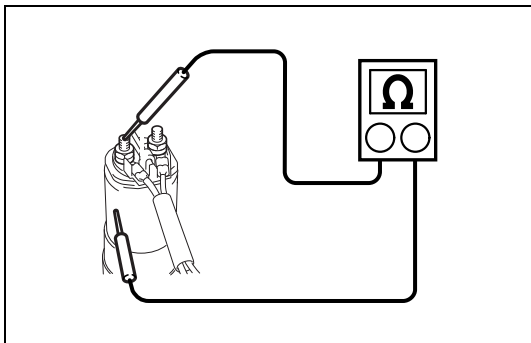
YES

Go to step 7.

NO

Go to step 6.

6 Inspect the injector unit



SAPH16F010300789

1. Measure the resistance between the #1 – #3 injector terminals and the injector bodies.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Between injector terminal and body	10 MΩ or more

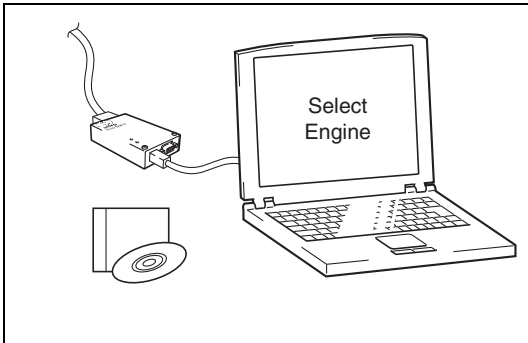
Do the measurements meet the standard value?

YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) [Hino-DX]


SAPH16F010300790

1. Warm-up the engine. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if P2146 has been detected in [Fault Information].

Has DTC P2146 been detected?

YES

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

NO

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

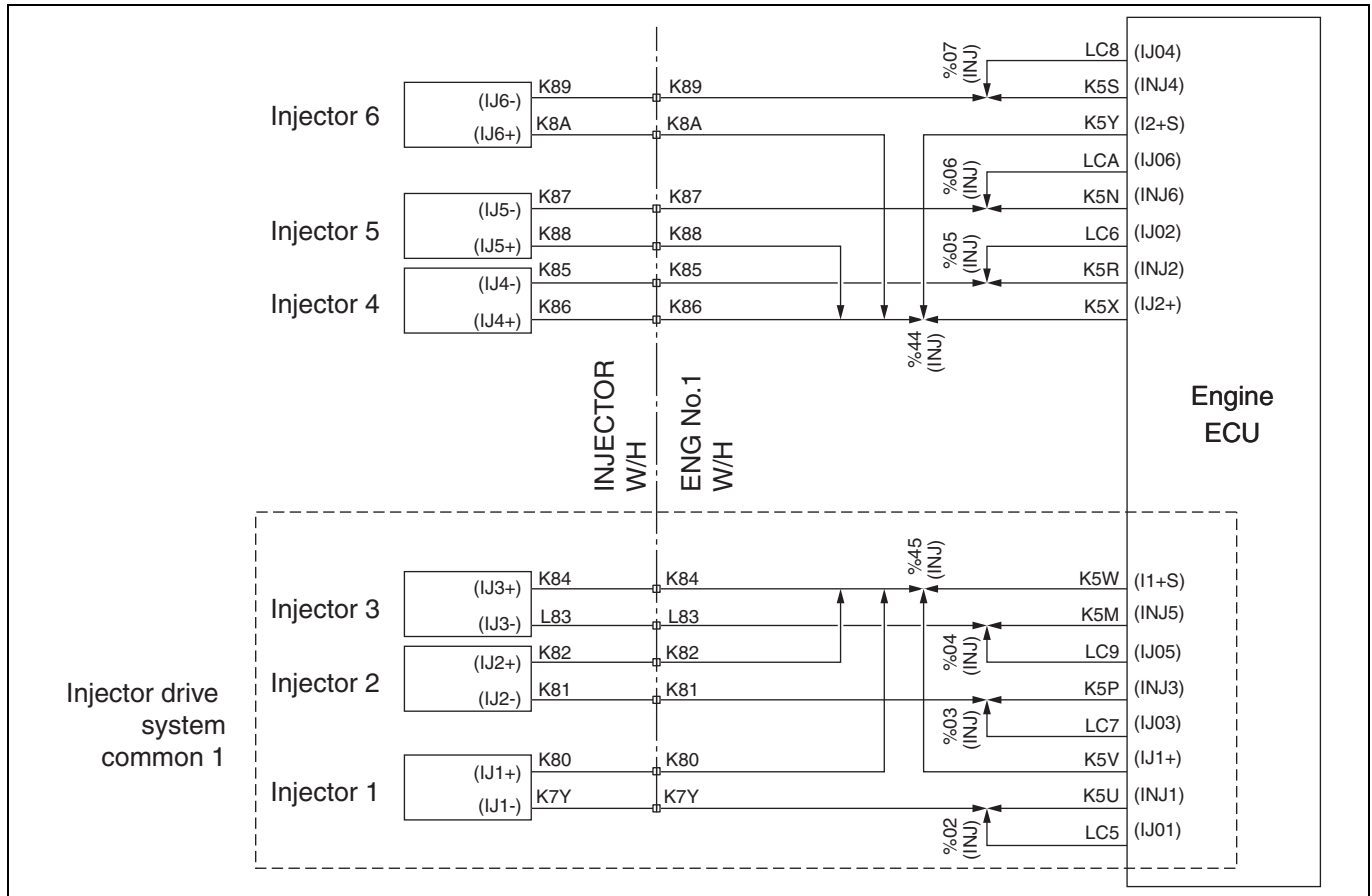
CHECKLIST: P2146

DTC: P2146		Fuel injector driver circuit 1 - circuit (circuit open)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the injector connector	Check the connection of the injector connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair or replace if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the injector power supply	Connect the signal check harness, and measure the voltage between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) I1+(E14) – Ground I1+S(E34) – Ground <Standard values> At least 3/4 of battery voltage	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Go to step 7.
3	Inspect the injector wire harness power supply (engine ECU – injector linked-up connector)	Disconnect the injector linked-up connector and measure the voltage between each terminal in the injector linked-up connector (ECU side) and ground. <Tester connections> Injector linked-up connector (ECU side): #1 injector: 11 – Ground #2 injector: 3 – Ground #3 injector: 6 – Ground <Standard values> 8 V or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P2146		Fuel injector driver circuit 1 - circuit (circuit open)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect for short-circuit of the injector wire harness (between injector linked-up connector and injector harness connector)	Disconnect the injector harness connector and measure the resistance between each terminal in the injector linked-up connector (engine side) and ground. <Tester connections> Injector linked-up connector (engine side) – Ground #1 injector: 11 – Ground #2 injector: 3 – Ground #3 injector: 6 – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
5	Inspect disconnection of injector wire harness	Measure the resistance between the terminals of the #1, #2 and #3 injector harness connector. <Tester connections> Injector harness connector terminals #1 IJ1+ – IJ1- #2 IJ2+ – IJ2- #3 IJ3+ – IJ3- <Standard values> 20 °C {68 °F}: 0.37 – 0.57 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 6.
6	Inspect the injector unit	Measure the resistance between the #1 – #3 injector terminals and the injector bodies. <Tester connections> Between injector terminal and body <Standard values> 10 M Ω or more	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Replace the injector. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	Perform engine warm-up (engine coolant temperature: 60 °C {140 °F} or more), and check if P2146 has been detected in [Engine].	DTC P2146 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2147 and P2148

EN01H16F01030F03001132

P2147: Fuel injector driver circuit 1 - circuit (circuit low)
INFORMATION

SAPH16F010300791

1. Technical description

- The engine ECU controls the fuel injection rate according to the injector valve-open interval.
- The valve-open interval is adjusted by the magnetic valve.

<Description of malfunction>

- Injector drive system common 1 is not working properly.
- Minus side harness may be in short-circuit.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- Injector is in operation.
- Engine speed is higher than 0 r/min.

(2) Judgement criteria

- When the injector drive system circuit 1 voltage is smaller than 0.9 V, the fail count is detected with the full count. (When the engine speed is 750 r/min: 0.6 seconds * Varies according to engine speed)

3. Reset condition

- After normal operation is restored and engine is restarted after having stalled.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

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

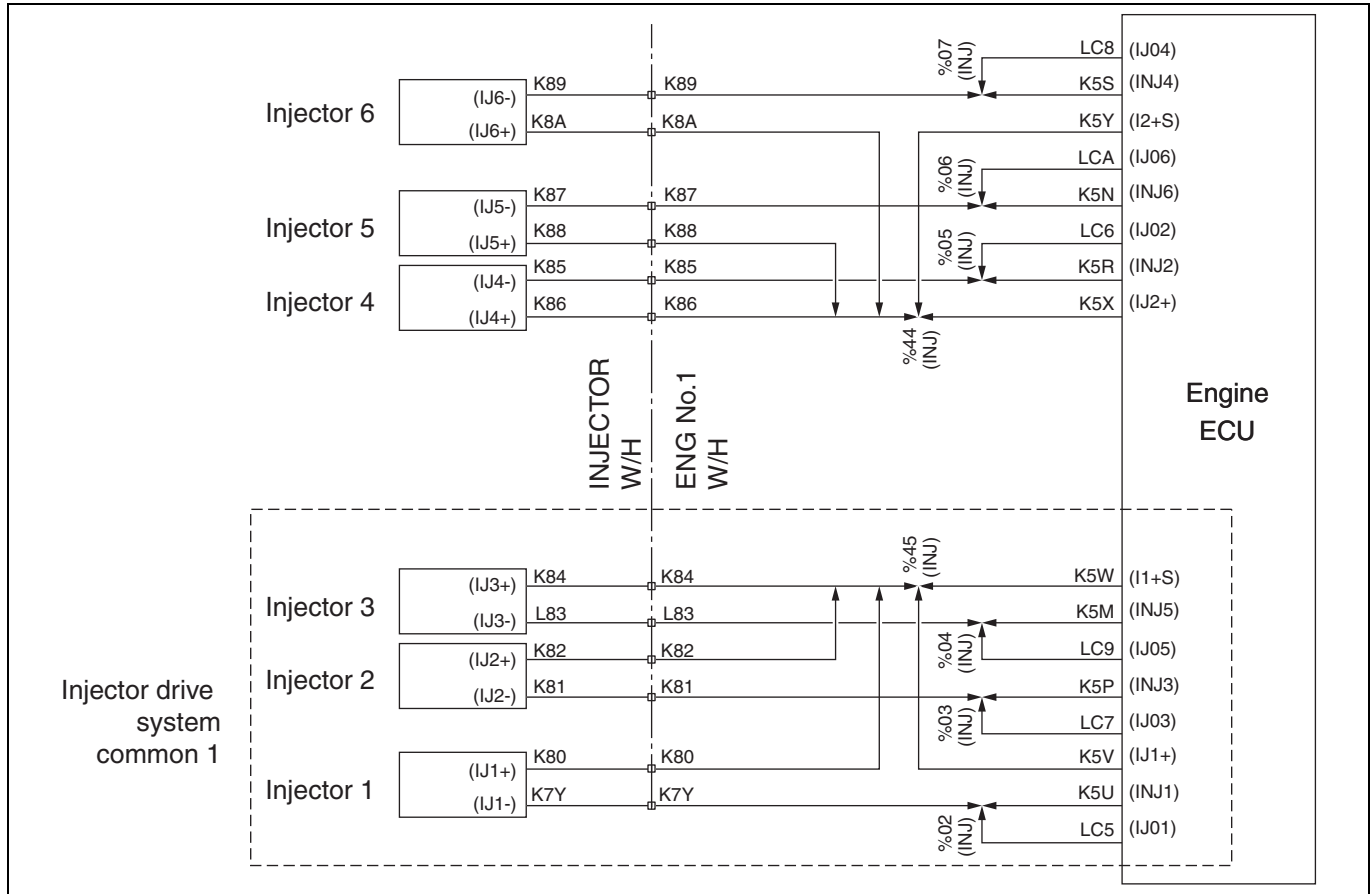
7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Injector internal coil disconnection
- Engine ECU failure

P2148: Fuel injector driver circuit 1 - circuit (circuit high) INFORMATION



SAPH16F010300792

1. Technical description

- The engine ECU controls the fuel injection rate according to the injector valve-open interval.
- The valve-open interval is adjusted by the magnetic valve.

<Description of malfunction>

- Injector drive system common 1 is not working properly.
- Minus side harness may be in short-circuit.

2. DTC set condition

(1) DTC detection condition

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- Injector is not in operation.
- Engine speed is higher than 0 r/min.

(2) Judgement criteria

- When the injector drive system circuit 1 voltage is larger than 9 V, the fail count is detected with the full count. (When the engine speed is 750 r/min: 0.6 seconds * Varies according to engine speed)

3. Reset condition

- After normal operation is restored and engine is restarted after having stalled.

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

- MIL: ON
- Diag lamp: OFF

- Engine output is restricted.
- Cruise control function is not available.
- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- Injector internal coil disconnection
- Engine ECU failure

INSPECTION PROCEDURE: P2147 and P2148**1 Inspect the injector connector**

1. Check the connection of the injector connector (Looseness and poor contact).

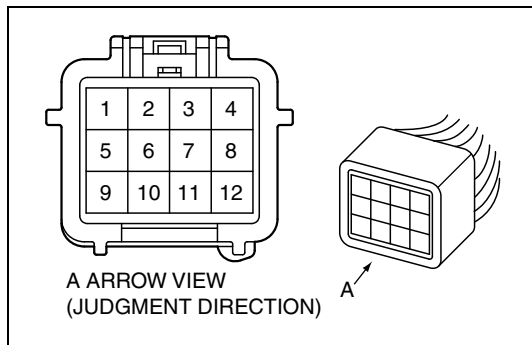
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect for short-circuit of the injector harness (engine ECU – injector linked-up connector)

SAPH16F010300793

1. Set the starter switch to the "LOCK" position.
2. Disconnect the injector linked-up connector and engine ECU connector.
3. Use the electrical tester to measure the resistance between each terminal in the injector linked-up connector (ECU side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Injector linked-up connector (ECU side): #1 injector: 11 terminal – Ground 12 terminal – Ground #2 injector: 3 terminal – Ground 4 terminal – Ground #3 injector: 5 terminal – Ground 6 terminal – Ground	$\infty \Omega$

Do the measurements meet the standard value?

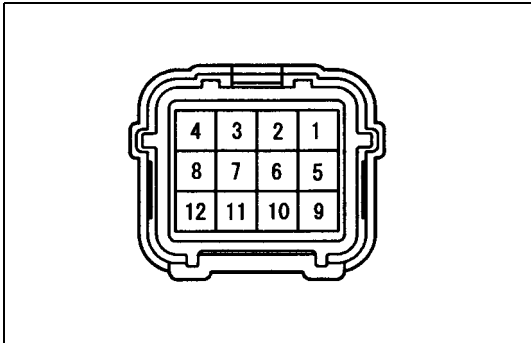
YES

Go to step 3.

NO

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

3 Inspect for short-circuit of the injector harness (between injector linked-up connector and injector harness connector)



SAPH16F010300794

1. Disconnect the injector harness connector.
2. Use the electrical tester to measure the resistance between each terminal in the injector linked-up connector (engine side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Injector linked-up connector (engine side): #1 injector: 11 terminal – Ground 12 terminal – Ground #2 injector: 3 terminal – Ground 4 terminal – Ground #3 injector: 5 terminal – Ground 6 terminal – Ground	$\infty \Omega$

Do the measurements meet the standard value?

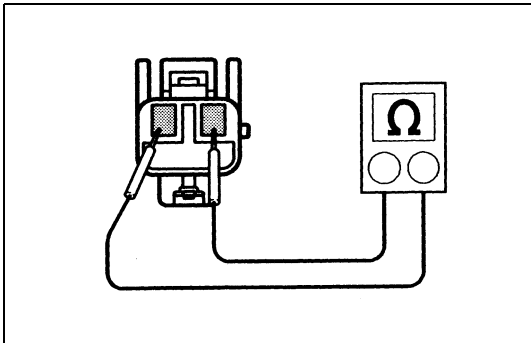
YES

NO

Go to step 4.

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

4 Inspect disconnection of the injector harness



SAPH16F010300795

1. Use the electrical tester to measure the resistance between the #1 – #3 injector harness connector terminals.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Between injector harness connector terminals #1 IJ1+ – IJ1- #2 IJ2+ – IJ2- #3 IJ3+ – IJ3-	20 °C {68 °F}: 0.37 – 0.57 Ω

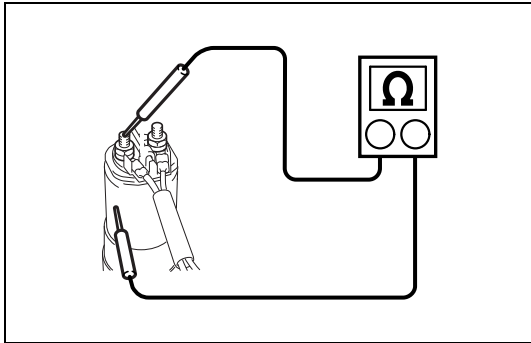
Do the measurements meet the standard value?

YES

NO

Go to step 5.

Go to step 6.

5 Inspect the injector unit

SAPH16F010300796

1. Measure the resistance between the #1 – #3 injector terminals and the injector bodies.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Between injector terminal and body	10 MΩ or more

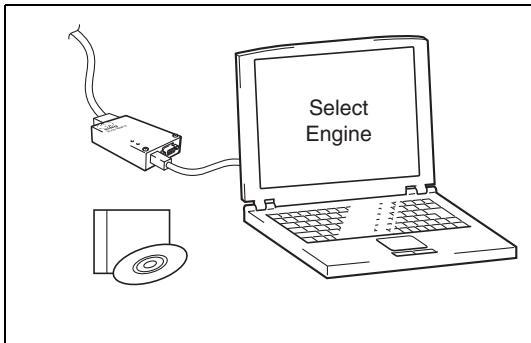
Do the measurements meet the standard value?

YES

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

NO

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

6 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300797

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if the DTC (P2147 or P2148) has been detected in [Fault Information].

Has DTC (P2147 or P2148) been detected?

YES

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

NO

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

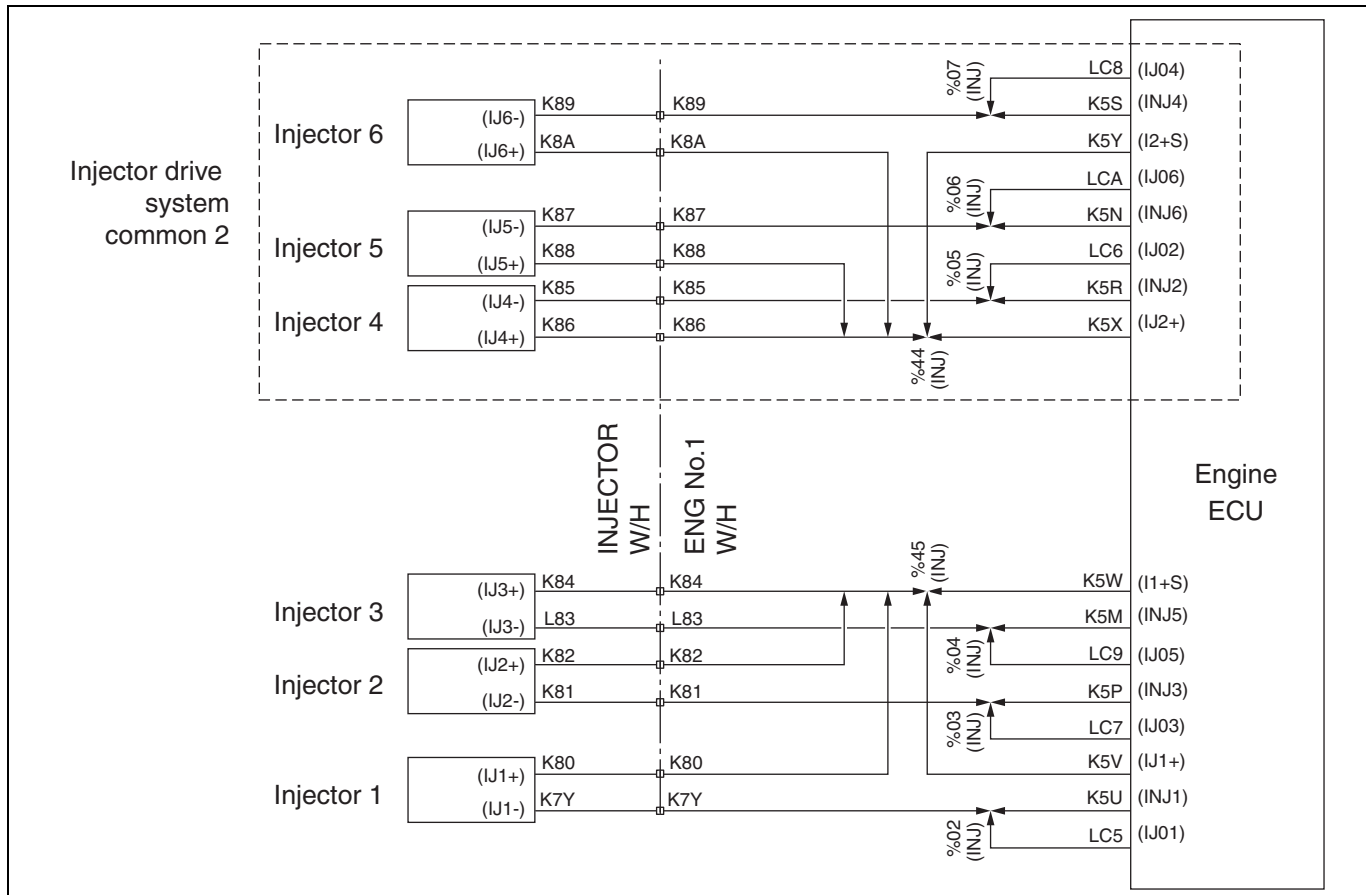
CHECKLIST: P2147 and P2148

DTC: P2147		Fuel injector driver circuit 1 - circuit (circuit low)		Inspection procedure		
DTC: P2148		Fuel injector driver circuit 1 - circuit (circuit high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the injector connector	Check the installation of the injector connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect for short-circuit of the injector harness (engine ECU — injector linked-up connector)	Inspect for short-circuit of the injector harness (engine ECU — injector linked-up connector) <Tester connections> linked-up connector (ECU side) #1 injector: 11 – Ground 12 – Ground #2 injector: 3 – Ground 4 – Ground #3 injector: 5 – Ground 6 – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
3	Inspect for short-circuit of the injector harness (between injector linked-up connector and injector harness connector)	Measure the resistance between each terminal in the injector linked-up connector (engine side) and ground. <Tester connections> injector linked-up connector (engine side) # 1 injector: 11 – Ground 12 – Ground # 2 injector: 3 – Ground 4 – Ground # 3 injector: 5 – Ground 6 – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P2147		Fuel injector driver circuit 1 - circuit (circuit low)		Inspection procedure		
DTC: P2148		Fuel injector driver circuit 1 - circuit (circuit high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect disconnection of the injector harness	Measure the resistance between the #1 – #3 injector harness connector terminals. <Tester connections> Injector harness connector terminals #1 IJ1+ – IJ1- #2 IJ2+ – IJ2- #3 IJ3+ – IJ3- <Standard values> 20 °C {68 °F}: 0.37 – 0.57 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Go to step 6.
5	Inspect the injector unit	Measure the resistance between the #1 – #3 injector terminals and the injector bodies. <Tester connections> Injector terminals – Body <Standard values> 10 MΩ or more	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the injector harness. Perform "After-inspection work" of INFORMATION section.	Replace the injector. Perform "After-inspection work" of INFORMATION section.
6	Check the DTC detected (Engine ECU) [Hino-DX]	Check if the DTC (P2147 or P2148) has been detected in [Engine].	DTC (P2147 or P2148) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2149

EN01H16F01030F03001133

P2149: Fuel injector driver circuit 2 - circuit (circuit open)
INFORMATION

SAPH16F010300798

1. Technical description

- The engine ECU controls the fuel injection rate according to the injector valve-open interval.
- The valve-open interval is adjusted by the magnetic valve.

<Description of malfunction>

- Injector drive system common 2 is not working properly.
- Possible short-circuit in plus-side harness

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- Injector is in operation.
- Engine speed is higher than 0 r/min.

(2) Judgement criteria

- When the injector drive system circuit 2 current value is smaller than 16 A, the fail count is detected with the full count. (When the engine speed is 750 r/min: 0.6 seconds * Varies according to engine speed)

3. Reset condition

- After normal operation is restored and engine is restarted after having stalled.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Injector internal coil disconnection
- Engine ECU failure

INSPECTION PROCEDURE: P2149

1 Inspect the injector connector

1. Check the connection of the injector connector (Looseness and poor contact).

Was any failure found?

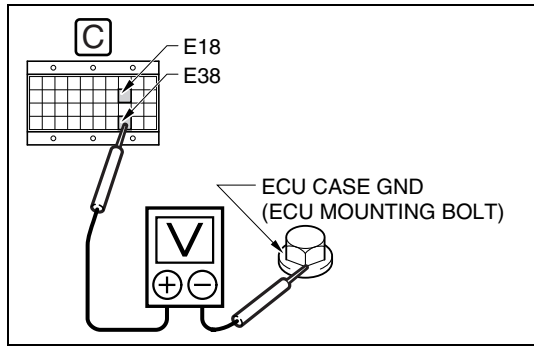
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the injector power supply



SAPH16F010300799

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the engine ECU (signal check harness) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Engine ECU (signal check harness) I J2+(E18) – Ground I 2+S(E38) – Ground	At least 3/4 of battery voltage

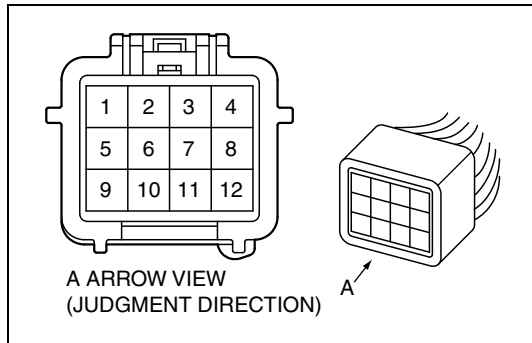
Do the measurements meet the standard value?

YES

NO

Go to step 3.

Go to step 7.

3 Inspect the injector wire harness power supply (engine ECU – injector linked-up connector)

SAPH16F010300800

1. Set the starter switch to the "LOCK" position.
2. Disconnect the injector linked-up connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between each terminal in the injector linked-up connector (ECU side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Injector linked-up connector (ECU side): #4 injector: 7 terminal – Ground #5 injector: 2 terminal – Ground #6 injector: 10 terminal – Ground	8 V or less

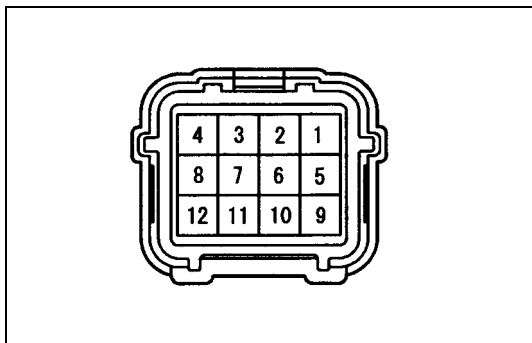
Do the measurements meet the standard value?

YES

Go to step 4.

NO

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

4 Inspect for short-circuit of the injector wire harness (between injector linked-up connector and injector harness connector)

SAPH16F010300801

1. Set the starter switch to the "LOCK" position.
2. Disconnect the injector harness connector.
3. Use the electrical tester to measure the resistance between each terminal in the injector linked-up connector (engine side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Injector linked-up connector (engine side): #4 injector: 7 terminal – Ground #5 injector: 2 terminal – Ground #6 injector: 10 terminal – Ground	$\infty \Omega$

Do the measurements meet the standard value?

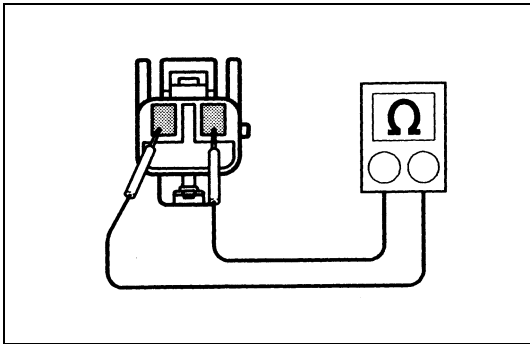
YES

NO

Go to step 5.

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

5 Inspect disconnection of the injector harness



SAPH16F010300802

1. Disconnect the injector harness connector.
2. Use the electrical tester to measure the resistance between #4 – #6 injector harness connector terminals.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Between injector harness connector terminals #4 IJ4+ – IJ4- #5 IJ5+ – IJ5- #6 IJ6+ – IJ6-	20 °C {68 °F}: 0.37 – 0.57 Ω

Do the measurements meet the standard value?

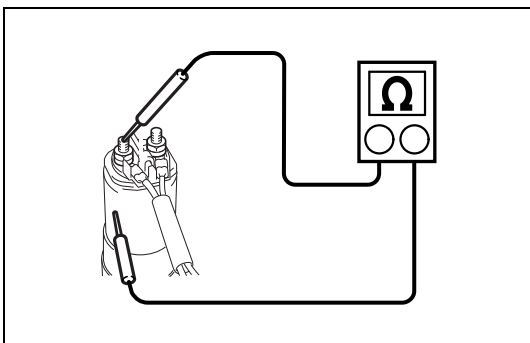
YES

NO

Go to step 7.

Go to step 6.

6 Inspect the injector unit



SAPH16F010300803

1. Measure the resistance between the #4 – #6 injector terminals and the injector bodies.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Between injector terminal and body	10 MΩ or more

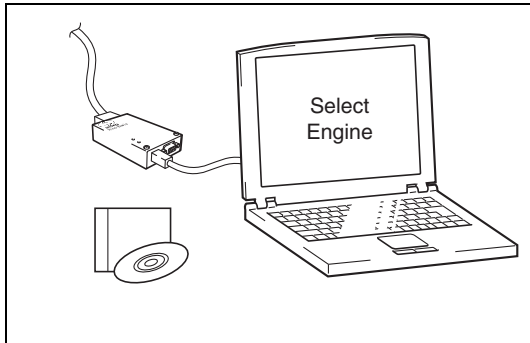
Do the measurements meet the standard value?

YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) [Hino-DX]


SAPH16F010300804

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if P2149 has been detected in [Fault Information].

Has DTC P2149 been detected?

YES

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

NO

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

CHECKLIST: P2149

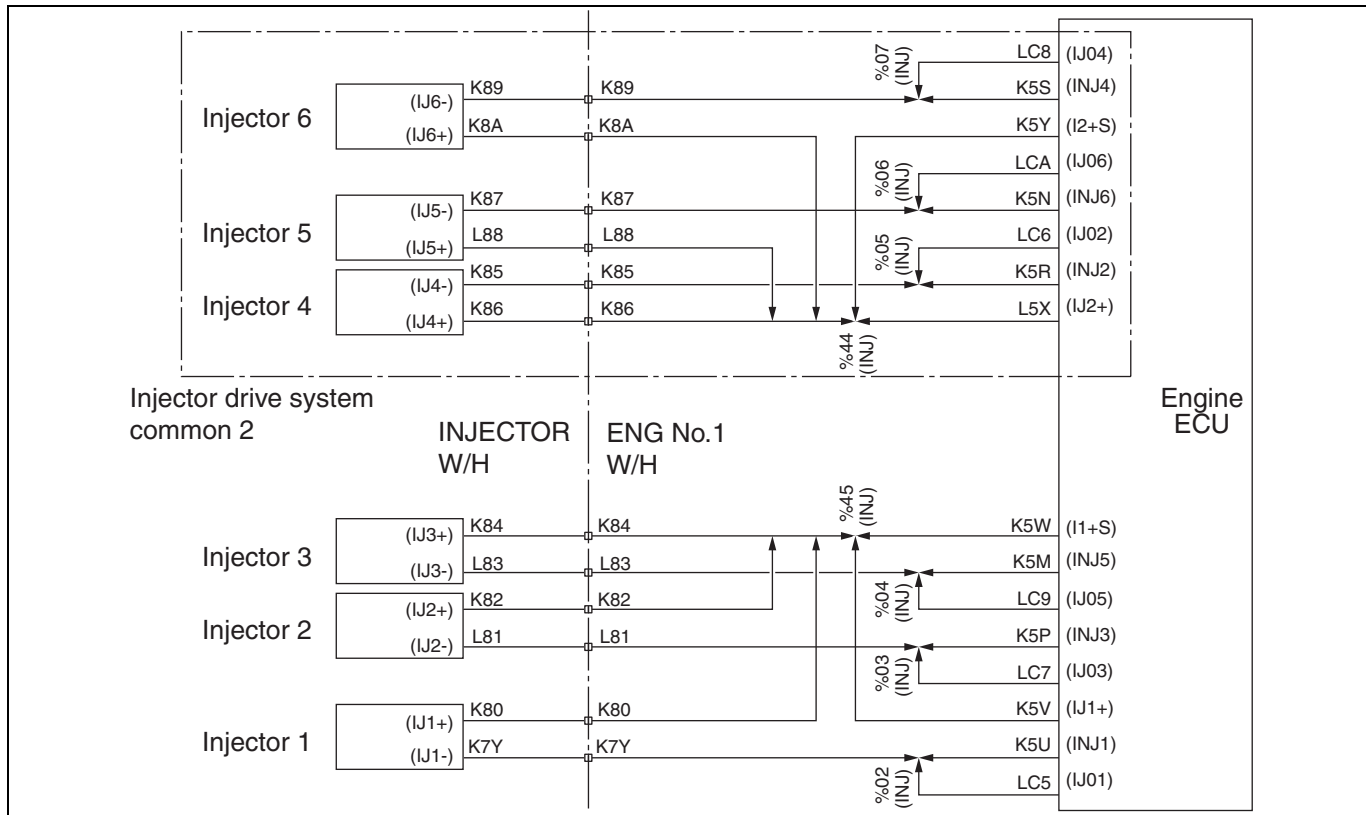
DTC: P2149		Fuel injector driver circuit 2 - circuit (circuit open)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the injector connector	Check the connection of the injector connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the injector power supply	Connect the signal check harness to the engine ECU and measure the voltage between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) I2+(E18) – Ground I2+S(E38) – Ground <Standard values> At least 3/4 of battery voltage	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Go to step 7.
3	Inspect the injector wire harness power supply (engine ECU – injector linked-up connector)	Measure the voltage between each terminal in the injector linked-up connector (ECU side) and ground. <Tester connections> injector linked-up connector (ECU side) #4 injector: 7 – Ground #5 injector: 2 – Ground #6 injector: 10 – Ground <Standard values> 8 V or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect for short-circuit of injector wire harness (between injector linked-up connector and injector harness connector)	Disconnect the injector harness connector and measure the resistance between each terminal in the injector linked-up connector (engine side) and ground. <Tester connections> injector linked-up connector (engine side) #4 injector: 7 – Ground #5 injector: 2 – Ground #6 injector: 10 – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P2149		Fuel injector driver circuit 2 - circuit (circuit open)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect disconnection of the injector harness	Disconnect the injector harness connector and measure the resistance between #4 – #6 injector harness connector terminals. <Tester connections> Injector harness connector terminals #4 IJ4+ – IJ4- #5 IJ5+ – IJ5- #6 IJ6+ – IJ6- <Standard values> 20 °C {68 °F}: 0.37 – 0.57 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 6.
6	Inspect the injector unit	Measure the resistance between the #4 – #6 injector terminals and the injector bodies. <Tester connections> Injector terminals – injector bodies <Standard values> 10 MΩ or more	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Replace the injector. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more) 2. Check if P2149 has been detected in [Engine].	DTC P2149 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2150 and P2151

EN01H16F01030F03001134

P2150: Fuel injector driver circuit 2 - circuit (circuit low) INFORMATION



SAPH16F010300805

1. Technical description

- The engine ECU controls the fuel injection rate according to the injector valve-open interval.
- The valve-open interval is adjusted by the magnetic valve.

<Description of malfunction>

- Injector drive system common 2 is not working properly.
- Possible short-circuit in minus-side harness

2. DTC set condition

(1) DTC detection condition

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- Injector is in operation.
- Engine speed is higher than 0 r/min.

(2) Judgement criteria

- When the injector drive system circuit 2 voltage is smaller than 0.9 V, the fail count is detected with the full count. (When the engine speed is 750 r/min: 0.6 seconds * Varies according to engine speed)

3. Reset condition

- After normal operation is restored and engine is restarted after having stalled.

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

- MIL: ON
- Diag lamp: OFF

- Engine output is restricted.
- Cruise control function is not available.
- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

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

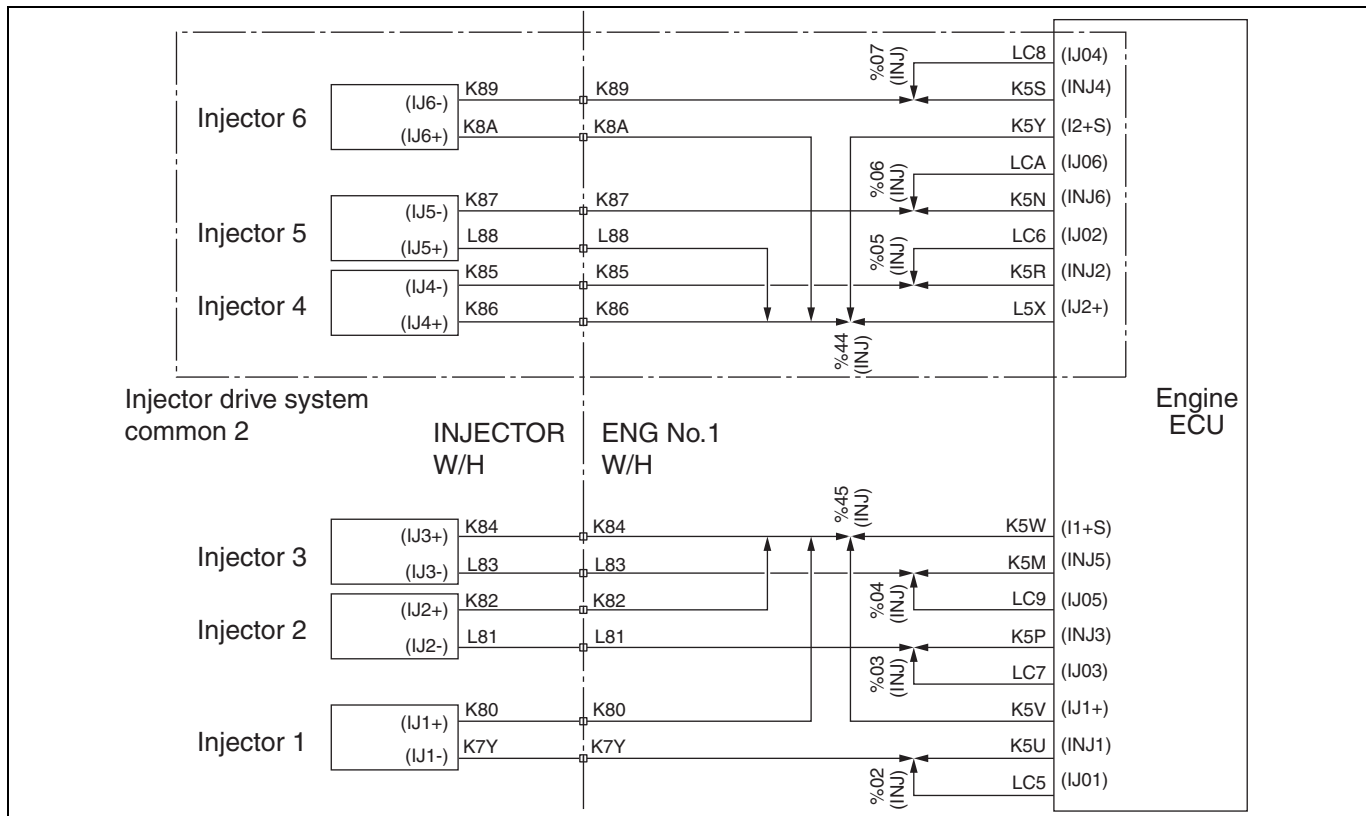
7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Injector internal coil disconnection
- Engine ECU failure

P2151: Fuel injector driver circuit 2 - circuit (circuit high) INFORMATION



SAPH16F010300806

1. Technical description

- The engine ECU controls the fuel injection rate according to the injector valve-open interval.
- The valve-open interval is adjusted by the magnetic valve.

<Description of malfunction>

- Injector drive system common 2 is not working properly.
- Possible short-circuit in minus-side harness

2. DTC set condition

(1) DTC detection condition

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.
- Injector is not in operation.
- Engine speed is higher than 0 r/min.

(2) Judgement criteria

- When the injector drive system circuit 2 voltage is smaller than 0.9 V, the fail count is detected with the full count. (When the engine speed is 750 r/min: 0.6 seconds * Varies according to engine speed)

3. Reset condition

- After normal operation is restored and engine is restarted after having stalled.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.

- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Injector internal coil disconnection
- Engine ECU failure

INSPECTION PROCEDURE: P2150 and P2151

1 Inspect the injector connector

1. Check the connection of the injector connector (Looseness and poor contact).

Was any failure found?

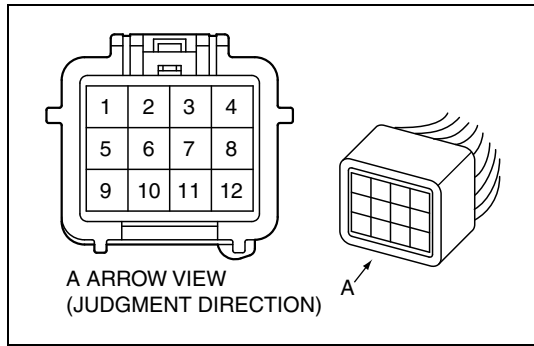
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect for short-circuit of the injector harness (engine ECU – injector linked-up connector)



1. Set the starter switch to the "LOCK" position.
2. Disconnect the injector linked-up connector and engine ECU connector.
3. Use the electrical tester to measure the resistance between each terminal in the injector linked-up connector (ECU side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Injector linked-up connector (ECU side): #4 injector: 7 terminal – Ground 8 terminal – Ground #5 injector: 1 terminal – Ground 2 terminal – Ground #6 injector: 9 terminal – Ground 10 terminal – Ground	$\infty \Omega$

Do the measurements meet the standard value?

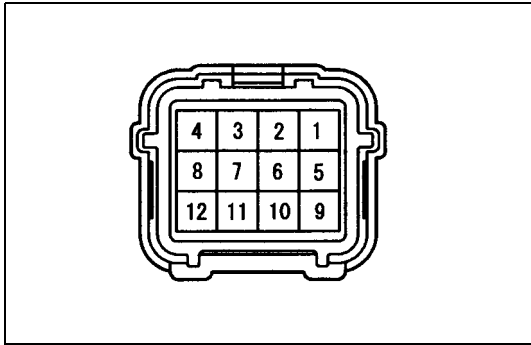
YES

NO

Go to step 3.

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

3 Inspect for short-circuit of the injector wire harness (between injector linked-up connector and injector harness connector)



SAPH16F010300808

1. Disconnect the injector harness connector.
2. Use the electrical tester to measure the resistance between each terminal in the injector linked-up connector (engine side) and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Injector linked-up connector (engine side): #4 injector: 7 terminal – Ground 8 terminal – Ground #5 injector: 1 terminal – Ground 2 terminal – Ground #6 injector: 9 terminal – Ground 10 terminal – Ground	$\infty \Omega$

Do the measurements meet the standard value?

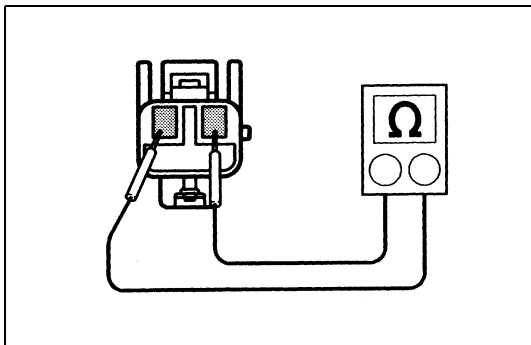
YES

NO

Go to step 4.

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

4 Inspect disconnection of the injector harness



SAPH16F010300809

1. Use the electrical tester to measure the resistance between the #4 – #6 injector harness connector terminals.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Between injector harness connector terminals #4 IJ4- – IJ4+ #5 IJ5- – IJ5+ #6 IJ6- – IJ6+	20 °C {68 °F}: 0.37 – 0.57 Ω

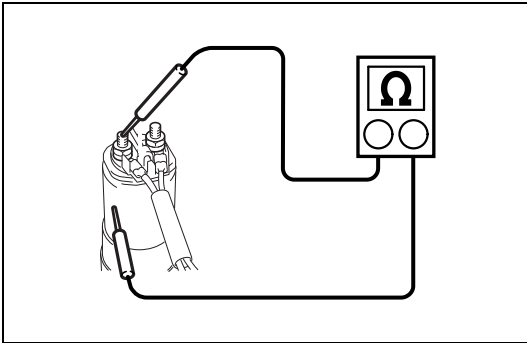
Do the measurements meet the standard value?

YES

NO

Go to step 5.

Go to step 6.

5 Inspect the injector unit

SAPH16F010300810

1. Measure the resistance between the #4 – #6 injector terminals and the injector bodies.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Between injector terminal and body	10 MΩ or more

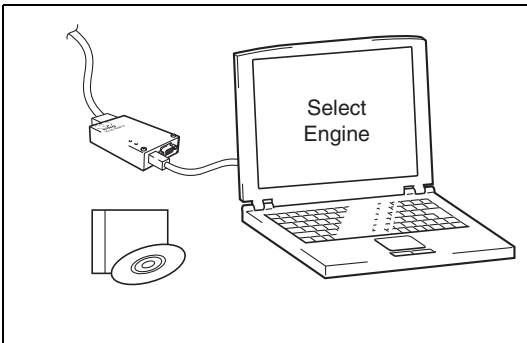
Do the measurements meet the standard value?

YES

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

NO

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

6 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300811

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if DTC P2150 or 2151 has been detected in [Fault Information].

Has DTC P2150 or 2151 been detected?

YES

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

NO

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

CHECKLIST: P2150 and P2151

DTC: P2150		Fuel injector driver circuit 2 - circuit (circuit low)		Inspection procedure		
DTC: P2151		Fuel injector driver circuit 2 - circuit (circuit high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the injector connector	Check the connection of the injector connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect for short-circuit of the injector wire harness (Engine ECU injector linked-up connector)	Disconnect the injector harness connector and engine ECU connector measure the resistance between each terminal in the injector linked-up connector (ECU side) and ground. <Tester connections> injector linked-up connector (ECU side) #4 injector: 7 – Ground 8 – Ground #5 injector: 1 – Ground 2 – Ground #6 injector: 9 – Ground 10 – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

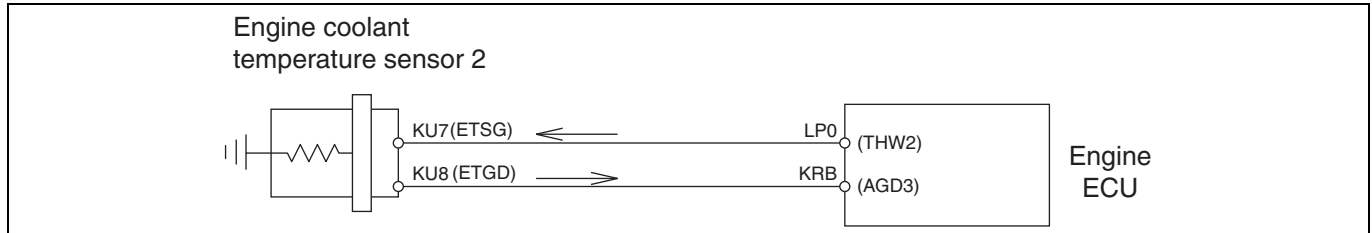
DTC: P2150		Fuel injector driver circuit 2 - circuit (circuit low)		Inspection procedure		
DTC: P2151		Fuel injector driver circuit 2 - circuit (circuit high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
3	Inspect for short-circuit of the injector wire harness (between injector linked-up connector and injector harness connector)	Disconnect the injector harness connector and measure the resistance between each terminal in the injector linked-up connector (engine side) and ground. <Tester connections> injector linked-up connector (engine side) #4 injector: 7 – Ground 8 – Ground #5 injector: 1 – Ground 2 – Ground #6 injector: 9 – Ground 10 – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect disconnection of the injector harness	Measure the resistance between the #4 – #6 injector harness connector terminals. <Tester connections> Injector harness connector terminals #4 IJ4- – IJ4+ #5 IJ5- – IJ5+ #6 IJ6- – IJ6+ <Standard values> 20 °C {68 °F}: 0.37 – 0.57 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Go to step 6.
5	Inspect the injector unit	Measure the resistance between the #4 – #6 injector terminals and the injector bodies. <Tester connections> injector terminals – injector bodies <Standard values> 10 M Ω or more	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the injector harness. Perform "After-inspection work" of INFORMATION section.	Replace the injector. Perform "After-inspection work" of INFORMATION section.
6	Check the DTC detected (Engine ECU) [Hino-DX]	Check if the DTC (P2150 or P2151) has been detected in [Engine].	DTC (P2150 or P2151) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2184 and P2185

EN01H16F01030F03001135

P2184: Engine coolant temperature sensor 2 - out of range (Out of range low)

INFORMATION



SAPH16F010300812

1. Technical description

- Engine coolant temperature sensor 2 is installed in a thermostat case and constantly measures the engine coolant temperature.

<Description of malfunction>

- Engine coolant temperature cannot be correctly recognized.

2. DTC set condition

(1) DTC detection condition

- Starter switch is inactive to the "ON" position.
- Battery voltage is in the range of 10 V to 16 V.

Above conditions continue for at least 5 seconds.

(2) Judgement criteria

- Engine coolant temperature sensor 2 output is 0.1 V (139 °C {282.2 °F}) or less, and this condition continues for at least 3 seconds.

3. Reset condition

- After restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<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

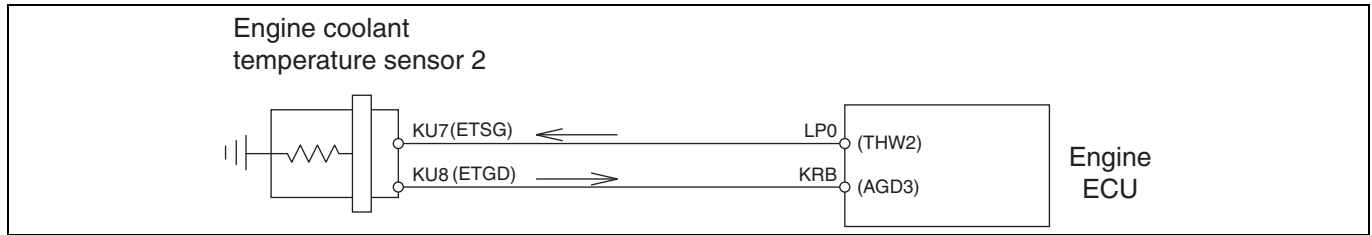
- Clear all past DTCs.

- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Sensor is disconnected or sensing unit is malfunctioning (due to dirt, clogging, damage, etc.)
- Abnormal sensor resistance
- Engine ECU sensor power supply failure or internal circuit failure
- Harness disconnection or short-circuit
- Looseness or poor contact of the connector

P2185: Engine coolant temperature sensor 2 - out of range (Out of range high) INFORMATION



SAPH16F010300813

1. Technical description

- Engine coolant temperature sensor 2 is installed in a thermostat case and constantly measures the engine coolant temperature.

<Description of malfunction>

- Engine coolant temperature cannot be correctly recognized.

2. DTC set condition

(1) DTC detection condition

- Starter switch is inactive to the "ON" position.
- Battery voltage is in the range of 10 V to 16 V.

Above conditions continue for at least 5 seconds.

(2) Judgement criteria

- Engine coolant temperature sensor 2 output is at least 4.85 V (-30 °C), and this condition continues for at least 3 seconds.

3. Reset condition

- After restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Idling stop system is not available.
- Vehicle start control is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.
- Cruise control does not work.
- Idling stop system does not work.
- Vehicle start control does not work.

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Abnormal resistance of the sensor
- Engine ECU sensor power supply failure or internal circuit failure
- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- Sensor internal short-circuit

INSPECTION PROCEDURE: P2184 and P2185**1 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.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 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.

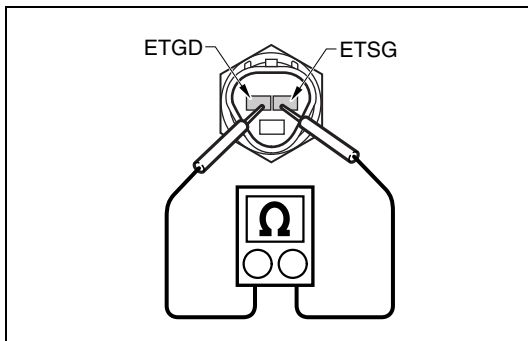
Was any failure found?

YES

Clean the engine coolant temperature sensor 2 and install it properly.
If damaged, replace the engine coolant temperature sensor 2.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the engine coolant temperature sensor 2 unit

SAPH16F010300814

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 connector.

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?

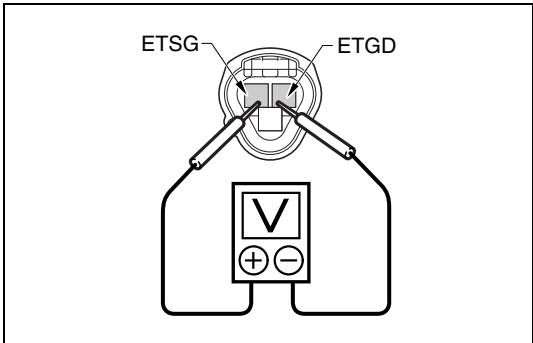
YES

NO

Go to step 4.

Replace the engine coolant temperature sensor 2.
Perform "After-inspection work" of INFORMATION section.

4 Inspect the engine coolant temperature sensor 2 power supply



SAPH16F010300815

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?

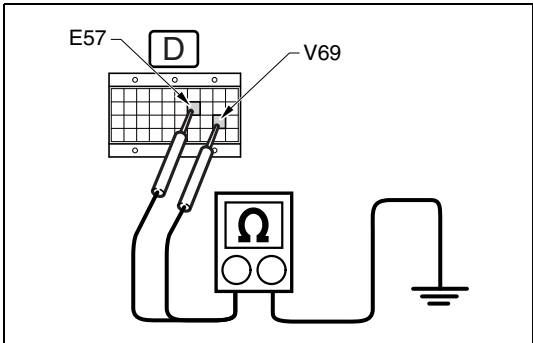
YES

NO

Go to step 7.

Go to step 5.

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



SAPH16F010300816

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU vehicle-side harness. (Do not connect harness to the ECU.)
3. 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) THW2(E69) – Ground AGD3(E57) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

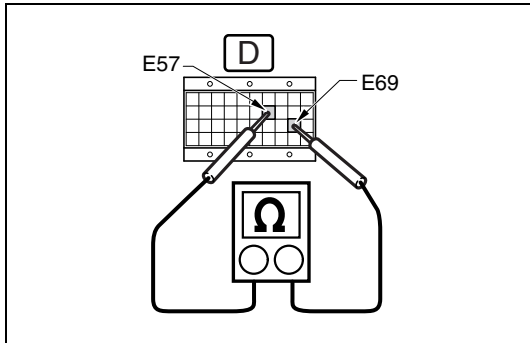
YES

NO

Go to step 6.

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

6 Inspect disconnection of the wire harness of engine coolant temperature sensor 2



SAPH16F010300817

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) THW2(E69) – AGD3(E57)	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?

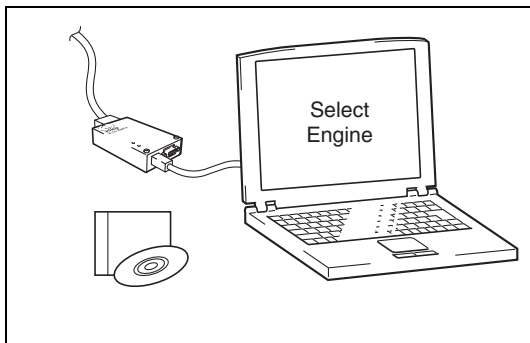
YES

NO

Go to step 7.

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

7 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300818

1. Warm-up the engine. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if DTC P2184 or 2185 has been detected in [Fault Information].

Has DTC P2184 or 2185 been detected?

YES

NO

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

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

CHECKLIST: P2184 and P2185

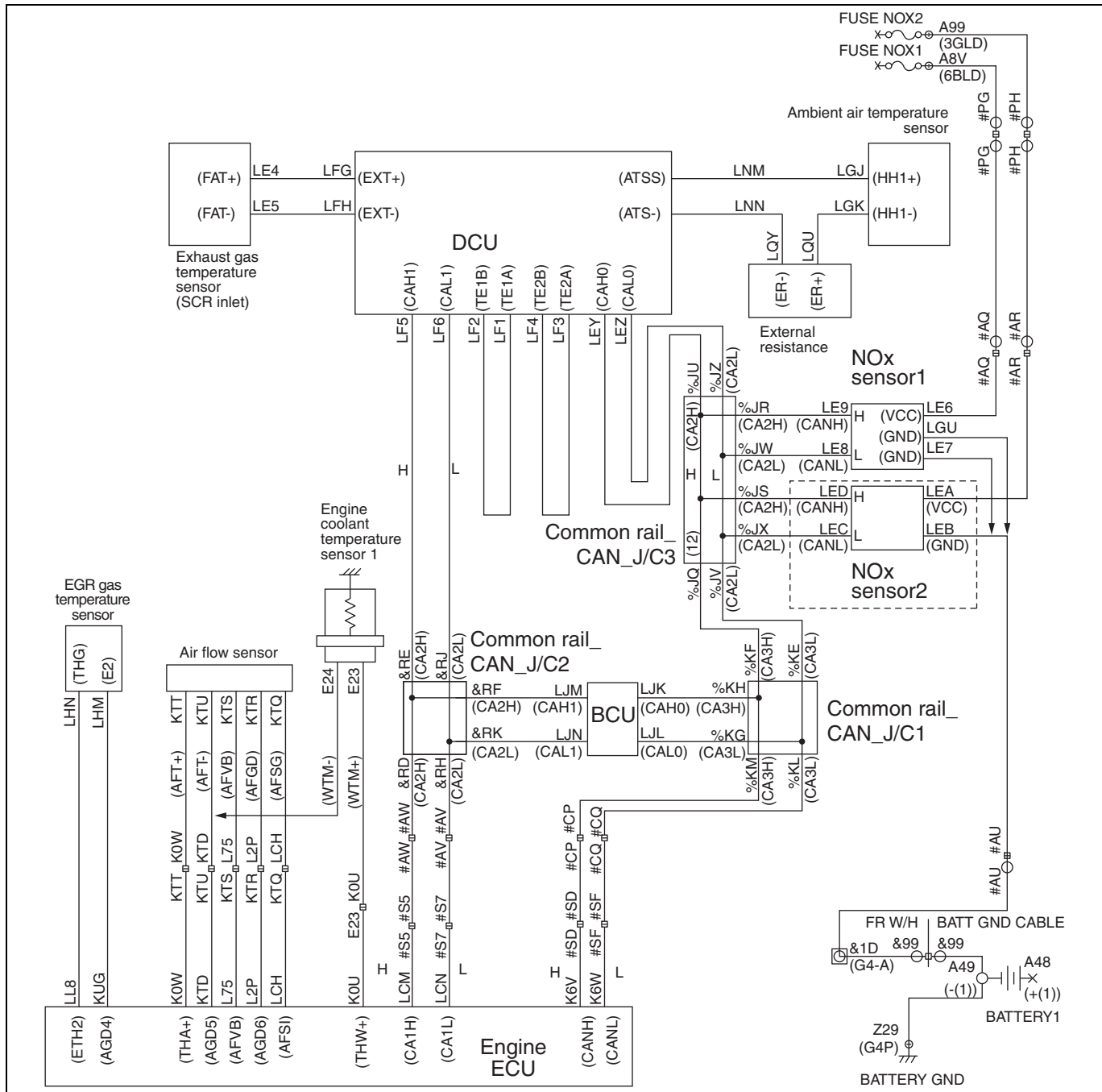
DTC: P2184		Engine coolant temperature sensor 2 - out of range (Out of range low)		Inspection procedure		
DTC: P2185		Engine coolant temperature sensor 2 - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the engine coolant temperature sensor 2 connector	Check the connection of the engine coolant temperature sensor 2 connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the engine coolant temperature sensor 2	<ol style="list-style-type: none"> 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. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the engine coolant temperature sensor 2 and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the engine coolant temperature sensor 2 unit	Disconnect the engine coolant temperature sensor 2 connector and measure the resistance between the terminals of the engine coolant temperature sensor 2 connector. <Tester connections> Engine coolant temperature sensor 2 ETSG – ETGD <Standard values> 20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the sensor 2. Perform "After-inspection work" of INFORMATION section.

DTC: P2184		Engine coolant temperature sensor 2 - out of range (Out of range low)		Inspection procedure		
DTC: P2185		Engine coolant temperature sensor 2 - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the engine coolant temperature sensor 2 power supply	Measure the voltage between the terminals of the engine coolant temperature sensor 2 vehicle-side connector. <Tester connections> Engine coolant temperature sensor 2 vehicle-side connector ETSG – ETGD <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 5.
5	Inspect for short-circuit of the engine coolant temperature sensor 2 wire harness	Connect the signal check harness, and measure the resistance between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) THW2(E69) – Ground AGD3(E57) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the wire harness of engine coolant temperature sensor 2	Connect the signal check harness to the engine ECU vehicle-side harness and measure the resistance between the terminal in the engine ECU (signal check harness). <Tester connections> Engine coolant temperature sensor 2 vehicle-side connector THW2(E69) and AGD3(E57) <Standard values> 20 °C {68 °F}: 2.59 – 2.32 k Ω 80 °C {176 °F}: 0.326 – 0.310 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	Check if the DTC (P2184 or P2185) has been detected in [Engine].	DTC (P2184 or P2185) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2214

EN01H16F01030F03001136

P2214: NOx sensor (SCR downstream) - Performance and Monitoring capability INFORMATION



SAPH16F010300819

1. Technical description

- NOx sensor 2 (SCR downstream) is controlled by the NOx sensor controller.
- The NOx sensor controller is connected via the DCU and a harness, and it sends and receives data.

<Description of malfunction>

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

2. DTC set condition

- (1) DTC detection condition

DPR active regeneration start
SCR catalyst temperature. (from DCU) ≥ 430 °C {806 °F}
Stop DEF dosing
Cumulative NOx mass flow (SCR upstream) from DEF dosing stop ≥ 5.3 g
 $10 \text{ ppm} \leq \text{NOX (SCR upstream)} \leq 500 \text{ ppm}$
 $|\Delta \text{NOx (SCR upstream)}| \leq 780 \text{ ppm/sec}$
 $300 \text{ kg/h} \leq \text{Exhaust gas mass flow} \leq 1,000 \text{ kg/h}$
Fuel injection quantity $\geq 5 \text{ mg/cyl/sec}$

(2) Judgement criteria

- $0.2 < \text{sum of downstream NOx sensor readings} / \text{sum of upstream NOx sensor readings} < 1.5$

3. Reset condition

- After normal operation is restored.

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

- MIL: ON
- 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

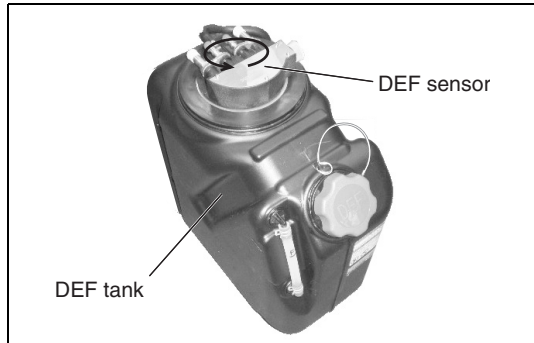
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Harness disconnection or short
- NOx sensor 2 (SCR downstream) failure
 - Sensor internal circuit failure
 - NOx sensor controller failure

INSPECTION PROCEDURE: P2214

1 Inspection of the DEF



SAPH16F010300820

1. Check the DEF concentration.

Standard values
32.5 ± 2.5 %

Do the measurements meet the standard value?

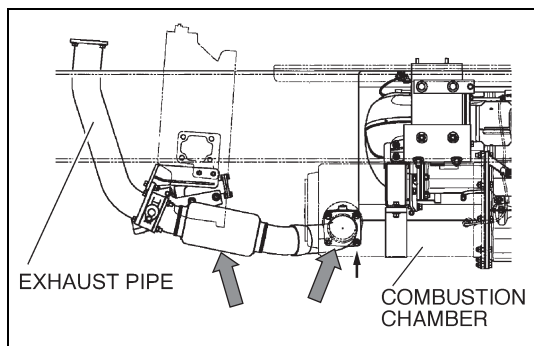
YES

Go to step 2.

NO

Replace the DEF.
 If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, and then refill the tank with at least 5 liters {1.3 gallons} of DEF solution. Afterward, drive the vehicle and confirm that the problem does not recur under driving conditions. Perform "After-inspection work" of INFORMATION section.

2 Inspect the exhaust pipe



SAPH16F010300821

1. Check the exhaust pipe and make sure it has no cracks or exhaust leaks (soot leaks), and verify that coupling flanges are properly tightened.

Was any failure found?

YES

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

NO

Go to step 3.

3 Inspect the air flow sensor connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 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.

Was any failure found?

YES

If damaged, replace the air flow sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 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.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 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).

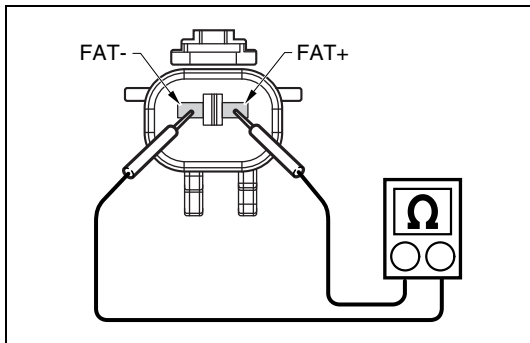
Was any failure found?

YES

Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 7.

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

SAPH16F010300822

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 8.

NO

Replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.

8 Inspect the exhaust temperature sensor (DOC outlet) connector

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

Was any failure found?

YES

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect the exhaust gas temperature sensor (DOC outlet)

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

Was any failure found?

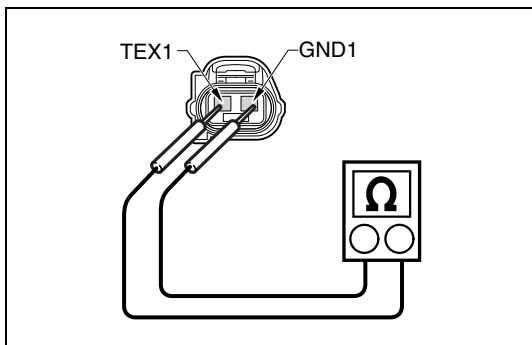
YES

Clean the exhaust gas temperature sensor (DOC Outlet) and install it properly. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect the exhaust gas temperature sensor (DOC outlet) unit



SAPH16F010300823

1. Disconnect the exhaust gas temperature sensor (DOC outlet) connector.
2. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor (DOC outlet).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (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 11.

NO

Replace the exhaust gas temperature sensor (DOC outlet).
Perform "After-inspection work" of INFORMATION section.

11 Inspect the ambient air temperature sensor connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 12.

12 Inspect the ambient air temperature sensor

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

Was any failure found?

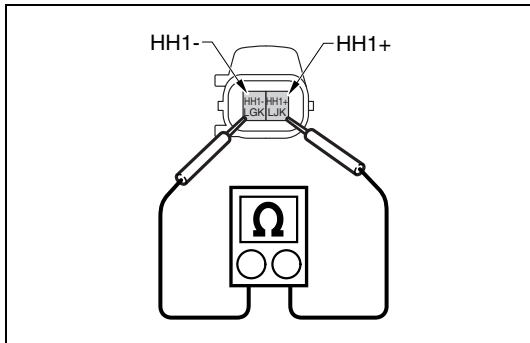
YES

Clean the ambient air temperature sensor and install it properly.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 13.

13 Inspect the ambient air temperature sensor unit



SAPH16F010300824

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Ambient air temperature sensor HH1+ – HH1-	25 °C {77 °F}: 1.7 kΩ

Do the measurements meet the standard value?

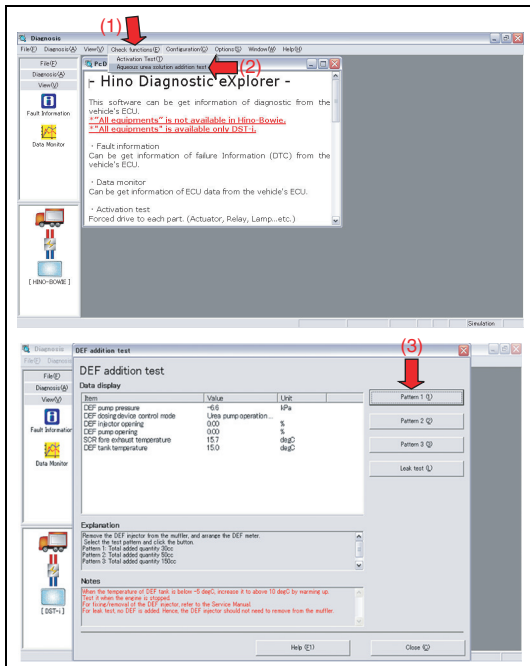
YES

Go to step 14.

NO

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

14 Inspection of the DEF injector [Hino-DX]



SAPH16F010300825

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.

HINT
Refer to the section "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Check Function] and check the DEF injector actuation.

<Inspection procedure>

 - (1) Select [Check Function].
 - (2) Select [DEF addition test].
 - (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)

NOTICE

When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.

HINT

Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.

Is operation normal?

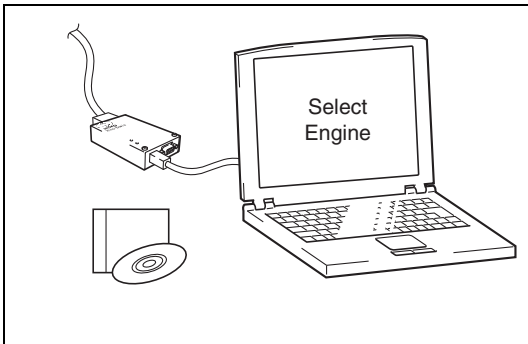
YES

Go to step 15.

NO

Replace the DEF injector.
(After replacing the DEF injector, execute a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.

15 Inspect the NOx sensor [Hino-DX]



SAPH16F010300826

1. Set the starter switch to the "LOCK" position.
2. Replace the NOx sensor 1 and NOx sensor 2.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history and execute a DPR forced regeneration.
5. Select [Engine] and check if P2214 has been detected in [Fault Information].

Has DTC P2214 been detected?

YES

Replace the engine ECU.
(After replacing the engine ECU, execute a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.

NO

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

CHECKLIST: P2214

DTC: P2214		NOx sensor (SCR downstream) - Performance and Monitoring capability		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspection of the DEF	Check the DEF concentration. <Standard values> 32.5 ± 2.5 %	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 2.	Replace the DEF. If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, and then refill the tank with at least 5 liters {1.3 gallons} of DEF solution. Afterward, drive the vehicle and confirm that the problem does not recur under driving conditions. Perform "After-inspection work" of INFORMATION section.
2	Inspect the exhaust pipe	Check the exhaust pipe and make sure it has no cracks or exhaust leaks (soot leaks), and verify that coupling flanges are properly tightened.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the exhaust pipe. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the air flow sensor connector	Check the connection of the air flow sensor connector. (Looseness and poor contact)	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.

DTC: P2214		NOx sensor (SCR downstream) - Performance and Monitoring capability		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the air flow sensor	<ol style="list-style-type: none"> 1. Check the installation of the air flow sensor. 2. Make sure there is no dirt or damage to the air flow sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		If damaged, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector. (Looseness and poor contact)	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 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). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Inspect the exhaust gas temperature sensor (SCR inlet) unit	<p>Measure the resistance between the terminals of the exhaust gas temperature sensor (SCR inlet). <Tester connections> Exhaust gas temperature sensor (SCR inlet) FAT+ – FAT- <Standard values> 20 °C {68 °F}: 220 Ω</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 8.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.

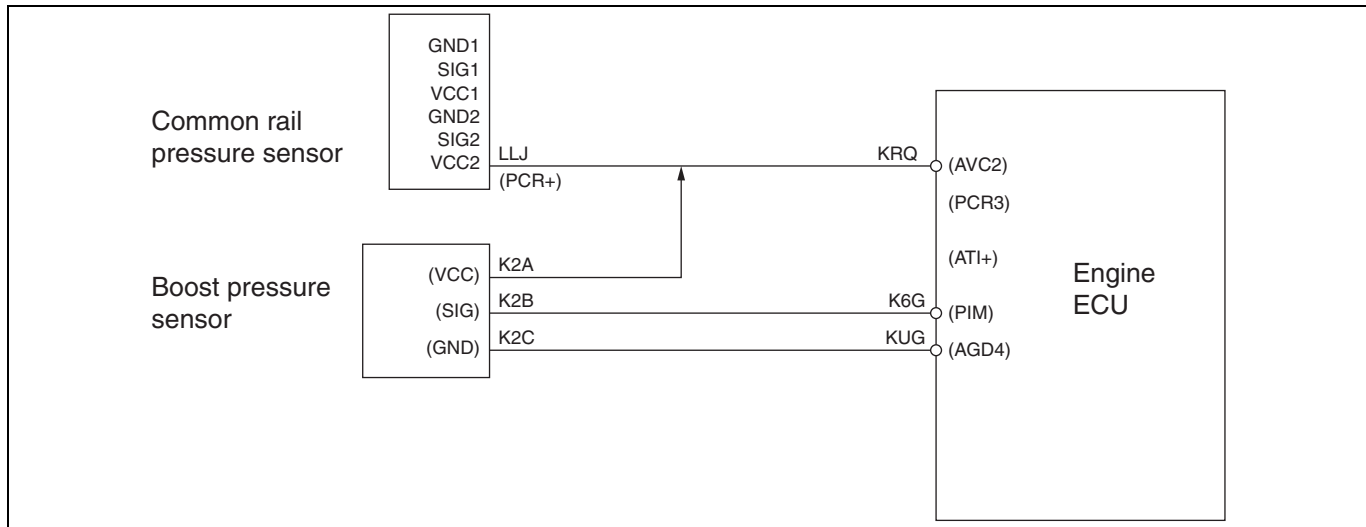
DTC: P2214		NOx sensor (SCR downstream) - Performance and Monitoring capability		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the exhaust temperature sensor (DOC outlet) connector	Check the connection of the exhaust gas temperature sensor (DOC outlet) connector. (Looseness and poor contact)	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 9.
9	Inspect the exhaust gas temperature sensor (DOC outlet)	<ol style="list-style-type: none"> 1. Check the installation of the exhaust gas temperature sensor connector (DOC outlet). 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (DOC Outlet). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (DOC Outlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (DOC outlet). Perform "After-inspection work" of INFORMATION section.	Go to step 10.
10	Inspect the exhaust gas temperature sensor (DOC outlet) unit	Measure the resistance between the terminals of the exhaust gas temperature sensor (DOC outlet). <Tester connections> Exhaust gas temperature sensor (DOC outlet) TEX1 – GND1 <Standard values> 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	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 11.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
11	Inspect the ambient air temperature sensor connector	Check the connection of the ambient air temperature sensor connector. (Looseness and poor contact)	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 12.

DTC: P2214		NOx sensor (SCR downstream) - Performance and Monitoring capability		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
12	Inspect the ambient air temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the ambient air temperature sensor. 2. Make sure there is no dirt or damage to the ambient air temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Clean the ambient air temperature sensor and install it properly.</p> <p>If damaged, replace the ambient air temperature sensor.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 13.
13	Inspect the ambient air temperature sensor unit	<p>Measure the resistance between the terminals of the ambient air temperature sensor.</p> <p><Tester connections> Ambient air temperature sensor HH1+ – HH1-</p> <p><Standard values> 25 °C {77 °F}: 1.7 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 14.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
14	Inspection of the DEF injector [Hino-DX]	<p>Remove the DEF injector from the muffler and select [Check functions] in Hino-EX menu [ECU] and inspect the operation of DEF injector.</p> <p><Inspection procedure></p> <ol style="list-style-type: none"> (1) Select [Check functions]. (2) Select [DEF addition test]. (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns) <p>NOTICE When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.</p> <p>HINT Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.</p>	<p>Operation normal: Go to YES.</p> <p>Abnormal: Go to NO.</p>		Go to step 15.	Replace the DEF injector. (After replacing the engine ECU, execute a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.

DTC: P2214		NOx sensor (SCR downstream) - Performance and Monitoring capability		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
15	Inspect the NOx sensor [Hino-DX]	<ol style="list-style-type: none"> 1. Replace the NOx sensor 1 and NOx sensor 2 and erase the trouble history and execute a DPR forced regeneration. 2. Check if P2214 has been detected in [Engine]. 	<p>DTC P2214 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the engine ECU. (After replacing the engine ECU, execute a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.</p>	<p>Procedure completed. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P2227

EN01H16F01030F03001137

P2227: Barometric pressure sensor - rationality
INFORMATION

SAPH16F010300827

1. Technical description

- –

<Description of malfunction>

- Barometric pressure is not correctly recognized.

2. DTC set condition**(1) DTC detection condition**

- Starter switch LOCK.
- Engine is stopped (engine stall condition).
- No characteristics failure of boost pressure sensor

(2) Judgement criteria

- Boost pressure value – barometric pressure value ≥ 18 kPa {2.6 psi}
- Failure determination time ≥ 3 seconds

3. Reset condition

- After normal operation is restored and starter switch OFF.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Engine ECU failure

INSPECTION PROCEDURE: P2227**1 Inspect the boost pressure sensor connector**

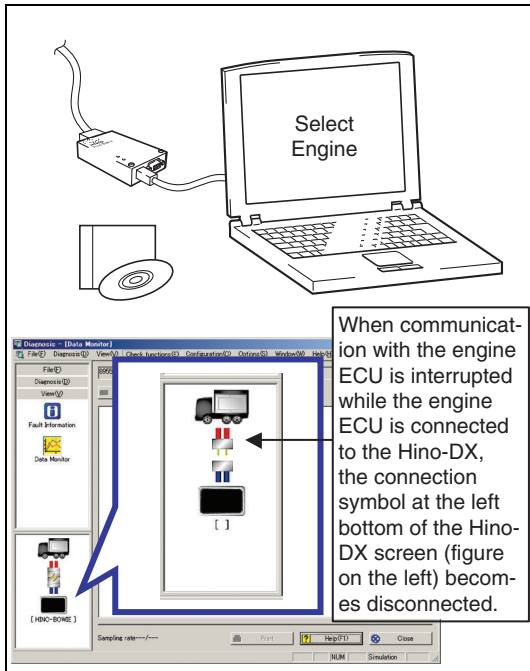
1. Check the connection of the boost pressure sensor connector (Looseness and poor contact).

Was any failure found?**YES****Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 2.****2 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. Check the boost pressure sensor pipes and hoses and make sure they are free of dirt, clogging, or damage.

Was any failure found?**YES****Replace the boost pressure sensor if the boost pressure sensor is dirty, clogged, or damaged.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 3.**

3 Check the DTC detected (Engine ECU) 2 [Hino-DX]



SAPH16F010300828

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history.
5. Set the starter switch to the "LOCK" position.
6. Check that the engine ECU main relay is OFF on Hino-DX menu. (This cuts off the communication between Hino-DX and the engine ECU.)
7. Set the starter switch to the "ON" position.
8. Select [Engine] and check if P2227 has been detected in [Fault Information].

Has DTC P2227 been detected?

YES

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

NO

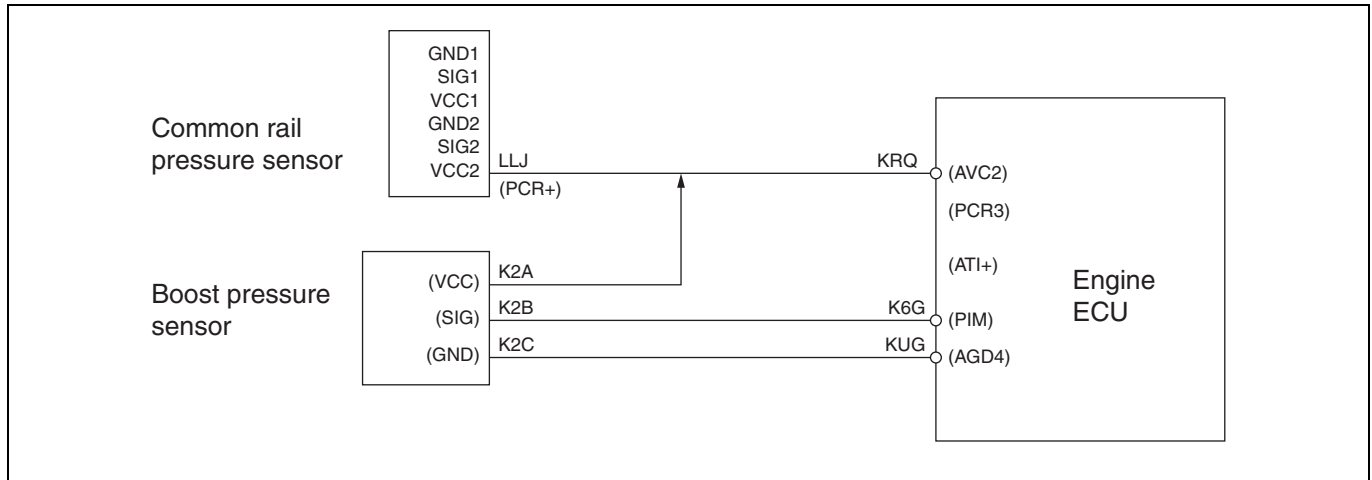
Procedure completed.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P2227

DTC: P2227		Barometric pressure sensor - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the boost pressure sensor connector	Check the connection of the boost pressure sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the boost pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the boost pressure sensor. 2. Make sure there is no dirt or damage to the boost pressure sensor. 3. Check the boost pressure sensor pipes and hoses and make sure they are free of dirt, clogging, or damage. 	Failure found: Go to YES. No failure found: Go to NO.		Replace the boost pressure sensor if the boost pressure sensor is dirty, clogged, or damaged. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Check the DTC detected (Engine ECU) 2 [Hino-DX]	<ol style="list-style-type: none"> 1. Erase the trouble history. 2. Set the starter switch to the "LOCK" position. 3. Make sure the engine ECU main relay is OFF in Hino-DX menu. (This cuts off the communication between Hino-DX and the engine ECU.) 4. Set the starter switch to the "ON" position. 5. Select [Engine] and check if P2227 has been detected in [Fault Information]. 	DTC P2227 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2228 and P2229

EN01H16F01030F03001138

P2228: Barometric pressure sensor - out of range (out of range low)**INFORMATION**

SAPH16F010300829

1. Technical description

- -

<Description of malfunction>

- The atmospheric pressure sensor (inside the ECU) is not properly functioning.

2. DTC set condition**(1) Check conditions**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V, and Engine stall, or Engine speed ≥ 500 r/min for 5 seconds.

(2) Judgement criteria

- Barometric pressure sensor voltage < 1.9 V (43.3 kPa {6.3 psi})
- Failure timer ≥ 3 seconds.

3. Reset condition

- After restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

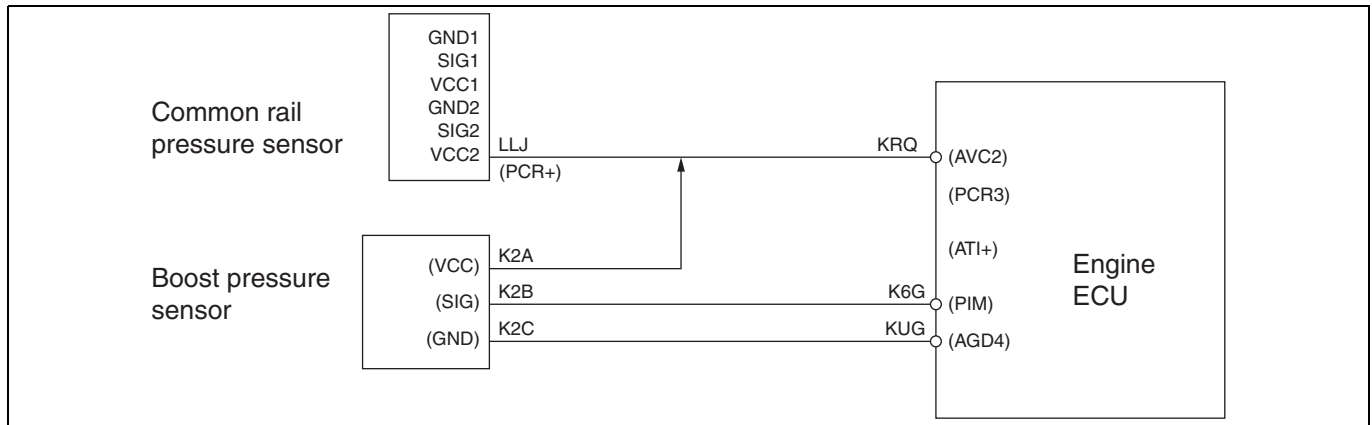
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Malfunction of engine ECU

P2229: Barometric pressure sensor - out of range (out of range high)**INFORMATION**

SAPH16F010300830

1. Technical description**<Description of malfunction>**

- The atmospheric pressure sensor (inside the ECU) is not properly functioning.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V, and Engine stall, or Engine speed ≥ 500 r/min for 5 seconds.

(2) Judgement criteria

- Barometric pressure sensor voltage > 4.2 V (120 kPa {17.4 psi})
- Failure timer ≥ 3 seconds

3. Reset condition

- Just after restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<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

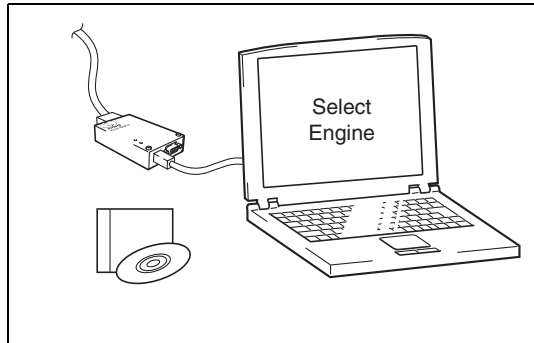
- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Malfunction of engine ECU

INSPECTION PROCEDURE: P2228 and P2229

1 Check the DTC detected (Engine ECU) 1



SAPH16F010300831

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than (P2228 or P2229) has been detected in [Fault Information].

Has a DTC other than (P2228 or P2229) been detected?

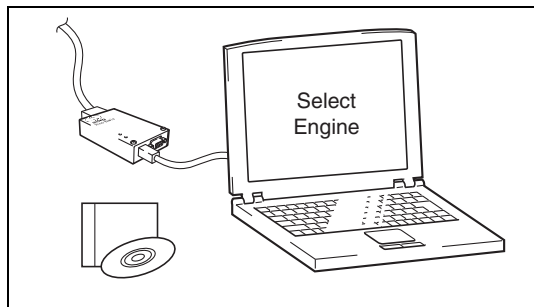
YES

NO

Go to the diagnostic procedure of a related DTC.

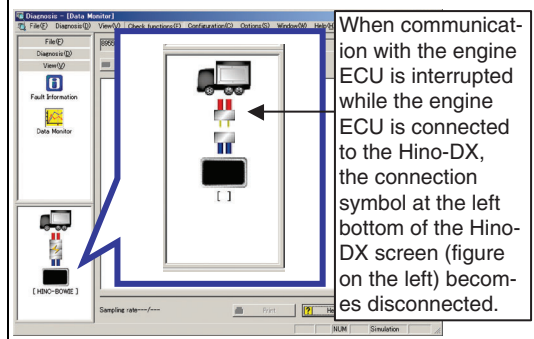
Go to step 2.

2 Check the DTC detected (Engine ECU) 2



SAPH16F010300832

1. Erase the trouble history.
2. Set the starter switch to the "LOCK" position.
3. Make sure the engine ECU main relay is OFF in Hino-DX menu. (This cuts off the communication between Hino-DX and the engine ECU.)
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if DTC has been detected in [Fault Information].



When communication with the engine ECU is interrupted while the engine ECU is connected to the Hino-DX, the connection symbol at the left bottom of the Hino-DX screen (figure on the left) becomes disconnected.

Has DTC (P2228 or P2229) been detected?

YES

NO

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

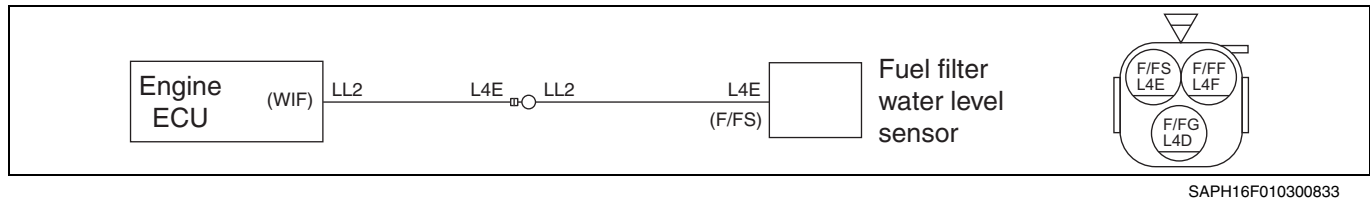
Procedure completed. Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P2228 and P2229

DTC: P2228		Barometric pressure sensor - out of range (out of range low)		Inspection procedure		
DTC: P2229		Barometric pressure sensor - out of range (out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) 1	Check if any DTC other than (P2228 or P2229) has been detected in [Engine].	DTC other than DTC (P2228 or P2229) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Check the DTC detected (Engine ECU) 2	<ol style="list-style-type: none"> 1. Erase the trouble history. 2. Set the starter switch to the "LOCK" position. 3. Make sure the engine ECU main relay is OFF in Hino-DX menu. (This cuts off the communication between Hino-DX and the engine ECU.) 4. Set the starter switch to the "ON" position. 5. Select [Engine] and check if DTC has been detected in [Fault Information]. 	DTC (P2228 or P2229) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2269

EN01H16F01030F03001139

P2269: Water in Fuel Condition
INFORMATION**1. Technical description****<Description of malfunction>**

- Water trapped in the fuel filter has been detected.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Battery voltage is in the range of 10 V to 16 V.

(2) Judgement criteria

- Fuel filter water level sensor switch is ON.

3. Reset condition

- Check that water has not accumulated in the fuel filter.

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

- MIL: OFF
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Water has been trapped in the fuel filter.

INSPECTION PROCEDURE: P2269**1 Inspect the fuel filter**

1. Check if water has accumulated in the fuel filter.

Was any failure found?

YES

Drain water out of the fuel filter.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the fuel filter water level sensor connector

1. Check the connection of the water level sensor connector (Looseness and poor contact).

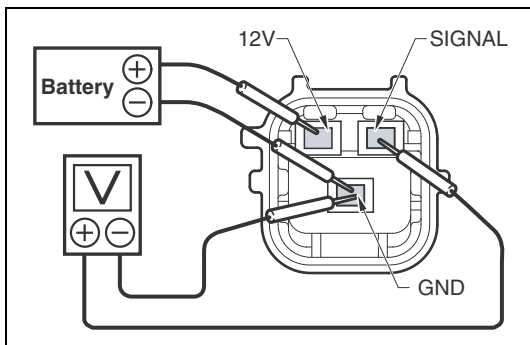
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the fuel filter water level sensor unit

SAPH16F010300834

1. Set the starter switch to the "LOCK" position.
2. Disconnect the fuel filter water level sensor connector.
3. Connect a battery between the 12 V terminal in the fuel filter water level sensor and the GND terminal.
4. Use the electrical tester to measure the voltage between the fuel filter water level sensor SIGNAL terminal and GND terminal.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Fuel filter water level sensor SIGNAL – GND	0 V (no water) 0.6 – 0.7 V (Water level within allowable range)

Do the measurements meet the standard value?

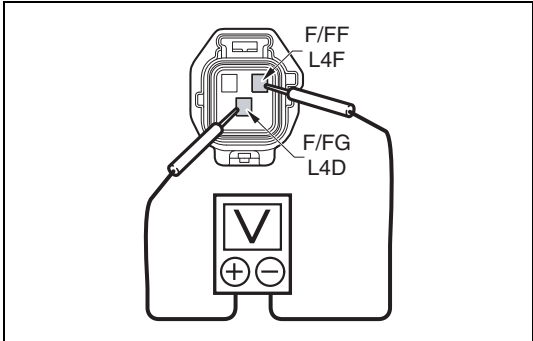
YES

NO

Go to step 4.

Replace the fuel filter water level sensor. Perform "After-inspection work" of INFORMATION section.

4 Inspect the fuel filter water level sensor power supply



SAPH16F010300835

1. Set the starter switch to the "ON" position.
2. Use the electrical tester to measure the voltage between the terminals of the fuel filter water level sensor vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Fuel filter water level sensor vehicle-side connector F/FF – F/FG	10 – 16 V

Do the measurements meet the standard value?

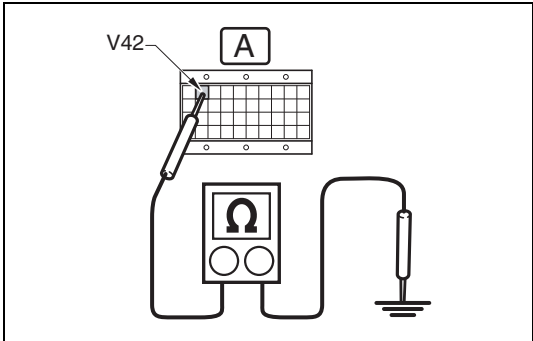
YES

NO

Go to step 5.

Inspect the fuel filter water level sensor power circuit. Perform "After-inspection work" of INFORMATION section.

5 Inspect for short-circuit in wire harness of the fuel filter water level sensor



SAPH16F010300836

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness. (Do not connect the harness to the ECU.)
3. Use the electrical tester to measure the resistance between the engine ECU (signal check harness) WIF (V42) terminal and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) WIF(V42) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

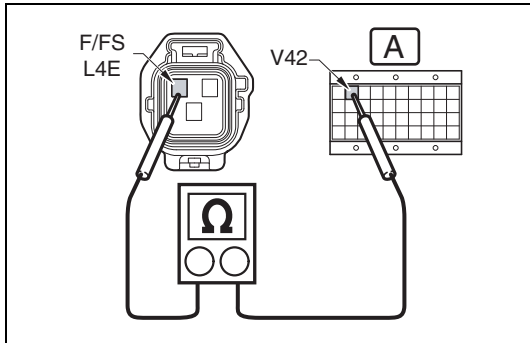
YES

Go to step 6.

NO

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

6 Inspect for disconnection in wire harness of the fuel filter water level sensor



SAPH16F010300837

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) – Fuel filter water level sensor vehicle-side connector WIF(V42) – F/FS	Less than 1 Ω

Do the measurements meet the standard value?

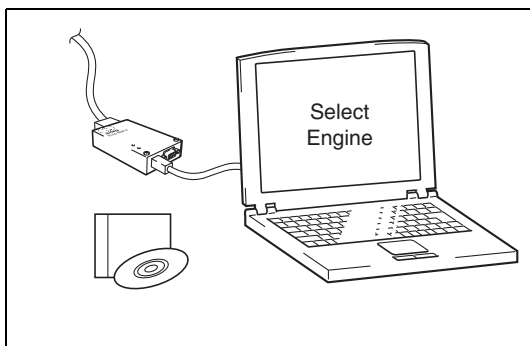
YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300838

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P2269 has been detected in [Fault Information].

Has DTC P2269 been detected?

YES

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

NO

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

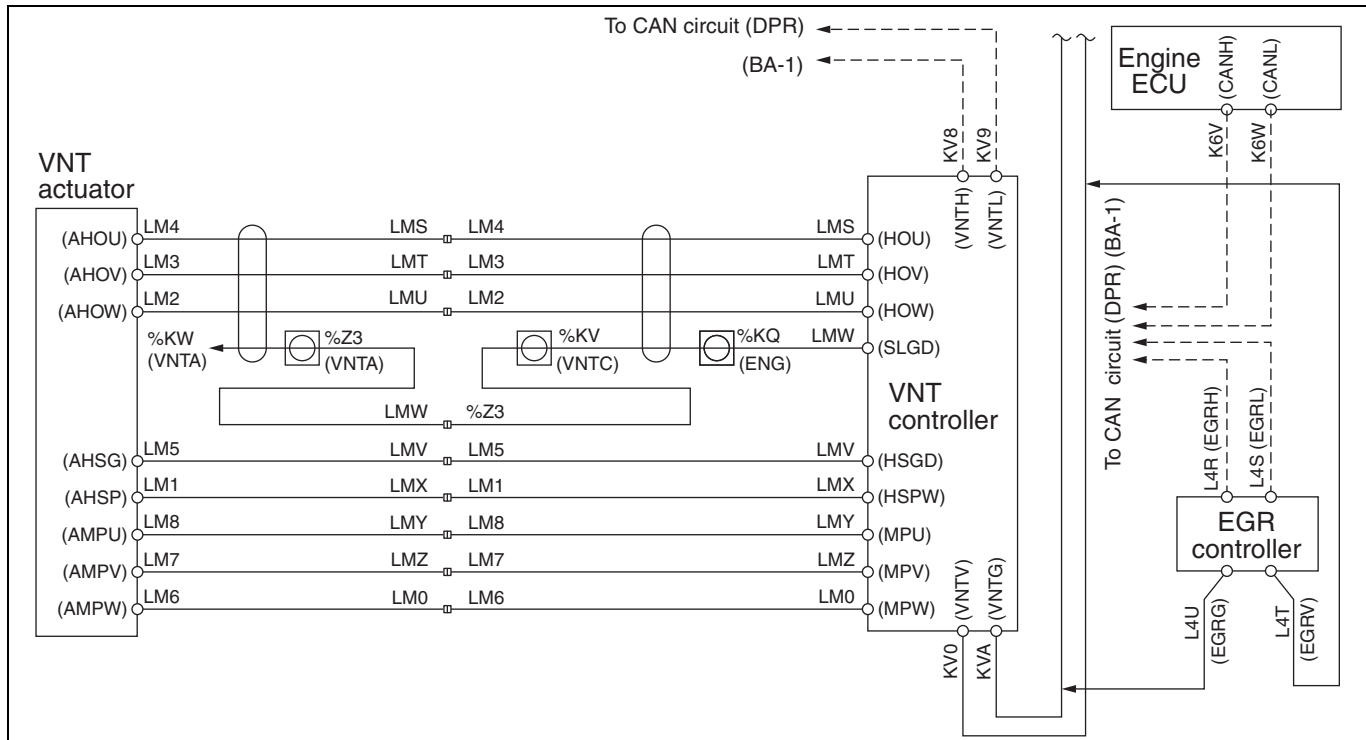
CHECKLIST: P2269

DTC: P2269		Water in Fuel Condition		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the fuel filter	Check if water has accumulated in the fuel filter.	Failure found: Go to YES. No failure found: Go to NO.		Drain water out of the fuel filter. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the fuel filter water level sensor connector	Check the connection of the water level sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the fuel filter water level sensor unit	<ol style="list-style-type: none"> Disconnect the fuel filter water level sensor connector and connect a battery between the 12 V terminal in the fuel filter water level sensor and the GND terminal. Measure the voltage between the fuel filter water level sensor SIGNAL terminal and GND terminal. <Tester connections> Fuel filter water level sensor SIGNAL – GND <Standard values> 0 V (no water) 0.6 – 0.7 V (Water level within allowable range)	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
4	Inspect the fuel filter water level sensor power supply	Measure the voltage between the terminals of the fuel filter water level sensor vehicle-side connector. <Tester connections> Fuel filter water level sensor vehicle-side connector F/FF – F/FG <Standard values> 10 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Inspect the sensor power circuit. Perform "After-inspection work" of INFORMATION section.

DTC: P2269		Water in Fuel Condition		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for short-circuit in wire harness of the fuel filter water level sensor	Connect the signal check harness to the engine ECU. (Do not connect harness to the ECU) and measure the resistance between the engine ECU (signal check harness) WIF(V42) terminal and ground. <Tester connections> Engine ECU (signal check harness) WIF(V42) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect for disconnection in wire harness of the fuel filter water level sensor	Measure the resistance between the engine ECU (signal check harness) terminal and fuel filter water level sensor vehicle-side connector terminal. <Tester connections> Engine ECU (signal check harness) – fuel filter water level sensor vehicle-side connector WIF(V42) – F/FS <Standard values> Less than 1 Ω	Within the standard value: Go to YES. Outside the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	Check if P2269 has been detected in [Engine].	DTC P2269 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P226C

EN01H16F01030F03001140

P226C: Boost pressure slow response
INFORMATION

SAPH16F010300839

1. Technical description

- The VNT actuator steplessly moves the nozzle vane via the REA (Rotary Electric Actuator) and controls turbocharger speed and boost pressure.
- The sensor inside the REA detects the amount of actuator movement and constantly monitors the nozzle vane target opening and actual opening.

<Description of malfunction>

- VNT response delay is detected.

2. DTC set condition**(1) DTC detection condition**

- 10 minutes after engine start-up

* Estimated boost pressure variation, which is calculated from the engine speed and fuel injection rate, is either ≥ 30 kPa/sec {4.4 psi} or ≤ -35 kPa/sec {-5.1 psi}.

* Engine speed fluctuation is less than 100 r/min.

(2) Judgement criteria

- Difference between [estimated boost pressure – actual boost pressure] is either ≥ 55 kPa/sec {8.0 psi/sec} or ≤ -30 kPa/sec {-4.4 psi/sec}.

3. Reset condition

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- –

<Symptoms on the vehicle due to malfunction>

- Faulty engine revving (engine hesitation)

6. Pre-inspection work

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

7. After-inspection work

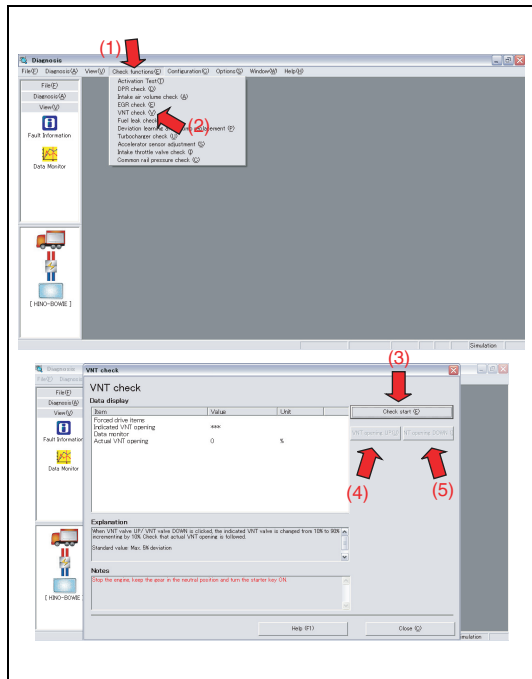
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Hesitation or sticking due to corrosion of VNT link system rods
- Faulty connector contact to REA
- Harness disconnection or short-circuit
- EGR valve malfunction
- Intake system failure
- Boost pressure sensor malfunction

INSPECTION PROCEDURE: P226C

1 Check the response delay of the VNT controller [Hino-DX]



1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Check functions]_[VNT check] from the menu, and inspect the response delay at the Target VNT position and Actual VNT position.

CAUTION

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

<Inspection procedure>

(1) Select [Check functions].

(2) Select [VNT check].

(3) Click [Check start].

(4) Click [VNT opening UP].

- Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %.

(5) Click [VNT opening DOWN].

- Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %.

HINT

- The VNT opening position changes of 10 % per step between 0 – 90 %.

Standard values

The response delay should be less than 3 seconds.

Do the measurements meet the standard value?

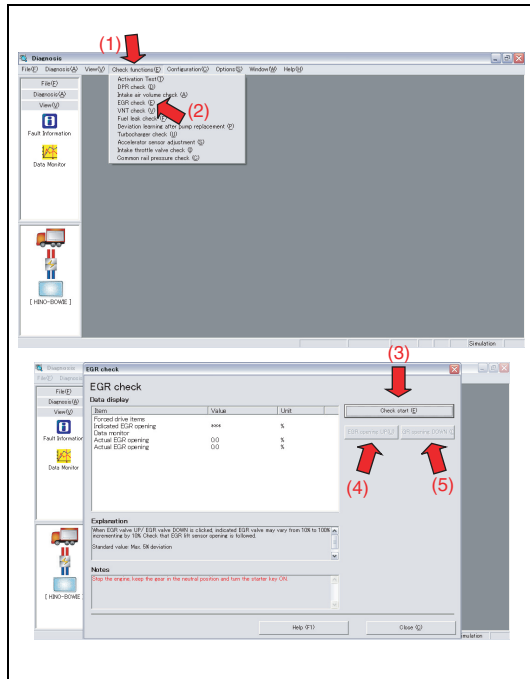
YES

Go to step 2.

NO

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

2 Check the response delay of the EGR valve [Hino-DX]



SAPH16F010300841

1. Check the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening.

⚠ CAUTION

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

<Inspection procedure>

- (1) Select [Check functions].
- (2) Select [EGR check].
- (3) Click [Check start].
- (4) Click [EGR opening UP]:
 - Check each step from 0 % – 100 % 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 100 % – 0 % of the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening.

HINT

- In EGR openings from 0 % – 100 %, 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 3.

NO

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

3 Inspect the air cleaner element

1. Check there is no dirt, damage or clogging in the air cleaner element.
2. Make sure the element is a Hino genuine part.

Was any failure found?

YES

Clean or replace the air cleaner element.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Check the air intake system

1. Check the air intake system (between air flow sensor and diesel throttle) for dirt, clogging, or damage.

Was any failure found?**YES**

**Clean or replace the faulty part.
Perform "After-inspection work" of INFORMATION section.**

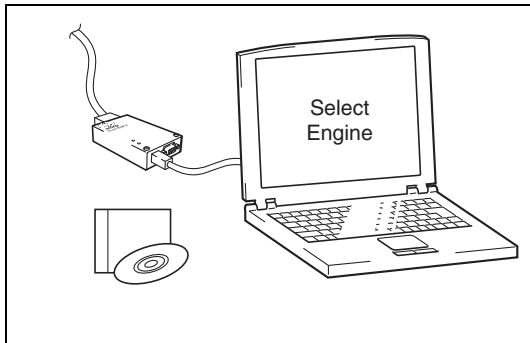
NO**Go to step 5.****5 Inspect the boost pressure sensor**

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

Was any failure found?**YES**

**Clean the boost pressure sensor and install it properly.
If dirt, clogging or damage was found, replace the sensor.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 6.**

6 Check the operation of the VNT actuator (DC motor) [Hino-DX]


SAPH16F010300842

1. Connect the VNT controller and VNT actuator connector.
2. Set the starter switch to the "ON" position.
3. Erase the trouble history.
4. Set the starter switch to the "LOCK" position.
5. Set the starter switch to the "ON" position again.
6. Select [Engine] and check if P226C has been detected in [Fault Information].

HINT

Turn the starter switch OFF and ON verifies the wiping operation of the VNT actuator (DC motor).

Has DTC P226C been detected?
YES

**Replace the turbocharger.
Perform "After-inspection work" of INFORMATION section.**

NO

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

CHECKLIST: P226C

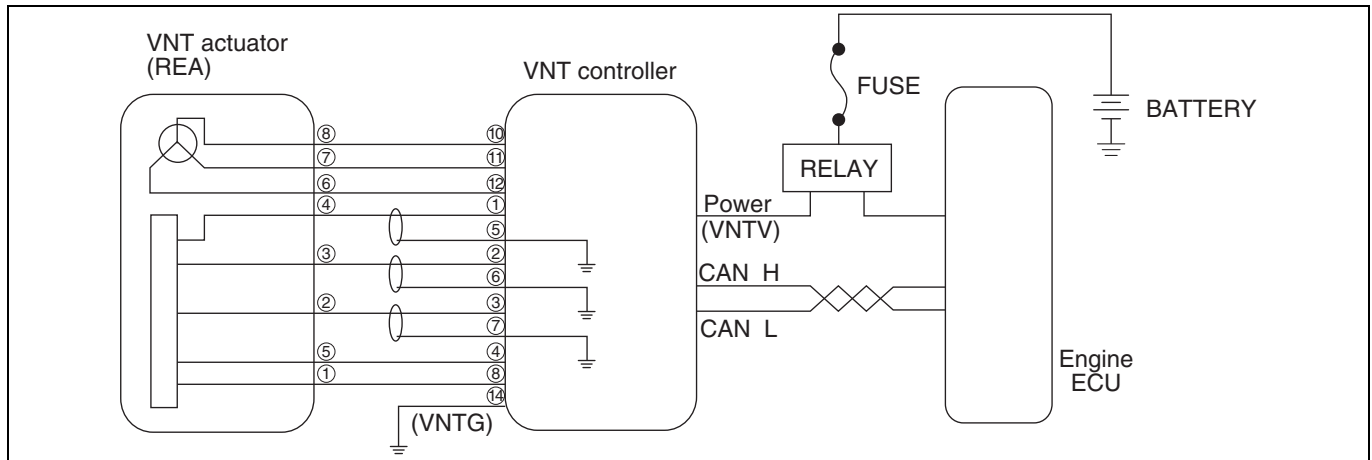
DTC: P226C		Boost pressure slow response		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the response delay of the VNT controller [Hino-DX]	<p>Check the time lag (following characteristics) of the target VNT position and actual VNT position.</p> <p>⚠ CAUTION Perform the inspection while the engine is stopped to avoid engine damages.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [VNT check]. (3) Click [Check start]. (4) Click [VNT opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %. <p>(5) Click [VNT opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %. <p>HINT The VNT opening position changes of 10 % per step between 0 – 90 %.</p> <p><Standard values> The response delay should be less than 3 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 2.	Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.

DTC: P226C		Boost pressure slow response		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
2	Check the response delay of the EGR valve [Hino-DX]	<p>Check the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening.</p> <p>⚠ CAUTION Perform the inspection while the engine is stopped to avoid engine damages.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [EGR check]. (3) Click [Check start]. (4) Click [EGR opening UP]:</p> <ul style="list-style-type: none"> Check each step from 0 % – 100 % of the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening. <p>(5) Click [EGR opening DOWN]:</p> <ul style="list-style-type: none"> Check each step from 100 % – 0 % of the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening. <p>HINT In EGR openings from 0 % – 100 %, 1 step corresponds to a 10 % change.</p> <p><Standard values> For the specified EGR opening, time lag (response lag) is less than 5 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 3.	Replace the EGR valve. Perform "After-inspection work" of INFORMATION section.
3	Inspect air cleaner element	<ol style="list-style-type: none"> Check there is no dirt, damage or clogging in the air cleaner element. Make sure the element is a Hino genuine part. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean or replace the air cleaner element. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Check the air intake system	Check the air intake system (between air flow sensor and diesel throttle) for dirt, clogging, or damage.	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 5.

DTC: P226C		Boost pressure slow response		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the boost pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the boost pressure sensor. 2. Make sure there is no dirt or damage to the boost pressure sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the boost pressure sensor and install it properly. If dirt, clogging or damage was found, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Check the operation of the VNT actuator (DC motor) [Hino-DX]	<p>Connect the VNT controller and VNT actuator connector and erase the trouble history. Turn the starter switch from "LOCK" position to the "ON" position, check if P226C has been detected in [Engine].</p> <p>HINT Turning the starter switch OFF and ON verifies the wiping operation of the VNT actuator (DC motor).</p>	<p>DTC P226C has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P22D3

EN01H16F01030F03001141

P22D3: Nozzle stuck (VNT stick failure)**INFORMATION**

SAPH16F010300843

1. Technical description

- The VNT actuator steplessly operates the nozzle via the REA (Rotary Electric Actuator) and controls turbine speed and boost pressure.
- The VNT actuator (REA) has a position sensor and constantly monitors the target opening and the actual opening.
- Wiping operation is carried out when the engine is stopped and the soot, oil, and other impurities accumulated in the vane working range are removed. Also, the turbocharger mechanical working range is checked for trouble.

2. DTC set condition

(1) DTC detection condition

- While the engine is in operation: Always
- While the engine is stopped: During wiping operation

(2) Judgement criteria

Item	Details (Reference)
1. Stuck nozzle (position control failure)	When motor drive load is 95 % or more for 3 seconds continuously and restoration operation fails 5 times.

3. Reset condition

- After normal operation is restored and starter switch is turned OFF.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.
- Auxiliary brake does not work.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

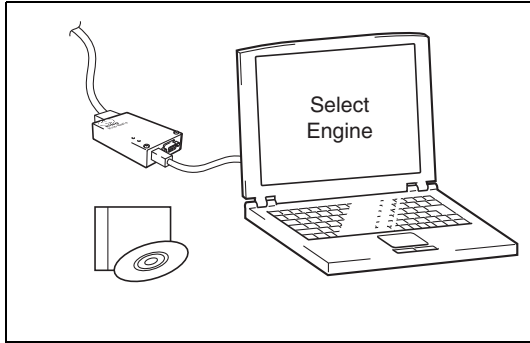
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Stuck nozzle
- Stuck external link

INSPECTION PROCEDURE: P22D3**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300844

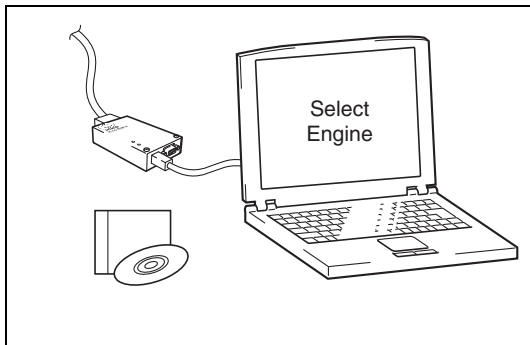
1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if P22D3 (for example, U010C) has been detected in [Fault Information].

Has a DTC other than P22D3 been detected?**YES**

**Go to the diagnostic procedure of a related DTC.
After the repair, go to step 2.**

NO

Go to step 3.

2 Check the DTC detected 2 (Engine ECU) [Hino-DX]

SAPH16F010300845

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P22D3 has been detected in [Fault Information].

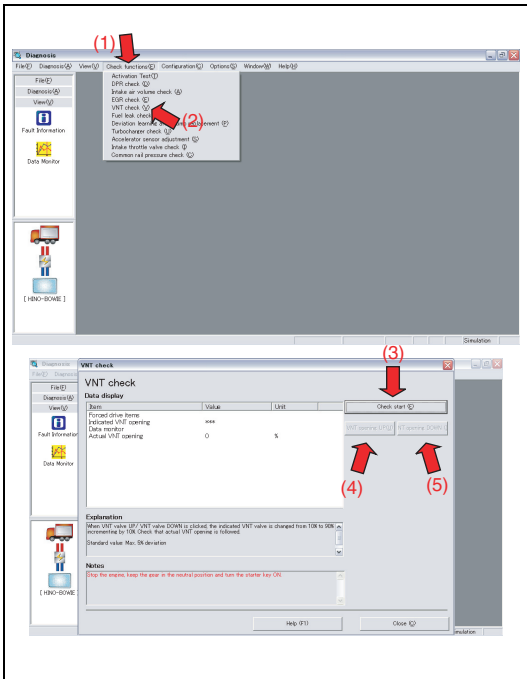
Has DTC P22D3 been detected?**YES**

Go to step 3.

NO

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

3 Check the response delay of the VNT controller [Hino-DX]



SAPH16F010300846

1. Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.

CAUTION

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

<Inspection procedure>

- (1) Select [Check functions].
 - (2) Select [VNT check].
 - (3) Click [Check start].
 - (4) Select [VNT opening UP]:
 - (5) Select [VNT opening DOWN]:
- Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %.
 - Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %.

HINT

- The VNT opening position changes of around 10 % per step between 0 – 90 %.

Standard values

From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.

Do the measurements meet the standard value?

YES

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

NO

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

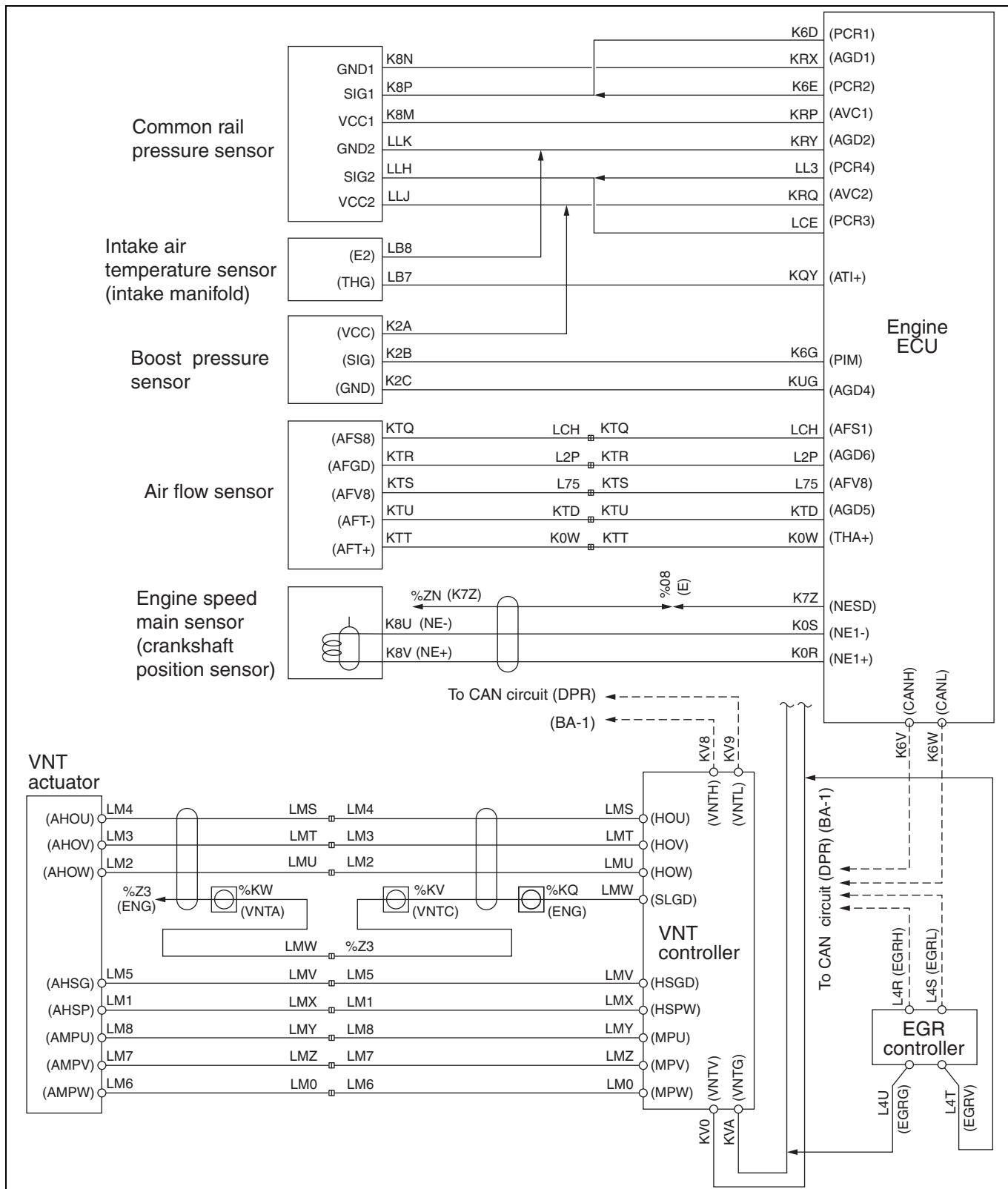
CHECKLIST: P22D3

DTC: P22D3		Nozzle stuck (VNT stick failure)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than P22D3 has been detected in [Engine].	DTC other than P22D3 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Go to step 3.
2	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if P22D3 has been detected in [Engine].	DTC P22D3 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Check the response delay of the VNT controller [Hino-DX]	<p>Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.</p> <p>⚠ CAUTION Perform the inspection while the engine is stopped to avoid damages.</p> <p><Inspection procedure> (1) Select [Check functions]. (2) Select [VNT check]. (3) Click [Check start]. (4) Select [VNT opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %. <p>(5) Select [VNT opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %. <p>HINT The VNT opening position changes of around 10 % per step between 0 – 90 %.</p> <p><Standard values> From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.

DTC: P240F

EN01H16F01030F03001142

P240F: EGR flow slow response INFORMATION



1. Technical description

- EGR valve is a butterfly type.
- EGR valve opening is controlled by engine speed and amount of intake air.
- EGR valve opening is adjusted by engine ECU and CAN communication.
- EGR valve will not operate when engine coolant temperature is low ($\leq 40\text{ }^{\circ}\text{C}$ {104 °F}).
- Engine ECU calculates the actual EGR rate based on information from the boost pressure sensor, engine speed sensor, intake air temperature sensor (intake manifold), and air flow sensor.
- Engine ECU compares the actual EGR rate and the theoretical EGR rate stored in the ECU memory.

<Description of malfunction>

- EGR valve response delay is detected.

2. DTC set condition

(1) DTC detection condition

- Battery voltage is in the range of 10 V to 16 V.
- There is no disconnection in harness connected to EGR valve.
- Engine speed is between 1,000 and 2,500 r/min 1sec.
- Fuel injection rate is 0 mm³/st. cyl.
- Engine speed fluctuation is < 313 r/min/sec
- Engine coolant temperature is $\geq 71\text{ }^{\circ}\text{C}$ {159.8 °F}.
- Atmospheric pressure is $\geq 75\text{ kPa}$ {10.8 psi}.
- Above conditions continue for at least 8 seconds.

(2) Judgement criteria

- When the sum of the differences between the theoretical EGR rate and actual EGR rate is equal to or greater than the threshold value.
- Above criterion is determined from the boost pressure, intake manifold temperature, air intake quantity, fuel injection rate, and engine speed.

3. Reset condition

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- Faulty engine revving (engine hesitation)
- Insufficient output or engine stall because of DPR clogging due to faulty catalyst regeneration

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

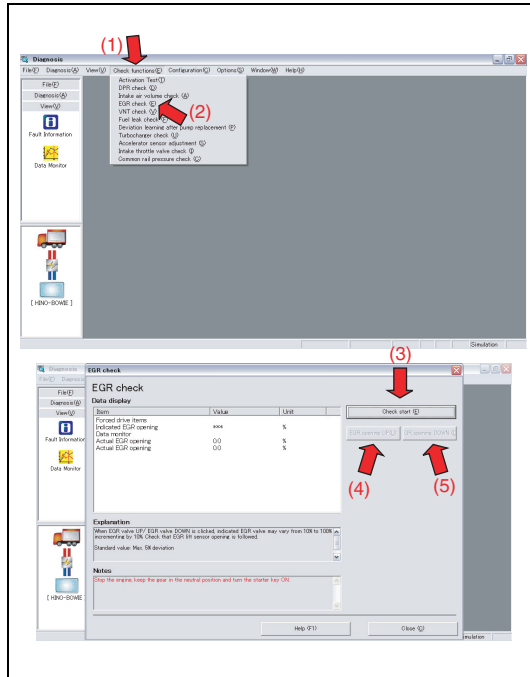
8. Estimated failure factors

- Intake air temperature sensor (intake manifold) malfunction
- Air flow sensor malfunction
- Boost pressure sensor malfunction
- Injector malfunction

- EGR valve malfunction
- Clogged air intake system
- VNT controller malfunction

INSPECTION PROCEDURE: P240F

1 Check the response delay of the EGR valve [Hino-DX]



SAPH16F010300848

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Check functions] on the Hino-DX screen and check the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening.

⚠ **CAUTION**

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

<Inspection procedure>

(1) Select [Check functions].

(2) Select [EGR check].

(3) Click [Check start].

(4) Click [EGR opening UP]:

- Check each step from 0 % – 100 % 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 100 % – 0 % of the time lag (following characteristics) of the target EGR valve opening and actual EGR valve opening.

HINT

- In EGR openings from 0 % – 100 %, 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?

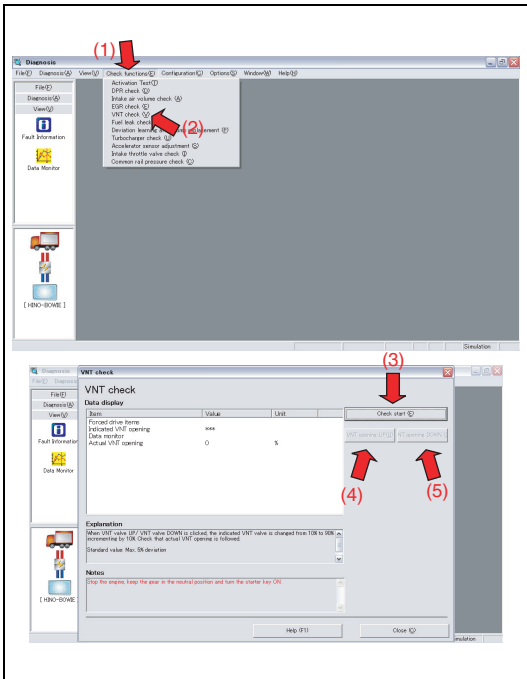
YES

Go to step 2.

NO

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

2 Check the response delay of the VNT controller [Hino-DX]



SAPH16F010300849

1. Select [Check functions]_[VNT check] from the menu, and inspect the response delay at the Target VNT position and Actual VNT position.

CAUTION

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

<Inspection procedure>

- (1) Select [Check functions].
 - (2) Select [VNT check].
 - (3) Click [Check start].
 - (4) Click [VNT opening UP].
- Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %.
 - (5) Click [VNT opening DOWN].
 - Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %.

HINT

- The VNT opening position changes of 10 % per step between 0 – 90 %.

Standard values

The response delay should be less than 3 seconds.

Do the measurements meet the standard value?

YES

Go to step 3.

NO

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

3 Inspect the air cleaner element

1. Check there is no dirt, damage or clogging in the air cleaner element.
2. Make sure the element is a Hino genuine part.

Was any failure found?

YES

Clean or replace the air cleaner element.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 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.

Was any failure found?

YES

If dirt, clogging or damage was found, replace the sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the air flow sensor connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Check the air intake system

1. Check the air intake system (between air cleaner and diesel throttle) for dirt, clogging, or damage.

Was any failure found?

YES

Clean or replace.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 7.

7 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.

Was any failure found?

YES

Clean the boost pressure sensor and install it properly.
If dirt, clogging or damage was found, replace the sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 8.

8 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.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 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

Clean the intake air temperature sensor (intake manifold) and install it properly.
If damaged, replace the sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect the EGR valve

1. Check the EGR valve for damage due to foreign substances.
2. Check if there is soot obstructing the exhaust gas passageway inlet or outlet.

Was any failure found?

YES

**Remove foreign substances and clean the EGR valve.
Replace the EGR valve if it is damaged.
Perform "After-inspection work" of INFORMATION section.**

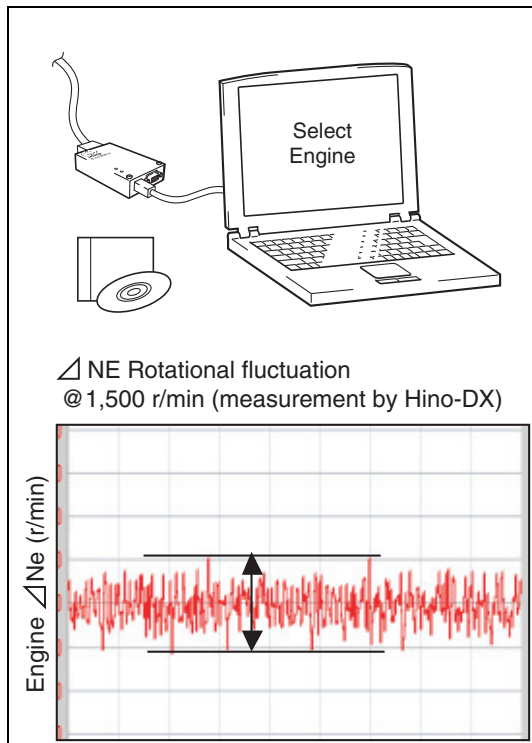
NO

Go to step 11.

11 Check the injector [Hino-DX]

Check the injection quantity and the rotational fluctuation.

1. Start the [Engine].
2. Select [Injection quantity] from [Data Monitor] on Hino-DX menu, and measure the fuel injection rate.
3. Select [Engine speed] from [Data Monitor] on Hino-DX menu, and measure the engine speed fluctuation.



SAPH16F010300850

Measurement conditions

**Engine speed: 1,500 r/min No-load,
T/M shift lever: Neutral position, A/C off and
Air compressor un-operating.
Engine coolant temperature: more than 80 °C {176 °F}**

Standard values

Type of	Q (mm ³ /st)	ΔNe (r/min)
MT	5.0q ≤	≤ 26
Allison® 2200	6.0q ≤	
Allison® 2500		
Allison® 3500		

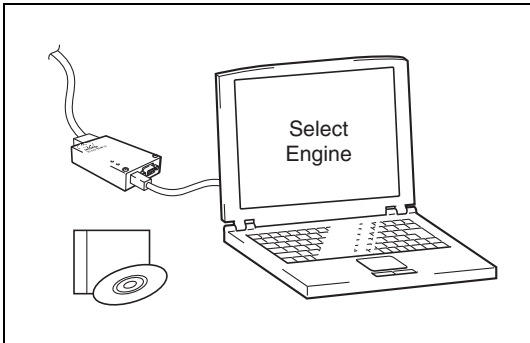
**Do the measurements meet the standard value?
(Both the injection quantity and the rotational fluctuation are within the standard values)**

YES

Go to step 12.

NO

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

12 Check the DTC detected (Engine ECU) [Hino-DX]


SAPH16F010300852

1. Warm-up the engine (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P240F has been detected in [Fault Information].

Has DTC P240F been detected?

YES

Return to step 1, and perform again the inspection.

NO

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

CHECKLIST: P240F

DTC: P240F		EGR flow slow response		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the response delay of the EGR valve [Hino-DX]	<p>Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.</p> <p><Inspection procedure></p> <p>(1) Select [Check functions]. (2) Select [EGR check]. (3) Click [Check start]. (4) Click [EGR opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 90 %. <p>(5) Select [EGR down]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 90 to 0 %. <p><Standard values> From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 2.	Replace the valve. Perform "After-inspection work" of INFORMATION section.
2	Check the response delay of the VNT controller [Hino-DX]	<p>Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.</p> <p><Inspection procedure></p> <p>(1) Select [Check functions]. (2) Select [VNT check]. (3) Click [Check start]. (4) Select [VNT opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %. <p>(5) Select [VNT opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %. <p><Standard values> From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 3.	Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.

DTC: P240F		EGR flow slow response		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
3	Inspect the air cleaner element	<ol style="list-style-type: none"> 1. Check there is no dirt, damage or clogging in the air cleaner element. 2. Make sure the element is a Hino genuine part. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean or replace the air cleaner element. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the air flow sensor	<ol style="list-style-type: none"> 1. Check the installation of the air flow sensor. 2. Make sure there is no dirt or damage to the air flow sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		If dirt, clogging or damage was found, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the air flow sensor connector	Check the connection of the air flow sensor connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Check the air intake system	Check the air intake system (between air cleaner and diesel throttle) for dirt, clogging, or damage	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Clean or replace. Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Inspect the boost pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the boost pressure sensor. 2. Make sure there is no dirt or damage to the boost pressure sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the boost pressure sensor and install it properly. If dirt, clogging or damage was found, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 8.

DTC: P240F		EGR flow slow response		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the intake air temperature sensor (intake manifold) connector	Check the connection of the intake air temperature sensor (intake manifold) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 9.
9	Inspect the intake air temperature sensor (intake manifold)	<ol style="list-style-type: none"> 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). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the intake air temperature sensor (intake manifold) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 10.
10	Inspect the EGR valve	<ol style="list-style-type: none"> 1. Check the EGR valve for damage due to foreign substances. 2. Check if there is soot obstructing the exhaust gas passageway inlet or outlet. 	Failure found: Go to YES. No failure found: Go to NO.		Remove foreign substances and clean the valve. Replace the EGR valve if it is damaged. Perform "After-inspection work" of INFORMATION section.	Go to step 11.

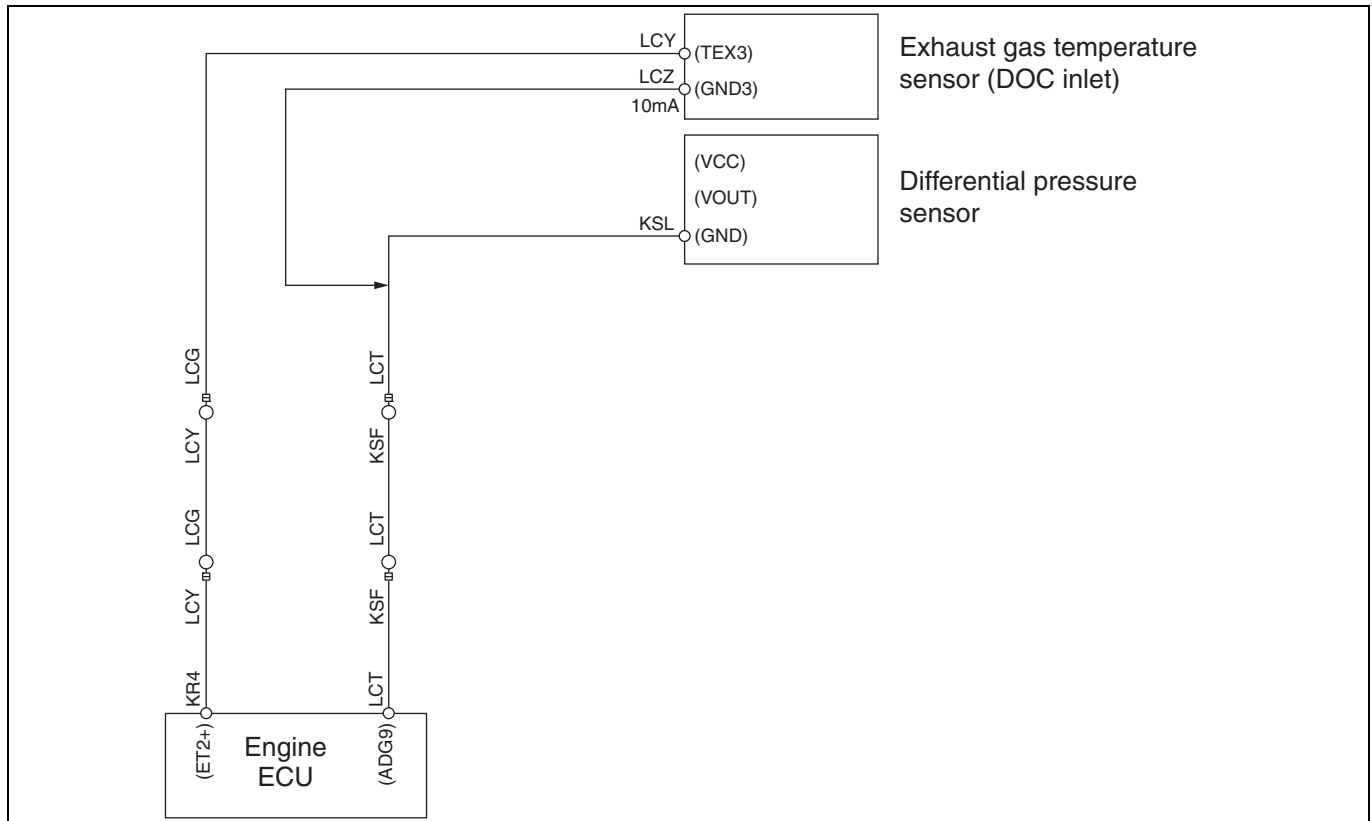
DTC: P240F		EGR flow slow response		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
11	Check the injector [Hino-DX]	<p>Check the injection quantity and the rotational fluctuation. Select [Injection quantity] from [Data Monitor] on Hino-DX menu, and measure the fuel injection rate. Select [Engine speed] from [Data Monitor] on Hino-DX menu, and measure the engine speed fluctuation. <Standard values> Injection quantity (mm³/st): 5.0q or more for with MT vehicle , 6.0q or more for with Allison® 2200, 2500, 3500 vehicle. Rotation fluctuation (r/min): 26 or less (for with all type of transmission vehicle).</p>	<p>Measurements met the standard value (Both injection amount and rotational variation.): Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 12.	Replace the injector. Perform "After-inspection work" of INFORMATION section.
12	Check the DTC detected (Engine ECU) [Hino-DX]	Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more), check if P240F has been detected in [Engine].	<p>DTC P240F has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Return to step 1, and perform again the inspection.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P242B

EN01H16F01030F03001143

P242B: Exhaust gas temperature sensor (DOC inlet) - rationality

INFORMATION [at Engine Start-up]



SAPH16F010300853

1. Technical description

- The exhaust gas temperature is constantly detected by the exhaust gas temperature sensor (DOC inlet).
- The value of the exhaust gas temperature sensor (DOC inlet) is used to control DPR regeneration.

<Description of malfunction>

- The exhaust gas temperature cannot be correctly recognized.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 10 V to 16 V.
 - Engine speed ≥ 500 r/min for at least 5 seconds.
 - Less than 10 seconds has elapsed since start of engine.
 - Difference between engine coolant temperature and intake temperature is within ± 8 °C { ± 14.4 °F}.
 - Difference between BCU exhaust gas temperature sensor value and exhaust gas temperature sensor value (DOC outlet) is within ± 30 °C { ± 54 °F}.
 - Engine coolant temperature and intake temperature are at least -10 °C {14 °F}.
 - Value of BCU exhaust gas temperature sensor ≤ 30 °C {86 °F}
 - No other DTC is detected.

(2) Judgement criteria

- Difference between BCU exhaust gas temperature sensor value and exhaust gas temperature sensor value (DOC inlet) stays more than ± 70 °C { ± 126 °F} for at least 1 second.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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

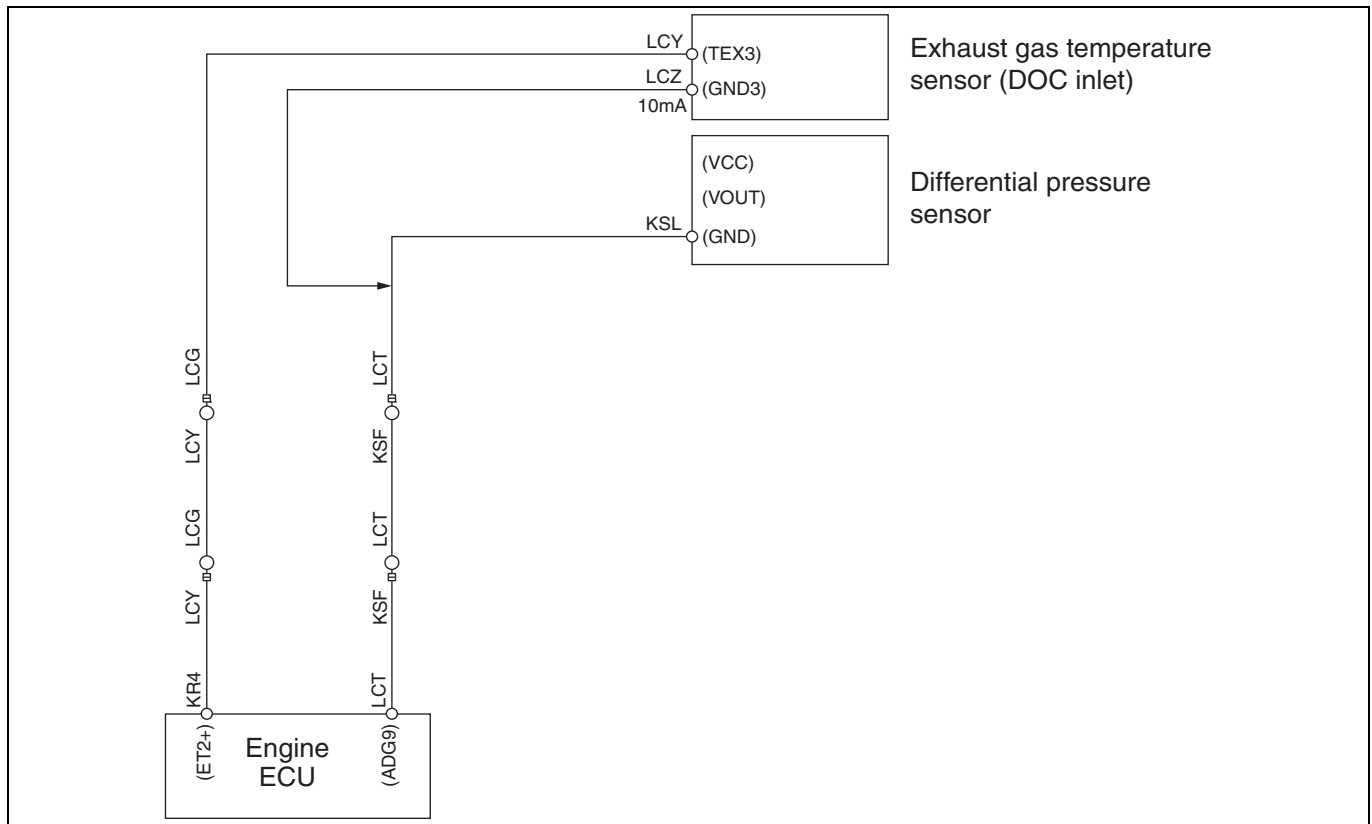
- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors**Exhaust gas temperature sensor (DOC inlet):**

- Disconnected sensor or sensing unit failure (due to dirt, clogging, damage, etc.)
- Abnormal sensor resistance
- Failure of engine ECU sensor power supply

P242B: Exhaust gas temperature sensor (DOC inlet) - rationality

INFORMATION [While Driving]



SAPH16F010300854

1. Technical description

- The exhaust gas temperature is constantly detected by the exhaust gas temperature sensor (DOC inlet).
- The value of the exhaust gas temperature sensor (DOC inlet) is used to control DPR regeneration.

<Description of malfunction>

- The exhaust gas temperature cannot be correctly recognized.

2. DTC set condition**(1) DTC detection condition**

- At least 10 seconds has elapsed since engine was started.
- Cumulative exhaust gas flow amount ≥ 3 kg.
- Cumulative exhaust gas flow amount of non-operating burner ≥ 50 kg.

After the above:

- Battery voltage is in the range of 10 V to 16 V.
- Engine speed ≥ 500 r/min for at least 5 seconds
- Engine speed ≥ 1750 r/min
- Fuel injection amount ≥ 15 mm³/st
- Exhaust gas flow rate ≥ 500 kg/h
- Difference between engine coolant temperature and intake temperature is more than ± 8 °C { ± 14.4 °F}

In addition, the following conditions continue for at least 10 seconds:

- Engine speed variation is within ± 78 r/min.
- Fuel injection rate variation is within ± 78 mm³/st.
- Vehicle speed ≥ 18.8 mile/h
- No other DTC is detected.

(2) Judgement criteria

- Difference between calculated value and actual value of DOC inlet temperature is not less than 80 °C {176 °F} for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

Exhaust gas temperature sensor (DOC inlet):

- Disconnected sensor or sensing unit failure (due to dirt, clogging, damage, etc.)
- Abnormal sensor resistance
- Failure of engine ECU sensor power supply

INSPECTION PROCEDURE: P242B**1 Inspect the exhaust gas temperature sensor (DOC inlet) connector**

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the exhaust gas temperature sensor (DOC inlet)

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

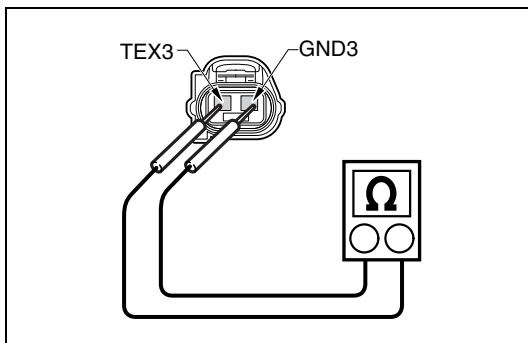
Was any failure found?

YES

Clean the exhaust gas temperature sensor (DOC inlet) and install it properly.
If damaged, replace the exhaust gas temperature sensor (DOC inlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the exhaust gas temperature sensor (DOC inlet) unit

SAPH16F010300855

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (DOC inlet) TEX3 – GND3	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?

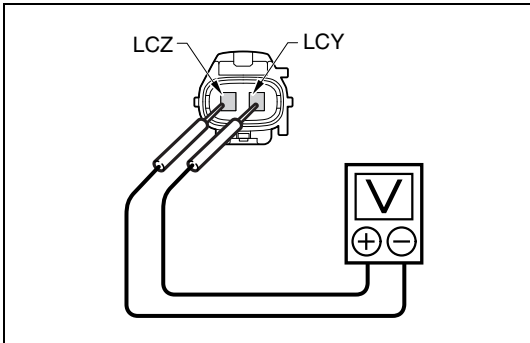
YES

NO

Go to step 4.

Replace the exhaust gas temperature sensor (DOC inlet).
Perform "After-inspection work" of INFORMATION section.

4 Inspect the sensor power supply



SAPH16F010300856

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 (DOC inlet) vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Exhaust gas temperature sensor (DOC inlet) vehicle-side connector LCZ – LCY	4.5 – 5.5 V

Do the measurements meet the standard value?

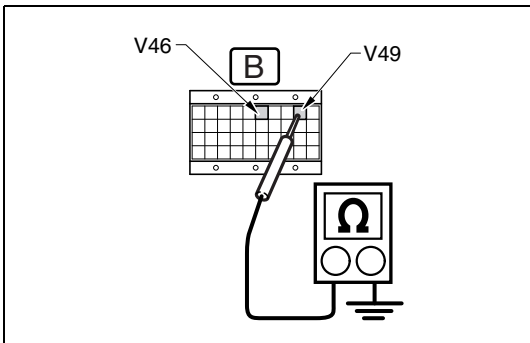
YES

NO

Go to step 7.

Go to step 5.

5 Inspect for short-circuit of the exhaust gas temperature sensor (DOC inlet) harness



SAPH16F010300857

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) ADG9(V46) – Ground ET2+(V49) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

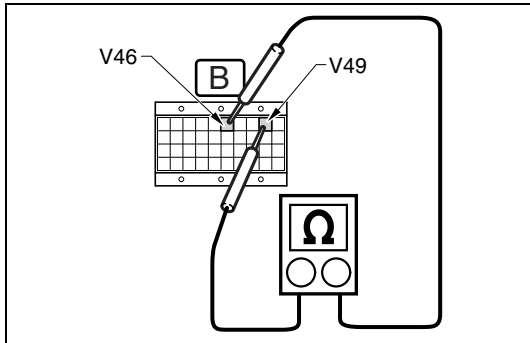
YES

Go to step 6.

NO

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

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



SAPH16F010300858

1. Connect the exhaust gas temperature sensor (DOC inlet) 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) ADG9(V46) – ET2+(V49)	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

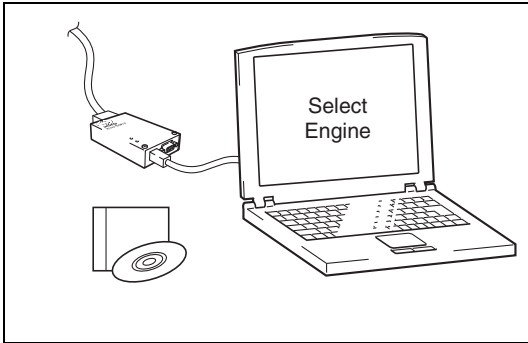
Do the measurements meet the standard value?

YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300859

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if P242B has been detected in [Fault Information].

Has DTC P242B been detected?**YES**

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

NO

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

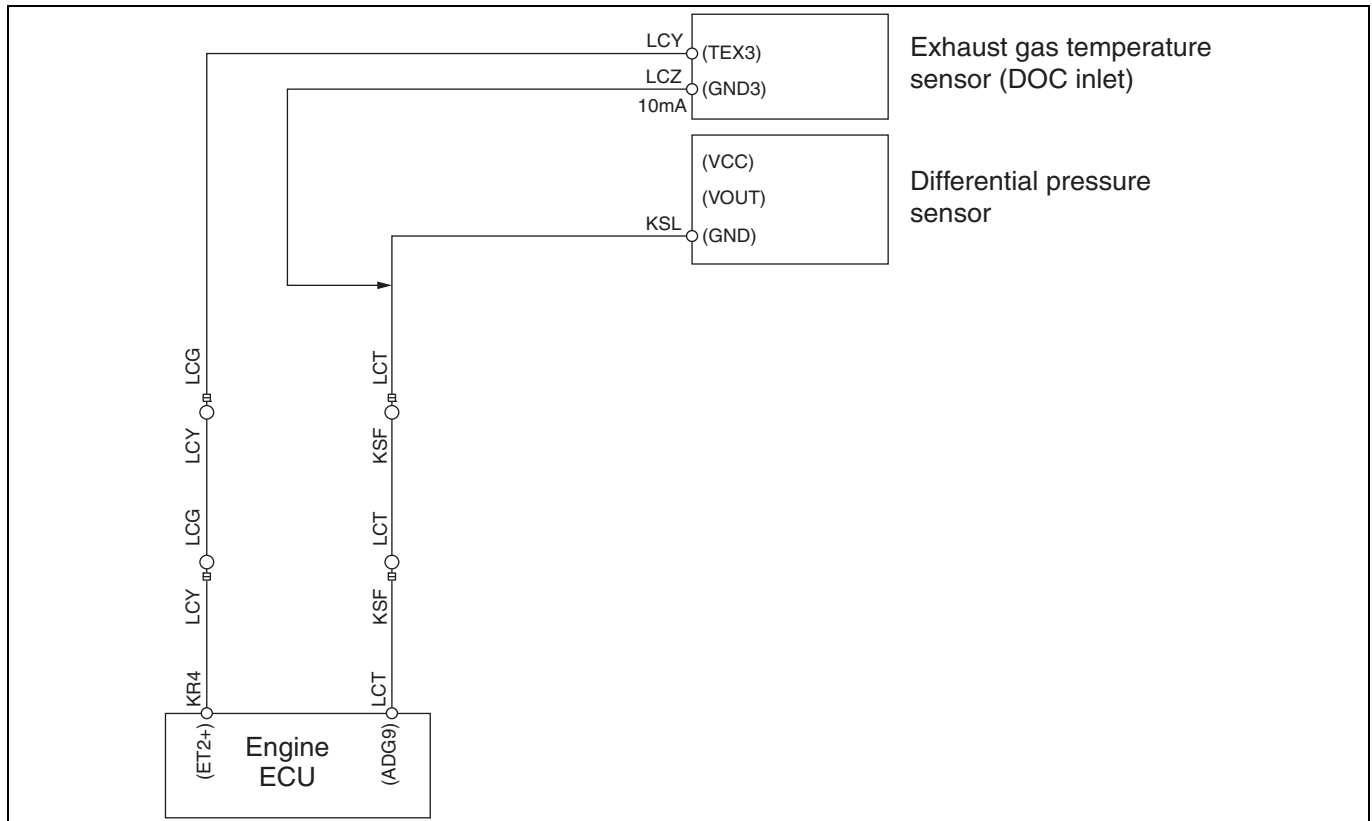
CHECKLIST: P242B

DTC: P242B		Exhaust gas temperature sensor (DOC inlet) - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the exhaust gas temperature sensor (DOC inlet) connector	Check the connection of the exhaust gas temperature sensor (DOC inlet) connector. (Looseness and poor contact)	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the exhaust gas temperature sensor (DOC inlet)	<ol style="list-style-type: none"> 1. Check the installation of the exhaust gas temperature sensor (DOC inlet). 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (DOC inlet). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (DOC inlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the exhaust gas temperature sensor (DOC inlet) unit	Disconnect the exhaust gas temperature sensor (DOC inlet) connector and measure the resistance between the terminals of the exhaust gas temperature sensor (DOC inlet). <Tester connections> TEX3 – GND3 <Standard values> 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	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P242B		Exhaust gas temperature sensor (DOC inlet) - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the sensor power supply	<p>Measure the voltage of the exhaust gas temperature sensor (DOC inlet) terminals.</p> <p><Tester connections> LCZ – LCY <Standard values> 4.5 – 5.5 V</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 7.	Go to step 5.
5	Inspect for short-circuit of the exhaust gas temperature sensor (DOC inlet) harness	<p>Connect the signal check harness to the engine ECU (Do not connect harness to the ECU) and measure the resistance between all the terminals of the engine ECU (signal check harness) and ground.</p> <p><Tester connections> ADG9(V46) – Ground ET2+(V49) – Ground <Standard values> $\infty \Omega$</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the exhaust gas temperature sensor (DOC inlet) harness	<p>Connect the exhaust gas temperature sensor (DOC inlet) connector and measure the resistance of the engine ECU (signal check harness) terminals.</p> <p><Tester connections> ADG9(V46) – ET2+(V49) <Standard values> 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</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	<ol style="list-style-type: none"> Warm up the engine. (engine coolant temperature: 60 °C {140 °F} or more) Check if P242B has been detected in [Engine]. 	<p>DTC P242B has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P242C and P242D

EN01H16F01030F03001144

P242C: Exhaust gas temperature sensor (DOC inlet) - out of range (Out of range low)
INFORMATION

SAPH16F010300860

1. Technical description

- The exhaust gas temperature sensor (DOC inlet) consistently detects exhaust gas temperature.
- A reading taken by the exhaust gas temperature sensor (DOC inlet) is used to control DPR regeneration.

<Description of malfunction>

- The exhaust gas temperature cannot be correctly recognized.

2. DTC set condition**(1) Check conditions**

- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped or runs at 500 r/min or higher for continuous 5 seconds.

(2) Judgement criteria

- Voltage of the exhaust gas temperature sensor (DOC inlet) remains less than 0.0057 V (1,240 °C {2,264 °F}) for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- –

<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

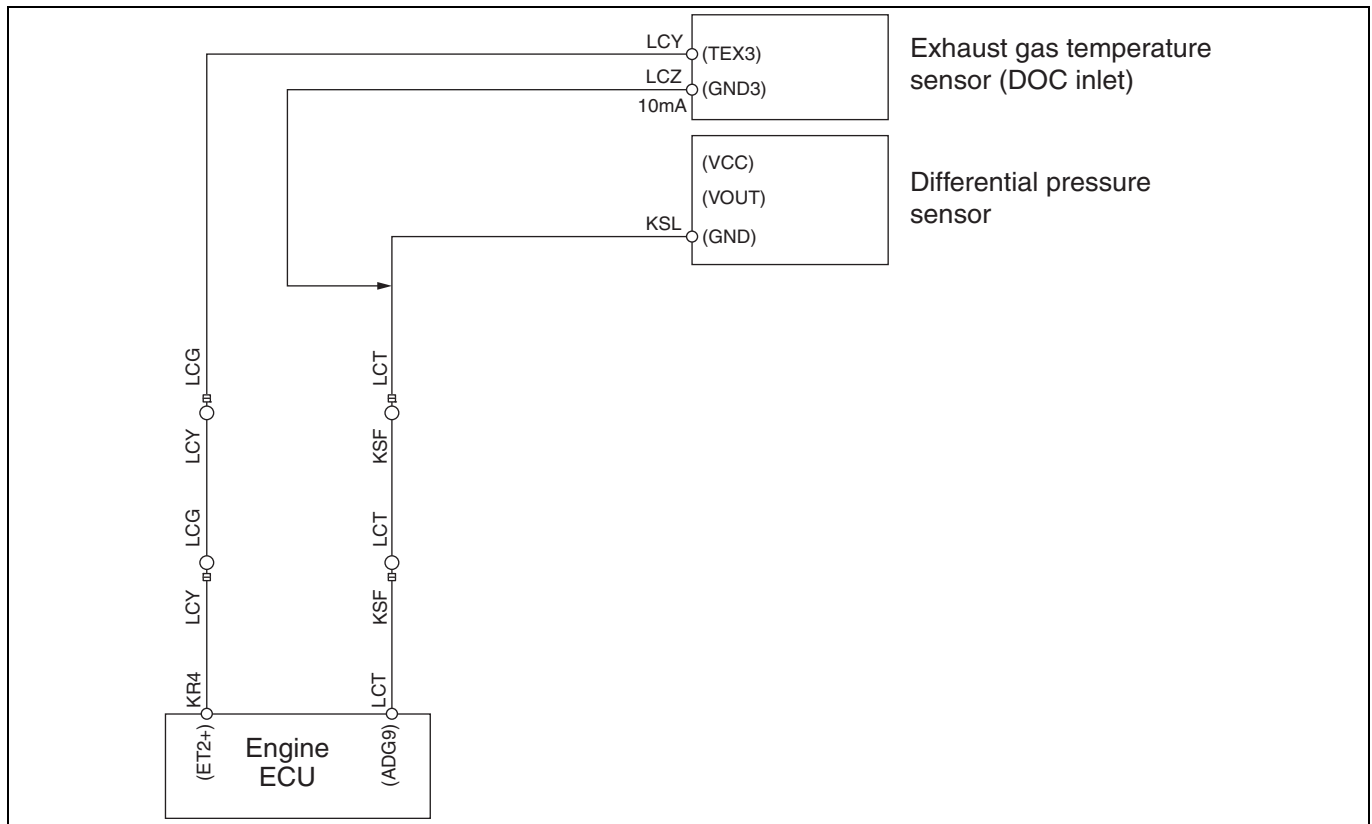
- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors**Exhaust gas temperature sensor (DOC inlet):**

- Loose/disconnected sensor or failure in sensing area (contamination, clogging or breakage)
- Abnormal resistance of sensor
- Failure in engine ECU sensor power supply
- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)

P242D: Exhaust gas temperature sensor (DOC inlet) - out of range (Out of range high)

INFORMATION



SAPH16F010300861

1. Technical description

- The exhaust gas temperature sensor (DOC inlet) consistently detects exhaust gas temperature.
- A reading taken by the exhaust gas temperature sensor (DOC inlet) is used to control DPR regeneration.

<Description of malfunction>

- The exhaust gas temperature cannot be correctly recognized.

2. DTC set condition

(1) Check conditions

- Intake air temperature is $-20\text{ }^{\circ}\text{C}$ $\{-4\text{ }^{\circ}\text{F}\}$ or higher.
- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped or runs at 500 r/min or higher for continuous 5 seconds.
- No other DTCs are present.

(2) Judgement criteria

- Voltage of the exhaust gas temperature sensor (DOC inlet) remains at 4.958 V or higher ($-46\text{ }^{\circ}\text{C}$ $\{-50.8\text{ }^{\circ}\text{F}\}$ or lower) for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- –

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors**Exhaust gas temperature sensor (DOC inlet):**

- Loose/disconnected sensor or failure in sensing area (contamination, clogging or breakage)
- Abnormal resistance of sensor
- Short-circuit in the sensor
- Failure in engine ECU sensor power supply
- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)

INSPECTION PROCEDURE: P242C and P242D**1 Inspect the exhaust gas temperature sensor (DOC inlet) connector**

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the exhaust gas temperature sensor (DOC inlet)

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

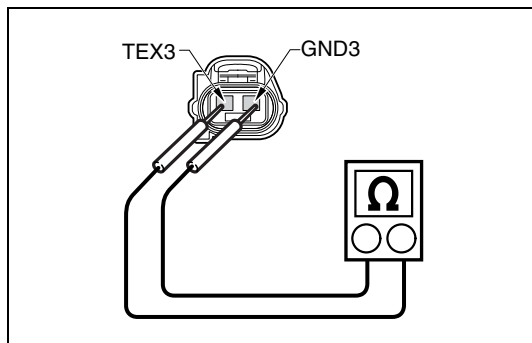
Was any failure found?

YES

Clean the exhaust gas temperature sensor (DOC inlet) and install it properly.
If damaged, replace the exhaust gas temperature sensor (DOC inlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the exhaust gas temperature sensor (DOC inlet) unit

SAPH16F010300862

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (DOC inlet) TEX3 – GND3	50 °C {122 °F}: 9.75 kΩ 100 °C {212 °F}: 3.77 Ω 150 °C {302 °F}: 1.80 Ω

Do the measurements meet the standard value?

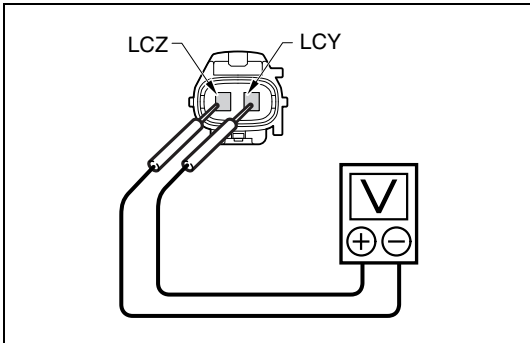
YES

NO

Go to step 4.

Replace the exhaust gas temperature sensor (DOC inlet).
Perform "After-inspection work" of INFORMATION section.

4 Inspect the sensor power supply



SAPH16F010300863

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 (DOC inlet) vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Exhaust gas temperature sensor (DOC inlet) vehicle-side connector LCZ – LCY	4.5 – 5.5 V

Do the measurements meet the standard value?

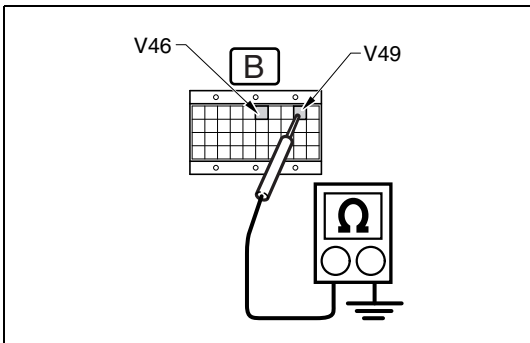
YES

NO

Go to step 7.

Go to step 5.

5 Inspect for short-circuit of the exhaust gas temperature sensor (DOC inlet) harness



SAPH16F010300864

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check harness to the engine ECU vehicle-side connector. (Do not connect 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) ADG9(V46) – Ground ET2+(V49) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

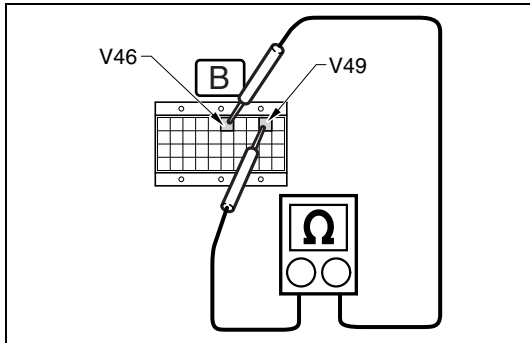
YES

Go to step 6.

NO

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

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



SAPH16F010300865

1. Connect the exhaust gas temperature sensor (DOC inlet) 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) ADG9(V46) – ET2+(V49)	50 °C {122 °F}: 9.75 k Ω 100 °C {212 °F}: 3.77 Ω 150 °C {302 °F}: 1.80 Ω

Do the measurements meet the standard value?

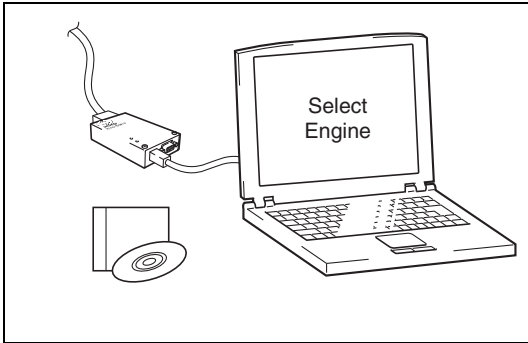
YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300866

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if the DTC (242C or P242D) has been detected in [Fault Information].

Has DTC (P242C or P242D) been detected?

YES

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

NO

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

CHECKLIST: P242C and P242D

DTC: P242C		Exhaust gas temperature sensor (DOC inlet) - out of range (Out of range low)		Inspection procedure		
DTC: P242D		Exhaust gas temperature sensor (DOC inlet) - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the exhaust gas temperature sensor (DOC inlet) connector	Check the connection of the exhaust gas temperature sensor (DOC inlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the exhaust gas temperature sensor (DOC inlet)	<ol style="list-style-type: none"> Check the installation of the exhaust gas temperature sensor (DOC inlet). Make sure there is no dirt or damage to the exhaust gas temperature sensor (DOC inlet). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (DOC inlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the exhaust gas temperature sensor (DOC inlet) unit	Measure the resistance between the terminals of the exhaust gas temperature sensor (DOC inlet). <Tester connections> Exhaust gas temperature sensor (DOC inlet) TEX3 – GND3 <Standard values> 50 °C {122 °F}: 9.75 kΩ 100 °C {212 °F}: 3.77 Ω 150 °C {302 °F}: 1.80 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
4	Inspect the sensor power supply	Measure the voltage between the terminals of the exhaust gas temperature sensor (DOC inlet) vehicle-side connector. <Tester connections> Exhaust gas temperature sensor (DOC inlet) vehicle-side connector LCY – LCZ <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 5.

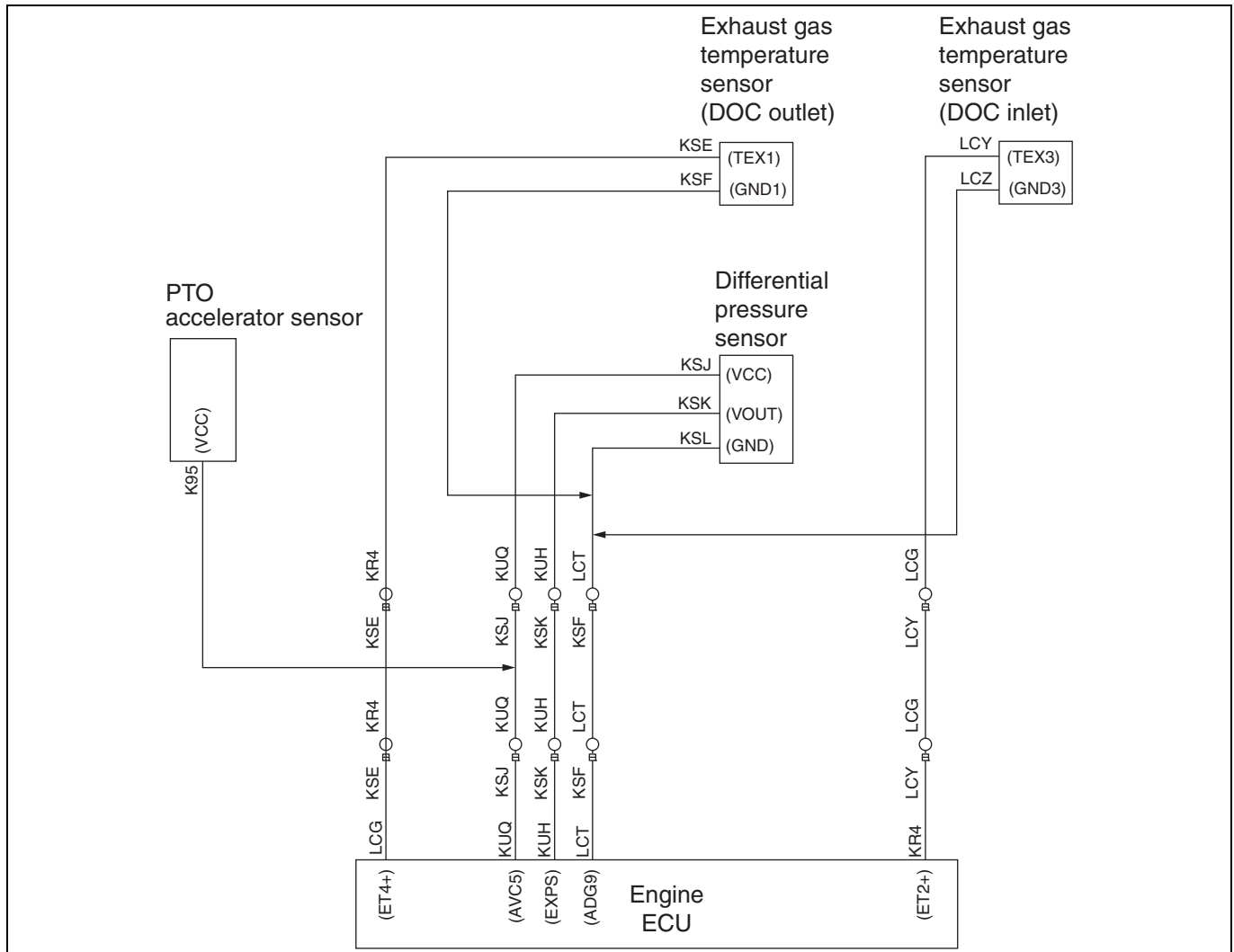
DTC: P242C		Exhaust gas temperature sensor (DOC inlet) - out of range (Out of range low)		Inspection procedure		
DTC: P242D		Exhaust gas temperature sensor (DOC inlet) - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for short-circuit of the exhaust gas temperature sensor (DOC inlet) harness	Connect the signal check harness, and measure the resistance between the terminals of the engine ECU and ground. <Tester connections> Engine ECU (signal check harness) ADG9(V46) – Ground ET2+(V49) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the exhaust gas temperature sensor (DOC inlet) harness	1. Connect the exhaust gas temperature sensor (DOC inlet) connector. 2. Measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) ADG9(V46) – ET2+(V49) <Standard values> 50 °C {122 °F}: 9.75 k Ω 100 °C {212 °F}: 3.77 Ω 150 °C {302 °F}: 1.80 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	Check if the DTC (P242C or P242D) has been detected in [Engine].	DTC (P242C or P242D) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P244A

EN01H16F01030F03001145

P244A: Filtering performance (missing substrate)

INFORMATION [missing substrate]



SAPH16F010300867

1. Technical description

- ECU constantly calculate and accumulate the amount of soot emission from the engine.
- Based on the values of the differential pressure sensor and the DPR temperature sensor, ECU detects clogging and erosion of the DPR.

<Description of malfunction>

- Abnormal drop in differential pressure in DPR part is detected.

2. DTC set condition**(1) DTC detection condition**

- The engine must not be stopped.
- After automatic regeneration
- Burner in inactive status
- Calculated exhaust gas flow rate of 205 L/s or higher
- Exhaust brake is inactive.

(2) Judgement criteria

- Failure is determined when the value of "differential pressure/exhaust gas flow rate" counted in establishing the judgment criteria is lower than the threshold value.

3. Reset condition

- Immediately after normal operation is restored and DPR-related memory is reset.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

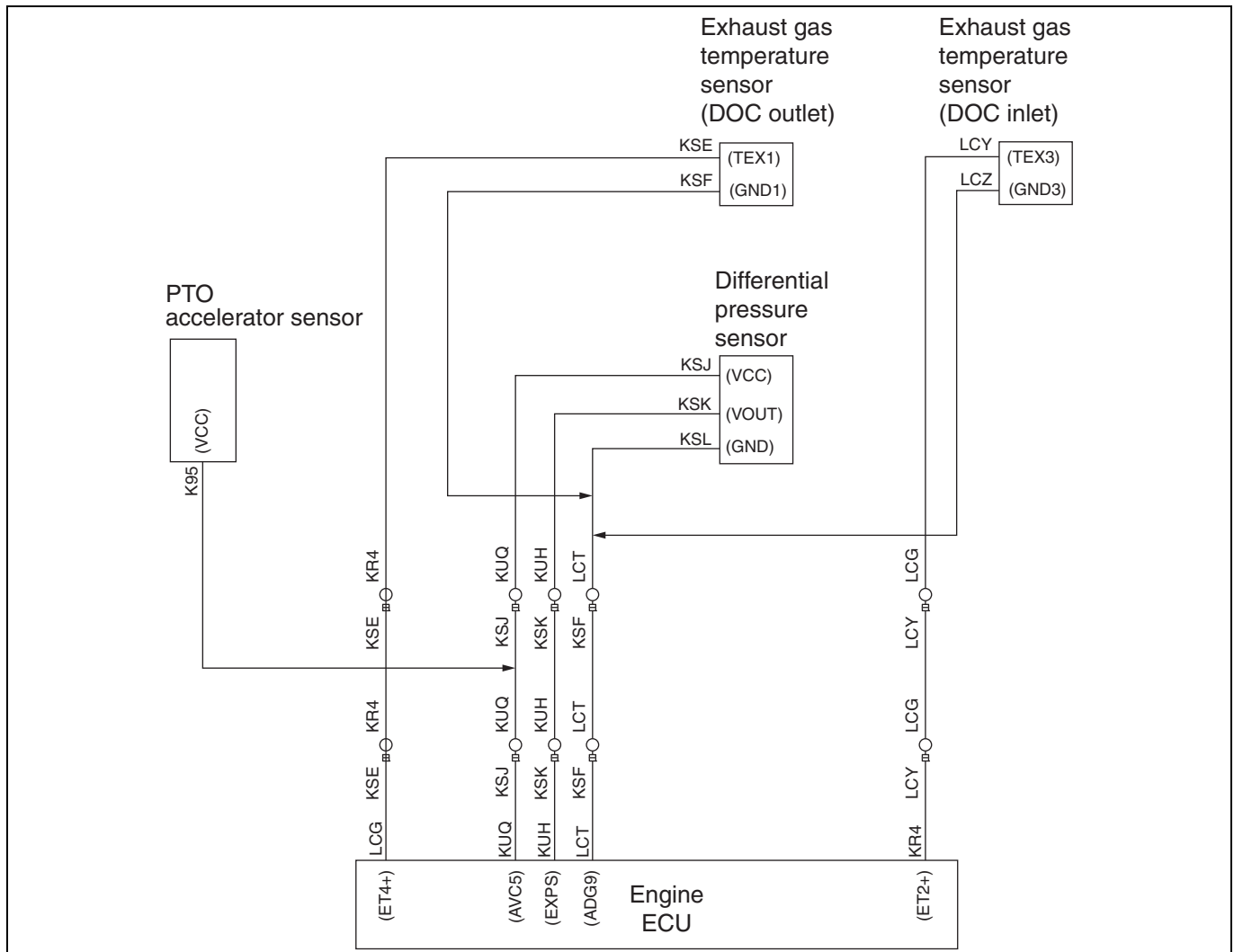
- DPR filter:
Check for intended filter tampering or damage on the rear end surface.
- Abnormal control of the temperature at regeneration
Burner system failure: Excessively high burner outlet temperature
- Filter damage due to abnormally-high temperature at regeneration due to excessive soot emission.
Injector: Characteristic abnormality of injection volume
SCV: Faulty control of common rail pressure
EGR valve: Faulty control of EGR opening angle
Diesel throttle valve: Faulty control of diesel throttle valve opening angle

[Confirmation points for judgment]

- Fault in the differential pressure sensor system
 - Faulty differential pressure sensor
 - Check if differential pressure value is wrongly sensed because of damaged hose or wrong connection.
 - Check for misjudgment due to clogging, hole or fault in the differential sensor pipe.
- Fault in the air flow meter
 - Check for misjudgment due to abnormal air volume for gas flow rate calculation.
- Exhaust gas temperature sensor
 - Check for misjudgment due to characteristic abnormality of the temperature for gas flow rate calculation.

P244A: Filtering performance (missing substrate)

INFORMATION [Breakage of DPR filter]



SAPH16F010300868

1. Technical description

- Based on the values of the differential pressure sensor and the DPR temperature sensor, ECU detects clogging and erosion of the DPR.

<Description of malfunction>

- Abnormal drop in differential pressure in DPR part is detected.

2. DTC set condition**(1) DTC detection condition**

- The engine is not stopped.

(2) Judgement criteria

- Failure is determined when the differential pressure value averaged over 15 seconds is less than the threshold value obtained from the intake air quantity, fuel injection quantity, and the prescribed exhaust gas flow rate derived from the exhaust temperature, and this is detected 6 times.

(Example: A differential pressure of 2 kPa {0.3 psi} or less is detected 6 times when the average exhaust gas flow rate is 800 L/s.)

3. Reset condition

- Immediately after normal operation is restored and DPR-related memory is reset.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<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

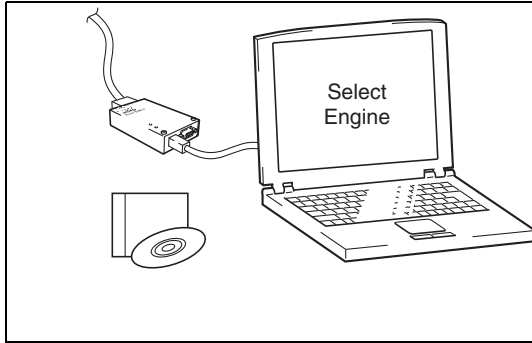
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- DPR filter:
Check for intended filter tampering or damage on the rear end surface.
- Abnormal control of the temperature at regeneration
Burner system failure: Excessively high burner outlet temperature
- Filter damage due to abnormally-high temperature at regeneration due to excessive soot emission.
Injector: Characteristic abnormality of injection volume
SCV: Faulty control of common rail pressure
EGR valve: Faulty control of EGR opening angle
Diesel throttle valve: Faulty control of diesel throttle valve opening angle

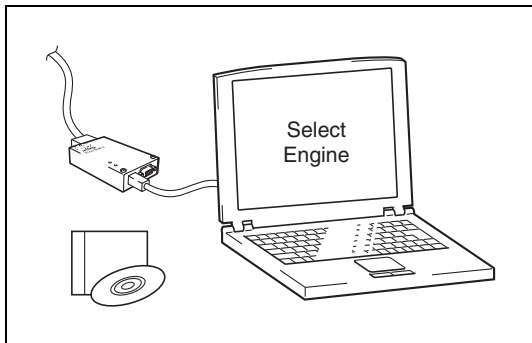
[Confirmation points for judgment]

- Fault in the differential pressure sensor system
 - Faulty differential pressure sensor
 - Check if differential pressure value is wrongly sensed because of damaged hose or wrong connection.
 - Check for misjudgment due to clogging, hole or fault in the differential sensor pipe.
- Fault in the air flow meter
 - Check for misjudgment due to abnormal air volume for gas flow rate calculation.
- Exhaust gas temperature sensor
 - Check for misjudgment due to characteristic abnormality of the temperature for gas flow rate calculation.

INSPECTION PROCEDURE: P244A**1 Check the DTC detected (Engine ECU)**

SAPH16F010300869

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P244A (P141F abnormal burner system) has been detected in [Fault Information].

Has DTC P141F been detected ?**YES****NO****Check the burner system (BCU).****Go to step 2.****2 Check the exhaust gas temperature sensor (DOC inlet) [Hino-DX]**

SAPH16F010300870

1. Use [DPR outlet max. exh. temp.] from [DX Report] to read the history of the exhaust gas temperature sensor (DOC inlet).

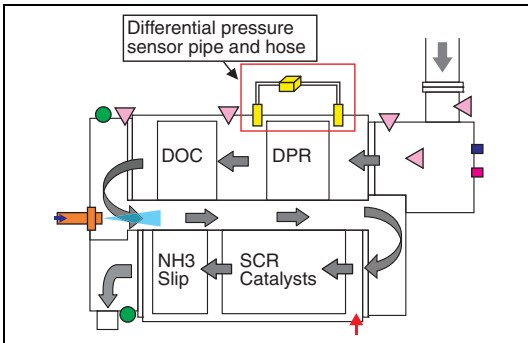
HINT

Refer to the chapter "HINO DIAGNOSTIC EXPLORER" in the section "Hino DX manual" for the detail of Hino-DX report (in the contents of "Past Work Information").

Have a temperature of over 950 °C {1,742 °F} been detected?**YES****NO****Go to step 8.****Go to step 3.**

3 Inspect the differential pressure sensor pipe

1. Inspect the differential pressure sensor pipe for clogging, cracks or other damages.



SAPH16F010300871

Was any failure found?

YES

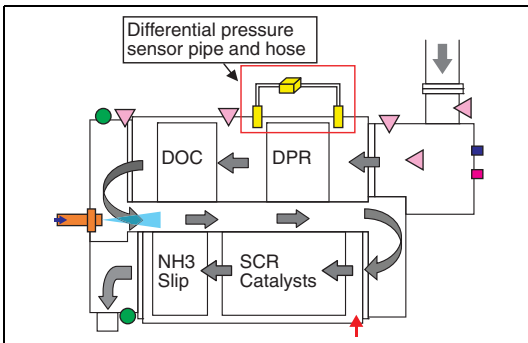
Repair (clean) or replace the differential pressure sensor pipe.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the differential pressure sensor hose

1. Inspect the differential pressure sensor hose for clogging, cracks or damages.



SAPH16F010300872

Was any failure found?

YES

Repair (cleaning) or replace the differential pressure sensor hose.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the differential pressure sensor connector

1. Inspect the connection of differential pressure sensor connector (Looseness and poor contact).

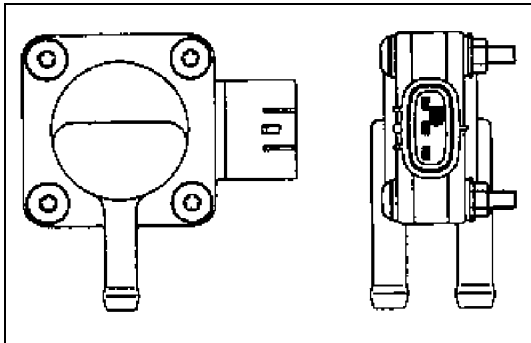
Was any failure found?

YES

Connect securely, Repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the differential pressure sensor


SAPH16F010300873

1. Inspect the sensor installation conditions.
2. Make sure there is no dirt or damage to the differential pressure sensor.

Was any failure found?

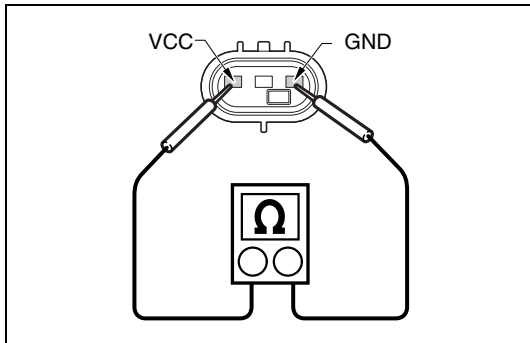
YES

Clean the differential pressure sensor and install it properly.
If damaged, replace the differential pressure sensor.
Perform "After-inspection work" of INFORMATION section.

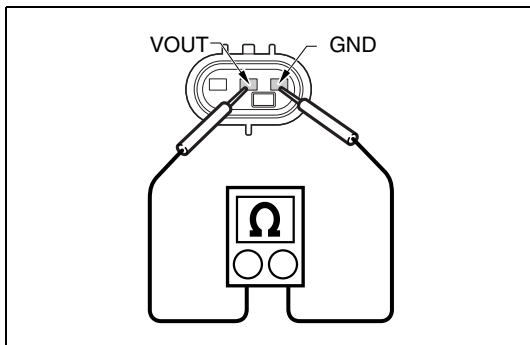
NO

Go to step 7.

7 Inspect the differential pressure sensor unit



SAPH16F010300874



SAPH16F010300875

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DPR differential pressure sensor connector.

3. Measure the resistance between the terminals of the sensor using the electrical tester.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DPR differential pressure sensor VCC – GND VOUT – GND	2 – 15 kΩ

Do the measurements meet the standard value ?

YES

Go to step 8.

NO

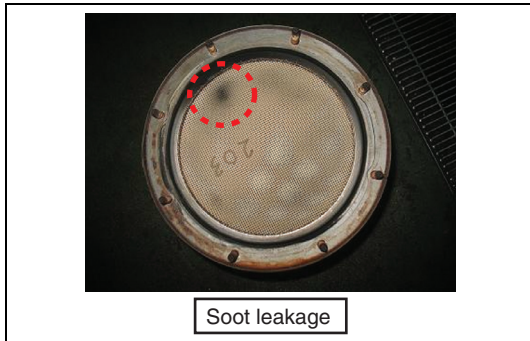
Replace the differential pressure sensor. Perform "After-inspection work" of INFORMATION section.

8 Inspect the DPR filter

Damage

SAPH16F010300876

1. Remove the DPR filter and check if there is no soot, damages or other abnormalities at its end.
2. Check for proof of a forceful removal of the DPR filter.



Soot leakage

SAPH16F010300877

Was any failure found?**YES**

Replace the DPR filter and the burner, and clean the igniter.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect the exhaust gas temperature sensor (burner inlet) connector

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

Was any failure found?**YES**

Connect securely.
Repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect the outside of the exhaust gas temperature sensor (burner inlet)

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

Was any failure found?

YES

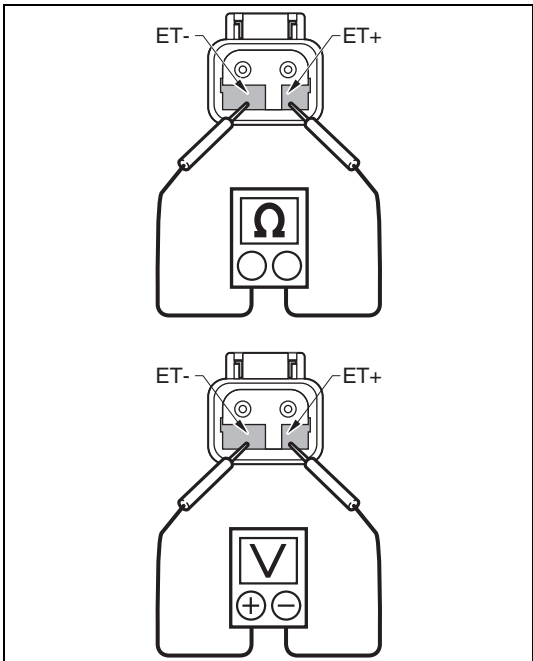
Clean the exhaust gas temperature sensor (burner inlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (burner inlet). Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

11 Inspect the exhaust gas temperature sensor (burner inlet) unit

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



SAPH16F010300878

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (Burner inlet) ET+ – ET-	0.3 – 1.8 Ω

Do the measurements meet the standard value ?

YES

Go to step 12.

NO

Replace the exhaust gas temperature sensor (burner inlet).
Perform "After-inspection work" of INFORMATION section.

12 Inspect the exhaust gas temperature sensor (burner outlet) connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 13.

13 Inspect the exhaust gas temperature sensor (burner outlet)

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

Was any failure found?

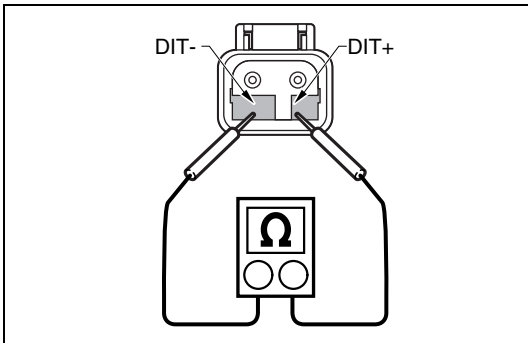
YES

Clean the exhaust gas temperature sensor (burner outlet) and install it properly.
If damaged, replace the exhaust gas temperature sensor (burner outlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 14.

14 Inspect the exhaust gas temperature sensor (burner outlet) unit



SAPH16F010300879

1. Disconnect the exhaust gas temperature sensor (burner outlet) connector.
2. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor (burner outlet).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (burner outlet) DIT+ – DIT-	0.3 – 1.8 Ω

Do the measurements meet the standard value ?

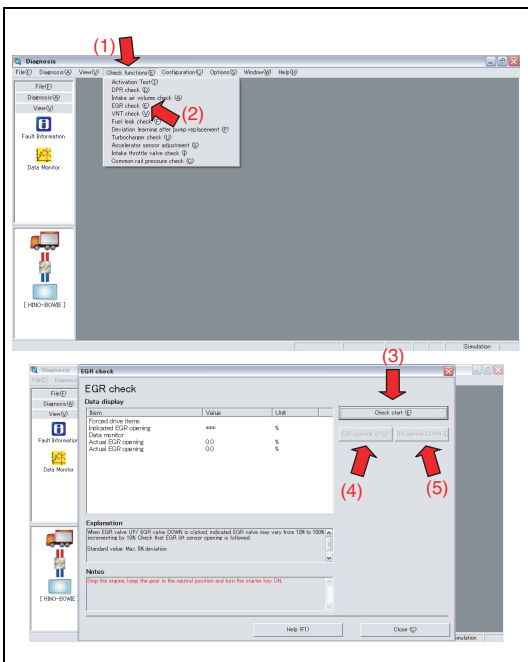
YES

Go to step 15.

NO

Replace the exhaust gas temperature sensor (burner outlet).
Perform "After-inspection work" of INFORMATION section.

15 Check the response of the EGR valve



SAPH16F010300880

1. Stop the engine.
2. Set the starter switch to the "ON" position.
3. Select [Check functions] - [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.

CAUTION

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

<Inspection procedure>

(1) Select [Check functions].

(2) Select [EGR check].

(3) Click [Check start].

(4) Click [EGR opening UP]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %.

(5) Click [EGR opening DOWN]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %.

HINT

- The EGR opening position changes of 10 % per step between 0 – 100 %.

Standard values

From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.

Are the measurements within standard value?

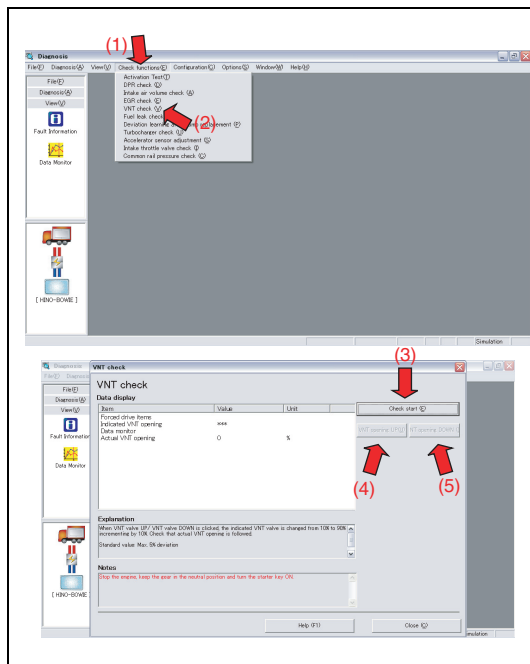
YES

Go to step 16.

NO

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

16 Check the response delay of the VNT controller



SAPH16F0103008B1

1. Select [Check functions] - [VNT check] from the menu, and inspect the response delay at the Target VNT position and Actual VNT position.

CAUTION

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

<Inspection procedure>

- (1) Select [Check functions].
 - (2) Select [VNT check].
 - (3) Click [Check start].
 - (4) Click [VNT opening UP].
 - (5) Click [VNT opening DOWN].
- Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %.
 - Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %.

HINT

- The VNT opening position changes of 10 % per step between 0 – 90 %.

Standard values

The response delay should be less than 3 seconds.

Do the measurements meet the standard value ?

YES

Go to step 17.

NO

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

17 Inspect the diesel throttle valve

1. Check if there are no abnormal opening angles or that the valve is not stuck.

Was any failure found?

YES

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

NO

Go to step 18.

18 Inspect the SCV

1. Perform the SCV free acceleration test.
 - For a detailed procedure, refer to the separate "SCV free acceleration test" in the following pages.

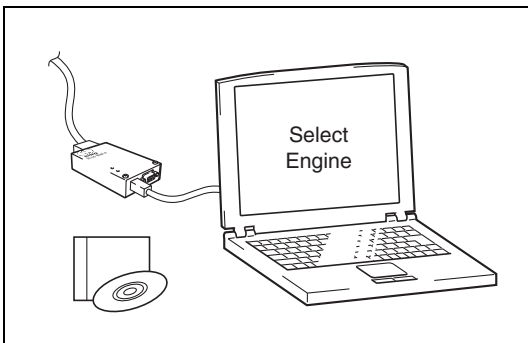
Was any failure found?

YES

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

NO

Go to step 19.

19 Inspect the injector [Hino-DX]

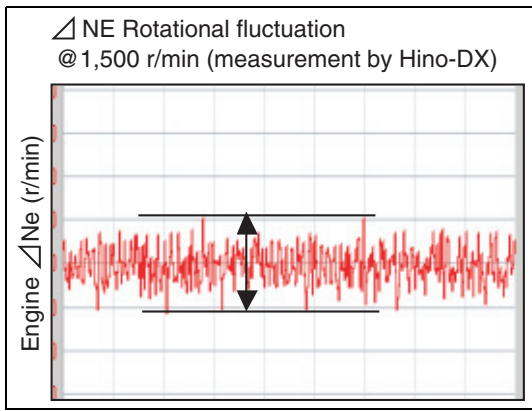
SAPH16F010300882

Check the injection quantity and the rotational fluctuation.

1. Start the engine
2. Select [Injection quantity] from the [Data Monitor] menu, and measure the fuel injection quantity.
3. Select [Engine speed] from the [Data Monitor] menu, and measure the rotational fluctuation.

Measurement conditions

**Engine speed: 1,500 r/min No-load,
T/M shift lever: Neutral position, A/C off and
Air compressor un-operating.
Engine coolant temperature: more than 80 °C {176 °F}**



SAPH16F010300883

Standard values		
Type of	Q (mm ³ /st)	△Ne (r/min)
MT	5.0q ≤	≤ 26
Allison® 2200	6.0q ≤	
Allison® 2500		
Allison® 3500		

**Do the measurements meet the standard values?
(Do the injection volume and the rotational fluctuation meet their standard values?)**

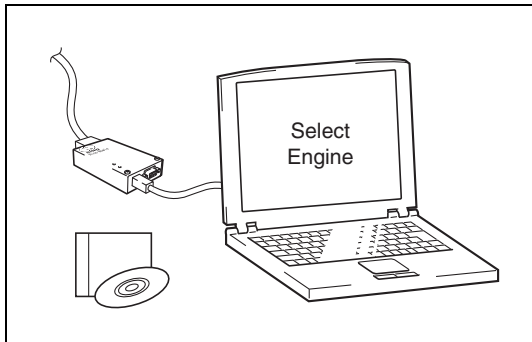
YES

Go to step 20.

NO

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

20 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300885

1. Perform an engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if the DTC P244A has been detected in [Fault Information].

Has DTC P244A been detected ?

YES

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

NO

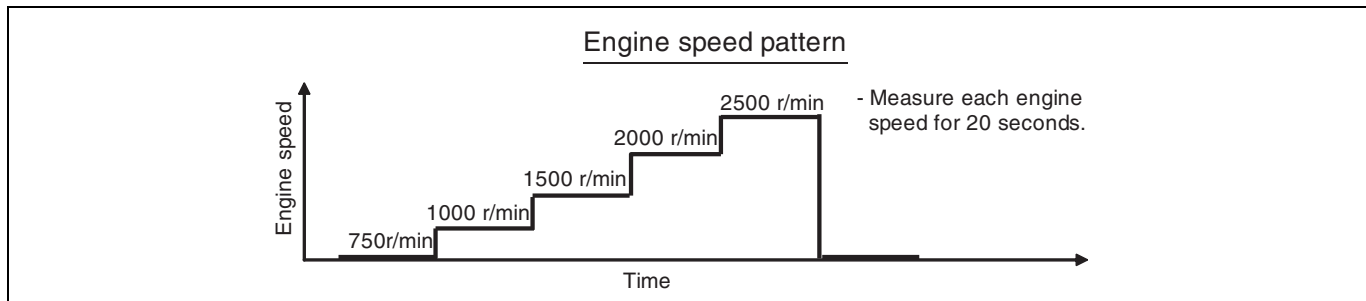
**Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

SCV FREE ACCELERATION TEST

1 Test method

<Engine speed pattern>

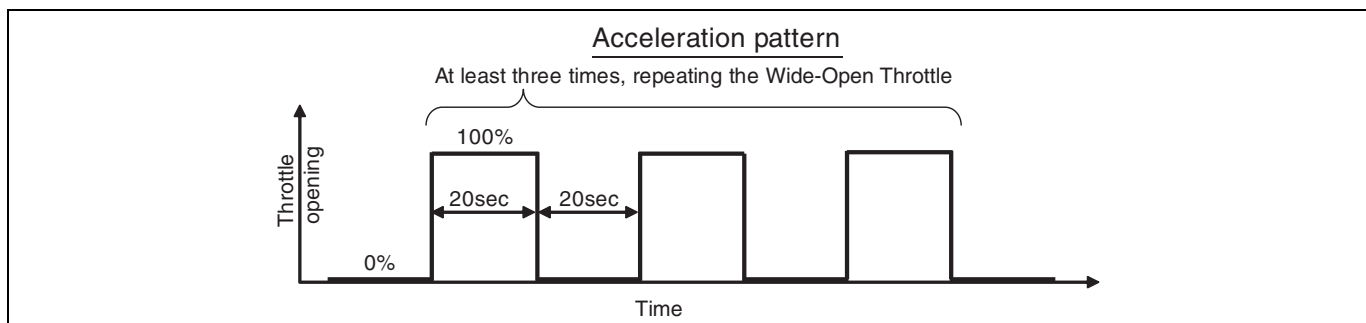
1. After engine has reached operating temperature (more than 82 °C {179.6 °F}).
2. After air compressor completed building pressure.
3. A/C, Head lights off.
4. All devices off. (PTO, Refrigeration compressor. etc)
5. Control the engine revolution by means of operating Cruise Control system.



SAPH16F010300886

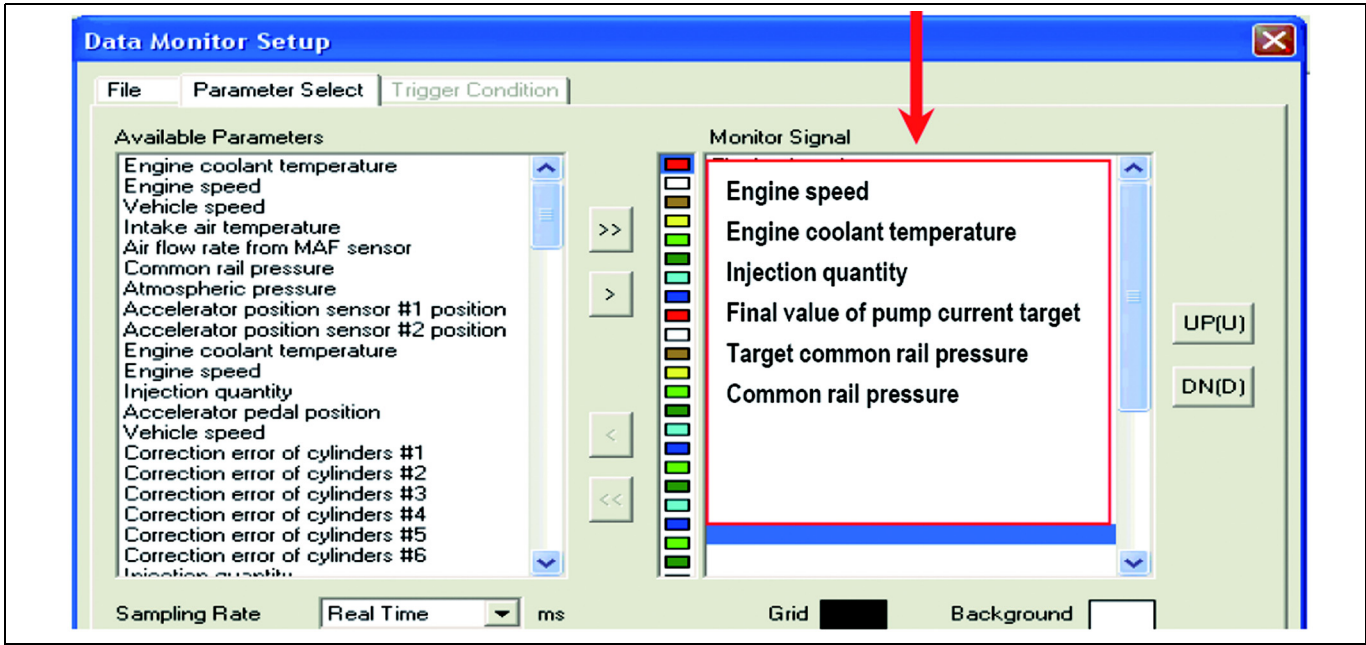
<Acceleration pattern>

1. After engine has reached operating temperature (more than 82 °C {179.6 °F}).
2. After air compressor completed building pressure.
3. A/C, Head lights off.
4. All devices off. (PTO, Refrigeration compressor. etc)
5. Check that actual common rail pressure following target.



SAPH16F010300887

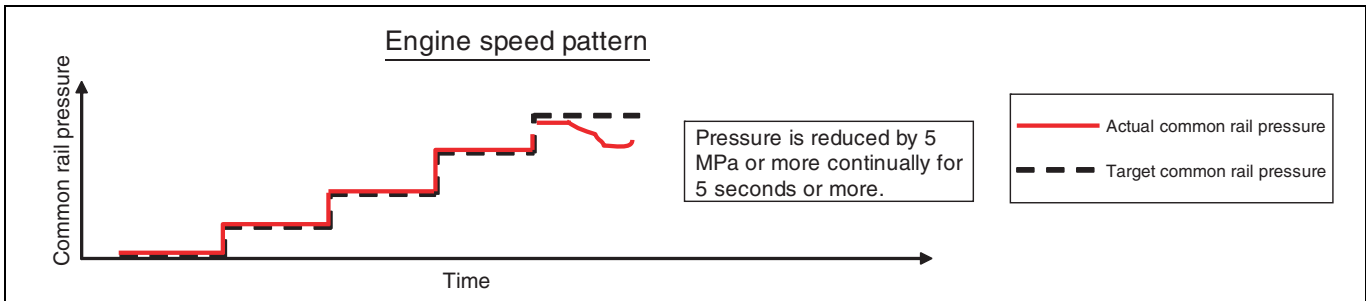
2 Types of Hino-DX data to be measured



SAPH16F010300888

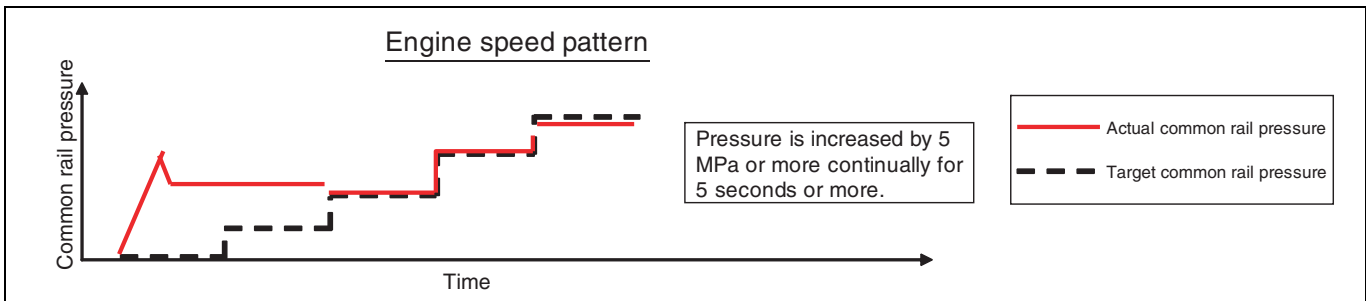
3 If the following symptoms occur, FAIL. If not, OK.

- a. Pressure is reduced by 5 MPa or more continually for 5 seconds or more. → Replace the supply pump.



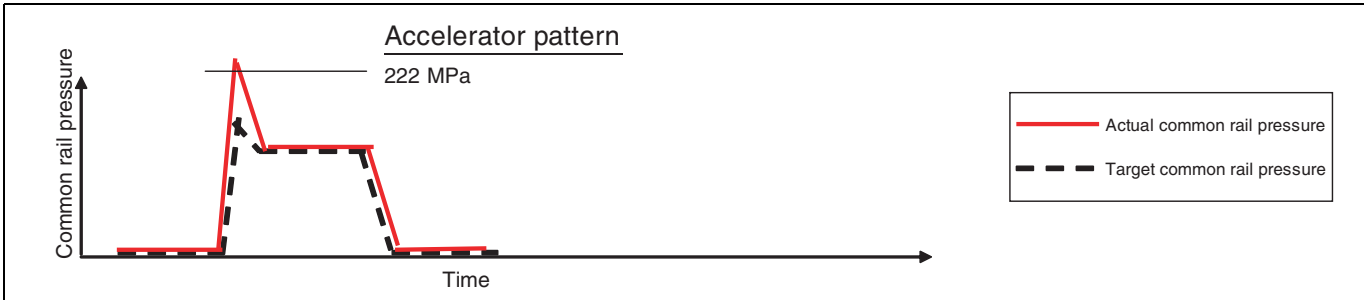
SAPH16F010300889

- b. Pressure is increased by 5 MPa or more continually for 5 seconds or more. → Replace the SCV.



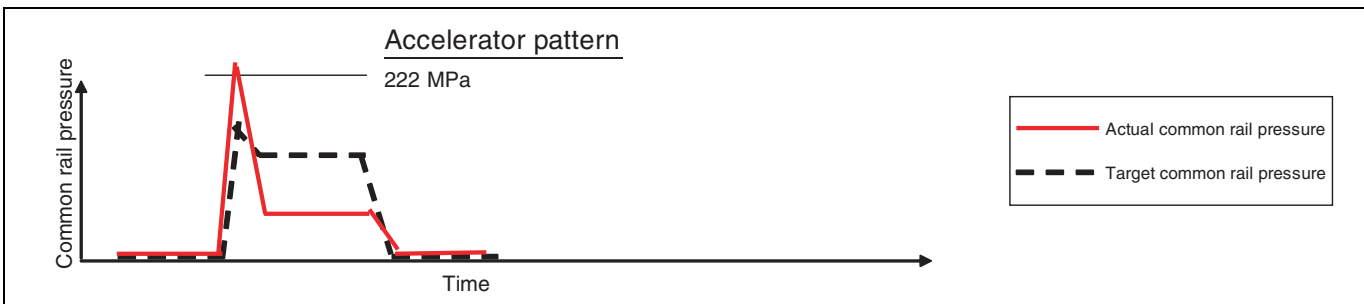
SAPH16F010300890

- c. The maximum common rail pressure exceeds 222 MPa for even a moment during pressure increase. → Replace the SCV.



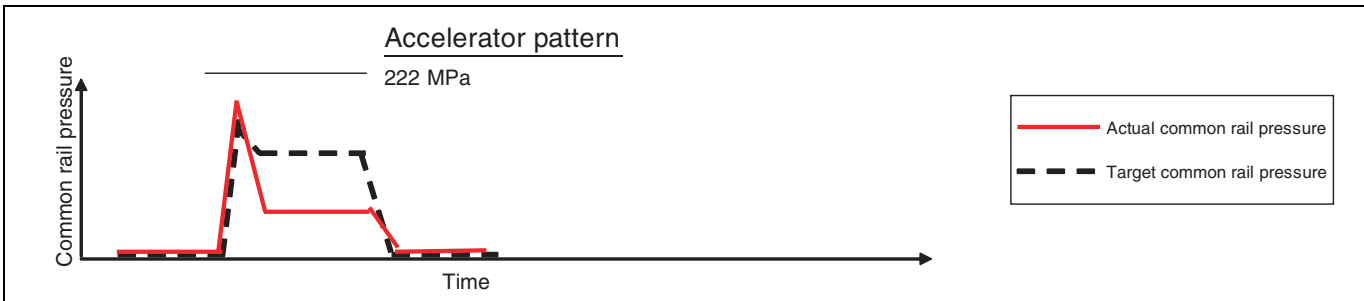
SAPH16F010300891

- d. After the maximum common rail pressure exceeds 222 MPa during pressure increase, the actual rail pressure falls below the target rail pressure. → Replace the SCV.



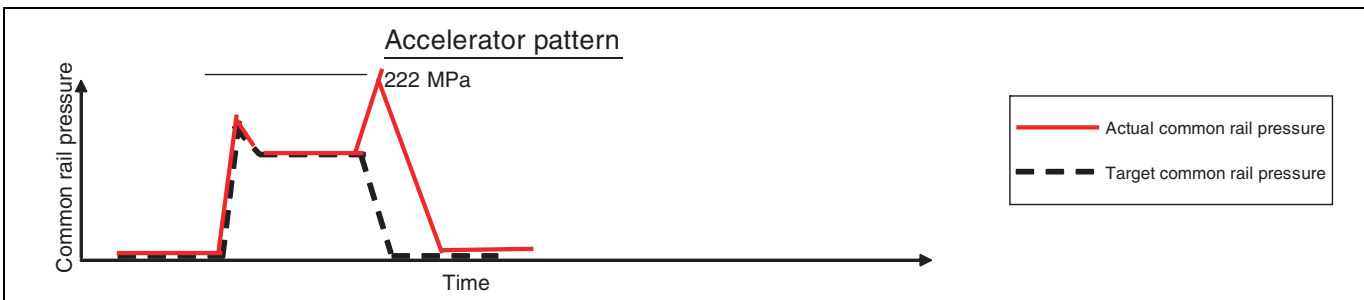
SAPH16F010300892

- e. Before the maximum common rail pressure exceeds 222 MPa during pressure increase, the actual rail pressure falls below the target rail pressure rapidly. → Replace the common rail.



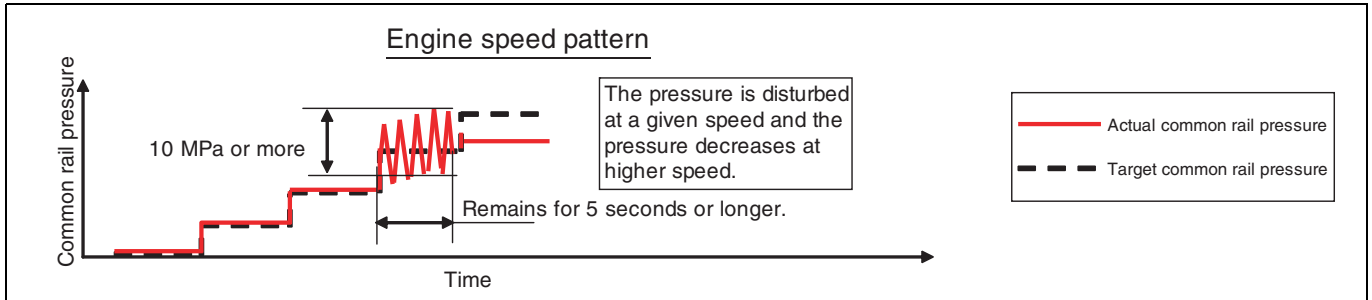
SAPH16F010300893

- f. The maximum common rail pressure exceeds 222 MPa during pressure drop. → Check the return pipe.



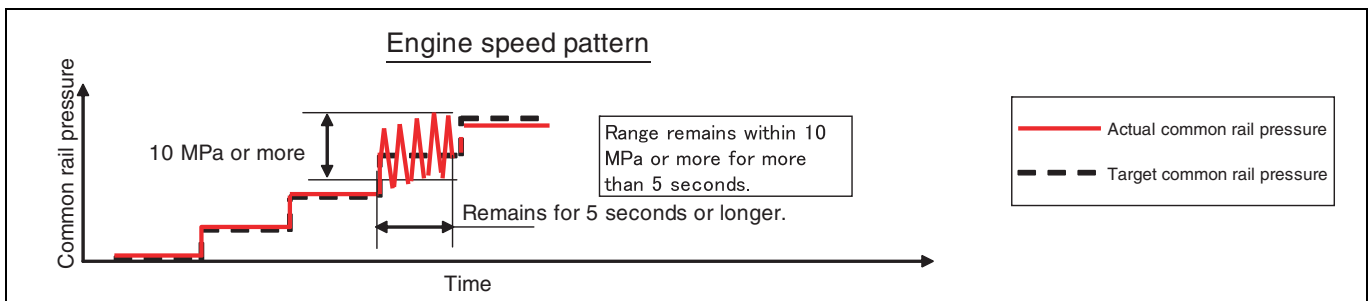
SAPH16F010300894

- g. The pressure is disturbed at a given speed and the pressure decreases at higher speed. → Replace the supply pump.



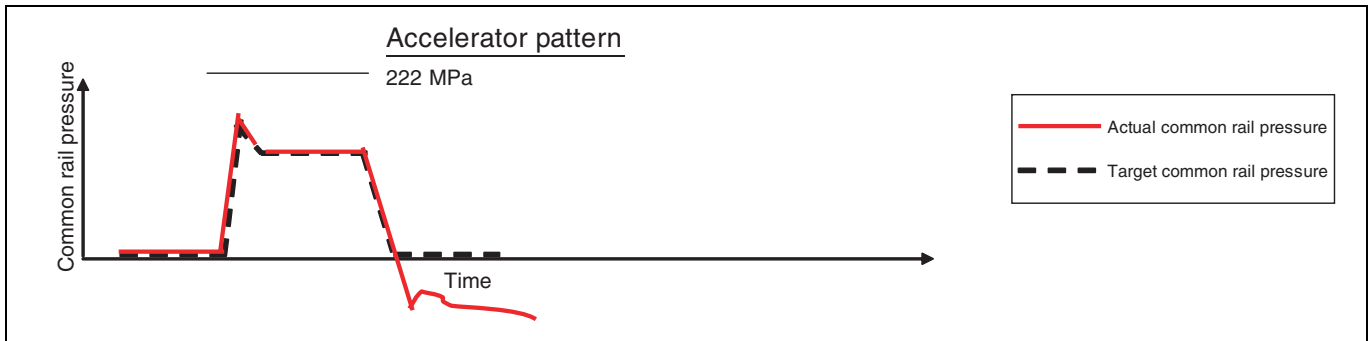
SAPH16F010300895

- h. Hunting remains within 10 MPa or more for more than 5 seconds. → Replace the SCV.



SAPH16F010300896

- i. The engine stops during pressure relief. → Replace the SCV.

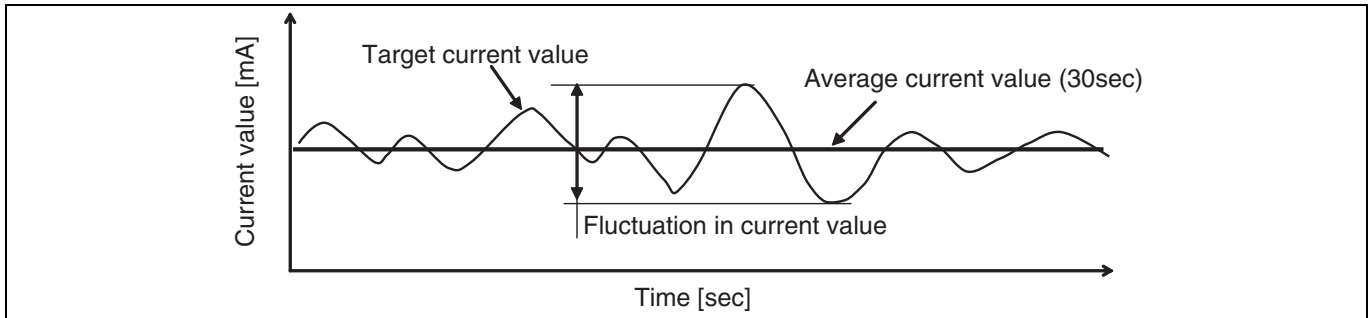


SAPH16F010300897

- j. Target common rail pressure during idling deviates from the standard value. → Replace the SCV.

<FINAL VALUE OF PUMP CURRENT TARGET test>

1. After engine has reached operating temperature. (more than 82 °C {179.6 °F})
2. After air compressor has completed building pressure.
3. A/C, Head lights are off.
4. All other devices turned off. (PTO, Refrigeration compressor. etc)
5. Engine speed: 750 r/min



SAPH16F010300898

Criteria		
FINAL VALUE OF PUMP CURRENT TARGET	Average current value	1740 ± 80 mA
	Fluctuation in current value	< 80 mA

CHECKLIST: P244A

DTC: P244A		Filtering performance (missing substrate)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU)	Check if any DTC other than P244A (P141F abnormal burner system) has been detected in [Engine].	DTC P141F has been detected: Go to YES. No DTC has been detected: Go to NO.		Inspect the burner system (BCU).	Go to step 2.
2	Check the exhaust gas temperature sensor (DOC inlet) [Hino-DX]	Check the [Exhaust Temperature (IN)] from Hino-DX [DX Report], and read the detected temperature (history) of the exhaust gas temperature sensor (DOC inlet). HINT Refer to the chapter "HINO DIAGNOSTIC EXPLORER" in the section "Hino DX manual" for the detail of Hino-DX report (in the contents of "Past Work Information").	More than 950 °C detected in the temperature history: Go to YES. No such history detected: Go to NO.		Go to step 8.	Go to step 3.
3	Inspect the differential pressure sensor pipe	Inspect the differential pressure sensor pipe for clogging, cracks or other damages.	Failure found: Go to YES. No failure found: Go to NO.		Repair (clean) or replace the differential pressure sensor pipe. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the differential pressure sensor hose	Inspect the differential pressure sensor hose for clogging, cracks or damages.	Failure found: Go to YES. No failure found: Go to NO.		Repair (cleaning) or replace the differential pressure sensor hose. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the differential pressure sensor connector	Inspect the installation of differential pressure sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 6.

DTC: P244A		Filtering performance (missing substrate)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
6	Inspect the differential pressure sensor	<ol style="list-style-type: none"> Inspect the sensor installation conditions. Make sure there is no dirt or damage to the differential pressure sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the differential pressure sensor and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Inspect the differential pressure sensor unit	<p>Measure the resistance between the terminals of the sensor using the electrical tester.</p> <p><Tester connections> DPR differential pressure sensor VCC – GND VOUT – GND</p> <p><Standard values> 2 – 15 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 8.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
8	Inspect the DPR filter	<ol style="list-style-type: none"> Remove the DPR filter and check if there is no soot, damages or other abnormalities at its end. Check for proof of a forceful removal of the DPR filter. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Replace the DPR filter and the burner, and clean the igniter. Perform "After-inspection work" of INFORMATION section.	Go to step 9.
9	Inspect the exhaust gas temperature sensor (burner inlet) connector	Check the connection of exhaust gas temperature sensor connector (burner inlet) (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 10.

DTC: P244A		Filtering performance (missing substrate)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
10	Inspect the exhaust gas temperature sensor (burner inlet)	<ol style="list-style-type: none"> 1. Check the installation of the sensor. 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (burner inlet). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Clean the exhaust gas temperature sensor (burner inlet) and install it properly.</p> <p>If damaged, replace the sensor.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 11.
11	Inspect the exhaust gas temperature sensor (burner inlet) unit	<p>Measure the resistance between the terminals of the exhaust gas temperature sensor (Burner inlet).</p> <p><Tester connections> Exhaust gas temperature sensor (Burner inlet) ET+ – ET-</p> <p><Standard values> 0.3 – 1.8 Ω</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 12.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
12	Inspect the exhaust gas temperature sensor (burner outlet) connector	Check the connection of the exhaust gas temperature sensor connector (burner outlet) (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Connect securely, repair if needed.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 13.
13	Inspect the exhaust gas temperature sensor (burner outlet)	<ol style="list-style-type: none"> 1. Check the installation of the sensor. 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (burner outlet). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Clean the exhaust gas temperature sensor (burner outlet) and install it properly.</p> <p>If damaged, replace the sensor.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 14.

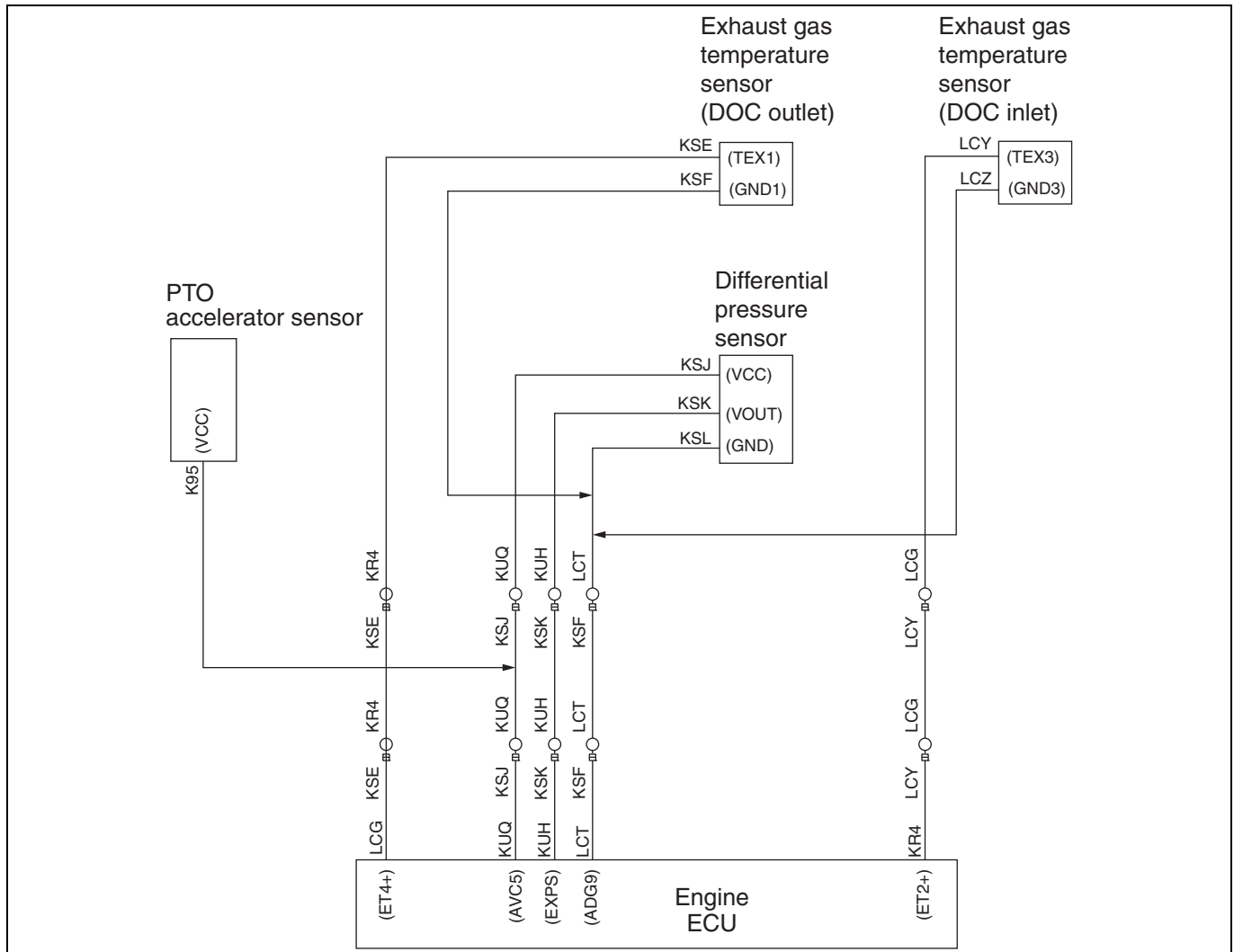
DTC: P244A		Filtering performance (missing substrate)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
14	Inspect the exhaust gas temperature sensor (burner outlet) unit	<p>Measure the resistance between the terminals of the exhaust gas temperature sensor (burner outlet).</p> <p><Tester connections> Exhaust gas temperature sensor (burner outlet) DIT+ – DIT- <Standard values> 0.3 – 1.8 Ω</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 15.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
15	Check the response delay of the EGR valve	<p>Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.</p> <p><Inspection procedure></p> <p>(1) Select [Check functions]. (2) Select [EGR check]. (3) Click [Check start]. (4) Click [EGR opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 90 %. <p>(5) Click [EGR opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 90 to 0 %. <p><Standard values> From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 16.	Replace the EGR valve. Perform "After-inspection work" of INFORMATION section.

DTC: P244A		Filtering performance (missing substrate)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
16	Check the response delay of the VNT controller	<p>Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.</p> <p><Inspection procedure></p> <p>(1) Select [Check functions].</p> <p>(2) Select [VNT check].</p> <p>(3) Click [Check start].</p> <p>(4) Select [VNT opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %. <p>(5) Select [VNT opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %. <p><Standard values></p> <p>From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 17.	Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.
17	Inspect the diesel throttle valve	Check if there are no abnormal opening angles or that the valve is not stuck.	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Replace the diesel throttle valve. Perform "After-inspection work" of INFORMATION section.	Go to step 18.
18	Inspect the SCV	<p>Perform the SCV free acceleration test.</p> <p>For a detailed procedure, refer to the separate "SCV free acceleration test" in the following pages.</p>	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 19

DTC: P244A		Filtering performance (missing substrate)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
19	Inspect the injector [Hino-DX]	<p>Check the injection quantity and the rotational fluctuation.</p> <ol style="list-style-type: none"> 1. Select [Injection quantity] from the [Data Monitor] menu, and measure the fuel injection quantity. 2. Select [Engine speed] from [Data Monitor] on the menu, and measure the rotational fluctuation. <p><Measurement conditions> Engine speed: 1,500 r/min No-load, Neutral, A/C off and Air compressor un-operating Engine coolant temperature: more than 80 °C {176 °F}</p> <p><Standard values> Injection quantity (mm³/st): 5.0q or more for with MT vehicle , 6.0q or more for with Allison® 2200, 2500, 3500 vehicle. Rotation fluctuation (r/min): 26 or less (for with all type of transmission vehicle).</p>	<p>Measurements met the standard value. (Both injection amount and rotational variation.): Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 20.	Replace the injector. Perform "After-inspection work" of INFORMATION section.
20	Check the DTC detected (Engine ECU) [Hino-DX]	<p>Perform engine warm-up. (Engine coolant temperature: 60 °C {140 °F} or more), and check if P244A has been detected in [Engine].</p>	<p>DTC P244A has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P244B

EN01H16F01030F03001146

P244B: Incomplete regeneration
INFORMATION

SAPH16F010300899

1. Technical description

- The ECU always calculates and integrates the soot discharge quantity from the engine.
- The ECU decides the DPR regeneration mode based on the soot accumulation quantity.
- The soot accumulation quantity has exceeded the allowable regeneration quantity.
- DPR regeneration failure is detected on the basis of the values obtained from the exhaust gas pressure sensor (differential pressure sensor) and the DPR temperature sensor.

<Description of malfunction>

- -

2. DTC set condition**(1) DTC detection condition**

- The engine must not be stopped.
- After automatic regeneration
- Burner in inactive status
- Calculated exhaust gas flow rate of 205 L/s or higher
- Exhaust brake is inactive.

(2) Judgement criteria

- Failure is determined when the value of "differential pressure/exhaust gas flow rate" counted in establishing the judgment criteria is higher than the threshold value.

3. Reset condition

- Immediately after normal operation is restored and DPR-related memory is reset.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors**[DPR clogged]**

- The DPR light has continued to blink, but manual regeneration has not been performed.
- The DPR indicator light does not blink.
- Check for a defective meter bulb (with the starter switch set to the "ON" (engine stopped), the indicator lamp in the meter must light).
- Regeneration has not completed because the burner system did not operate (DTC is stored).

[Incomplete regeneration]

- DPR temperature does not rise and regeneration is incomplete.
 - Exhaust gas temperature sensor (burner outlet): Check if sensing is wrong because of abnormal temperature characteristics.
- Soot remains because of excessive quantity of soot accumulation
 - Injector: fuel injection quantity characteristics failure
 - SCV: faulty common rail pressure control
 - EGR valve: faulty EGR opening control
 - Turbocharger: faulty VNT opening control

[Confirmation points for erroneous judgment]**[DPR clogged]**

- The DPR light has continued to blink, but manual regeneration has not been performed. Check the following items, because the regeneration conditions (in the idling status) may not have been met.
 1. Inspection of neutral switch, accelerator switch, and vehicle speed sensor.
 2. Inspection for a wire break of the DPR switch.
 3. No response of the PTO ON signal or the external accelerator signal.

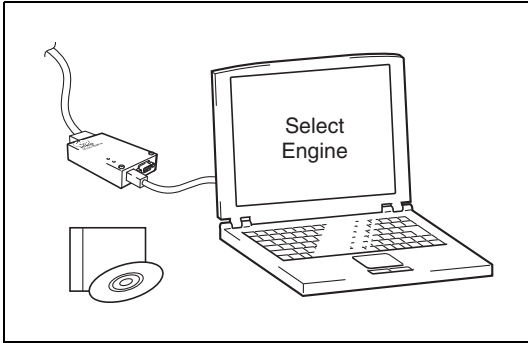
[Incomplete regeneration]

- Failure in differential pressure sensor system
 - Differential pressure sensor failure
 - Check if differential pressure value is wrongly sensed because of damaged hose or wrong connection.
 - Check if sensing is wrong because the exhaust gas pressure sensor pipe is faulty, clogged by foreign substances, or has a hole in it.
- Air flow sensor failure

Check if sensing is wrong because gas flow rate calculation is based on abnormal intake air quantity.

- Exhaust gas temperature sensor
Check if sensing is wrong because gas flow rate calculation is based on abnormal temperature characteristics.
- Diesel-throttle: Diesel-throttle opening control defective
- Exhaust brake: Stuck on the closed side

INSPECTION PROCEDURE [sheet 1]: P244B

1 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300900

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P244B has been detected in [Fault Information].

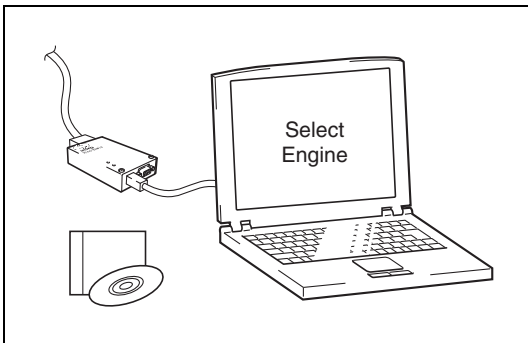
Have DTCs other than P244B been detected ?

YES

NO

Go to diagnosis procedure of a related DTC.

Go to step 2.

2 Check the DPR soot accumulation quantity

SAPH16F010300901

1. Check [PM amount of piling up] from [DX Report] to read the DPR soot accumulation quantity.

NOTICE

For the P244B code, there are two types of DTC detection conditions. The inspection method depends on these conditions. Check that the amount of soot deposited from Hino-DX report, and operate using the method that matches the detection condition.

- If the amount of deposited soot is less than 5.0 g/L, check "Sheet 1".
- If the amount of deposited soot is more than 5.0 g/L, check "Sheet 2".

HINT

Refer to the chapter "HINO DIAGNOSTIC EXPLORER" in the section "Hino DX manual" for the detail of Hino-DX report (in the contents of "Past Work Information").

Is the amount of soot in the DPR less than 5.0 g/L?

YES

NO

Go to step 3.

Perform "Sheet 2" diagnosis.

3 Check the DPR filter

1. Remove DPR filter and check that there is no soot leaking at the rear edge of the DPR filter, no damage, and no other abnormality.



Damage

SAPH16F010300902



Soot leakage

SAPH16F010300903

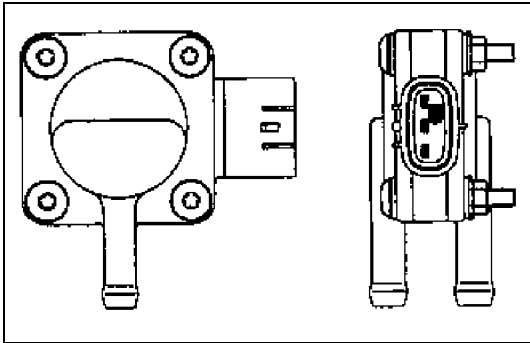
Was any failure found?**YES**

**Replace the DPR filter and the burner nozzle
and clean the igniter.
Go to step 7 after replacement.**

NO

Go to step 4.

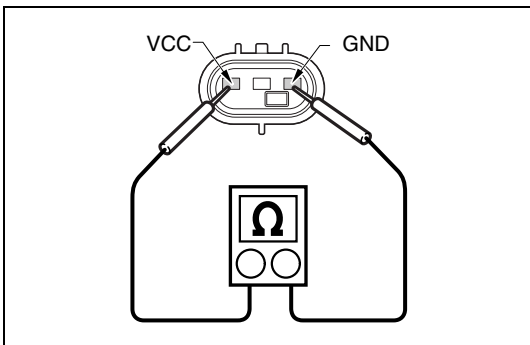
4 Inspect the differential pressure sensor (exhaust gas pressure sensor) unit



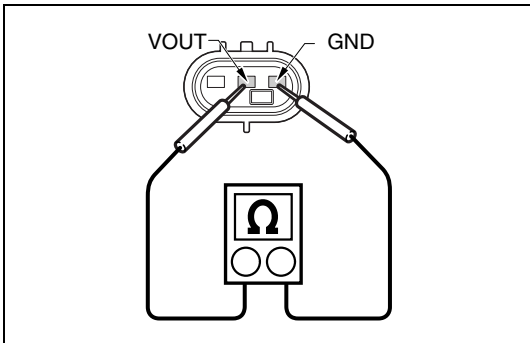
SAPH16F010300904

1. Disconnect the differential pressure sensor connector.
2. Use the electrical tester to measure the resistance between the terminals of the differential pressure sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Differential pressure sensor connector VCC – GND VOUT – GND	2 – 15 k Ω



SAPH16F010300905



SAPH16F010300906

Are the measurements within standard value?

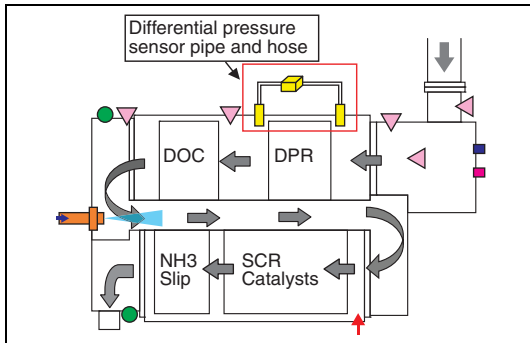
YES

Go to step 5.

NO

Replace the differential pressure sensor (exhaust gas pressure sensor).
Perform "After-inspection work" of INFORMATION section.

5 Inspect the differential pressure sensor pipe



SAPH16F010300907

1. Inspect differential pressure sensor pipe for clogging, cracks, and other damage.

Was any failure found?

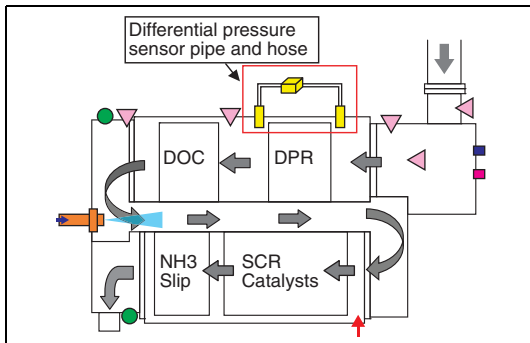
YES

Repair (cleaning) or replace differential pressure sensor pipe.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the differential pressure sensor hose



SAPH16F010300908

1. Inspect the differential pressure sensor hose for clogging, cracks, and other damages.

Was any failure found?

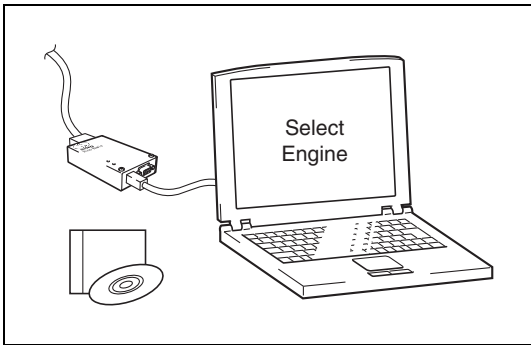
YES

Repair (cleaning) or replace differential pressure sensor hose.
After replacement, perform DPR forced regeneration.
Perform "After-inspection work" of INFORMATION section.

NO

Perform DPR forced regeneration.
Procedure complete.
Perform "After-inspection work" of INFORMATION section.

7 Perform an engine basic inspection [Hino-DX]



SAPH16F010300909

1. Inspect the engine parts and systems based on the Engine basic inspection sheet.

HINT

Inspect each system of the engine for anything that may aggravate the exhaust gas properties.

Was any failure found?

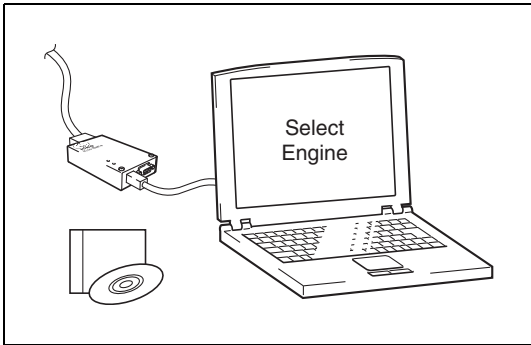
YES

Repair or replace the faulty part. If the air flow sensor is defective, go to step 8.

NO

Go to step 8.

8 Inspect the air flow sensor [Hino-DX]



SAPH16F010300910

1. Set the starter switch to the "LOCK" position.
2. Inspect the connection of the air flow sensor's connector (mating, poor contact).
3. Replace the air flow sensor to the new one.
4. Set the starter switch to the "ON" position.
5. Select [Engine] on Hino-DX menu.
6. Select [Suction air volume check] from [Check functions] on the menu, and check that the characteristic air flow sensor performance error does not exceed 10 % compare with new and old sensors.

Standard values
Performance error: less than 10 %

Do the measurements meet the standard value?

YES

Go to step 9.

NO

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

9 Inspect the exhaust gas temperature sensor (burner inlet) connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect the exhaust gas temperature sensor (burner inlet)

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

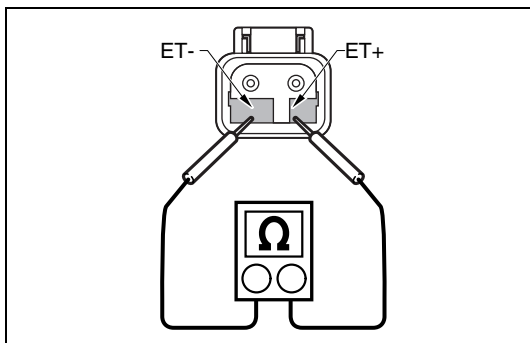
Was any failure found?

YES

Clean the exhaust gas temperature sensor (burner inlet) and install it properly.
If damaged, replace the exhaust gas temperature sensor (burner inlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

11 Inspect the exhaust gas temperature sensor (burner inlet) unit

SAPH16F010300911

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (burner inlet) ET+ – ET-	0.3 – 1.8 Ω

Do the measurements meet the standard value?

YES

Go to step 12.

NO

Replace the exhaust gas temperature sensor (burner inlet).
Perform "After-inspection work" of INFORMATION section.

12 Inspect the exhaust gas temperature sensor (burner outlet) connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 13.

13 Inspect the exhaust gas temperature sensor (burner outlet)

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

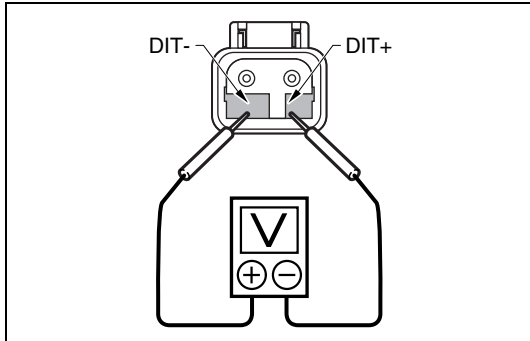
Was any failure found?

YES

Clean the exhaust gas temperature sensor (burner outlet) and install it properly.
If damaged, replace the exhaust gas temperature sensor (burner outlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 14.

14 Inspect the exhaust gas temperature sensor (burner outlet) unit

SAPH16F010300912

1. Disconnect the exhaust gas temperature sensor (burner outlet) connector.
2. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor (burner outlet).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (burner outlet) DIT+ – DIT-	0.3 – 1.8 Ω

Do the measurements meet the standard value?

YES

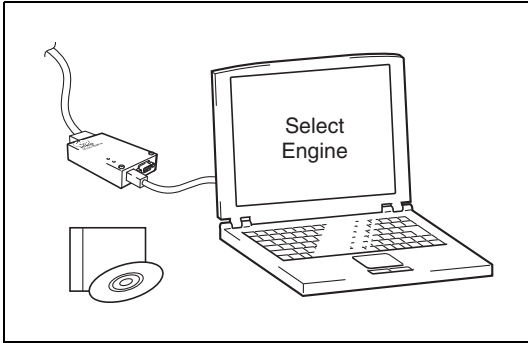
Perform DPR forced regeneration.
Procedure completed.
Perform "After-inspection work" of INFORMATION section.

NO

Replace the exhaust gas temperature sensor (burner outlet).
Perform "After-inspection work" of INFORMATION section.

INSPECTION PROCEDURE [sheet 2]: P244B

1 Check the DTC detected (Engine ECU) [Hino-DX]



SAPH16F010300913

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P244B has been detected in [Fault Information].

Have DTCs other than P244B been detected ?

YES

Go to the diagnosis procedure of a related DTC.

NO

Go to step 2.

2 Check the DPR soot accumulation quantity

1. Check [PM amount of piling up] from [DX Report] to read the DPR soot accumulation quantity.

HINT

For the P244B code, there are two types of DTC detection conditions. The inspection method depends on these conditions. Check that the amount of soot deposited from Hino-DX report, and operate using the method that matches the detection condition.

- If the amount of deposited soot is less than 5.0 g/L, check "Sheet 1".
- If the amount of deposited soot is more than 5.0 g/L, check "Sheet 2".

HINT

Refer to the chapter "HINO DIAGNOSTIC EXPLORER" in the section "Hino DX manual" for the detail of Hino-DX report (in the contents of "Past Work Information").

Is the amount of soot more than 5.0 g/L?

YES

Go to step 3.

NO

Perform "Sheet 1" diagnosis.

3 Check the DTC detected (BCU (Burner))

1. Select [BCU (Burner)] and check if DTC has been detected in [Fault Information].

Have any DTC been detected ?

YES

NO

Go to diagnosis procedure of a related DTC.

Go to step 4.

4 Check the burner system 1 [Hino-DX]

Event log example

	Event #	TR hours	Event	Flame temp
No	857	1228:24:36	EECU_REQUEST_START_AUTO_REGEN	202
	858	1228:24:58	IGNITION_SUCCESS	196
	859	1228:25:17	EECU_REQUEST_STOP_REGEN	496
Yes	574	1866:23:18	EECU_REQUEST_START_AUTO_REGEN	244
	575	1866:23:48	FAILED_IGNITION (MISFIRE)	213
Yes	934	1254:47:38	EECU_REQUEST_START_AUTO_REGEN	246
	935	1254:47:59	IGNITION_SUCCESS	223
	936	1254:50:01	CANNOT_REACH_TEMP	132
	937	1254:50:01	EECU_REQUEST_STOP_REGEN	132
	948	1258:33:04	EECU_REQUEST_START_AUTO_REGEN	266
Yes	949	1258:33:26	IGNITION_SUCCESS	232
	950	1258:33:49	LOST_FLAME	197

SAPH16F010300914

1. Select [Event log] from the [Check functions] menu on Hino-DX and check the burner event log.
2. Check the newest (latest) [EECU_REQUEST_START_AUTO_REGEN].
3. Check if FAILED_IGNITION (MISFIRE), [LOST_FLAME] and [CANNOT_ACHIEVE_TEMP] are present after the newest (latest) [EECU_REQUEST_START_AUTO_REGEN].

HINT

If there is a FAILED_IGNITION (MISFIRE), LOST_FLAME, CANNOT_REACH_TEMP, regeneration has not been performed because of a burner defect in the automatic regeneration region (soot bar: 3 to 5 elements)

Did you find a response log ?

YES

NO

If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure.
If [LOST FLAME] is displayed, go to DTC P140E inspection procedure.
If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.

Go to step 5.

HINT

Automatic regeneration has not been completed in the automatic regeneration region (soot bar: 3 to 5 elements) because of exhaust brake operation, stop the vehicle, PTO operation, engine stop, or use of reverse gear during automatic regeneration operation. As combustion air is not supplied to the burner during exhaust brake operation, the burner operation stops.

5 Check burner system 2 [Hino-DX]

Event log example

	Event #	TR hours	Event	Flame temp
	959	1262:38:05	EECU_REQUEST_START_AUTO_REGEN	260
	960	1262:43:21	IGNITION_SUCCESS	241
Yes	961	1262:43:24	EECU_REQUEST_STOP_REGEN	337
	963	1262:46:54	EECU_REQUEST_START_MANUAL_REGEN	630
	964	1262:47:18	IGNITION_SUCCESS	510
	965	1262:56:29	EECU_REQUEST_STOP_REGEN	911

SAPH16F010300915

1. In the log you received check if [EECU_REQUEST_START_MANUAL_REGEN] is present after [EECU_REQUEST_START_AUTO_REGEN].

HINT

If there is an EECU_REQUEST_START_MANUAL_REGEN, the DPR manual regeneration request has been emitted correctly from the ECU, and it has been received correctly by the BCU.

Did you find a response log ?

YES

Go to step 6.

NO

Go to step 8.

HINT

The DPR manual regeneration request signal is not being transmitted correctly to the ECU (the DPR button has not been pressed, or failure of the electrical system of the DPR button).

6 Check burner system 3 [Hino-DX]

Event log example

	Event #	TR hours	Event	Flame temp
Yes	741	1208:26:21	EECU_REQUEST_START_MANUAL_REGEN	104
	742	1208:26:43	IGNITION_SUCCESS	104
	743	1208:41:29	EECU_REQUEST_EMERGENCY_STOP	943

SAPH16F010300916

1. In the obtained log, check if [EECU_REQUEST_EMERGENCY_STOP] is present after [EECU_REQUEST_START_AUTO_REGEN].

HINT

If there is an EECU_REQUEST_EMERGENCY_STOP, the DPR outlet temperature is abnormally high and regeneration has not been completed.

Did you find a response log ?

YES

Go to DTC P200C.

NO

Go to step 7.

7 Check burner system 4 [Hino-DX]

Event log example

No	Event #	TR hours	Event	Flame temp
No	857	1228:24:36	ECCU_REQUEST_START_MANUAL_REGEN	202
	858	1228:24:58	IGNITION_SUCCESS	196
	859	1228:25:17	ECCU_REQUEST_STOP_REGEN	496
Yes	Event #	TR hours	Event	Flame temp
Yes	574	1866:23:18	ECCU_REQUEST_START_MANUAL_REGEN	244
	575	1866:23:48	FAILED_IGNITION (MISFIRE)	213
Yes	Event #	TR hours	Event	Flame temp
Yes	934	1254:47:39	ECCU_REQUEST_START_MANUAL_REGEN	246
	935	1254:47:59	IGNITION_SUCCESS	223
	936	1254:50:01	CANNOT_REACH_TEMP	132
	937	1254:50:01	ECCU_REQUEST_STOP_REGEN	132
Yes	Event #	TR hours	Event	Flame temp
Yes	948	1258:33:04	ECCU_REQUEST_START_MANUAL_REGEN	266
	949	1258:33:26	IGNITION_SUCCESS	232
	950	1258:33:49	LOST_FLAME	197

SAPH16F010300917

- In the obtained log, check if [FAILED_IGNITION (MISFIRE)], [LOST_FLAME], [CANNOT_ACHIEVE_TEMP] are present after [ECCU_REQUEST_START_MANUAL_REGEN].

HINT

If there is a **FAILED_IGNITION (MISFIRE)**, **LOST_FLAME**, **CANNOT_REACH_TEMP**, regeneration has not been performed because of a burner defect, although the DPR manual regeneration request has been received correctly by the BCU.

Did you find a response log ?

YES

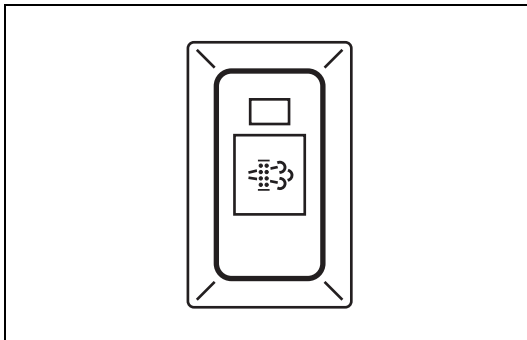
If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure.
 If [LOST FLAME] is displayed, go to DTC P140E inspection procedure.
 If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.

NO

This is due to the fact that during the DPR manual regeneration stepping on the accelerator pedal, moving the shift, working on the PTO and pressing two time the DPR button will cancel the manual regeneration.

- Replace the DPR filter and the burner nozzle, and clean the igniter.
- After performing the DPR manual regeneration, the inspection procedure will be complete.
 Perform "After-inspection work" of INFORMATION section.

8 Inspect DPR manual regeneration switch (DPR switch)



SAPH16F010300918

- Inspect the DPR switch connector (mating, poor contact).
- Inspect the switch unit.
- Inspect the harness for disconnections and short-circuits.

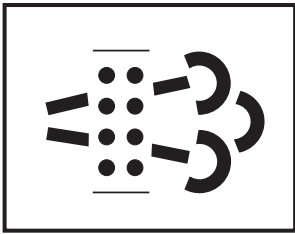
Was any failure found?

YES

- Repair or replace the faulty parts.
 - Replace the DPR filter and the burner nozzle and clean the igniter.
 - After DPR manual regeneration, the diagnosis procedure will be complete.
- Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect DPR indicator light

SAPH16F010300919

1. Inspect the combination meter connector (mating, poor contact).
2. Check for broken bulb.
3. Inspect the harness for disconnections and short-circuits.

Was any failure found?

YES

- Repair or replace the faulty part.
 - Replace the DPR filter and the burner nozzle and clean the igniter.
 - After DPR manual regeneration, the diagnosis procedure will be complete.
- Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect the neutral switch

SAPH16F010300920

1. Inspect the neutral connector (mating, poor contact).
2. Inspect the switch unit.
3. Inspect the harness for disconnections and short-circuits.

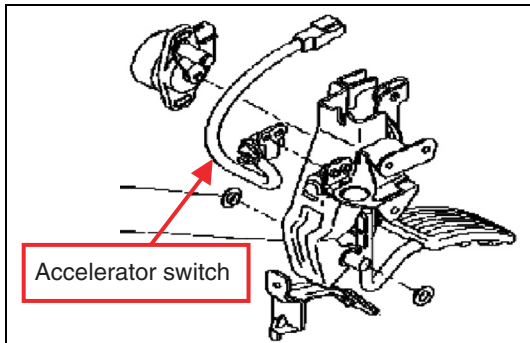
Was any failure found?

YES

- Repair or replace the faulty part.
- Replace the DPR filter and the burner nozzle and clean the igniter.
- After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

11 Inspect accelerator switch

SAPH16F010300921

1. Inspect the accelerator switch (mating, poor contact).
2. Inspect the switch unit.
3. Inspect the harness for disconnections and short-circuits.

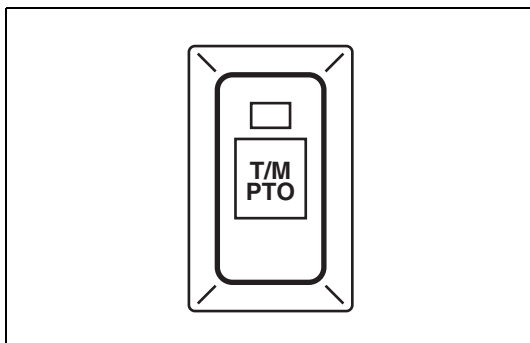
Was any failure found?

YES

- Repair or replace the faulty part.
- Replace the DPR filter and the burner nozzle and clean the igniter.
- After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 12.

12 Inspect PTO signal

SAPH16F010300922

1. Inspect the PTO switch connector (mating, poor contact).
2. Check the PTO input signal.
3. Inspect the switch unit.
4. Inspect the harness for disconnections and short-circuits.

Was any failure found?

YES

- Repair or replace the faulty part.
 - Replace the DPR filter and the burner nozzle and clean the igniter.
 - After DPR manual regeneration, the diagnosis procedure will be complete.
- Perform "After-inspection work" of INFORMATION section.

NO

Go to step 13.

13 Inspect the external accelerator signal [Hino-DX]

1. Set the starter switch to the "ON" position.
2. Select [Engine] on Hino-DX.
3. Select [PTO accelerator sensor position] and [PTO accelerator sensor voltage] from the [Data Monitor] menu, and check that you do not have a sensor signal output of more than 5 % when the accelerator sensor is at 0 % position (Accelerator pedal not operated).

Was any failure found?

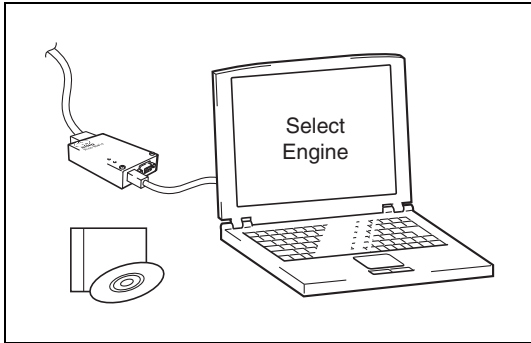
YES

- Check the external accelerator sensor. Repair if necessary.
 - Replace the DPR filter and the burner nozzle and clean the igniter.
 - After DPR manual regeneration, the diagnosis procedure will be complete.
- Perform "After-inspection work" of INFORMATION section.

NO

Go to step 14.

14 **Inspect injector [Hino-DX]**

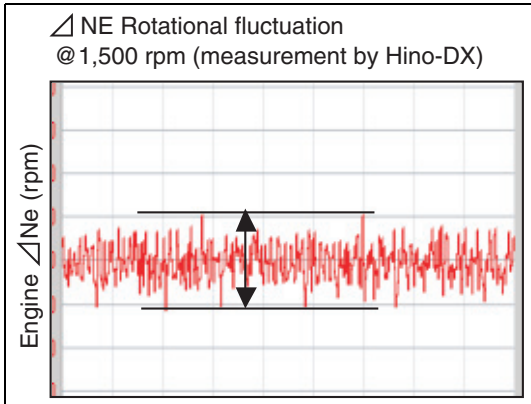


SAPH16F010300923

Check the injection quantity and the rotational fluctuation.

1. Start the engine.
2. Select [Injection quantity] from the [Data Monitor] menu and measure the amount of fuel consumption.
3. Select [Engine speed] from the [Data Monitor] menu and measure the rotational fluctuation.

Measurement conditions
Engine speed: 1,500 r/min No-load, T/M shift lever: Neutral position, A/C off and Air compressor un-operating. Engine coolant temperature: more than 80 °C {176 °F}



SAPH16F010300924

Standard values		
Type of	Q (mm ³ /st)	△Ne (r/min)
MT	5.0q ≤	≤ 26
Allison® 2200	6.0q ≤	
Allison® 2500		
Allison® 3500		

Do the measurements meet the standard values?
(Do the injection volume and the rotational fluctuation meet their standard values?)

YES

- You forgot to press the DPR switch.
- Replace the DPR filter and the burner nozzle and clean the igniter.
- After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.

NO

Replace the injector.
Perform "After inspection work" of INFORMATION SECTION.

CHECKLIST [sheet 1]: P244B

DTC: P244B		Incomplete regeneration (check sheet 1)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P244B has been detected in [Engine].	DTC other than P244B have been detected: Go to YES No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Check the DPR soot accumulation quantity	Check [PM amount of piling up] from [DX Report] to read the DPR soot accumulation quantity. NOTICE For the P244B code, there are two types of DTC detection conditions. The inspection method depends on these conditions. Check that the amount of soot deposited from Hino-DX report, and operate using the method that matches the detection condition. <ul style="list-style-type: none"> If the amount of deposited soot is less than 5.0 g/L, check "Sheet 1". If the amount of deposited soot is more than 5.0 g/L, check "Sheet 2". HINT Refer to the chapter "HINO DIAGNOSTIC EXPLORER" in the section "Hino DX manual" for the detail of Hino-DX report (in the contents of "Past Work Information").	[PM amount of piling up] is less than 5.0 g/L → YES [PM amount of piling up] is more than 5.0 g/L → NO.		Go to step 3.	Go to the [Sheet 2] diagnosis.
3	Check the DPR filter	Remove DPR filter and check that there is no soot leaking at the rear edge of the DPR filter, no damage, and no other abnormality.	Failure found: Go to YES. No failure found: Go to NO.		Replace the DPR filter and the burner nozzle and clean the igniter. Go to step 7 after replacement.	Go to step 4.

DTC: P244B		Incomplete regeneration (check sheet 1)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the differential pressure sensor (exhaust gas pressure sensor) unit	1. Disconnect the differential pressure sensor connector. 2. Use the electrical tester to measure the resistance between the terminals of the differential pressure sensor. <Tester connections> VCC – GND VOUT – GND <Standard values> 2 – 15 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
5	Inspect the differential pressure sensor pipe	Inspect differential pressure sensor pipe for clogging, cracks, and other damage.	Failure found: Go to YES. No failure found: Go to NO.		Repair (cleaning) or replace differential pressure sensor pipe. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the differential pressure sensor hose	Inspect the differential pressure sensor hose for clogging, cracks, and other damages.	Failure found: Go to YES. No failure found: Go to NO.		Repair (cleaning) or replace differential pressure sensor hose. After replacement, perform DPR forced regeneration. Perform "After-inspection work" of INFORMATION section.	Perform DPR forced regeneration. Procedure complete. Perform "After-inspection work" of INFORMATION section.
7	Perform an engine basic inspection [Hino-DX]	Inspect the engine parts and systems based on the Engine basic inspection sheet. HINT Inspect each system of the engine for anything that may aggravate the exhaust gas properties.	Corresponding log: Go to YES. No corresponding log: Go to NO.		Repair or replace the faulty part. If the air flow sensor is defective, go to step 8.	Go to step 8.

DTC: P244B		Incomplete regeneration (check sheet 1)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the air flow sensor [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Inspect the connection of the air flow sensor's connector (mating, poor contact). 3. Replace the air flow sensor to the new one. 4. Set the starter switch to the "ON" position. 5. Select [Engine] on Hino-DX menu. 6. Select [Suction air volume check] from [Check functions] on the menu, and check that the characteristic air flow sensor performance error does not exceed 10 % compare with new and old sensors. <p><Standard values> Performance error: less than 10 %</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 9.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
9	Inspect the exhaust gas temperature sensor (burner inlet) connector	Check the connection of the exhaust gas temperature sensor (burner inlet) connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 10.
10	Inspect the exhaust gas temperature sensor (burner inlet)	<ol style="list-style-type: none"> 1. Check the installation of the exhaust gas temperature sensor (burner inlet). 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (burner inlet). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the exhaust gas temperature sensor (burner inlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 11.

DTC: P244B		Incomplete regeneration (check sheet 1)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
11	Inspect the exhaust gas temperature sensor (burner inlet) unit	<ol style="list-style-type: none"> Set the starter switch to the "LOCK" position. Disconnect the exhaust gas temperature sensor (burner inlet) connector. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor (burner inlet). <Tester connections> ET+ – ET- <Standard values> 0.3 – 1.8 Ω	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 12.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
12	Inspect the exhaust gas temperature sensor (burner outlet) connector	Check the connection of the exhaust gas temperature sensor (burner outlet) connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 13.
13	Inspect the exhaust gas temperature sensor (burner outlet)	<ol style="list-style-type: none"> Check the installation of the exhaust gas temperature sensor (burner outlet). Make sure there is no dirt or damage to the exhaust gas temperature sensor (burner outlet). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the exhaust gas temperature sensor (burner outlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 14.
14	Inspect the exhaust gas temperature sensor (burner outlet) unit [Hino-DX]	<ol style="list-style-type: none"> Disconnect the exhaust gas temperature sensor (burner outlet) connector. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor (burner outlet). <Tester connections> DIT+ – DIT- <Standard values> 0.3 – 1.8 Ω	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Perform DPR forced regeneration. Procedure completed. Perform "After-inspection work" of INFORMATION section.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.

CHECKLIST [sheet 2]: P244B

DTC: P244B		Incomplete regeneration (check sheet 2)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P244B has been detected in [Engine].	DTC other than P244B have been detected: Go to YES No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Check the DPR soot accumulation quantity [Hino-DX]	Check [PM amount of piling up] from [DX Report] to read the DPR soot accumulation quantity. HINT For the P244B code, there are two types of DTC detection conditions. The inspection method depends on these conditions. Check that the amount of soot deposited from Hino-DX report, and operate using the method that matches the detection condition. <ul style="list-style-type: none"> • If the amount of deposited soot is less than 5.0 g/L, check "Sheet 1". • If the amount of deposited soot is more than 5.0 g/L, check "Sheet 2". HINT Refer to the chapter "HINO DIAGNOSTIC EXPLORER" in the section "Hino DX manual" for the detail of Hino-DX report (in the contents of "Past Work Information").	Is the amount of [PM amount of piling up] more than 5.0g/L?		Go to step 3.	Go to the [Sheet 1] diagnosis.
3	Check the DTC detected (Burner)	Check if DTC has been detected in [Burner].	DTC has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 4.

DTC: P244B		Incomplete regeneration (check sheet 2)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Check the burner system 1 [Hino-DX]	<ol style="list-style-type: none"> 1. Check the burner event log from Hino-DX. 2. Check the newest (latest) [EECU REQUEST START AUTO REGEN]. 3. Check if [FAILED IGNITION (MISFIRE)], [LOST FLAME] and [CANNOT ACHIEVE TEMP] are present after the newest (latest) [EECU REQUEST START AUTO REGEN]. 	<p>Corresponding log: Go to YES.</p> <p>No corresponding log: Go to NO.</p>		<p>If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure.</p> <p>If [LOST FLAME] is displayed, go to DTC P140E inspection procedure.</p> <p>If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.</p>	Go to step 5.
5	Check burner system 2 [Hino-DX]	In the log you received check if [EECU REQUEST START MANUAL REGEN] is present after [EECU REQUEST START AUTO REGEN].	<p>Corresponding log: Go to YES.</p> <p>No corresponding log: Go to NO.</p>		Go to step 6.	Go to step 8.
6	Check burner system 3 [Hino-DX]	In the obtained log, check if [EECU REQUEST EMERGENCY STOP] is present after [EECU REQUEST START AUTO REGEN].	<p>Corresponding log: Go to YES.</p> <p>No corresponding log: Go to NO.</p>		Go to the diagnosis of DTC P200C.	Go to step 7.

DTC: P244B		Incomplete regeneration (check sheet 2)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
7	Check burner system 4 [Hino-DX]	In the obtained log, check if [FAILED IGNITION (MISFIRE)], [LOST FLAME], [CANNOT ACHIEVE TEMP] are present after [EECU REQUEST START MANUAL REGEN].	Corresponding log: Go to YES. No corresponding log: Go to NO.		If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure. If [LOST FLAME] is displayed, go to DTC P140E inspection procedure. If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.	This is due to the fact that during the DPR manual regeneration stepping on the accelerator pedal, moving the shift, working on the PTO and pressing two time the DPR button will cancel the manual regeneration. -Replace the DPR filter and the burner nozzle, and clean the igniter. -After performing the DPR manual regeneration, the inspection procedure will be complete. Perform "After-inspection work" of INFORMATION section.
8	Inspect DPR switch	<ol style="list-style-type: none"> 1. Check the connection of the DPR switch connector. (Looseness and poor contact) 2. Check the switch unit. 3. Inspect the harness for disconnections and short-circuits. 	Failure found: Go to YES. No failure found: Go to NO.		-Repair or replace the faulty part. -Replace the DPR filter and the burner nozzle and clean the igniter. -After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.	Go to step 9.

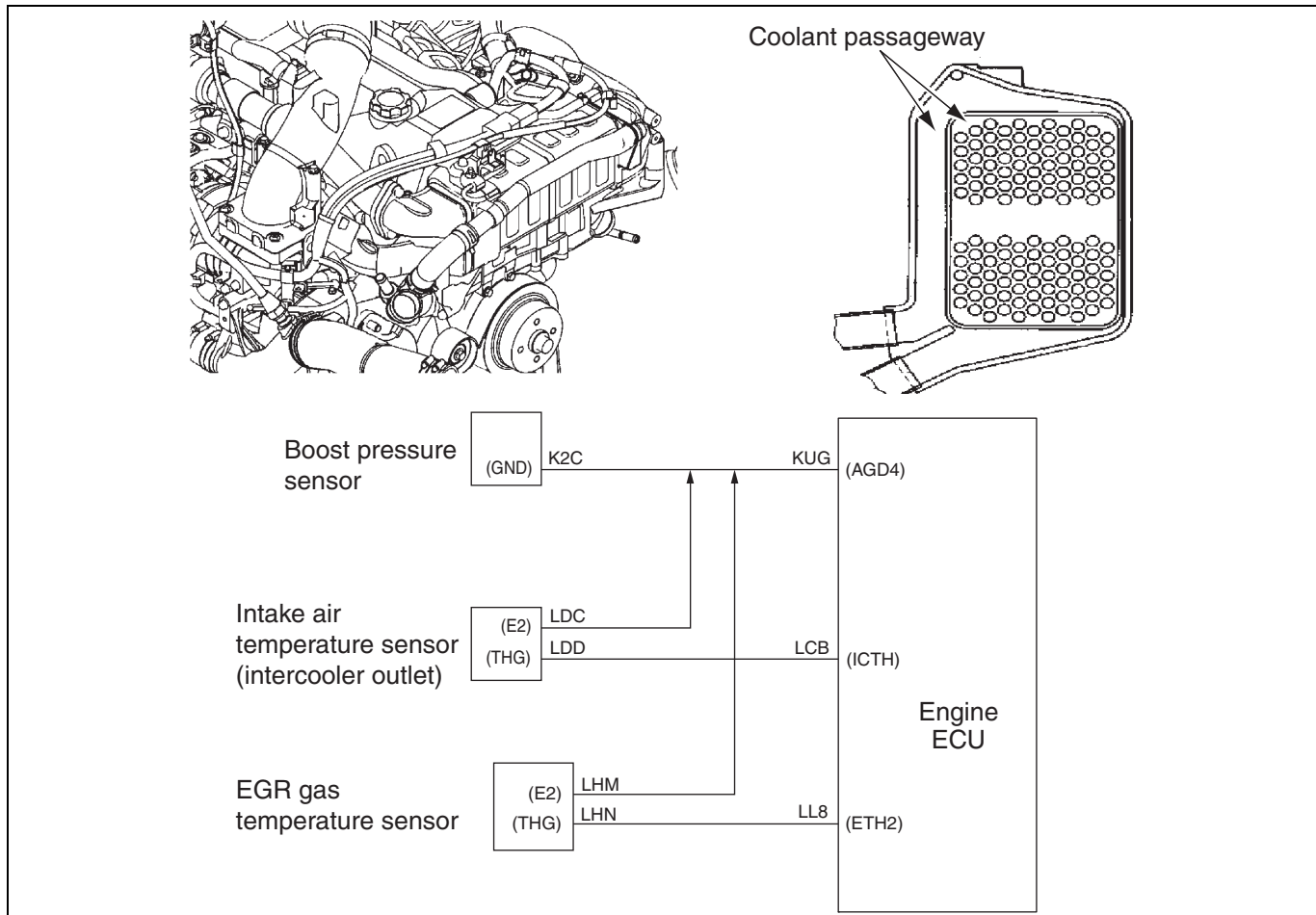
DTC: P244B		Incomplete regeneration (check sheet 2)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Inspect DPR indicator light	<ol style="list-style-type: none"> 1. Inspect the combination meter connector (mating, poor contact). 2. Check for broken bulb. 3. Inspect the harness for disconnections and short-circuits. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>-Repair or replace the faulty part.</p> <p>-Replace the DPR filter and the burner nozzle and clean the igniter.</p> <p>-After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 10.
10	Inspect the neutral switch	<ol style="list-style-type: none"> 1. Inspect the neutral connector (mating, poor contact). 2. Inspect the switch unit. 3. Inspect the harness for disconnections and short-circuits. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>-Repair or replace the faulty part.</p> <p>-Replace the DPR filter and the burner nozzle and clean the igniter.</p> <p>-After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 11.

DTC: P244B		Incomplete regeneration (check sheet 2)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
11	Inspect Accelerator switch	<ol style="list-style-type: none"> 1. Inspect the Accelerator switch connector (mating, poor contact). 2. Inspect the switch unit. 3. Inspect the harness for disconnections and short-circuits. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>-Repair or replace the faulty part.</p> <p>-Replace the DPR filter and the burner nozzle and clean the igniter.</p> <p>-After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 12.
12	Inspect PTO signal	<ol style="list-style-type: none"> 1. Inspect the PTO switch connector (mating, poor contact). 2. Check the PTO input signal. 3. Inspect the switch unit. 4. Inspect the harness for disconnections and short-circuits. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>-Repair or replace the faulty part.</p> <p>-Replace the DPR filter and the burner nozzle and clean the igniter.</p> <p>-After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 13.

DTC: P244B		Incomplete regeneration (check sheet 2)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
13	Inspect the external accelerator signal [Hino-DX]	<ol style="list-style-type: none"> Set the starter switch to the "ON" position. Select [Data Monitor] menu, and check that you do not have a sensor signal output of more than 5 % when the accelerator sensor is at 0 % position (Accelerator pedal not operated). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>-Check the external accelerator sensor. Repair if necessary.</p> <p>-Replace the DPR filter and the burner nozzle and clean the igniter.</p> <p>-After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 14.
14	Inspect injector [Hino-DX]	<p>Check the injection quantity and the rotational fluctuation.</p> <ol style="list-style-type: none"> Start the engine. Select [Injection quantity] from the [Data Monitor] menu and measure the amount of fuel consumption. Select [Engine speed] from the [Data Monitor] menu and measure the rotational fluctuation. <p><Measurement conditions> Engine speed: 1,500 r/min No-load, Neutral, A/C off and Air compressor un-operating Engine coolant temperature: more than 80 °C {176 °F} <Standard values> Injection quantity (mm³/st): 5.0 q or more for with MT vehicle , 6.0 q or more for with Allison® 2200, 2500, 3500 vehicle. Rotation fluctuation (r/min): 26 or less (for with all type of transmission vehicle).</p>	<p>Measurements met the standard value. (Both injection amount and rotational variation.): Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		<p>-You forgot to press the DPR switch.</p> <p>-Replace the DPR filter and the burner nozzle and clean the igniter.</p> <p>-After DPR manual regeneration, the diagnosis procedure will be complete. Perform "After-inspection work" of INFORMATION section.</p>	Replace the injector. Perform "After-inspection work" of INFORMATION section.

DTC: P2457

EN01H16F01030F03001147

**P2457: EGR cooler performance
INFORMATION**

SAPH16F010300926

1. Technical description

- The engine ECU detects abnormally high EGR gas temperatures by means of the EGR cooler outlet gas temperature sensor.

<Description of malfunction>

- The EGR cooler efficiency has dropped.

2. DTC set condition**(1) DTC detection condition**

- Engine revolution is more than 1,500 r/min.
- Fuel injection rate $\geq 40 \text{ mm}^3/\text{st. cyl.}$
- Battery voltage is in the range of 10 V to 16 V.
- Engine speed fluctuation $< 156 \text{ r/min.}$
- Fuel injection rate fluctuation $< 87 \text{ mm}^3/\text{st. cyl.}$
- Atmospheric pressure $\geq 75 \text{ kPa}$ {10.8 psi}
- Vehicle speed $\geq 21 \text{ km/h}$ {13 mph}.
- Intake rate $\geq 75 \text{ g/sec.}$
- Intake temperature sensor (with built-in air flow sensor) is at least $-10 \text{ }^\circ\text{C}$ {14 } $^\circ\text{F}$.

The above conditions continue for at least 40 seconds.

(2) Judgement criteria

- The calculated EGR cooler efficiency, which is derived from the engine speed, fuel injection rate, EGR gas outlet temperature, and coolant temperature, does not exceed 65 %. And:
- The calculated intercooler efficiency, which is derived from the intake temperature sensor, boost pressure sensor, intake air temperature sensor (intercooler outlet), and atmospheric pressure sensor, exceeds 45 – 65 % (for vehicle speeds 21 and 40 km/h {13 and 25 mph}). And:
- The difference among the estimated EGR rate calculated from the engine speed and fuel injection rate, the estimated intake manifold temperature calculated from the EGR gas outlet temperature sensor and intake air temperature sensor (intercooler outlet), and the value of the intake air temperature sensor (intake manifold) are within 40 °C {104 °F} (when EGR rate is 40 %).

3. Reset condition

- Just after restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- –

<Symptoms on the vehicle due to malfunction>

- Insufficient output or engine stall because of DPR filter clogging due to abnormal soot buildup

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

EGR cooler outlet gas temperature sensor:

- Sensor failure

Circuit supplying coolant to EGR cooler:

- Coolant leakage from coolant circuit
- Air incursion due to improper air venting

EGR cooler:

- Air incursion due to improper air venting
- Coolant leakage from EGR cooler
- Deformation of EGR cooler coolant passageway
- Obstruction due to soot buildup in inlet/outlet of EGR gas passageway
- Obstruction due to buildup of foreign substances in coolant passageway of EGR cooler.

EGR valve malfunction

Diesel throttle valve malfunction

SCV malfunction

Injector malfunction

INSPECTION PROCEDURE: P2457

1 Inspect the EGR cooler outlet gas temperature sensor connector

1. Check the connection of the EGR cooler outlet gas temperature sensor connector (Looseness and poor contact).

Was any failure found?

YES

NO

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the EGR cooler outlet gas temperature sensor

1. Check the installation of the EGR cooler outlet gas temperature sensor.
2. Make sure there is no dirt or damage to the EGR cooler outlet gas temperature sensor.

Was any failure found?

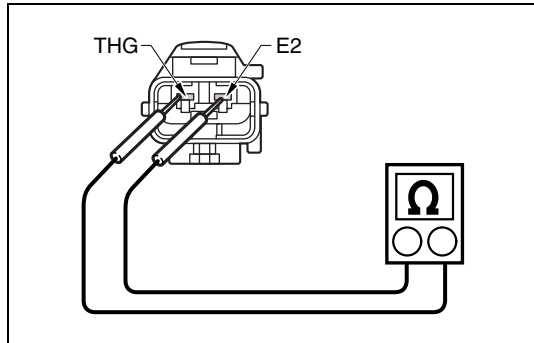
YES

NO

Clean the EGR cooler outlet gas temperature sensor and install it properly.
If damaged, replace the EGR cooler outlet gas temperature sensor.
Perform "After-inspection work" of INFORMATION section.

Go to step 3.

3 Inspect the EGR cooler outlet gas temperature sensor unit



SAPH16F010300927

1. Set the starter switch to the "LOCK" position.
2. Disconnect the EGR cooler outlet gas temperature sensor.
3. Use the electrical tester to measure the resistance between the terminals of the EGR cooler outlet gas temperature sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	EGR cooler outlet gas temperature sensor THG – E2	20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ

Do the measurements meet the standard value?

YES

Go to step 4.

NO

Replace the EGR cooler outlet gas temperature sensor.
Perform "After-inspection work" of INFORMATION section.

4 Inspect the coolant

1. Check the level and condition of the coolant in the coolant reservoir.
2. Check the condition of the coolant pipe (clogging or leaks).

Was any failure found?

YES

Replenish the coolant, or repair or replace the faulty part.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the EGR cooler 1

1. Check if soot is obstructing the inlet/outlet of the EGR cooler gas passageway.

Was any failure found?

YES

Remove the soot in the gas passageway inlet/outlet and then go to step 6.

NO

Go to step 6.

6 Inspect the EGR cooler 2

1. Check if there are foreign substances stuck to the EGR cooler coolant passageway.
2. Check the EGR cooler coolant passageway for obstruction due to deformation or other damage.
3. Check if coolant is leaking from the EGR cooler.

Was any failure found?

YES

Remove the soot in the gas passageway inlet/outlet, or repair or replace the faulty part.
If the only cause of the malfunction was soot, go to step 6.

NO

Go to step 7.

7 Inspect the EGR valve

1. Check the EGR valve for damage due to incursion of foreign substances.
2. Check if the inlet/outlet of the exhaust gas passageway is obstructed by soot.

Was any failure found?

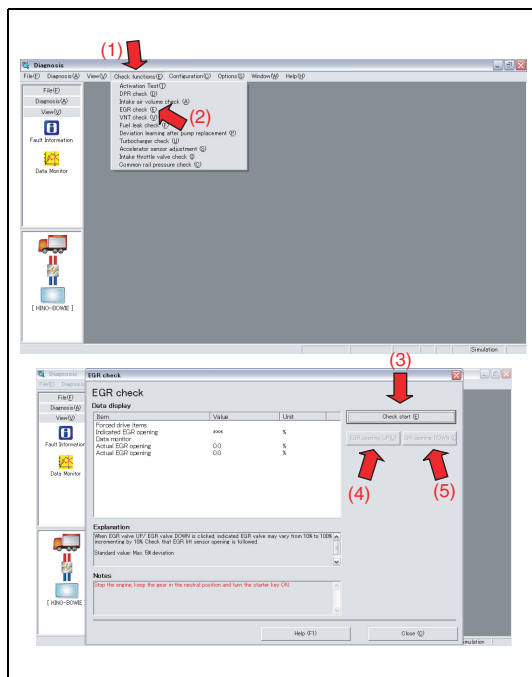
YES

Remove foreign substances and clean the passageway.
Replace the EGR valve if it is damaged.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 8.

8 Check the response delay of the EGR valve [Hino-DX]



SAPH16F010300928

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.

CAUTION

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

<Inspection procedure>

(1) Select [Check functions].

(2) Select [EGR check].

(3) Click [Check start].

(4) Select [EGR opening UP]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %.

(5) Select [EGR opening DOWN]:

- Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %.

HINT

The EGR opening position changes of around 10 % per step between 0 – 100 %.

Standard values

The response delay should be less than 5 seconds.

Do the measurements meet the standard value?

YES

Go to step 9.

NO

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

9 Inspect the diesel throttle valve

1. Stop the engine.
2. Check the working condition of the diesel throttle valve (abnormal opening or valve sticking).

Was any failure found?

YES

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

NO

Go to step 10.

10 Inspect the SCV [Hino-DX]

1. Perform an SCV test and a malfunction reproduction test.
 - For a detailed procedure, refer to the separate "SCV free acceleration test" in the following pages.

Was any failure found?

YES

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

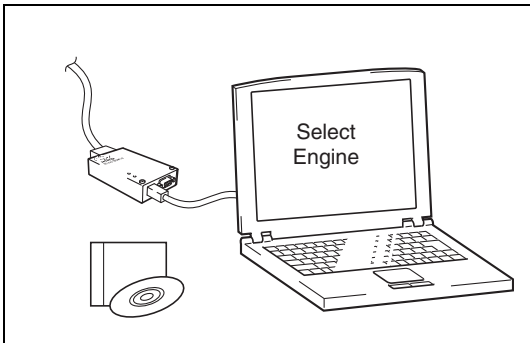
NO

Go to step 11.

11 Inspect the Injector [Hino-DX]

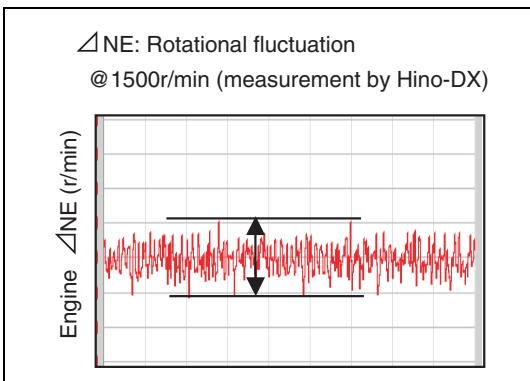
Check the injection quantity and the rotational fluctuation.

1. Start the Engine.
2. Select [Injection quantity] from the [Data Monitor] menu, and measure the fuel injection quantity.
3. Select [Engine speed] from [Data Monitor] on the menu, and measure the rotational fluctuation.



SAPH16F010300929

Measurement conditions
Engine speed: 1,500 r/min No-load T/M shift lever: Neutral A/C off and Air compressor un-operating Engine coolant temperature: More than 80 °C {176 °F}



SAPH16F010300930

Standard values		
Type of	Q (mm ³ /st)	△Ne (r/min)
MT	5.0q ≤	≤ 26
Allison@2200	6.0q ≤	
Allison@2500		
Allison@3500		

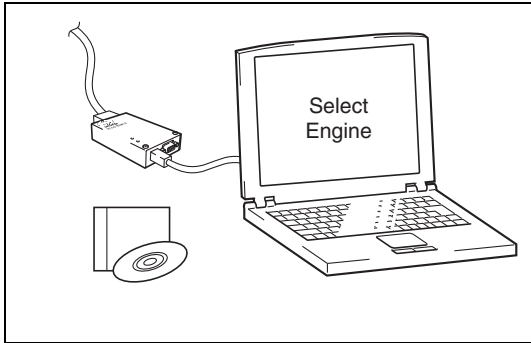
Do the measurements meet the standard value? (both Injection quantity and rotational fluctuation)

YES

NO

Go to step 12.

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

12 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010300932

1. Warm-up the engine. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P2457 has been detected in [Fault Information].

Has DTC P2457 been detected?**YES**

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

NO

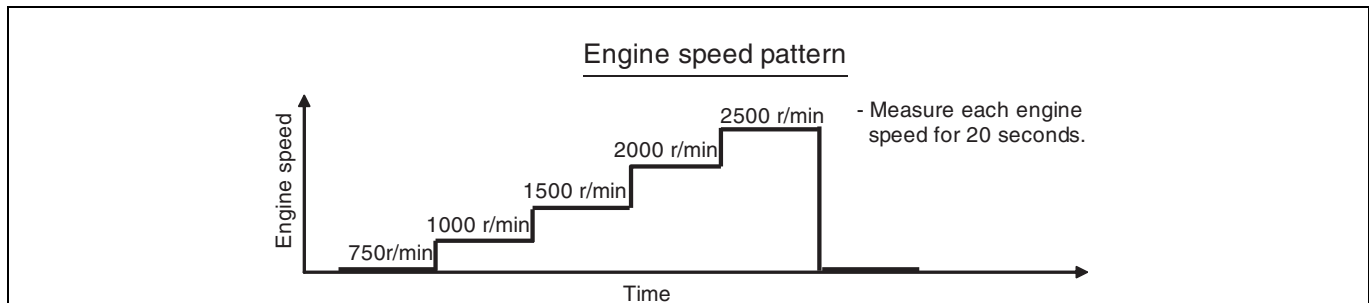
**Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

SCV FREE ACCELERATION TEST

1 Test method

<Engine speed pattern>

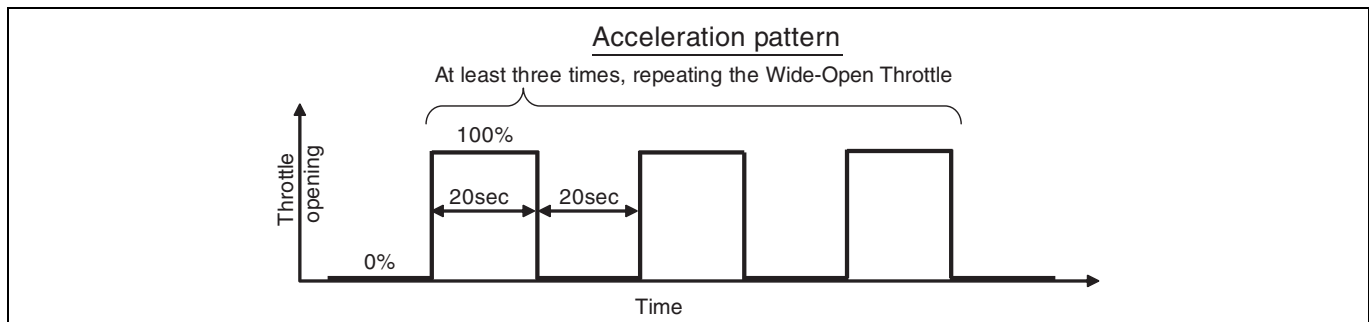
1. After engine has reached operating temperature (more than 82 °C {179.6 °F}).
2. After air compressor completed building pressure.
3. A/C, Head lights off.
4. All devices off. (PTO, Refrigeration compressor. etc)
5. Control the engine revolution by means of operating Cruise Control system.



SAPH16F010300933

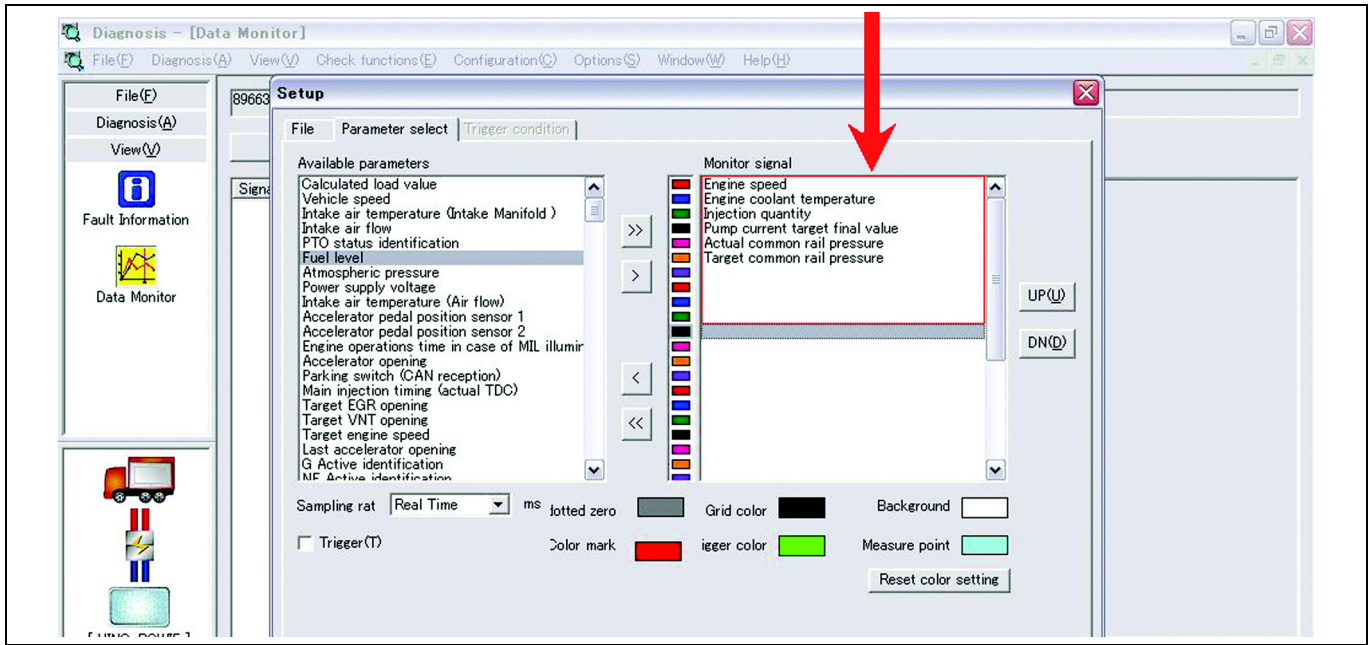
<Acceleration pattern>

1. After engine has reached operating temperature (more than 82 °C {179.6 °F}).
2. After air compressor completed building pressure.
3. A/C, Head lights off.
4. All devices off. (PTO, Refrigeration compressor. etc)
5. Check that actual common rail pressure following target.



SAPH16F010300934

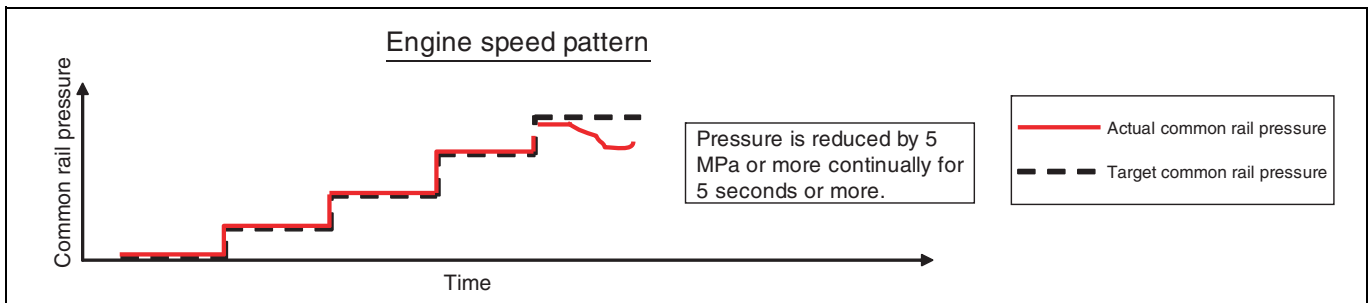
2 Types of Hino-DX data to be measured



SAPH16F010300935

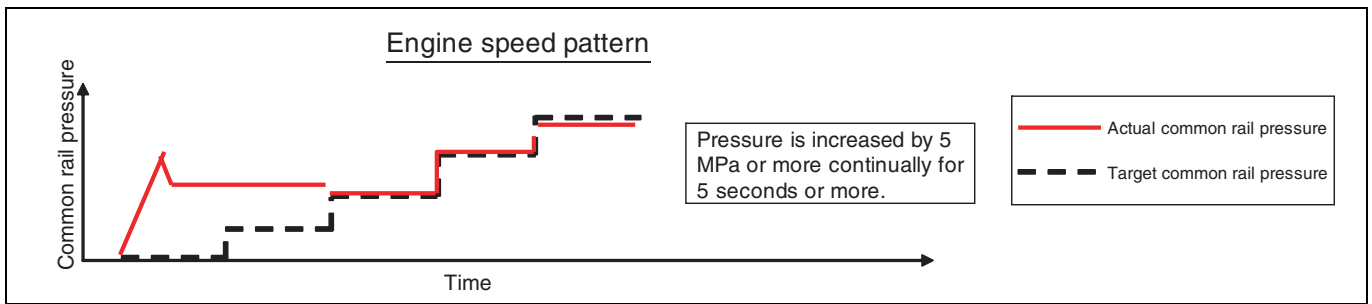
3 | If the following symptoms occur, FAIL. If not, OK.

- a. Pressure is reduced by 5 MPa or more continually for 5 seconds or more. → Replace the supply pump.



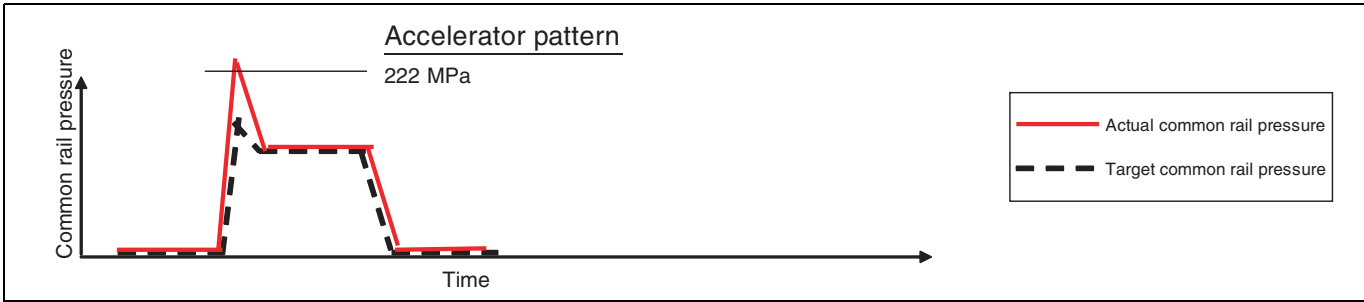
SAPH16F010300936

- b. Pressure is increased by 5 MPa or more continually for 5 seconds or more. → Replace the SCV.



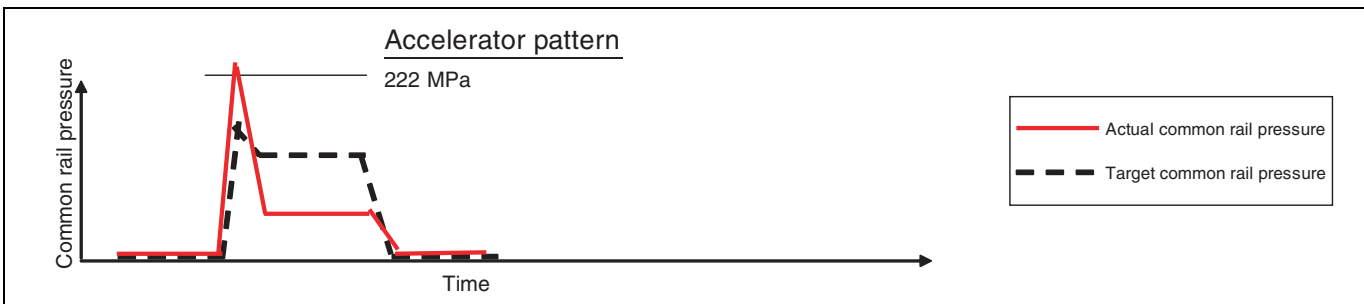
SAPH16F010300937

- c. The maximum common rail pressure exceeds 222 MPa for even a moment during pressure increase. → Replace the SCV.



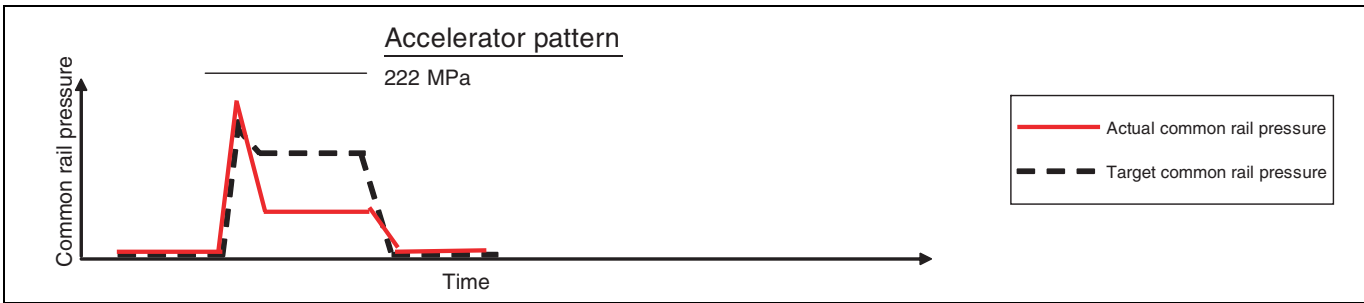
SAPH16F010300938

- d. After the maximum common rail pressure exceeds 222 MPa during pressure increase, the actual rail pressure falls below the target rail pressure. → Replace the SCV.



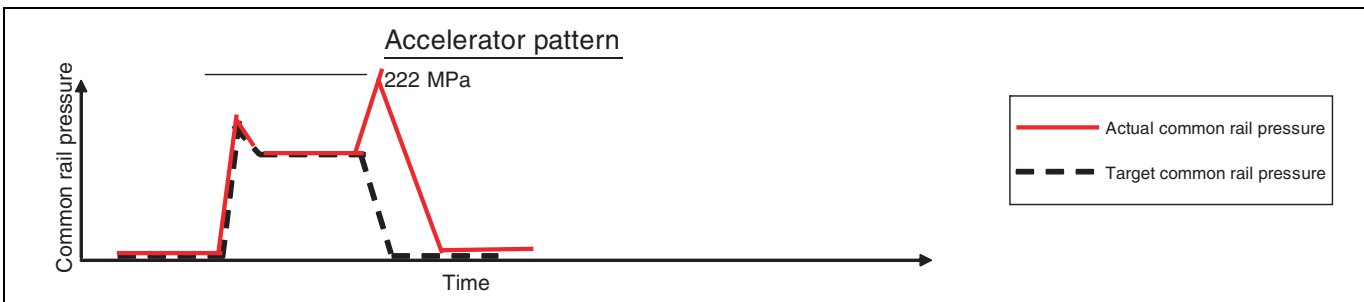
SAPH16F010300939

- e. Before the maximum common rail pressure exceeds 222 MPa during pressure increase, the actual rail pressure falls below the target rail pressure rapidly. → Replace the common rail.



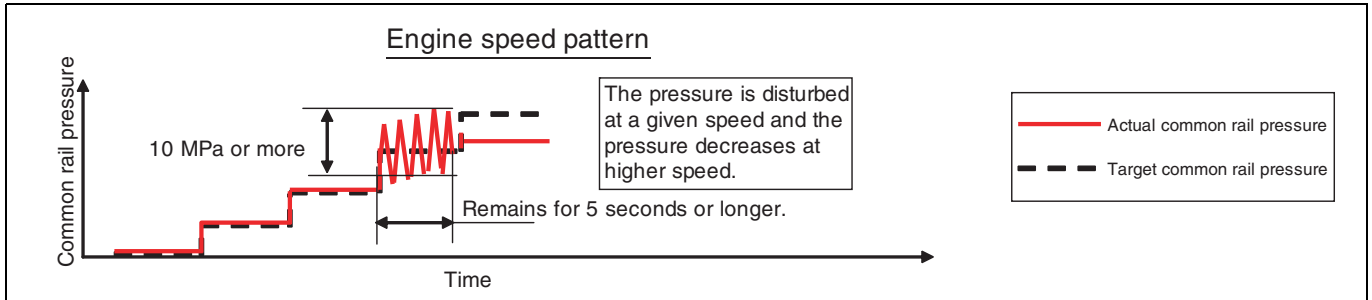
SAPH16F010300940

- f. The maximum common rail pressure exceeds 222 MPa during pressure drop. → Check the return pipe.



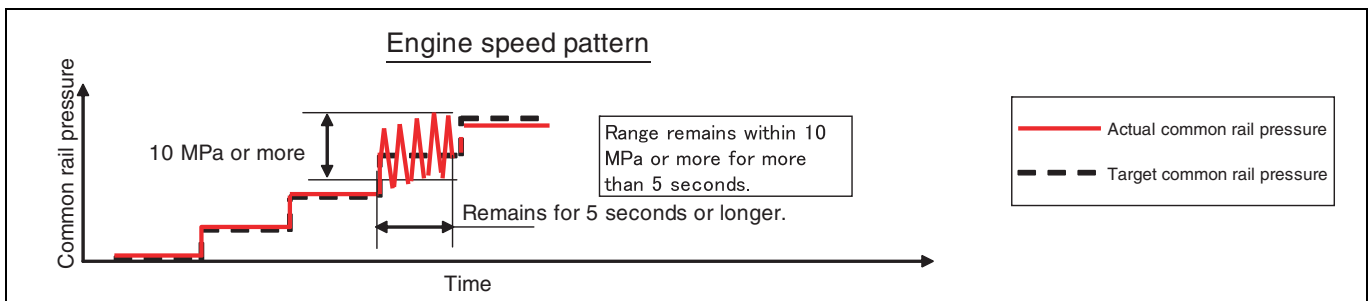
SAPH16F010300941

- g. The pressure is disturbed at a given speed and the pressure decreases at higher speed. → Replace the supply pump.



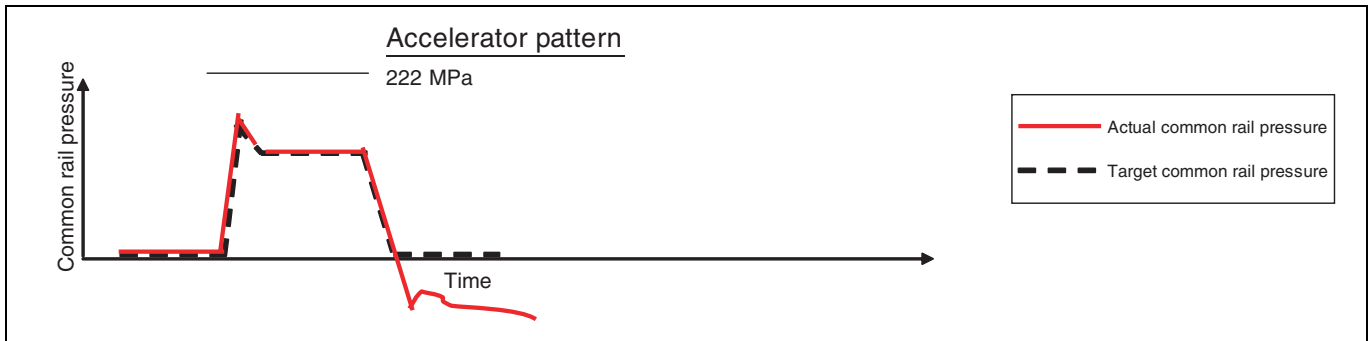
SAPH16F010300942

- h. Hunting remains within 10 MPa or more for more than 5 seconds. → Replace the SCV.



SAPH16F010300943

- i. The engine stops during pressure relief. → Replace the SCV.



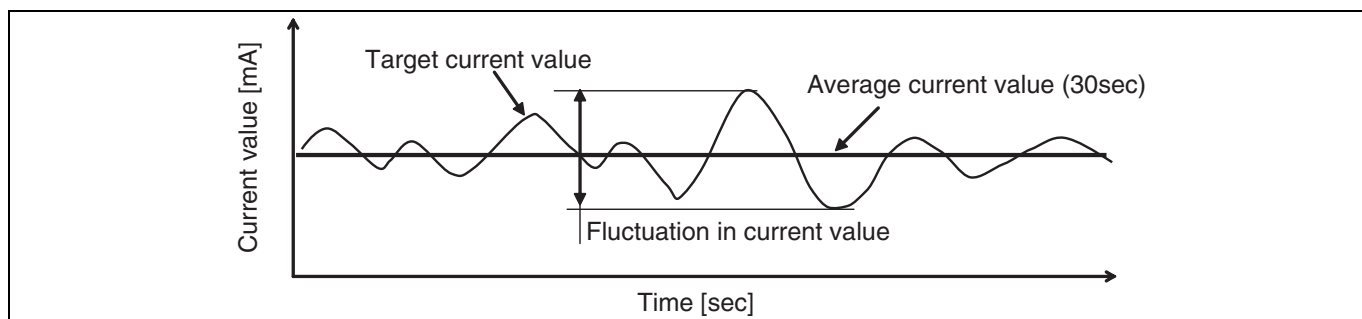
SAPH16F010300944

- j. Target common rail pressure during idling deviates from the standard value. → Replace the SCV.

<FINAL VALUE OF PUMP CURRENT TARGET test>

1. After engine has reached operating temperature. (more than 82 °C {179.6 °F})
2. After air compressor has completed building pressure.
3. A/C, Head lights are off.
4. All other devices turned off. (PTO, Refrigeration compressor. etc)
5. Engine speed: 750 r/min

Criteria		
FINAL VALUE OF PUMP CURRENT TARGET	Average current value	1740 ± 80 mA
	Fluctuation in current value	< 80 mA



SAPH16F010300945

CHECKLIST: P2457

DTC: P2457		EGR cooler performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the EGR cooler outlet gas temperature sensor connector	Check the connection of the EGR cooler outlet gas temperature sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the EGR cooler outlet gas temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the EGR cooler outlet gas temperature sensor. 2. Make sure there is no dirt or damage to the EGR cooler outlet gas temperature sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the EGR cooler outlet gas temperature sensor and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the EGR cooler outlet gas temperature sensor unit	measure the resistance between the terminals of the EGR cooler outlet gas temperature sensor. <Tester connections> EGR cooler outlet gas temperature sensor THG – E2 <Standard values> 20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the sensor. Perform "After-inspection work" of INFORMATION section.
4	Inspect the coolant	Check the level and condition of the coolant in the coolant reservoir.	Failure found: Go to YES. No failure found: Go to NO.		Replenish the coolant, or repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 5.

DTC: P2457		EGR cooler performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the EGR cooler 1	Check if soot is obstructing the inlet/outlet of the EGR cooler gas passageway.	Failure found: Go to YES. No failure found: Go to NO.		Remove the soot in the inlet/outlet of the gas passageway, go to step 6.	Go to step 6.
6	Inspect the EGR cooler 2	<ol style="list-style-type: none"> 1. Check if there are foreign substances stuck to the EGR cooler coolant passageway. 2. Check the EGR cooler coolant passageway for obstruction due to deformation or other damage. 3. Check if coolant is leaking from the EGR cooler. 	Failure found: Go to YES. No failure found: Go to NO.		Remove the soot in the gas passageway inlet/outlet, or repair or replace the faulty part. If the only cause of the malfunction was soot, go to step 6.	Go to step 7.
7	Inspect the EGR valve	<ol style="list-style-type: none"> 1. Check the EGR valve for damage due to incursion of foreign substances. 2. Check if the inlet/outlet of the exhaust gas passageway is obstructed by soot. 	Failure found: Go to YES. No failure found: Go to NO.		Remove foreign substances and clean the passageway. Replace the EGR valve if it is damaged. Perform "After-inspection work" of INFORMATION section.	Go to step 8.

DTC: P2457		EGR cooler performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Check the response delay of the EGR valve [Hino-DX]	<p>Select [Check functions] and then [EGR check] from the menu, then inspect the response delay at the Target EGR position and Actual EGR position.</p> <p><Inspection procedure></p> <p>(1) Select [Check functions].</p> <p>(2) Select [EGR check].</p> <p>(3) Click [Check start].</p> <p>(4) Select [EGR opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 0 to 100 %. <p>(5) Select [EGR opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target EGR position and Actual EGR position from 100 to 0 %. <p><Standard values></p> <p>From the Target EGR position to the Actual EGR position, the response delay should be within 5 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 9.	Replace the EGR valve. Perform "After-inspection work" of INFORMATION section.
9	Inspect the diesel throttle valve	Check the working condition of the diesel throttle valve. (Connection or valve opening degree abnormalities)	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Replace the diesel throttle valve. Perform "After-inspection work" of INFORMATION section.	Go to step 10.
10	Inspect the SCV [Hino-DX]	<ol style="list-style-type: none"> Perform an SCV test and a malfunction reproduction test. <ul style="list-style-type: none"> For a detailed procedure, refer to the separate "SCV free acceleration test" in the following pages. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 11.

DTC: P2457		EGR cooler performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
11	Inspect the injector [Hino-DX]	<p>Check the injection quantity and the rotational fluctuation.</p> <ol style="list-style-type: none"> Select [Injection quantity] from [Data Monitor] on Hino-DX menu and measure the fuel injection quantity. Select [Engine speed] from [Data Monitor] on Hino-DX menu and measure the engine speed fluctuation. <p><Measurement conditions> Engine speed: 1,500 r/min No-load, Neutral, A/C off and Air compressor un-operating Engine coolant temperature: more than 80 °C {176 °F} <Standard values> Injection quantity (mm³/st): 5.0q or more for with MT vehicle, 6.0q or more for with Allison® 2200, 2500, 3500 vehicle. Rotation fluctuation (r/min): 26 or less (for with all type of transmission vehicle).</p>	<p>Measurements met the standard value. (Both injection amount and rotational variation.): Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 12.	Replace the injector. Perform "After-inspection work" of INFORMATION section.
12	Check the DTC detected (Engine ECU) [Hino-DX]	<p>Perform engine warm-up (engine coolant temperature: 60 °C {140 °F} or more), and check if P2457 has been detected in [Engine].</p>	<p>DTC P2457 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2459

EN01H16F01030F03001148

P2459: Frequent regeneration INFORMATION

1. Technical description

- ECU constantly calculate and accumulate the amount of soot deposit from the engine.
- Moreover, based on the accumulated amount, the regeneration interval is determined.

<Description of malfunction>

- Failure is detected for DPR prescribed regeneration interval.

2. DTC set condition

(1) DTC detection condition

- The engine must not be stopped.
- Calculated amount of DPR filter soot buildup \geq regeneration threshold value.

(2) Judgement criteria

- There was a difference between the actual amount of soot deposit calculation and the ideal amount of soot deposit calculation.

3. Reset condition

- Immediately after normal operation is restored and DPR-related memory is reset.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

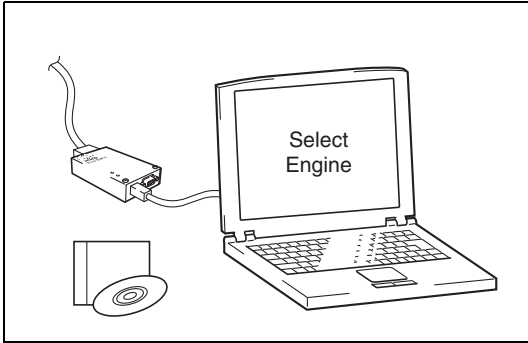
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

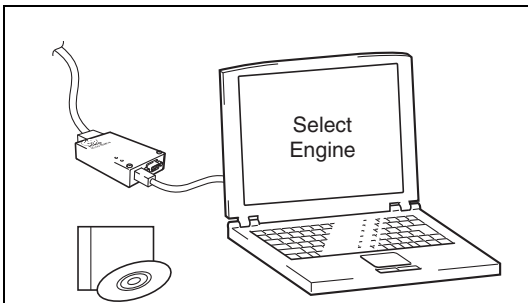
8. Estimated failure factors

- Abnormality in the soot calculation area, such as the atmospheric pressure sensor, within ECU is suspected.

INSPECTION PROCEDURE: P2459**1 Check the DTC detected (Engine ECU) [Hino-DX]**

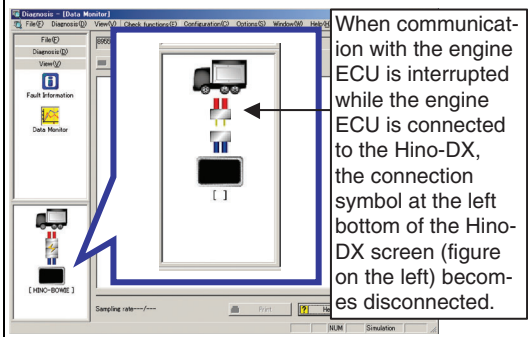
SAPH16F010300946

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P2459 has been detected in [Fault Information].

Has a DTC other than P2459 been detected?**YES****NO****Go to diagnosis procedure of a related DTC.****Go to step 2.****2 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300947

1. Erase the trouble history.
2. Set the starter switch to the "LOCK" position.
3. Make sure the engine ECU main relay is OFF in Hino-DX menu. (This cuts off the communication between Hino-DX and the engine ECU.)
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if DTC has been detected in [Fault Information].



SAPH16F010300947

Has DTC P2459 been detected?**YES****NO****Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.****Procedure completed. Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P2459

DTC: P2459		Frequent regeneration		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Select [Engine] and check if any DTC other than P2459 have been detected in [Fault Information].	DTC other than P2459 have been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Check the DTC detected (Engine ECU) [Hino-DX]	<ol style="list-style-type: none"> 1. Erase the trouble history. 2. Set the starter switch to the "LOCK" position. 3. Make sure the engine ECU main relay is OFF in Hino-DX menu. (This cuts off the communication between Hino-DX and the engine ECU.) 4. Set the starter switch to the "ON" position. 5. Select [Engine] and check if P2459 has been detected in [Fault Information]. 	DTC P2459 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2463

EN01H16F01030F03001149

P2463: DPF clogged**INFORMATION****1. Technical description**

- ECU constantly calculate and accumulate the amount of soot deposit from the engine. Moreover, based on the accumulated amount, the regeneration mode is determined.

<Description of malfunction>

- Operation is not completed according to DPR manual regeneration request.

2. DTC set condition

(1) DTC detection condition

- Starter switch ON.

(2) Judgement criteria

- Judge when soot deposit accumulated by ECU reaches the warning level judgment value (5.0 g/L).

(Automatic regeneration was not completed for some reason. Then, the DPR light blinked, but manual regeneration was not performed. Or manual regeneration was attempted, but the regeneration did not start and the vehicle continued to be driven.)

3. Reset condition

- Immediately after normal operation is restored and DPR-related memory is reset.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- The DPR light continued to blink, but manual regeneration was not performed.
- The DPR light did not blink.
- Check for a burned-out meter bulb. (OK if the indicator illuminates when the starter switch is turned ON while the engine is not running with the key ON.)
- The burner conditions were not met and regeneration was not completed.

(DTC codes are present.)

1. Air pressure too low (P2431)
2. Misfire (Failed last ignition) (P140D)/Lost Flame (P140E)

(No DTC codes are present.)

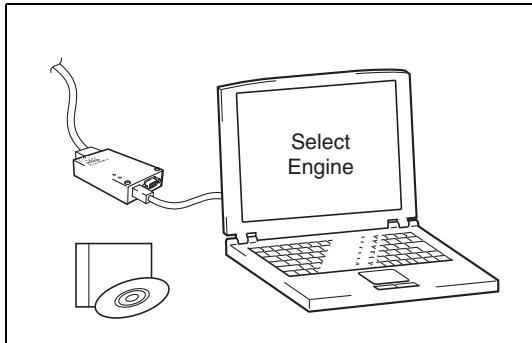
1. Key off during regeneration, Engine speed too low during regeneration
2. Exhaust outlet over temperature (OT1)
(Judge at 580 °C {1,076 °F} or higher at the DPR filter inlet. At 580 °C {1,076 °F} or lower, the abort OFF will be immediately enabled to be ready for regeneration.)

[Confirmation points for judgment]

- The DPR light continued to blink, but manual regeneration was not performed.

Since the regeneration condition (idle condition) may not be met, check the following:

- Inspect the neutral switch, accelerator switch system and vehicle speed sensor system.
- Check for disconnection in the DPR switch.
- PTO signal ON or unresponsive return of external accelerator.

INSPECTION PROCEDURE: P2463**1 Check the DTC detected (Engine ECU) [Hino-DX]**

SAPH16F010300948

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P2463 has been detected in [Fault Information].

Has a DTC other than P2463 been detected?

YES

Go to diagnosis procedure of a related DTC.

NO

Go to step 2.

2 Check the DTC detected (Burner)

1. Select [Burner] and check if DTC has been detected in [Fault Information].

Has DTC P2463 been detected?

YES

Go to diagnosis procedure of a related DTC.

NO

Go to step 3.

3 Burner system check 1 [Hino-DX]

Event log example

	Event #	TR hours	Event	Flame temp
No	857	1228:24:36	EECU_REQUEST_START_AUTO_REGEN	202
	858	1228:24:58	IGNITION_SUCCESS	196
	859	1228:25:17	EECU_REQUEST_STOP_REGEN	496
Yes	574	1866:23:18	EECU_REQUEST_START_AUTO_REGEN	244
	575	1866:23:48	FAILED_IGNITION (MISFIRE)	213
Yes	934	1254:47:38	EECU_REQUEST_START_AUTO_REGEN	246
	935	1254:47:59	IGNITION_SUCCESS	223
	936	1254:50:01	CANNOT_REACH_TEMP	132
	937	1254:50:01	EECU_REQUEST_STOP_REGEN	132
Yes	948	1258:33:04	EECU_REQUEST_START_AUTO_REGEN	266
	949	1258:33:26	IGNITION_SUCCESS	232
	950	1258:33:49	LOST_FLAME	197

SAPH16F010300949

1. Select [Event log] from the [Check functions] menu on Hino-DX and check the burner event log.
2. Check the newest (latest) [EECU REQUEST START AUTO REGEN].
3. Check if [FAILED IGNITION (MISFIRE)], [LOST FLAME] or [CANNOT ACHIEVE TEMP] are displayed after the newest (latest) [EECU REQUEST START AUTO REGEN].

Is the pertinent log displayed?

YES

NO

If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure.
 If [LOST FLAME] is displayed, go to DTC P140E inspection procedure.
 If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.

Go to step 4.

4 Burner system check 2 [Hino-DX]

Event log example

	Event #	TR hours	Event	Flame temp
Yes	959	1262:38:05	EECU_REQUEST_START_AUTO_REGEN	260
	960	1262:43:21	IGNITION_SUCCESS	241
	961	1262:43:24	EECU_REQUEST_STOP_REGEN	337
	963	1262:46:54	EECU_REQUEST_START_MANUAL_REGEN	630
	964	1262:47:18	IGNITION_SUCCESS	510
	965	1262:56:29	EECU_REQUEST_STOP_REGEN	911

SAPH16F010300950

1. From the retrieved log, check if [EECU REQUEST START MANUAL REGEN] is displayed after the newest (latest) [EECU REQUEST START AUTO REGEN].

Is the pertinent log displayed?

YES

NO

Go to step 5.

Go to step 7.

5 Burner system check 3 [Hino-DX]

1. From the retrieved log, check if [EECU REQUEST EMERGENCY STOP] is displayed after the newest (latest) [EECU REQUEST START MANUAL REGEN].

Event log example

	Event #	TR hours	Event	Flame temp
Yes	741	1208:26:21	EECU_REQUEST_START_MANUAL_REGEN	104
	742	1208:26:43	IGNITION_SUCCESS	104
	743	1208:41:29	EECU_REQUEST_EMERGENCY_STOP	943

SAPH16F010300951

Is the pertinent log displayed?

YES

NO

Go to DTC P200C inspection procedure.

Go to step 6.

6 Burner system check 4 [Hino-DX]

1. From the retrieved log, check if [FAILED IGNITION (MISFIRE)], [LOST FLAME], and [CANNOT ACHIEVE TEMP] are displayed after the newest (latest) [EECU REQUEST START MANUAL REGEN].

Event log example

	Event #	TR hours	Event	Flame temp
No	857	1228:24:36	EECU_REQUEST_START_MANUAL_REGEN	202
	858	1228:24:58	IGNITION_SUCCESS	196
	859	1228:25:17	EECU_REQUEST_STOP_REGEN	496
Yes	574	1866:23:18	EECU_REQUEST_START_MANUAL_REGEN	244
	575	1866:23:48	FAILED_IGNITION (MISFIRE)	213
Yes	934	1254:47:38	EECU_REQUEST_START_MANUAL_REGEN	246
	935	1254:47:59	IGNITION_SUCCESS	223
	936	1254:50:01	CANNOT_REACH_TEMP	132
	937	1254:50:01	EECU_REQUEST_STOP_REGEN	132
Yes	948	1258:33:04	EECU_REQUEST_START_MANUAL_REGEN	266
	949	1258:33:26	IGNITION_SUCCESS	232
	950	1258:33:49	LOST_FLAME	197

SAPH16F010300952

Is the pertinent log displayed?

YES

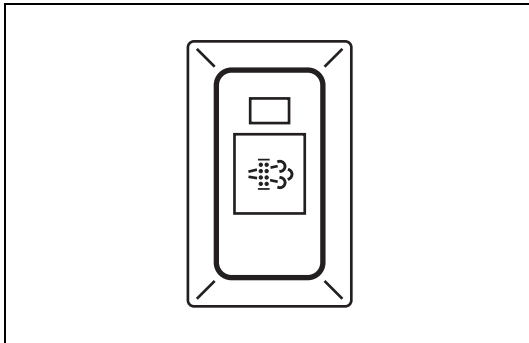
If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure.
 If [LOST FLAME] is displayed, go to DTC P140E inspection procedure.
 If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.

NO

The cause is that manual regeneration was canceled by depressing the accelerator pedal, moving the shift lever, operating the PTO, and pressing the DPR button 2 times during DPR manual regeneration.

- Replace the DPR filter and burner nozzle and clean the igniter.
 - Perform a DPR manual regeneration to complete the check procedure.
- Perform "After-inspection work" of INFORMATION section.

7 Inspect DPR switch



SAPH16F010300953

1. Check the connection of the DPR switch connector (Looseness or poor contact).
2. Check the switch unit.
3. Check that there is no disconnection or short-circuit of the DPR switch harness.

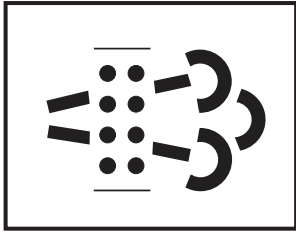
Was any failure found?

YES

- Repair or replace the faulty part.
 - Replace the DPR filter and burner nozzle and clean the igniter.
 - Perform a DPR manual regeneration to complete the check procedure.
- Perform "After-inspection work" of INFORMATION section.

NO

Go to step 8.

8 Inspect the DPR indicator light

SAPH16F010300954

1. Check the connection of the combination meter connector (Looseness or poor contact).
2. Check if bulb is burnt out.
3. Check there is no disconnection or short-circuit of the DPR indicator light harness.

Was any failure found?**YES**

- **Repair or replace the faulty part.**
 - **Replace the DPR filter and burner nozzle and clean the igniter.**
 - **Perform a DPR manual regeneration to complete the check procedure.**
- Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 9.****9 Inspect the neutral switch**

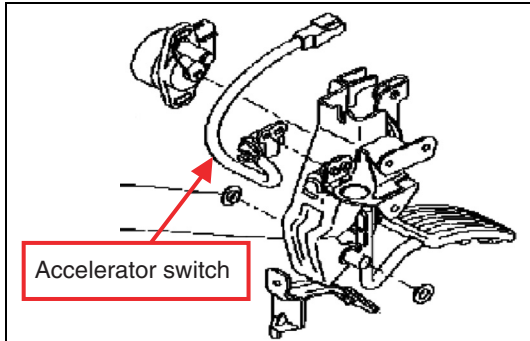
SAPH16F010300955

1. Check the connection of the neutral switch connector (Looseness or poor contact).
2. Check the switch unit.
3. Check there is no disconnection or short-circuit of the neutral switch harness.

Was any failure found?**YES**

- **Repair or replace the faulty part.**
 - **Replace the DPR filter and burner nozzle and clean the igniter.**
 - **Perform a DPR manual regeneration to complete the check procedure.**
- Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 10.**

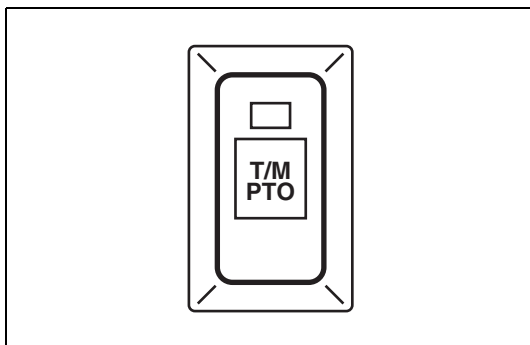
10 Inspect the accelerator switch

SAPH16F010300956

1. Check the connection of the accelerator switch connector (Looseness or poor contact).
2. Check the switch unit.
3. Check there is no disconnection or short-circuit of the accelerator switch harness.

Was any failure found?**YES**

- **Repair or replace the faulty part.**
 - **Replace the DPR filter and burner nozzle and clean the igniter.**
 - **Perform a DPR manual regeneration to complete the check procedure.**
- Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 11.****11 Inspect the PTO switch**

SAPH16F010300957

1. Check the connection of the PTO switch connector (Looseness or short-circuit).
2. Check the PTO signal input.
3. Check the switch unit.
4. Check there is no disconnection or short-circuit of the PTO switch harness.

Was any failure found?

YES

- Repair or replace the faulty part.
 - Replace the DPR filter and burner nozzle and clean the igniter.
 - Perform a DPR manual regeneration to complete the check procedure.
- Perform "After-inspection work" of INFORMATION section.

NO

Go to step 12.

12 Check the external accelerator signal [Hino-DX]

1. Set the starter switch to the "ON" position.
2. Select [Engine] in Hino-DX menu.
3. Select [PTO accelerator sensor opening] from the [Data Monitor] menu, and check if a sensor opening signal of at least 5 % is output with the accelerator sensor at 0 % position (accelerator pedal or lever is not being operated).

Was any failure found?

YES

- Check the installation of the external accelerator sensor. Repair if necessary.
 - Replace the DPR filter and burner nozzle and clean the igniter.
 - Perform a DPR manual regeneration to complete the check procedure.
- Perform "After-inspection work" of INFORMATION section.

NO

- Caused by failure to press DPR switch.
 - Replace the DPR filter and burner nozzle and clean the igniter.
 - Perform a DPR manual regeneration to complete the check procedure.
- Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P2463

DTC: P2463		DPF clogged		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) [Hino-DX]	Check if any DTC other than P2463 has been detected in [Engine].	DTC other than P2463 have been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Check the DTC detected (Burner)	Check if DTC has been detected in [Burner].	DTC has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 3.
3	Burner system check 1 [Hino-DX]	<ol style="list-style-type: none"> 1. Collect the burner events log from the Hino-DX. 2. Check whether [EECU REQUEST START AUTO REGEN] is the latest. 3. Check [FAILED IGNITION (MISFIRE)], [LOST FLAME] or [CANNOT ACHIEVE TEMP] are displayed after the latest [EECU REQUEST START AUTO REGEN]. 	Corresponding log: Go to YES. No corresponding log: Go to NO.		If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure. If [LOST FLAME] is displayed, go to DTC P140E inspection procedure. If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.	Go to step 4.
4	Burner system check 2 [Hino-DX]	<ol style="list-style-type: none"> 1. From the retrieved log, check if [EECU REQUEST START MANUAL REGEN] is displayed after the newest (latest) [EECU REQUEST START AUTO REGEN]. 	Corresponding log: Go to YES. No corresponding log: Go to NO.		Go to step 5.	Go to step 7.

DTC: P2463		DPF clogged		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Burner system check 3 [Hino-DX]	1. From the retrieved log, check if [EECU REQUEST EMERGENCY STOP] is displayed after the newest (latest) [EECU REQUEST START MANUAL REGEN].	Corresponding log: Go to YES. No corresponding log: Go to NO.		Go to DTC P200C inspection procedure.	Go to step 6.
6	Burner system check 4 [Hino-DX]	1. From the retrieved log, check if [FAILED IGNITION (MISFIRE)], [LOST FLAME], and [CANNOT ACHIEVE TEMP] are displayed after the newest (latest) [EECU REQUEST START MANUAL REGEN].	Corresponding log: Go to YES. No corresponding log: Go to NO.		If [FAILED IGNITION (MISFIRE)] is displayed, go to DTC P140D inspection procedure. If [LOST FLAME] is displayed, go to DTC P140E inspection procedure. If [CANNOT ACHIEVE TEMP] is displayed, go to DTC P1400 inspection procedure.	The cause is that manual regeneration was canceled by depressing the accelerator pedal, moving the shift lever, operating the PTO, and pressing the DPR button 2 times during DPR manual regeneration. Replace the DPR and perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.
7	Inspect DPR switch	1. Check the connection of the DPR switch connector (Looseness or poor contact). 2. Inspect the switch unit. 3. Check that there is no disconnection or short-circuit of the DPR switch harness.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part. Replace the DPR filter and burner nozzle and clean the igniter. Perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.	Go to step 8.

DTC: P2463		DPF clogged		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the DPR indicator light	<ol style="list-style-type: none"> 1. Check the connection of the combination meter connector (Looseness or poor contact). 2. Check if bulb is burnt out. 3. Check there is no disconnection or short-circuit of the DPR indicator light harness. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Repair or replace the faulty part. Replace the DPR filter and burner nozzle and clean the igniter. Perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 9.
9	Inspect the neutral switch	<ol style="list-style-type: none"> 1. Check the connection of the neutral switch connector (Looseness or poor contact). 2. Inspect the switch unit. 3. Check there is no disconnection or short-circuit of the neutral switch harness. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Repair or replace the faulty part. Replace the DPR filter and burner nozzle and clean the igniter. Perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 10.

DTC: P2463		DPF clogged		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
10	Inspect the accelerator switch	<ol style="list-style-type: none"> 1. Check the connection of the accelerator switch connector (Looseness or poor contact). 2. Inspect the switch unit. 3. Check there is no disconnection or short-circuit of the accelerator switch harness. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Repair or replace the faulty part. Replace the DPR filter and burner nozzle and clean the igniter. Perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 11.
11	Inspect the PTO switch	<ol style="list-style-type: none"> 1. Check the connection of the PTO switch connector (Looseness or short-circuit). 2. Inspect the switch unit. 3. Check the PTO signal input. 4. Check there is no disconnection or short-circuit of the PTO switch harness. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Repair or replace the faulty part. Replace the DPR filter and burner nozzle and clean the igniter. Perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 12.

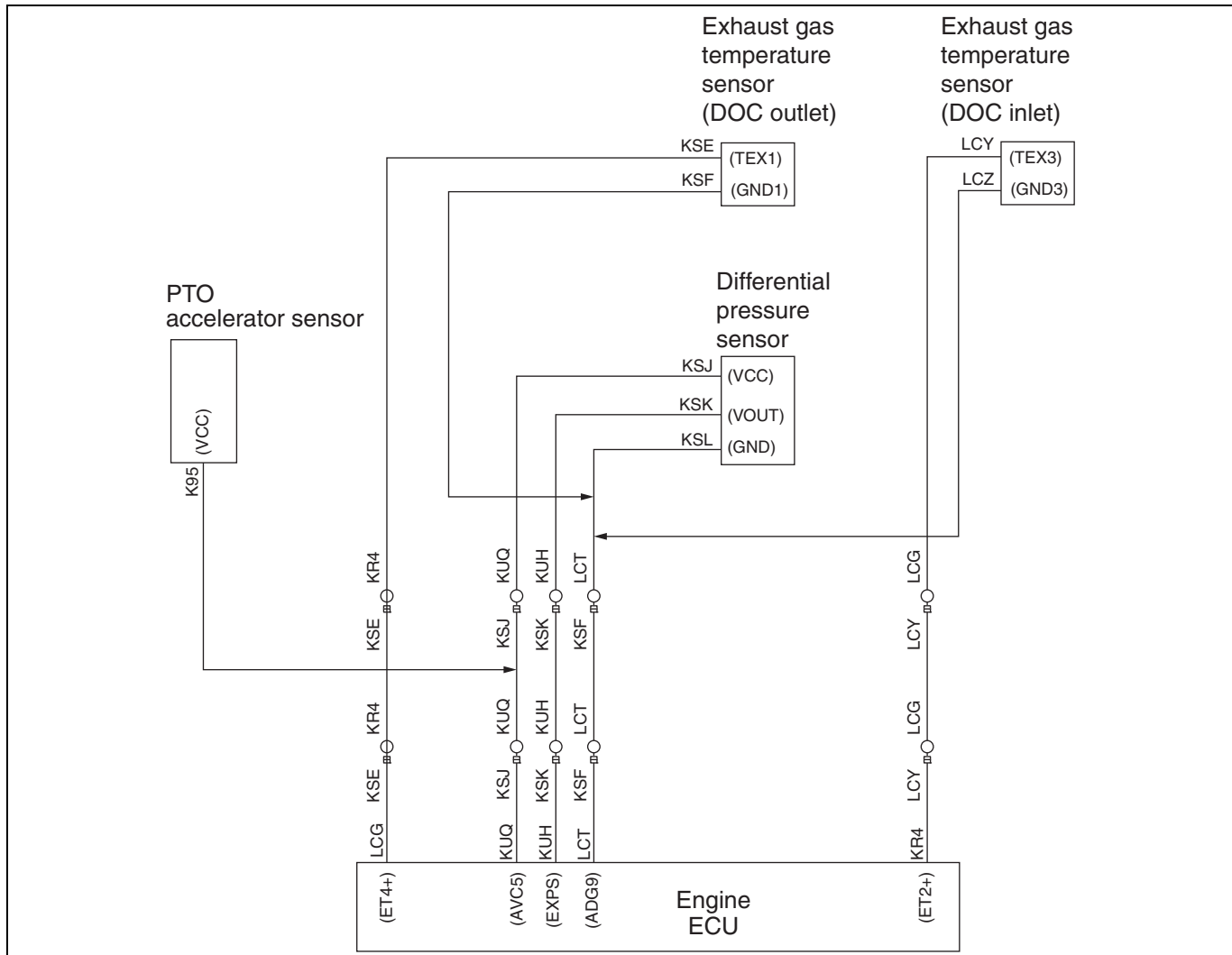
DTC: P2463		DPF clogged		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
12	Check the external accelerator signal [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "ON" position. 2. Select [Engine] in Hino-DX menu. 3. Select [Data Monitor] and check if a sensor signal of at least 5 % is output with the accelerator pedal at 0 % position (accelerator pedal is not being operated). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Check the installation of the external accelerator sensor. Repair if necessary. Replace the DPR filter and burner nozzle and clean the igniter. Perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.</p>	<p>Caused by failure to press DPR switch. Replace the DPR filter and burner nozzle and clean the igniter. Perform a DPR manual regeneration to complete the check procedure. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P246F

EN01H16F01030F03001150

P246F: Exhaust gas temperature sensor (DOC outlet) - rationality

INFORMATION [at engine start]



SAPH16F010300958

1. Technical description

- The function of the DPR is to regenerate PM, which raises the exhaust gas temperature.
- The value of the exhaust gas temperature sensor (DOC outlet) is used to control DPR regeneration.

<Description of malfunction>

- The exhaust gas temperature cannot be correctly recognized.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is 10 V – 16 V.
- Engine speed \geq 500 r/min for at least 5 sec.
- Less than 10 seconds has elapsed since start of engine
- Difference between engine coolant temperature and intake temperature is within ± 8 °C { ± 14.4 °F}.
- Difference between BCU exhaust gas temperature sensor value and exhaust gas temperature sensor value (DOC inlet) is within ± 70 °C { ± 126 °F}.
- Engine coolant temperature and intake temperature are at least -10 °C {14 °F}.
- Value of BCU exhaust gas temperature sensor is less than 30 °C {86 °F}.

- No other DTC is detected.

The above conditions continue for 5 seconds.

(2) Judgement criteria

- Difference between BCU exhaust gas temperature sensor value and exhaust gas temperature sensor value (DOC outlet) is at least $\pm 70\text{ }^{\circ}\text{C}$ { $\pm 126\text{ }^{\circ}\text{F}$ } for 1 second.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is stored after test drive.

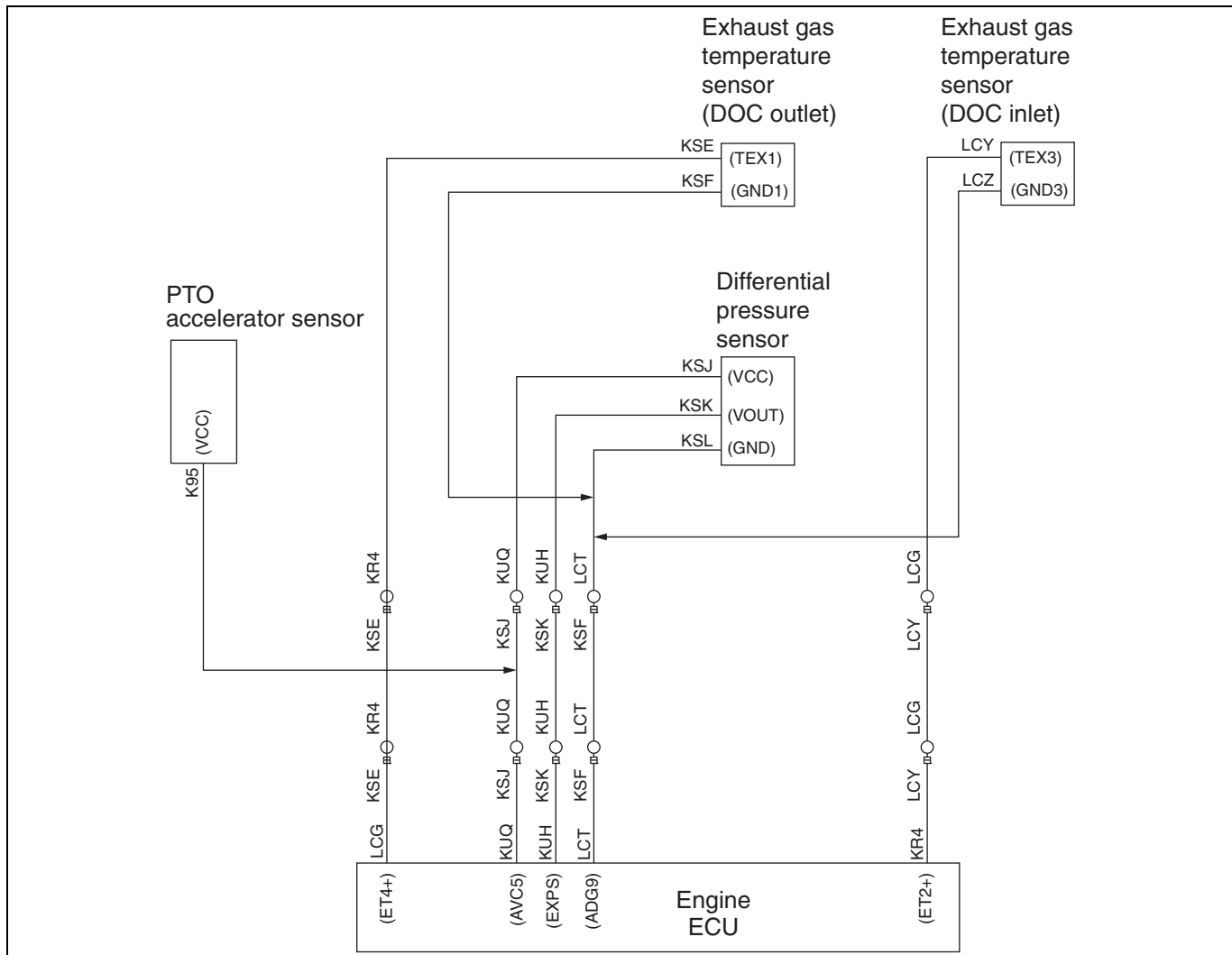
8. Estimated failure factors

Exhaust gas temperature sensor (DOC outlet):

- Disconnected sensor or sensing unit failure (due to dirt, clogging, damage, etc.)
- Abnormal sensor resistance
- Malfunction of engine ECU sensor power supply

P246F: Exhaust gas temperature sensor (DOC outlet) - rationality

INFORMATION [at engine running]



SAPH16F010300959

1. Technical description

- The function of the DPR is to regenerate PM, which raises the exhaust gas temperature.
- The value of the exhaust gas temperature sensor (DOC outlet) is used to control DPR regeneration.

<Description of malfunction>

- The exhaust gas temperature cannot be correctly recognized.

2. DTC set condition**(1) DTC detection condition**

- At least 10 seconds has elapsed since engine was started.
- Cumulative exhaust gas flow amount ≥ 3 kg.
- Cumulative exhaust gas flow amount of non-operating burner ≥ 50 kg.

After the above:

- Battery voltage is 10 V – 16 V.
- Engine speed ≥ 500 r/min for at least 5 sec.
- Difference between engine coolant temperature and intake temperature $\geq \pm 8$ °C { ± 14.4 °F}.
- Exhaust gas flow rate ≥ 500 kg/h.
- Engine speed $\geq 1,750$ r/min.
- Fuel injection amount ≥ 15 mm³/st

In addition, the following conditions continue for at least 10 seconds:

- Engine speed variation is within ± 78 r/min.
- Fuel injection rate variation is within ± 78 mm³/st. sec
- Vehicle speed ≥ 18.8 mph.
- No other DTC is detected.

(2) Judgement criteria

- Difference between the calculated value and actual value of DOC outlet temperature is at least 100 °C for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors**Exhaust gas temperature sensor (DOC outlet):**

- Disconnected sensor or sensing unit failure (due to dirt, clogging, damage, etc.)
- Abnormal sensor resistance
- Malfunction of engine ECU sensor power supply

INSPECTION PROCEDURE: P246F

1 Inspect the exhaust gas temperature sensor (DOC outlet) connector

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

Was any failure found?

YES

NO

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the exhaust gas temperature sensor (DOC outlet)

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

Was any failure found?

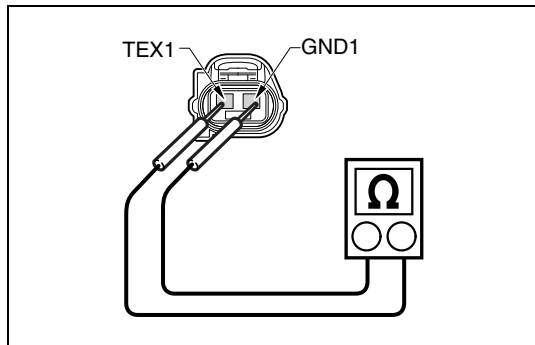
YES

NO

Clean the exhaust gas temperature sensor (DOC outlet) and install it properly.
If damaged, replace the exhaust gas temperature sensor (DOC outlet).
Perform "After-inspection work" of INFORMATION section.

Go to step 3.

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



SAPH16F010300960

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (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?

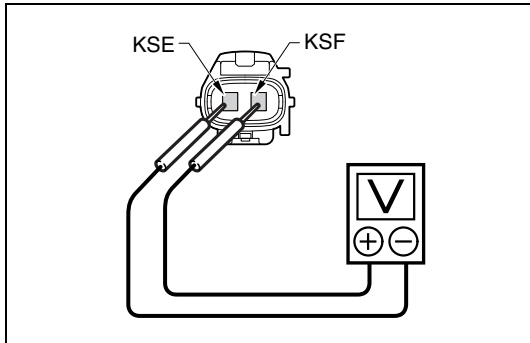
YES

NO

Go to step 4.

Replace the exhaust gas temperature sensor (DOC outlet)
Perform "After-inspection work" of INFORMATION section.

4 Inspect the sensor power supply



SAPH16F010300961

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 (DOC outlet) vehicle-side connector.

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

Do the measurements meet the standard value?

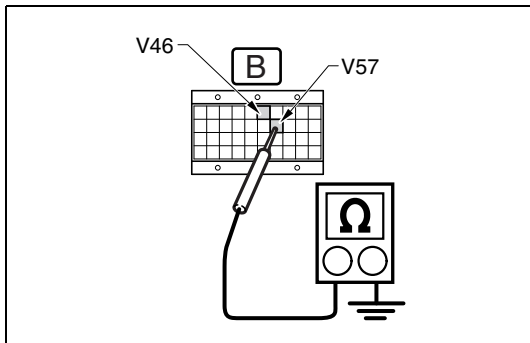
YES

NO

Go to step 7.

Go to step 5.

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



SAPH16F010300962

1. Set the starter switch to the "LOCK" position.
2. Connect the signal check 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) ADG9(V46) – Ground ET4+(V57) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

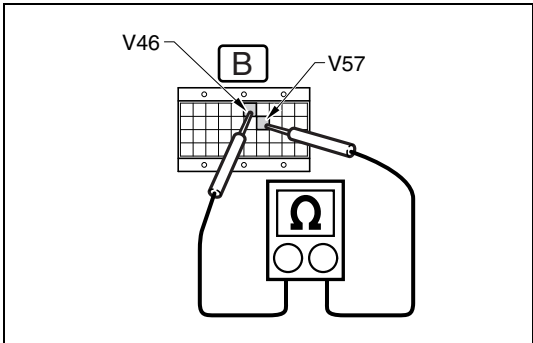
YES

Go to step 6.

NO

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

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



1. Connect the exhaust gas temperature sensor (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) ADG9 (V46) – ET4+ (V57)	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

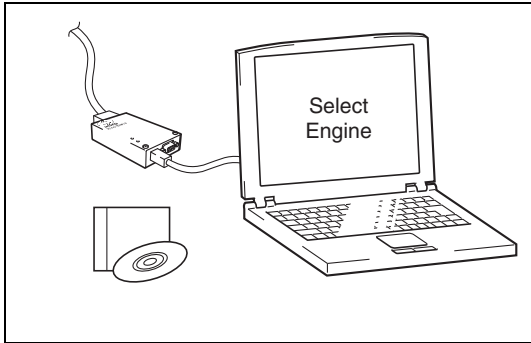
Do the measurements meet the standard value?

YES

Go to step 7.

NO

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

7 Check the DTC detected (Engine ECU) 2 [Hino-DX]

SAPH16F010300964

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if P246F has been detected in [Fault Information].

Has DTC P246F been detected?**YES**

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

NO

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

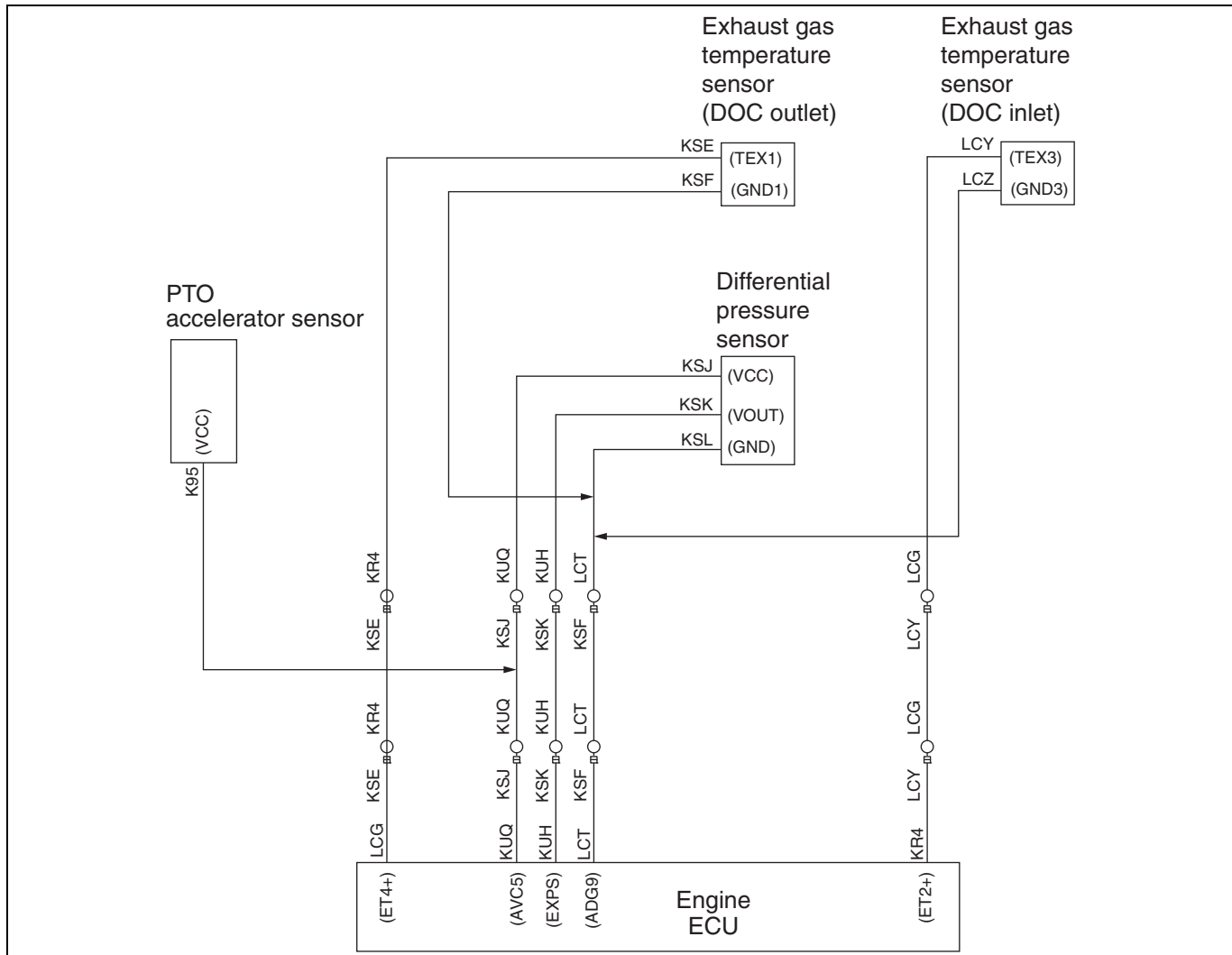
CHECKLIST: P246F

DTC: P246F		Exhaust gas temperature sensor (DOC outlet) - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the exhaust gas temperature sensor (DOC outlet) connector	Check the connection of the exhaust gas temperature sensor (DOC outlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the exhaust gas temperature sensor (DOC outlet)	<ol style="list-style-type: none"> 1. Check the installation of the exhaust gas temperature sensor (DOC outlet). 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (DOC outlet). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (DOC outlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the exhaust gas temperature sensor (DOC outlet) unit	Measure the resistance of the exhaust gas temperature sensor (DOC outlet) terminals. <Tester connections> Exhaust gas temperature sensor (DOC outlet) TEX1 – GND1 <Standard values> 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	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the exhaust gas temperature sensor (DOC outlet). Perform "After-inspection work" of INFORMATION section.
4	Inspect the sensor power supply	Measure the voltage of the exhaust gas temperature sensor (DOC outlet) terminals. <Tester connections> exhaust gas temperature sensor (DOC outlet) vehicle-side connector KSF – KSE <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 5.

DTC: P246F		Exhaust gas temperature sensor (DOC outlet) - rationality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect for short-circuit of the exhaust gas temperature sensor (DOC outlet) harness	Connect the signal check harness and, measure the resistance between the engine ECU (signal check harness) terminals and ground. <Tester connections> Engine ECU (signal check harness) ADG9(V46) – Ground ET4+(V57) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Inspect disconnection of the exhaust gas temperature sensor (DOC outlet) harness	1. Connect the exhaust gas temperature sensor (DOC outlet). 2. Measure the resistance of the engine ECU (signal check harness) terminal. <Tester connections> Engine ECU (signal check harness) ADG9(V46) – ET4+(V57) <Standard values> 20 °C {68 °F}: 13.7 – 29.8 k Ω 50 °C {122 °F}: 7.13 – 13.7 k Ω 80 °C {176 °F}: 4.1 – 7.13 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) 2 [Hino-DX]	1. Warm up the engine (engine coolant temperature: 60 °C {140 °F} or more). 2. Check if P246F has been detected in [Engine].	DTC P246F has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2470 and P2471

EN01H16F01030F03001151

P2470: Exhaust gas temperature sensor (DOC outlet) - out of range (Out of range low)
INFORMATION

SAPH16F010300965

1. Technical description

- The temperature sensor consistently detects exhaust gas temperature.
- A reading taken by the exhaust gas temperature sensor is used to control DPR regeneration.

<Description of malfunction>

- Exhaust gas temperature cannot be correctly recognized.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped or runs at 500 r/min or higher for continuous 5 seconds or longer.

(2) Judgement criteria

- Voltage of the exhaust gas temperature sensor (DOC outlet) remains less than 0.0057 V (1,240 °C {2,264 °F}) for 3 seconds.

3. Reset condition

- After restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

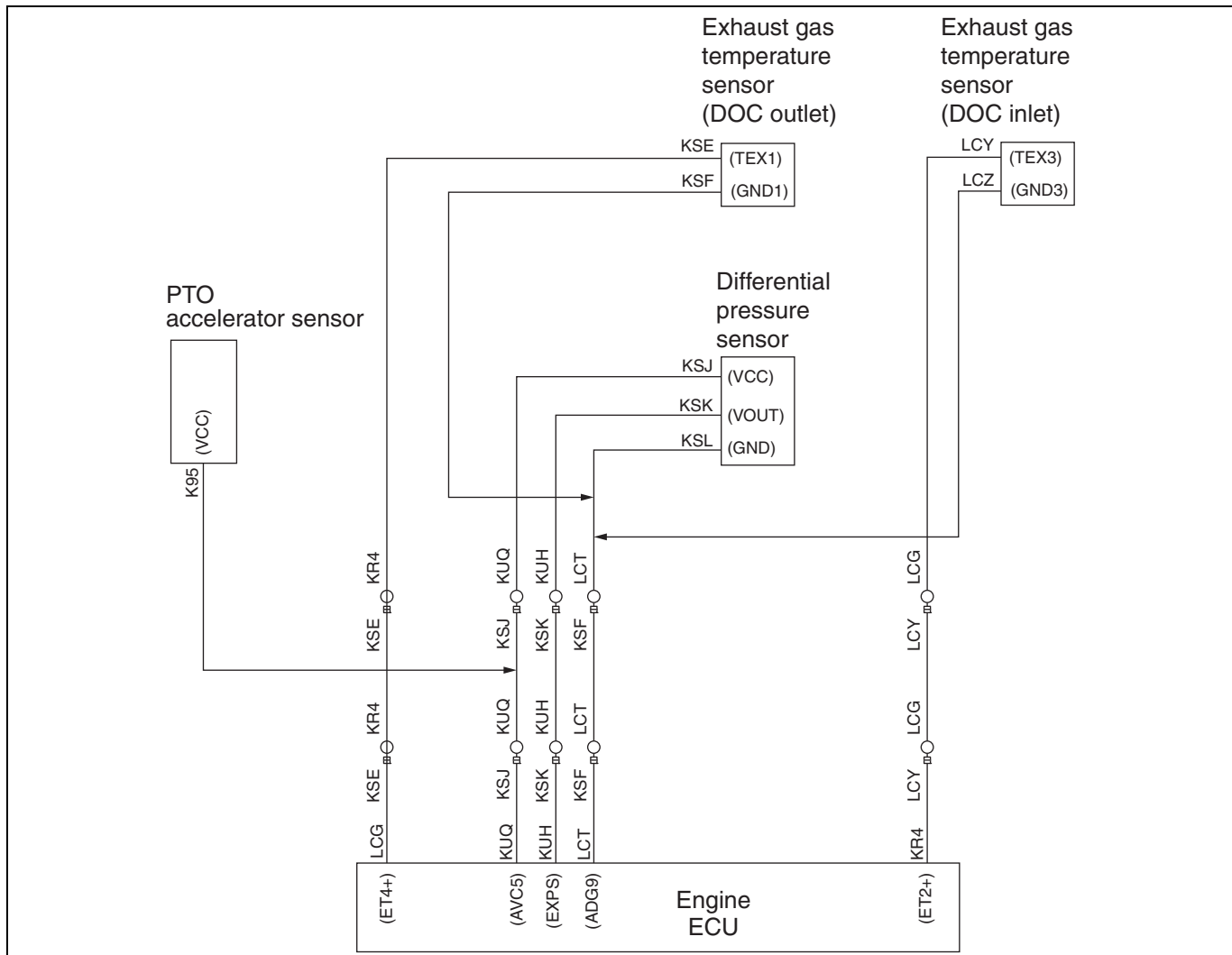
7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors**Exhaust gas temperature sensor (DOC outlet):**

- Loose/disconnected sensor or failure in sensing area (contamination, clogging or breakage)
- Abnormal resistance of sensor
- Failure in engine ECU sensor power supply
- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Short-circuit in the sensor

P2471: Exhaust gas temperature sensor (DOC outlet) - out of range (Out of range high) INFORMATION



SAPH16F010300966

1. Technical description

- The temperature sensor consistently detects exhaust gas temperature.
- A reading taken by the exhaust gas temperature sensor is used to control DPR regeneration.

<Description of malfunction>

- Exhaust gas temperature cannot be correctly recognized.

2. DTC set condition

(1) DTC detection condition

- Intake air temperature is $-20\text{ }^{\circ}\text{C}$ $\{-4\text{ }^{\circ}\text{F}\}$ or higher.
- Battery voltage is in the range of 10 V to 16 V.
- The engine has stopped or runs at 500 r/min or higher for continuous 5 seconds or longer.
- No other DTCs are present.

(2) Judgement criteria

- Voltage of the exhaust gas temperature sensor (DOC outlet) remains at 4.958 V or higher ($-46\text{ }^{\circ}\text{C}$ $\{-50.8\text{ }^{\circ}\text{F}\}$ or lower) for 3 seconds.

3. Reset condition

- After restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors**Exhaust gas temperature sensor (DOC outlet):**

- Loose/disconnected sensor or failure in sensing area (contamination, clogging or breakage)
- Abnormal resistance of sensor
- Failure in engine ECU sensor power supply
- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Short-circuit in the sensor

INSPECTION PROCEDURE: P2470 and P2471**1 Inspect the exhaust gas temperature sensor (DOC outlet) connector**

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the exhaust gas temperature sensor (DOC outlet)

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

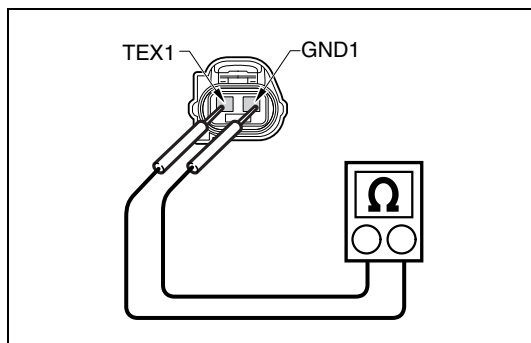
Was any failure found?

YES

Clean the exhaust gas temperature sensor (DOC outlet) and connect the sensor securely.
If damaged, replace the exhaust gas temperature sensor (DOC outlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

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

SAPH16F010300967

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor (DOC outlet) TEX1 – GND1	50 °C {122 °F}: 7.4 – 19.6 kΩ
		100 °C {212 °F}: 3.0 – 6.2 kΩ
		150 °C {302 °F}: 1.5 – 2.6 kΩ

Do the measurements meet the standard value?

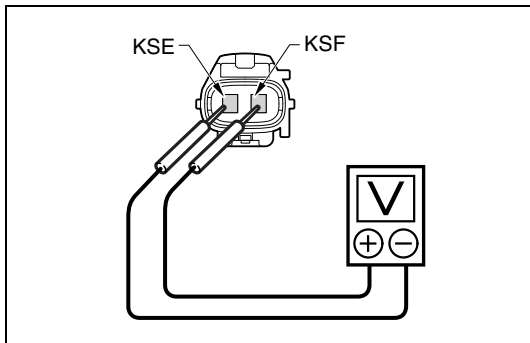
YES

NO

Go to step 4.

Replace the exhaust gas temperature sensor (DOC outlet).
Perform "After-inspection work" of INFORMATION section.

4 Inspect the exhaust gas temperature sensor (DOC outlet) power supply



SAPH16F010300968

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 (DOC outlet).

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

Do the measurements meet the standard value?

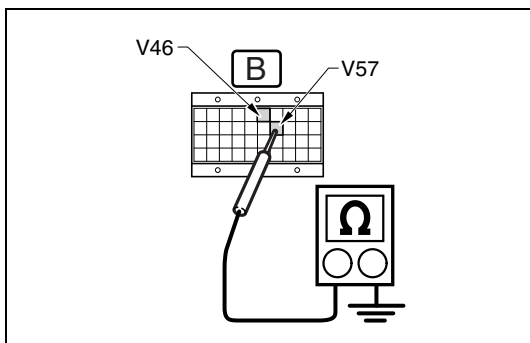
YES

NO

Go to step 7.

Go to step 5.

5 Check short-circuit in wire harness of exhaust gas temperature sensor (DOC outlet)



SAPH16F010300969

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) ADG9(V46) – Ground ET4+(V57) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

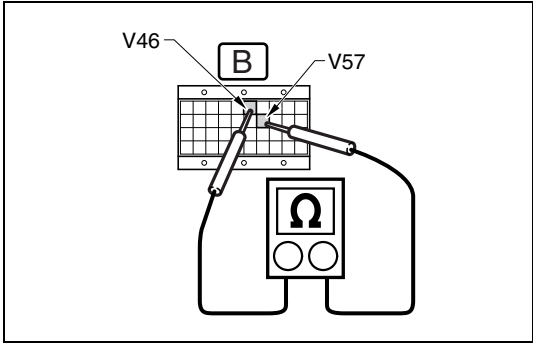
YES

NO

Go to step 6.

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

6 Check disconnection in wire harness of exhaust gas temperature sensor (DOC outlet)



SAPH16F010300970

1. Connect the exhaust gas temperature sensor (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) ADG9(V46) – ET4+(V57)	50 °C {122 °F}: 7.4 – 19.6 kΩ 100 °C {212 °F}: 3.0 – 6.2 kΩ 150 °C {302 °F}: 1.5 – 2.6 kΩ

Do the measurements meet the standard value?

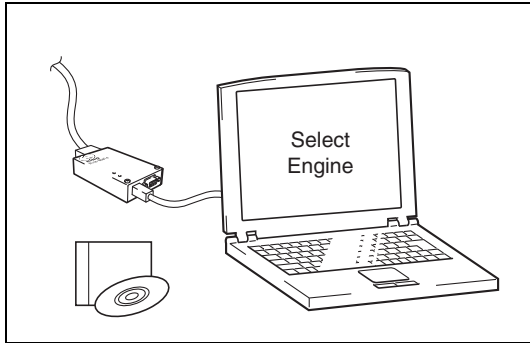
YES

NO

Go to step 7.

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

7	Check the DTC detected (Engine ECU) [Hino-DX]
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SAPH16F010300971

1. Perform engine warm-up. (engine coolant temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if the DTC (P2470 or P2471) has been detected in [Fault Information].

Has DTC (P2470 or P2471) been detected?
--

YES

<p>Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.</p>

NO

<p>Procedure completed. Perform "After-inspection work" of INFORMATION section.</p>
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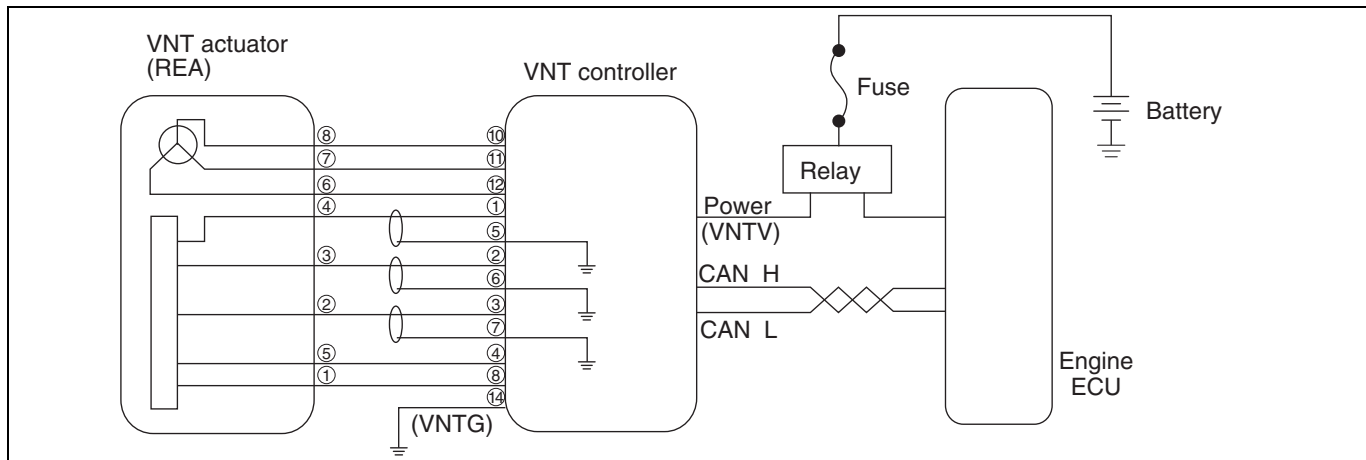
CHECKLIST: P2470 and P2471

DTC: P2470		Exhaust gas temperature sensor (DOC outlet) - out of range (Out of range low)		Inspection procedure		
DTC: P2471		Exhaust gas temperature sensor (DOC outlet) - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the exhaust gas temperature sensor (DOC outlet) connector	Check the connection of the exhaust gas temperature sensor (DOC outlet) connector (Looseness or poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the exhaust gas temperature sensor (DOC outlet)	<ol style="list-style-type: none"> Check the installation of the exhaust gas temperature sensor (DOC outlet). Make sure there is no dirt or damage to the exhaust gas temperature sensor (DOC outlet). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (DOC outlet) and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the exhaust gas temperature sensor (DOC outlet) unit	Measure the resistance between the terminals of the exhaust gas temperature sensor (DOC outlet). <Tester connections> Exhaust gas temperature sensor (DOC outlet) TEX1 – GND1 <Standard values> 50 °C {122 °F}: 7.4 – 19.6 kΩ 100 °C {212 °F}: 3.0 – 6.2 kΩ 150 °C {302 °F}: 1.5 – 2.6 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Replace the exhaust gas temperature sensor (DOC outlet). Perform "After-inspection work" of INFORMATION section.

DTC: P2470		Exhaust gas temperature sensor (DOC outlet) - out of range (Out of range low)		Inspection procedure		
DTC: P2471		Exhaust gas temperature sensor (DOC outlet) - out of range (Out of range high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the sensor power supply	Measure the voltage between the terminals of the exhaust gas temperature sensor (DOC outlet). <Tester connections> Exhaust gas temperature sensor (DOC outlet) vehicle-side connector KSF – KSE <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Go to step 5.
5	Check short-circuit in wire harness of exhaust gas temperature sensor (DOC outlet)	Connect the signal check harness, and measure the resistance between the terminals of the engine ECU (signal check harness) and ground. <Tester connections> Engine ECU (signal check harness) ADG9(V46) – Ground ET4+(V57) – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
6	Check for disconnection in wire harness of exhaust gas temperature sensor (DOC outlet)	1. Connect the exhaust gas temperature sensor (DOC outlet) connector. 2. Measure the resistance between the terminals of the engine ECU (signal check harness). <Tester connections> Engine ECU (signal check harness) ADG9 (V46) – ET4+ (V57) <Standard values> 50 °C {122 °F}: 7.4 – 19.6 k Ω 100 °C {212 °F}: 3.0 – 6.2 k Ω 150 °C {302 °F}: 1.5 – 2.6 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
7	Check the DTC detected (Engine ECU) [Hino-DX]	Check if the DTC (P2470 or P2471) has been detected in [Fault Information].	DTC (P2470 or P2471) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2563

EN01H16F01030F03001152

P2563: Nozzle position sensor failure range (High level) (VNT actuator position sensor performance invalid)
INFORMATION

SAPH16F010300972

1. Technical description

- The VNT actuator steplessly operates the nozzle via the REA (Rotary Electric Actuator) and controls turbine speed and boost pressure.
- The VNT actuator (REA) has a position sensor and constantly monitors the target opening and the actual opening.
- Wiping operation is carried out when the engine is stopped and the soot, oil, and other impurities accumulated in the vane working range are removed. Also, the turbocharger mechanical working range is checked for trouble.

<Description of malfunction>

- -

2. DTC set condition

(1) DTC detection condition

- While the engine is in operation: Always
- While the engine is stopped: During wiping operation

(2) Judgement criteria

Item	Details (Reference)
Position sensor failure	When faulty output value from sensor is measured 30 times in 1 second.

3. Reset condition

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.

- Auxiliary brake does not work.

<Symptoms on the vehicle due to malfunction>

- Engine output is restricted.

6. Pre-inspection work

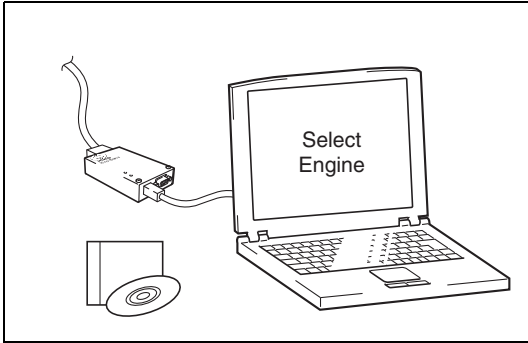
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Faulty contact in VNT actuator (REA) connector
- Harness disconnection or short-circuit
- Actuator internal sensor failure
- Controller internal failure

INSPECTION PROCEDURE: P2563**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300973

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if any DTC other than P2563 (for example U010C) has been detected in [Fault Information].

HINT

Due to CAN communication failures, P2563 may have been detected.

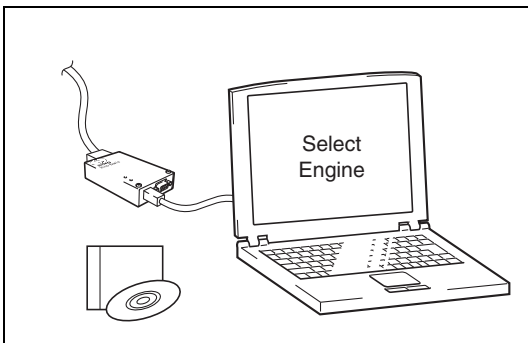
Has a DTC other than P2563 (for example U010C) been detected?

YES

**Go to diagnosis procedure of a related DTC.
Go to step 2 after repair.**

NO

Go to step 3.

2 Check the DTC detected 2 (Engine ECU) [Hino-DX]

SAPH16F010300974

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P2563 has been detected in [Fault Information].

Has DTC P2563 been detected?

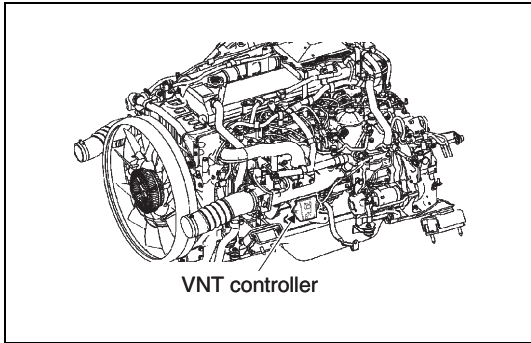
YES

Go to step 3.

NO

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

3 Check the connector connection [Hino-DX]



SAPH16F010300975

1. Set the starter switch to the "LOCK" position.
2. Disconnect the connector connecting the VNT actuator and VNT controller and then securely re-connect it.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if P2563 has been detected in [Fault Information].

Has DTC P2563 been detected?

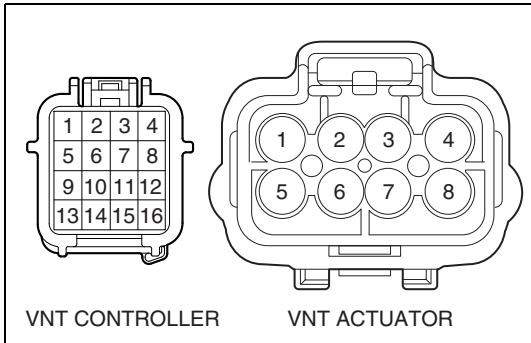
YES

Go to step 4.

NO

**Procedure completed.
(Poor contact of the connector)
Perform "After-inspection work" of INFORMATION section.**

4 Inspect the VNT actuator harness



SAPH16F010300976

1. Set the starter switch to the "LOCK" position.
2. Disconnect the connector connecting the VNT actuator and VNT controller.
3. Use the electrical tester to measure the resistance from the VNT controller vehicle-side connector to each of the terminals in the VNT actuator vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	CONT – ACT 1 terminal – 4 terminal 2 terminal – 3 terminal 3 terminal – 2 terminal 4 terminal – 5 terminal 8 terminal – 1 terminal	1 Ω or less

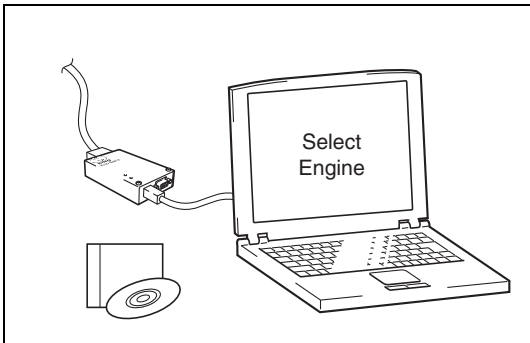
Do the measurements meet the standard value?

YES

Go to step 5.

NO

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

5 Replace the VNT controller [Hino-DX]

SAPH16F010300977

1. Set the starter switch to the "LOCK" position.
2. Replace the VNT controller with a new one.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history using Hino-DX.
5. Set the starter switch to the "LOCK" position.
6. Set the starter switch to the "ON" position again.
7. Select [Engine] and check if P2563 has been detected in [Fault Information].

Has DTC P2563 been detected?**YES**

**Replace the turbocharger.
Perform "After-inspection work" of INFORMATION section.**

NO

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

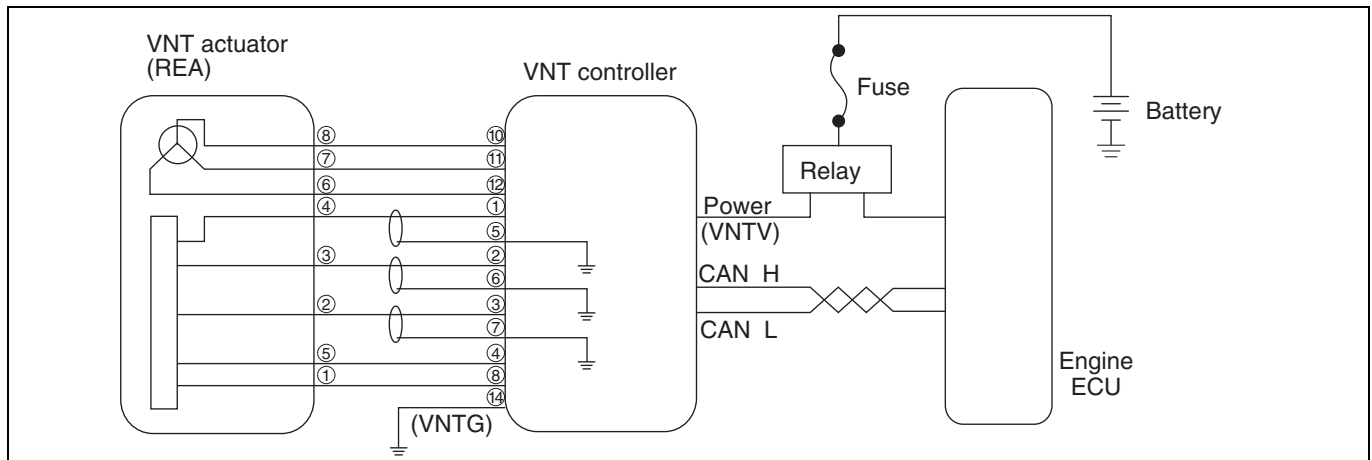
CHECKLIST: P2563

DTC: P2563		Nozzle position sensor failure range (High level) (VNT actuator position sensor performance invalid)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than P2563 (for example U010C) has been detected in [Engine].	DTC other than P2563 have been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC. Go to step 2 after repair.	Go to step 3.
2	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if P2563 has been detected in [Engine].	DTC P2563 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Check the connector connection [Hino-DX]	<ol style="list-style-type: none"> Set the starter switch to the "LOCK" position. Disconnect the connector connecting the VNT actuator and VNT controller and then securely re-connect it. Set the starter switch to the "ON" position. Check if P2563 has been detected in [Engine]. 	DTC P2563 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 4.	Procedure completed. (Poor contact of the connector) Perform "After-inspection work" of INFORMATION section.
4	Inspect the VNT actuator harness	<ol style="list-style-type: none"> Disconnect the connector connecting the VNT actuator and VNT controller. Measure the resistance from the VNT controller vehicle-side connector to each of the terminals in the VNT actuator vehicle-side connector. <p><Tester connections> CONT – ACT 1 – 4 2 – 3 3 – 2 4 – 5 8 – 1</p> <p><Standard values> 1 Ω or less</p>	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P2563		Nozzle position sensor failure range (High level) (VNT actuator position sensor performance invalid)		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Replace the VNT controller [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Replace the VNT controller with a new one. 3. Set the starter switch to the "ON" position. 4. Erase the trouble history using the Hino-DX. 5. Set the starter switch to the "LOCK" position. 6. Set the starter switch to the "ON" position again. 7. Check if P2563 has been detected in [Engine]. 	<p>DTC P2563 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2564 and P2565

EN01H16F01030F03001153

P2564: Nozzle position sensor failure range (Low level) (VNT actuator position sensor signal too low)**INFORMATION**

SAPH16F010300978

1. Technical description

- The VNT actuator steplessly operates the nozzle via the REA (Rotary Electric Actuator) and controls turbine speed and boost pressure.
- The VNT actuator (REA) has a position sensor and constantly monitors the target opening and the actual opening.
- Wiping operation is carried out when the engine is stopped and the soot, oil, and other impurities accumulated in the vane working range are removed. Also, the turbocharger mechanical working range is checked for trouble.

2. DTC set condition

- (1) DTC detection condition
 - While the engine is in operation: Always
 - While the engine is stopped: During wiping operation
- (2) Judgement criteria

Item	Details (Reference)
Position sensor failure	When faulty output value from sensor is measured 30 times in 1 second.

3. Reset condition

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.
- Auxiliary brake does not work.

<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

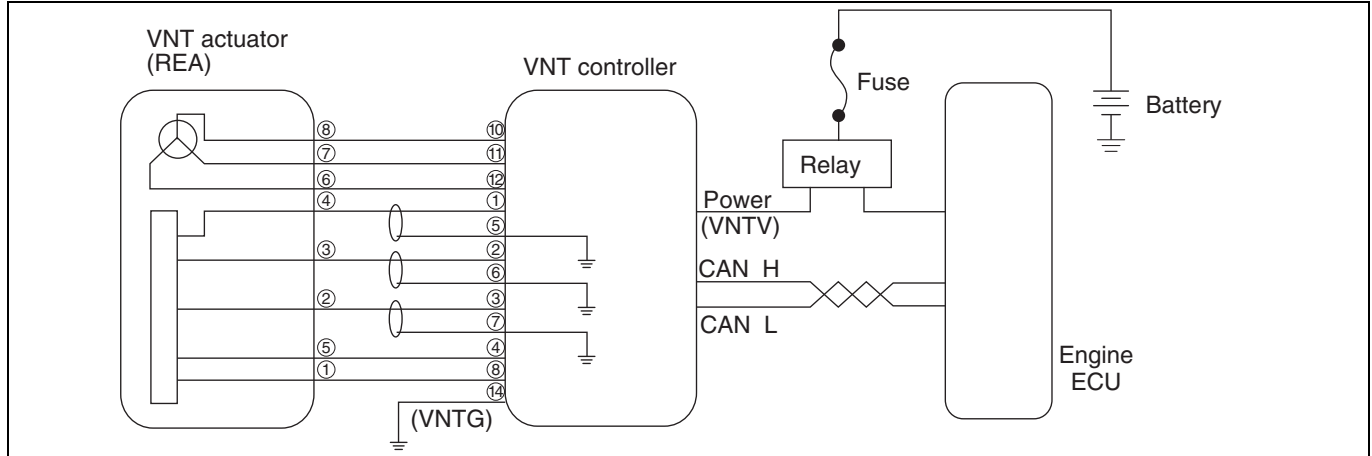
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Faulty contact in VNT actuator (REA) connector
- Harness disconnection or short-circuit
- Actuator internal sensor failure
- Controller internal failure

P2565: Nozzle position sensor failure range (High level) (VNT actuator position sensor signal too high)

INFORMATION



SAPH16F010300979

1. Technical description

- The VNT actuator steplessly operates the nozzle via the REA (Rotary Electric Actuator) and controls turbine speed and boost pressure.
- The VNT actuator (REA) has a position sensor and constantly monitors the target opening and the actual opening.
- Wiping operation is carried out when the engine is stopped and the soot, oil, and other impurities accumulated in the vane working range are removed. Also, the turbocharger mechanical working range is checked for trouble.

2. DTC set condition

(1) DTC detection condition

- While the engine is in operation: Always
- While the engine is stopped: During wiping operation

(2) Judgement criteria

Item	Details (Reference)
Position sensor failure	When faulty output value from sensor continues for 1 second.

3. Reset condition

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set

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

- Engine output is insufficient.
- Cruise control does not work.
- Auxiliary brake does not work.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

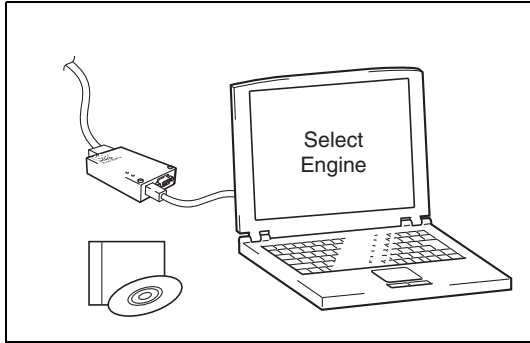
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Faulty contact in VNT actuator (REA) connector
- Harness disconnection or short-circuit
- Actuator internal sensor failure
- Controller internal failure

INSPECTION PROCEDURE: P2564 and P2565**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300980

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if any DTC other than DTC (P2564 or P2565) (for example U010C) has been detected in [Fault Information].

HINT

Due to CAN communication failures, P2564 or P2565 may have been detected.

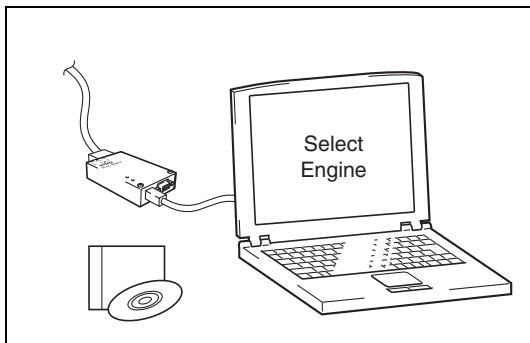
Has a DTC other than DTC (for example U010C) been detected?

YES

**Go to diagnosis procedure of a related DTC.
Go to step 2 after repair.**

NO

Go to step 3.

2 Check the DTC detected 2 (Engine ECU) [Hino-DX]

SAPH16F010300981

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if the DTC (P2564 or P2565) has been detected in [Fault Information].

Has DTC (P2564 or P2565) been detected?

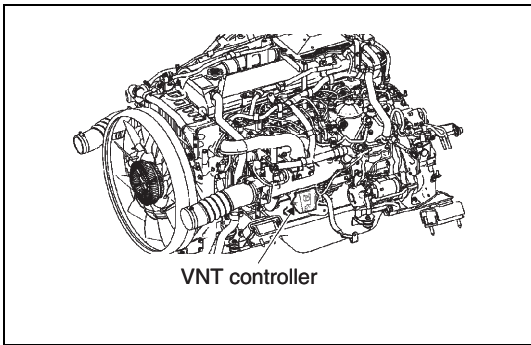
YES

Go to step 3.

NO

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

3 Check the connector connection [Hino-DX]



SAPH16F010300982

1. Set the starter switch to the "LOCK" position.
2. Disconnect the connector connecting the VNT actuator and VNT controller and then securely re-connect it.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if the DTC (P2564 or P2565) has been detected in [Fault Information].

Has DTC (P2564 or P2565) been detected?

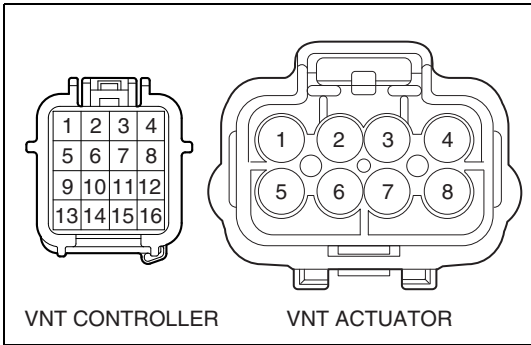
YES

Go to step 4.

NO

**Procedure completed.
(Poor contact of the connector)
Perform "After-inspection work" of INFORMATION section.**

4 Inspect the VNT actuator harness



SAPH16F010300983

1. Set the starter switch to the "LOCK" position.
2. Disconnect the connector connecting the VNT actuator and VNT controller.
3. Use the electrical tester to measure the resistance from the VNT controller vehicle-side connector to each of the terminals in the VNT actuator vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	CONT – ACT 1 terminal – 4 terminal 2 terminal – 3 terminal 3 terminal – 2 terminal 4 terminal – 5 terminal 8 terminal – 1 terminal	1 Ω or less

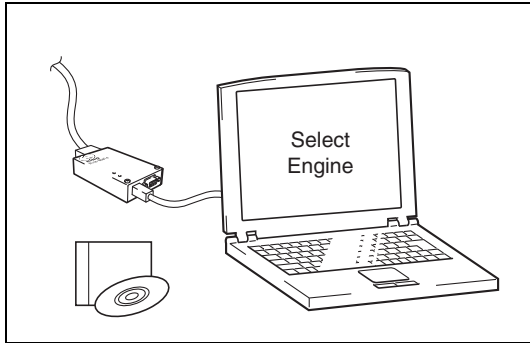
Do the measurements meet the standard value?

YES

Go to step 5.

NO

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

5 Replace the VNT controller [Hino-DX]


SAPH16F010300984

1. Set the starter switch to the "LOCK" position.
2. Replace the VNT controller with a new one.
3. Set the starter switch to the "ON" position.
4. Erase the trouble history using Hino-DX.
5. Set the starter switch to the "LOCK" position.
6. Set the starter switch to the "ON" position again.
7. Select [Engine] and check if the DTC (P2564 or P2565) has been detected in [Fault Information].

Has DTC (P2564 or P2565) been detected?
YES
**Replace the turbocharger.
Perform "After-inspection work" of INFORMATION section.**
NO
**Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

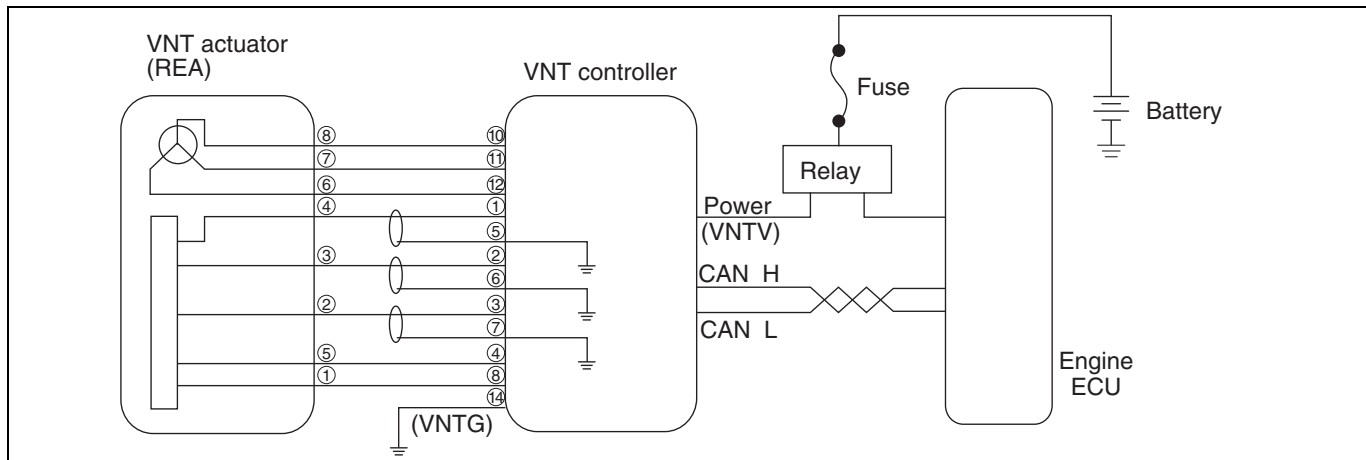
CHECKLIST: P2564 and P2565

DTC: P2564		Nozzle position sensor failure range (Low level) (VNT actuator position sensor signal too low)		Inspection procedure		
DTC: P2565		Nozzle position sensor failure range (High level) (VNT actuator position sensor signal too high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU) 1 [Hino-DX]	Check if any DTC other than DTC (P2564 or P2565) (for example U010C) has been detected in [Engine].	DTC other than this DTC (for example U010C) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC. Go to step 2 after repair.	Go to step 3.
2	Check the DTC detected (Engine ECU) 2 [Hino-DX]	Check if the DTC (P2564 or P2565) has been detected in [Engine].	DTC (P2564 or P2565) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Check the connector connection [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Disconnect the connector connecting the VNT actuator and VNT controller and then securely re-connect it. 3. Set the starter switch to the "ON" position. 4. Check if the DTC (P2564 or P2565) has been detected in [Engine]. 	DTC (P2564 or P2565) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 4.	Procedure completed. (Poor contact of the connector) Perform "After-inspection work" of INFORMATION section.

DTC: P2564		Nozzle position sensor failure range (Low level) (VNT actuator position sensor signal too low)		Inspection procedure		
DTC: P2565		Nozzle position sensor failure range (High level) (VNT actuator position sensor signal too high)				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the VNT actuator harness	1. Disconnect the connector connecting the VNT actuator and VNT controller. 2. Measure the resistance from the VNT controller vehicle-side connector to each of the terminals in the VNT actuator vehicle-side connector. <Tester connections> CONT – ACT 1 – 4 2 – 3 3 – 2 4 – 5 8 – 1 <Standard values> 1 Ω or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
5	Replace the VNT controller [Hino-DX]	Check if the DTC (P2564 or P2565) has been detected.	DTC (P2564 or P2565) has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P259E

EN01H16F01030F03001154

P259E: Nozzle operating range failure -NARROW (VNT actuator wiping error (too narrow range))**INFORMATION**

SAPH16F010300985

1. Technical description

- The VNT actuator steplessly operates the nozzle via the REA (Rotary Electric Actuator) and controls turbine speed and boost pressure.
- The VNT actuator (REA) has a position sensor and constantly monitors the target opening and the actual opening.
- Wiping operation is carried out when the engine is stopped and the soot, oil, and other impurities accumulated in the vane working range are removed. Also, the turbocharger mechanical working range is checked for trouble.

<Description of malfunction>

- -

2. DTC set condition

- (1) DTC detection condition
 - While the engine is in operation: Always
 - While the engine is stopped: During wiping operation
- (2) Judgement criteria

Item	Details (Reference)
1. Wiping failure	When a wiping operating range narrower than Lo range is detected 2 times.

3. Reset condition

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.

- Auxiliary brake does not work.

<Symptoms on the vehicle due to malfunction>

- Engine output is restricted.

6. Pre-inspection work

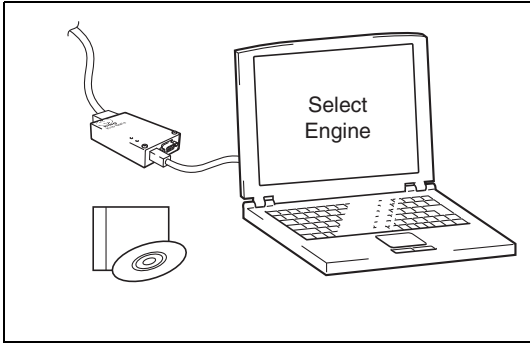
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- VNT link is stuck or cannot operate due to rust, etc.

INSPECTION PROCEDURE: P259E**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300986

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Check if any DTC other than P259E (for example, U010C) has been detected.

HINT

Due to CAN communication failures, P259E may have been detected.

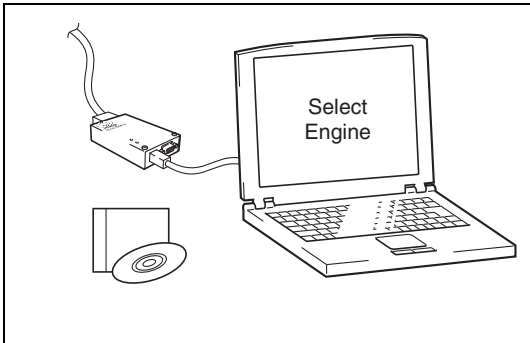
Has a DTC other than P259E been detected?

YES

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

NO

Go to step 3.

2 Check the DTC detected 2 (Engine ECU) [Hino-DX]

SAPH16F010300987

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P259E has been detected in [Fault Information].

Has DTC P259E been detected?

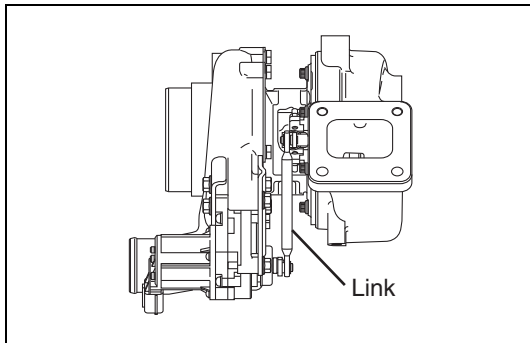
YES

Go to step 3.

NO

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

3 Check the turbocharger external appearance



SAPH16F010300988

1. Check the turbocharger external appearance and make sure no foreign substances are trapped around the link.

Was any failure found?

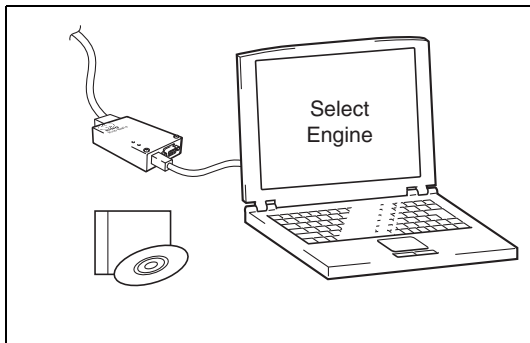
YES

NO

Remove foreign substance, and go to step 4.

Go to step 4.

4 Check the operation of the VNT controller [Hino-DX]



SAPH16F010300989

1. Set the starter switch to the "ON" position.
2. Erase the trouble history using Hino-DX.
3. Set the starter switch to the "LOCK" position.
4. Set the starter switch to the "ON" position again.
5. Select [Engine] and check if P259E has been detected in [Fault Information].

HINT

Turn the starter switch OFF and ON verifies the wiping operation of the VNT actuator (DC motor).

Measurement conditions

Starter switch: LOCK → ON

Has DTC P259E been detected?

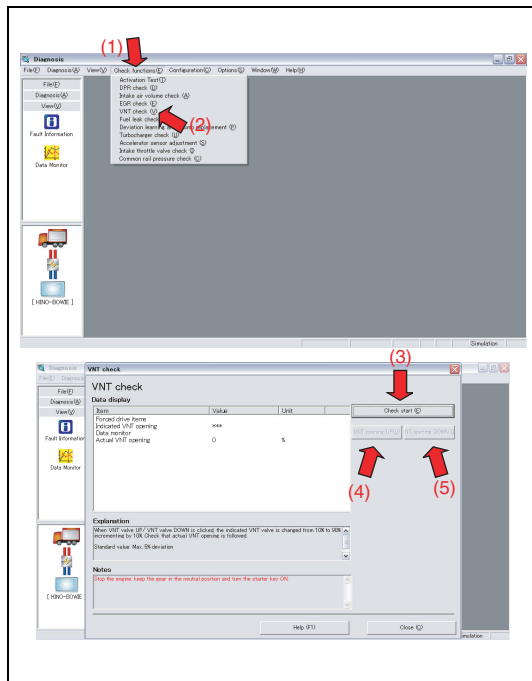
YES

NO

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

Go to step 5.

5 Check the response delay of the VNT controller 2 [Hino-DX]



SAPH16F010300990

1. Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.

CAUTION

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

<Inspection procedure>

- (1) Select [Check functions].
 - (2) Select [VNT check].
 - (3) Click [Check start].
 - (4) Select [VNT opening UP]:
 - (5) Select [VNT opening DOWN]:
- Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %.
 - Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %.

HINT

- The VNT opening position changes of around 10 % per step between 0 – 90 %.

Standard values

From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.

Do the measurements meet the standard value?

YES

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

NO

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

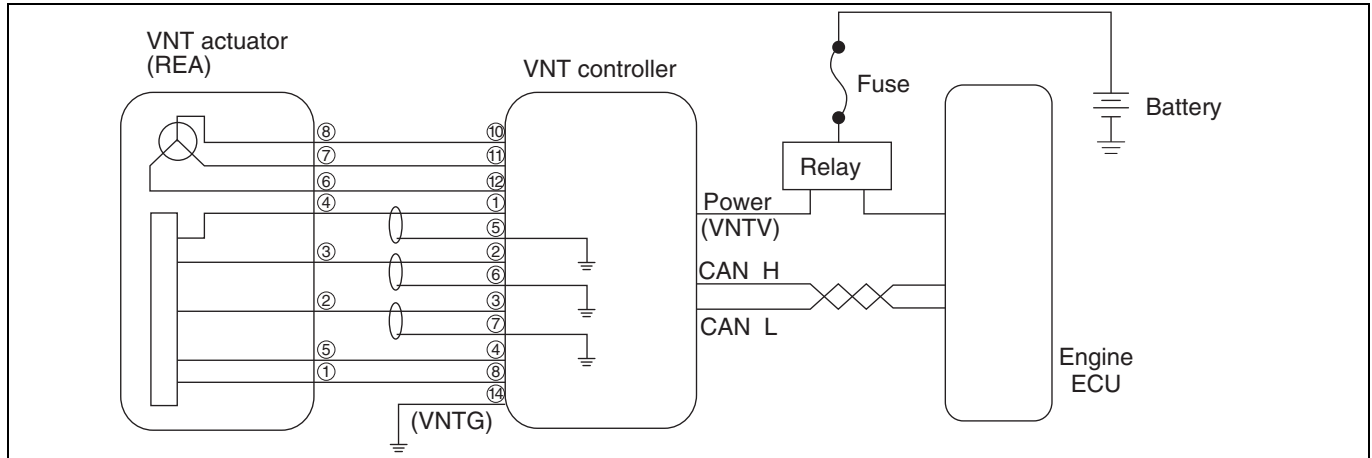
CHECKLIST: P259E

DTC: P259E		Nozzle operating range failure -NARROW (VNT actuator wiping error (too narrow range))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than P259E (for example U010C) has been detected in [Engine].	DTC other than P259E (for example U010C) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC. Go to step 2 after repair.	Go to step 3.
2	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if P259E has been detected in [Engine].	DTC P259E has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Check the turbocharger external appearance	Check the turbocharger external appearance and make sure no foreign substances are trapped around the link.	Failure found: Go to YES. No failure found: Go to NO.		Remove foreign substance, and go to step 4.	Go to step 4.
4	Check the operation of the VNT controller [Hino-DX]	1. Erase the malfunction history, turn the starter switch to LOCK. 2. Turn again the starter switch to ON, and check if P259E has been detected in [Engine]. <Measurement conditions> Starter switch: LOCK →ON	DTC P259E has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.	Go to step 5.

DTC: P259E		Nozzle operating range failure -NARROW (VNT actuator wiping error (too narrow range))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the response delay of the VNT controller 2 [Hino-DX]	<p>Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.</p> <p><Inspection procedure></p> <p>(1) Select [Check functions].</p> <p>(2) Select [VNT check].</p> <p>(3) Click [Check start].</p> <p>(4) Select [VNT opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %. <p>(5) Select [VNT opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %. <p><Standard values></p> <p>From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		<p>Procedure completed. Perform "After-inspection work" of INFORMATION section.</p>	<p>Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P259F

EN01H16F01030F03001155

P259F: Nozzle operating range failure -WIDE (VNT actuator wiping error (too wide range))
INFORMATION

SAPH16F010300991

1. Technical description

- The VNT actuator steplessly operates the nozzle via the REA (Rotary Electric Actuator) and controls turbine speed and boost pressure.
- The VNT actuator (REA) has a position sensor and constantly monitors the target opening and the actual opening.
- Wiping operation is carried out when the engine is stopped and the soot, oil, and other impurities accumulated in the vane working range are removed. Also, the turbocharger mechanical working range is checked for trouble.

<Description of malfunction>

- -

2. DTC set condition

(1) DTC detection condition

- While the engine is in operation: Always
- While the engine is stopped: During wiping operation.

(2) Judgement criteria

Item	Details (Reference)
1. Wiping failure	When a wiping operating range wider than HI range is detected 2 times.

3. Reset condition

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Cruise control does not work.
- Auxiliary brake does not work.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

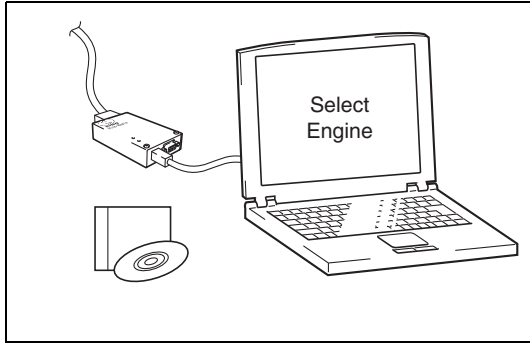
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Disconnection of external link

INSPECTION PROCEDURE: P259F**1 Check the DTC detected 1 (Engine ECU) [Hino-DX]**

SAPH16F010300992

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Check if any DTC other than P259F (for example, U010C) has been detected in [Fault Information].

HINT

Due to CAN communication failures, P259F may have been detected.

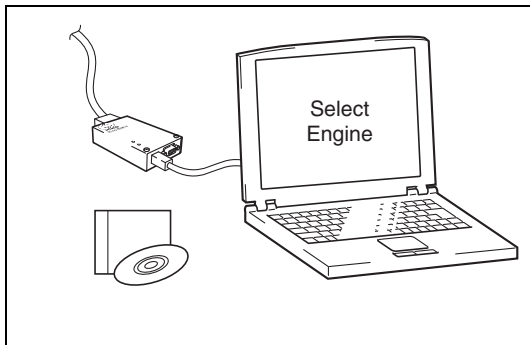
Has a DTC other than P259F been detected?

YES

**Go to the diagnostic procedure of a related DTC.
After repair, go to step 2.**

NO

Go to step 3.

2 Check the DTC detected 2 (Engine ECU) [Hino-DX]

SAPH16F010300993

1. Set the starter switch to the "ON" position.
2. Select [Engine] and check if P259F has been detected in [Fault Information].

Has DTC P259F been detected?

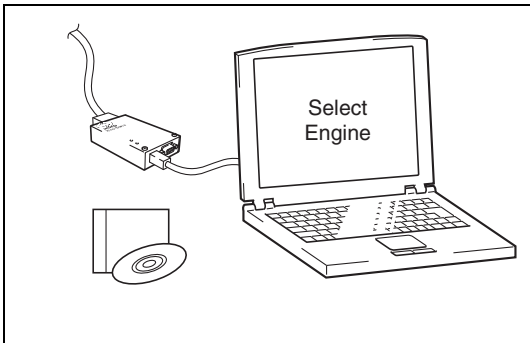
YES

Go to step 3.

NO

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

3 Check operation of VNT controller [Hino-DX]



SAPH16F010300994

1. Set the starter switch to the "ON" position.
2. Erase the trouble history using Hino-DX.
3. Set the starter switch to the "LOCK" position.
4. Set the starter switch to the "ON" position again.
5. Select [Engine] and check if P259F has been detected.

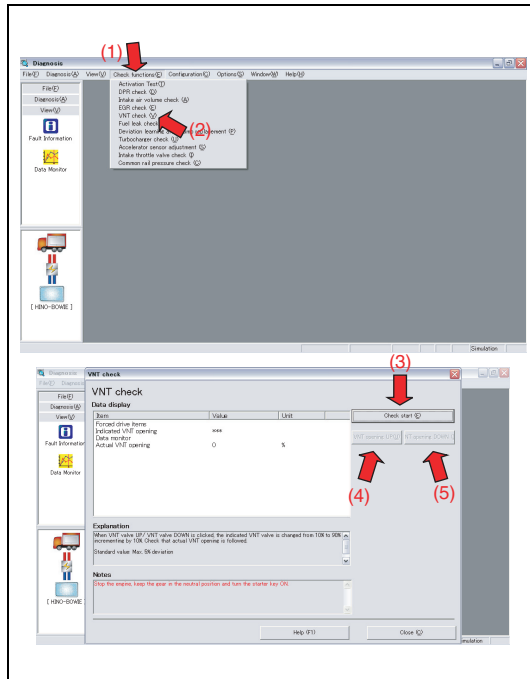
HINT

Turn the starter switch OFF and ON verifies the wiping operation of the VNT actuator (DC motor).

Measurement conditions
Starter switch: LOCK → ON

<p>Has DTC P259F been detected?</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>YES</p> <div style="border: 1px solid black; padding: 5px; width: 80%; margin: 5px auto;"> <p>Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.</p> </div> </div> <div style="text-align: center;"> <p>NO</p> <div style="border: 1px solid black; padding: 5px; width: 80%; margin: 5px auto;"> <p>Go to step 4.</p> </div> </div> </div>
--

4 Check the response delay of the VNT controller 2 [Hino-DX]



SAPH16F010300995

1. Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.

⚠ CAUTION

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

<Inspection procedure>

- (1) Select [Check functions].
 - (2) Select [VNT check].
 - (3) Click [Check start].
 - (4) Select [VNT opening UP]:
 - (5) Select [VNT opening DOWN]:
- Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %.
 - Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %.

HINT

- The VNT opening position changes of around 10 % per step between 0 – 90 %.

Standard values

From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.

Do the measurements meet the standard value?

YES

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

NO

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

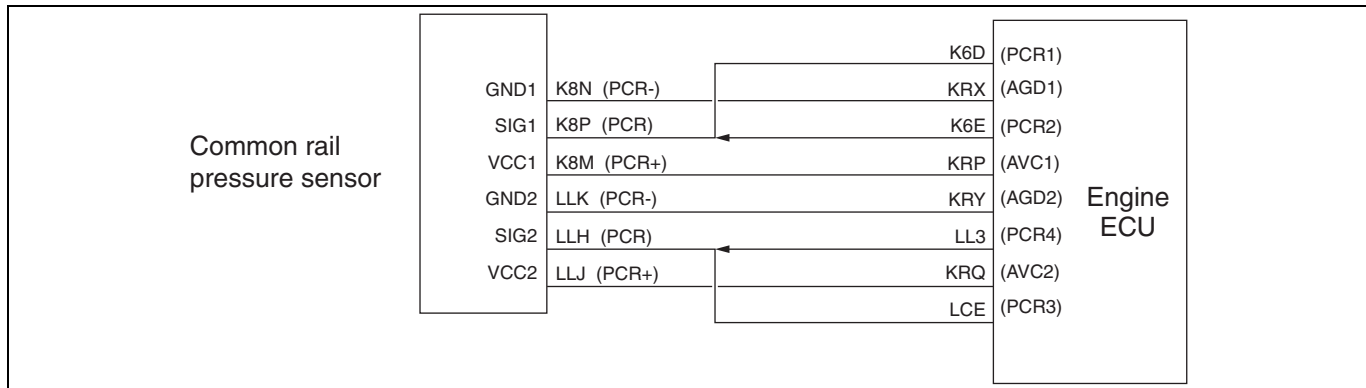
CHECKLIST: P259F

DTC: P259F		Nozzle operating range failure -WIDE (VNT actuator wiping error (too wide range))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected 1 (Engine ECU) [Hino-DX]	Check if any DTC other than P259F (for example U010C) has been detected in [Engine]	DTC other than P259F (for example U010C) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC. Go to step 2 after repair.	Go to step 3.
2	Check the DTC detected 2 (Engine ECU) [Hino-DX]	Check if P259F has been detected in [Engine].	DTC P259F has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Check the operation of the VNT controller [Hino-DX]	1. Erase the malfunction history, set the starter switch to the "LOCK" position. 2. Check if P259F has been detected in [Engine]. <Measurement conditions> Starter switch: LOCK → ON	DTC P259F has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.	Go to step 4.

DTC: P259F		Nozzle operating range failure -WIDE (VNT actuator wiping error (too wide range))		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Check the response delay of the VNT controller 2 [Hino-DX]	<p>Select [Check functions] from the menu, then inspect the response delay at the Target VNT position and Actual VNT position.</p> <p><Inspection procedure></p> <p>(1) Select [Check functions].</p> <p>(2) Select [VNT check].</p> <p>(3) Click [Check start].</p> <p>(4) Select [VNT opening UP]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 0 to 90 %. <p>(5) Select [VNT opening DOWN]:</p> <ul style="list-style-type: none"> Inspect the response delay at each step of the Target VNT position and Actual VNT position from 90 to 0 %. <p><Standard values></p> <p>From the Target VNT position to the Actual VNT position, the response delay should be within 3 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Replace the turbocharger. Perform "After-inspection work" of INFORMATION section.

DTC: P2635

EN01H16F01030F03001156

P2635: Fuel Pump Low Flow/Performance
INFORMATION

SAPH16F010300996

1. Technical description

- Excessively high common rail pressure (this duration varies depending on the engine speed) is detected.

<Description of malfunction>

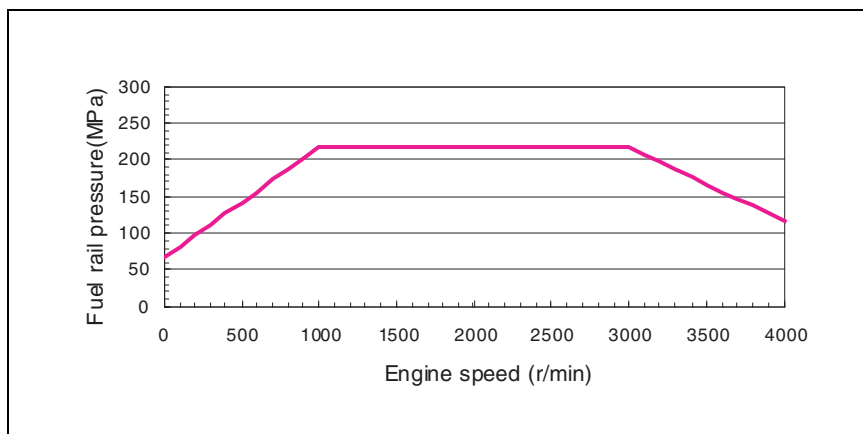
- Supply pump was exposed to abnormally high pressure.

2. DTC set condition**(1) DTC detection condition**

- Battery voltage is in the range of 10 V to 16 V.
- Common rail pressure sensor; no malfunction.

(2) Judgement criteria

- Fuel rail pressure \geq threshold map
- 60 sec continue

**3. Reset condition**

- After normal operation is restored and the starter switch is on the "LOCK" position.

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

- MIL: OFF
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

-

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- Supply pump failure
- Malfunction of engine ECU

INSPECTION PROCEDURE: P2635**1 Inspect the start of the engine**

1. Inspect the start of the engine.

Does the engine start?

YES

NO

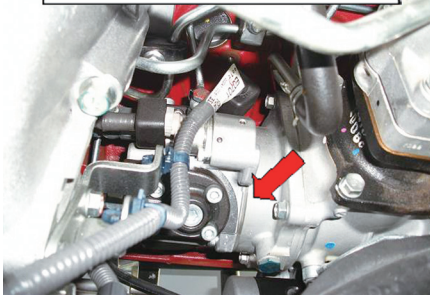
Go to step 4.

Go to step 2.

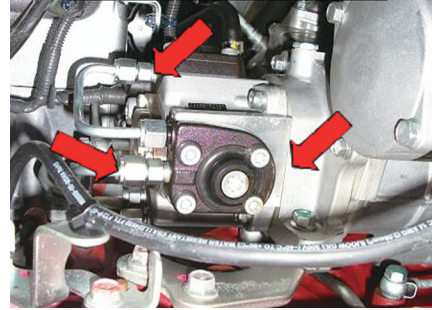
2 Inspect the supply pump

1. Check if fuel is leaking or seeping out of the supply pump.

Check No leak or crack



Check No leak or crack



SAPH16F010300998

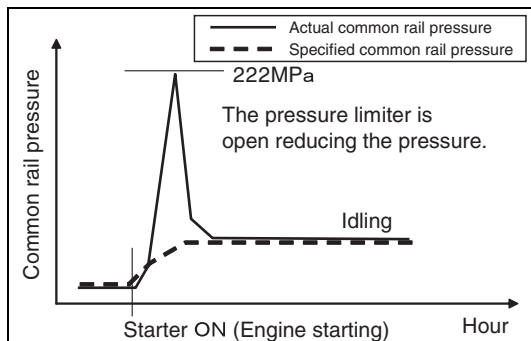
Was any failure found?

YES

NO

Replace the supply pump, and go to step 4 after replacement.

Go to step 3.

3 Function check of supply pump [Hino-DX]

SAPH16F010300999

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine].
4. Select [Actual common rail pressure] and [Target common rail pressure] in [Data Monitor].
5. Start the engine while checking the common rail pressure.

Standard values

The actual common rail pressure rises and stabilizes at a constant value.

Was any failure found?

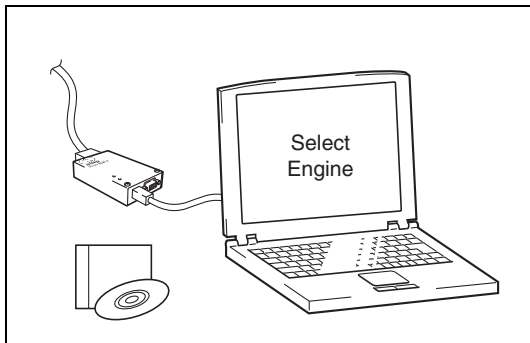
YES

Replace the supply pump, go to step 4 after replacement.

NO

Contact the Hino national service manager.

4 SCV free acceleration test [Hino-DX]



SAPH16F010301000

1. Select [Freeze Frame] of DTC P2635 in [Fault Information] in Hino-DX menu, and confirm the freeze-frame data.
2. Conduct an SCV test and confirm the existing data.
 - For a detailed procedure, refer to the separate "SCV free acceleration test" in the following pages.

HINT

The data obtained in this procedure will serve as comparison data in subsequent procedures.

After confirming data and go to step 5.

5 Check the engine ECU

1. Check the engine ECU software part number (ECU part number) by Hino-DX.
(Select [About System] in the [View] menu.)
Confirm the latest part number with Hino national service manager.

Does the engine ECU have the latest software number?

YES

Go to step 6.

NO

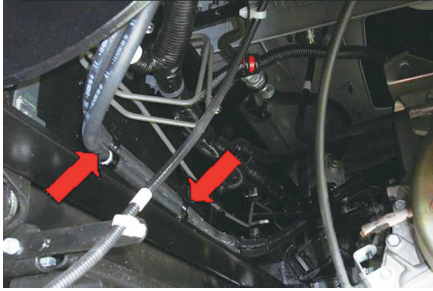
Reprogram the engine ECU and then go to step 6.
Refer to the section "Re-programming work" in the chapter "HINO Reprog Manager".

6 Inspect the fuel filter

Check no water no restriction



Check no bending no restriction



SAPH16F010301001

1. Check the fuel filter.
 - Has the replacement period expired?
 - Is it dirty, damaged, or clogged?
 - Is it a genuine Hino part?
2. Check if the fuel inside the fuel filter is within the standard value.

Measurement conditions	Standard values
While engine is running	<ul style="list-style-type: none"> • At least 25.4 mm {1 in.} above collar and below the element upper level. • Fuel level does not continue to drop during wide open throttle.

Was any failure found?

YES

Replace the fuel filter element, and go to step 7.

NO

Go to step 12.

7 Inspect the fuel pipe and hose

1. Check if the fuel pipe and hose between the fuel tank and fuel filter are clogged, punctured, or bent.
2. Make sure the fuel pipe joint bolts are not loose.

Was any failure found?

YES

Repair or replace the faulty part, and go to step 8.

NO

Go to step 8.

8 Inspect the fuel tank breather

1. Check if the breather hose is clogged, punctured, or bent.
2. Make sure the check valve is functioning normally.

Was any failure found?**YES****Repair or replace the faulty part, and go to step 9.****NO****Go to step 9.****9 Inspect the fuel tank feed pipe**

1. Make sure the fuel tank feed pipe is not clogged.

Was any failure found?**YES****Repair or replace the faulty part, and go to step 10.****NO****Go to step 10.****10 Inspect the fuel tank**

1. Drain fuel out of the fuel tank and check if there are foreign objects inside the tank.

Was any failure found?**YES****Remove the foreign object and clean the fuel tank, then go to step 11.****NO****Go to step 11.****11 Inspect the supply pump gauze filter**

1. Make sure the gauze filter (built into the supply pump) is not clogged.

Was any failure found?

YES

Clean the gauze filter, and go to step 12.

NO

Go to step 12.

12 Inspect the fuel high-pressure pipe

1. Make sure the fuel high-pressure pipe is not leaking fuel.

Was any failure found?

YES

Repair or replace the faulty part, and go to step 13.

NO

Go to step 13.

13 Inspect the bubble separator

1. Make sure the bubble separator is not clogged.

Was any failure found?

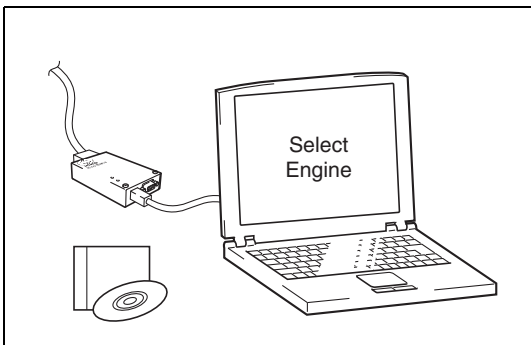
YES

Repair or replace the faulty part, and go to step 14.

NO

If failure was found in steps 7 – 12: Go to step 14.
If failure was not found in steps 7 – 12: Go to step 15.

14 SCV free acceleration test [Hino-DX]



SAPH16F010301002

1. Perform an SCV test and a malfunction reproduction test.
 - For a detailed procedure, refer to the separate "SCV free acceleration test".
2. Compare the results with those obtained in step 4 and check if they improved.

Did the test results improve?

YES

NO

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

Go to step 15.

15 Inspect the SCV connector

1. Check the connection of the SCV connector (Looseness or short-circuit).

Was any failure found?

YES

NO

Repair or replace the faulty part, and go to step 16.

Go to step 16.

16 Inspect the common rail pressure sensor connector

1. Check the connection of the common rail pressure sensor connector (Looseness or short-circuit).

Was any failure found?

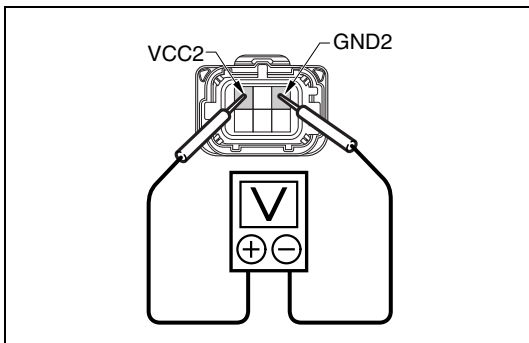
YES

NO

Repair or replace the faulty part, and go to step 17.

Go to step 17.

17 Inspect the common rail pressure sensor power supply



SAPH16F010301003

1. Disconnect the connector of the common rail pressure sensor.
2. Set the starter switch to the "ON" position.
3. Use the electrical tester to measure the voltage between the terminals of the common rail pressure sensor vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Common rail pressure sensor vehicle-side connector VCC2 – GND2	4.5 – 5.5 V

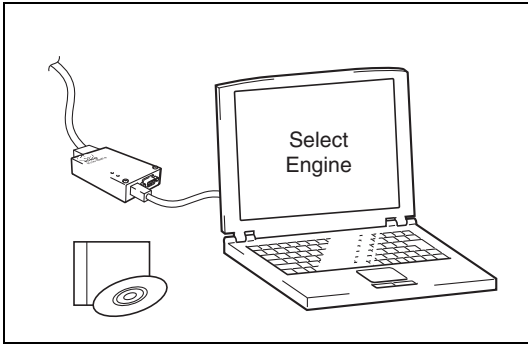
Do the measurements meet the standard value?

YES

Go to step 18.

NO

Repair the common rail pressure sensor and then go to step 18.

18 Inspect the crankshaft position sensor (engine speed main sensor) [Hino-DX]

SAPH16F010301004

1. Set the starter switch to the "ON" position.
2. Select [Engine].
3. Select [NE sensor active flag], [G sensor active flag] in [Data Monitor].
4. Start the engine and confirm that the engine main speed sensor (NE) and sub speed sensor (G) operate (stay ON) continuously.

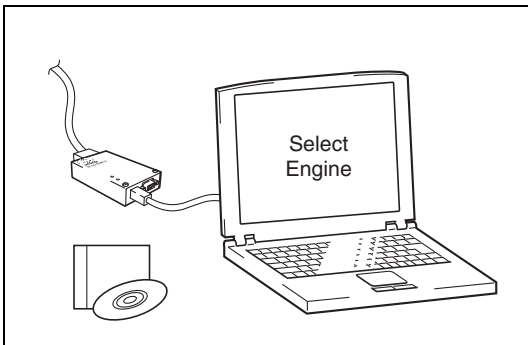
Was any failure found?

YES

Check the faulty sensor and repair or replace if as needed.
After inspection, go to step 19.

NO

Go to step 19.

19 SCV free acceleration test [Hino-DX]

SAPH16F010301005

1. Perform an SCV test and a malfunction reproduction test.
 - For a detailed procedure, refer to the separate "SCV free acceleration test".
2. Compare the test results with those obtained in step 4 and check if they improved.

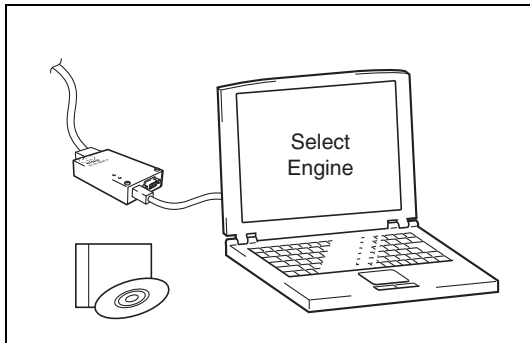
Was the data improved?

YES

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

NO

Go to step 20.

20 SCV free acceleration test [Hino-DX]

SAPH16F010301006

1. Check that the malfunction pattern from the malfunction reproduction test carried out in step 19, and replace the pertinent part.

<Reproduction test results>**a, g: Replace the supply pump.****b, c, d, h, i, j: Replace the SCV.****e: Replace the common rail.****f: Check the fuel return pipe/hose.**

2. After replacing the part, perform the SCV test and malfunction reproduction test again.
3. Compare the test results with those obtained in step 4 and check if they improved.

Did the test results improve?**YES****NO**

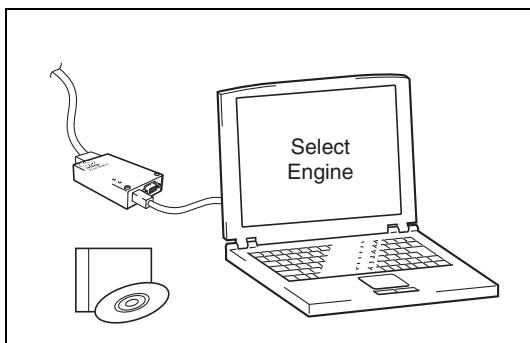
Procedure completed.
Perform "After-inspection work" of INFORMATION section.

Go to step 21.**21 Inspect the fuel return pipe and hose**

1. Check if the fuel return pipe and hose are clogged.

Was any failure found?**YES****NO**

Repair or replace the faulty part, and go to step 22.

Go to step 22.**22 SCV free acceleration test [Hino-DX]**

SAPH16F010301007

1. Perform an SCV test and a malfunction reproduction test.
 - For a detailed procedure, refer to the separate "SCV free acceleration test".
2. Compare the test results with those obtained in step 4 and check if they improved.

Did the test results improve?

YES

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

NO

Go to step 23.

23 Check again the fuel pipe

1. Check the fuel pipe again (steps 7 – 13).

Was any failure found?

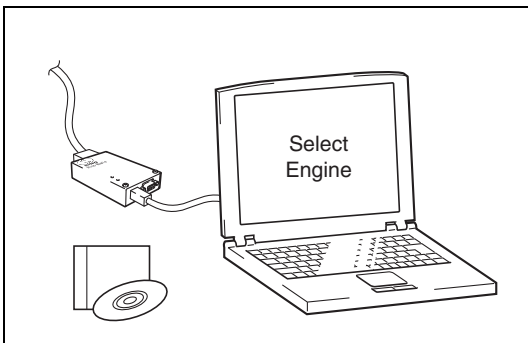
YES

Repair or replace the faulty part, and go to step 24.

NO

Go to step 24.

24 SCV free acceleration test [Hino-DX]



SAPH16F010301008

1. Perform an SCV test and a malfunction reproduction test.
 - For a detailed procedure, refer to the separate "SCV free acceleration test".
2. Compare the test results with those obtained in step 4 and check if they improved.

Did the test results improve?

YES

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

NO

Go to step 25.

25 Check again the sensor system

1. Check the sensor system again (steps 15 – 18).

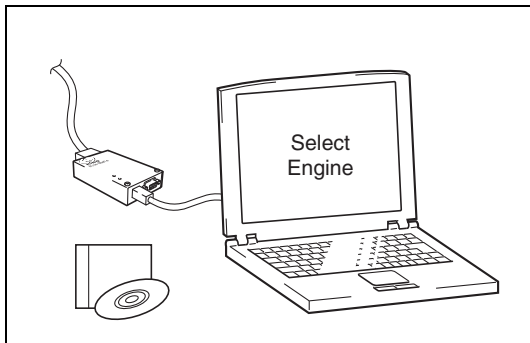
Was any failure found?

YES

Repair or replace the faulty part, and go to step 26.

NO

Go to step 26.

26 SCV free acceleration test [Hino-DX]

SAPH16F010301009

1. Perform an SCV test and a malfunction reproduction test.
 - For a detailed procedure, refer to the separate "SCV free acceleration test".
2. Compare the test results with those obtained in step 4 and check if they improved.

Did the test results improve?

YES

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

NO

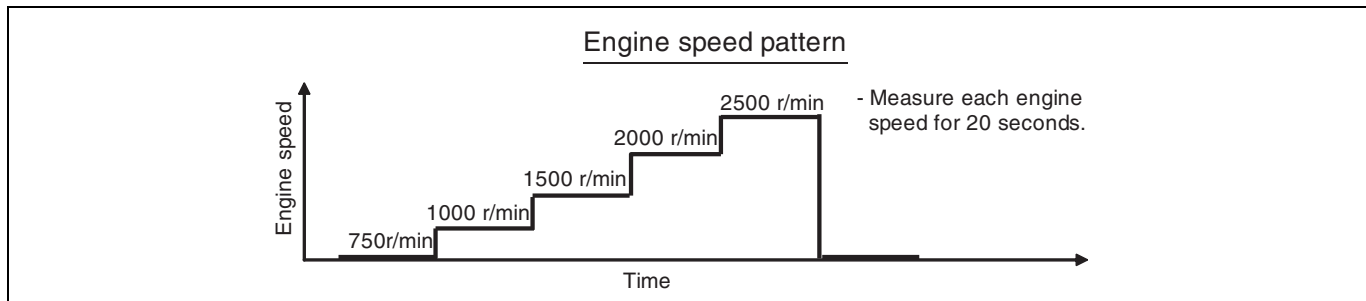
Contact the Hino national service manager.

SCV FREE ACCELERATION TEST

1 Test method

<Engine speed pattern>

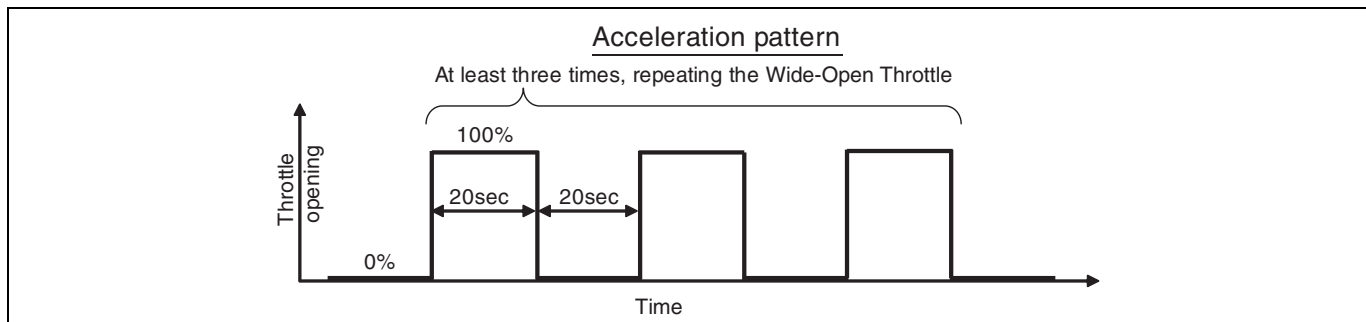
1. After engine has reached operating temperature (more than 82 °C {179.6 °F}).
2. After air compressor completed building pressure.
3. A/C, Head lights off.
4. All devices off. (PTO, Refrigeration compressor. etc)
5. Control the engine revolution by means of operating Cruise Control system.



SAPH16F010301010

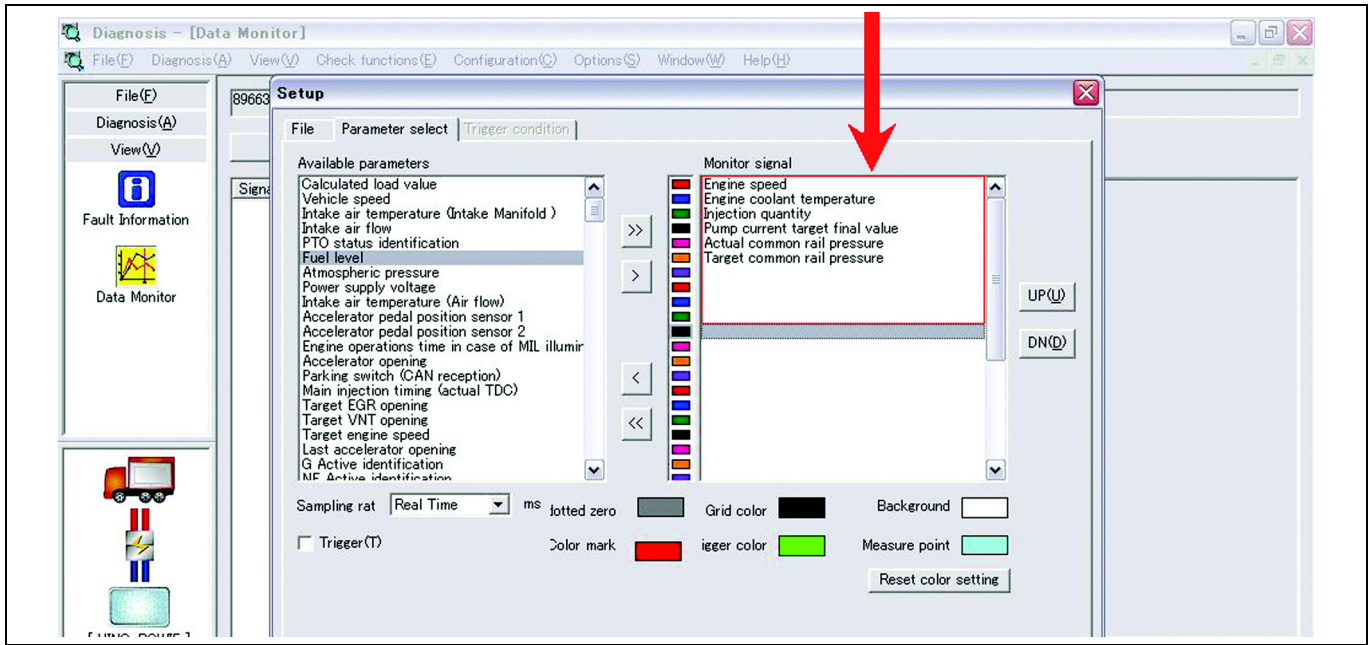
<Acceleration pattern>

1. After engine has reached operating temperature (more than 82 °C {179.6 °F}).
2. After air compressor completed building pressure.
3. A/C, Head lights off.
4. All devices off. (PTO, Refrigeration compressor. etc)
5. Check that actual common rail pressure following target.



SAPH16F010301011

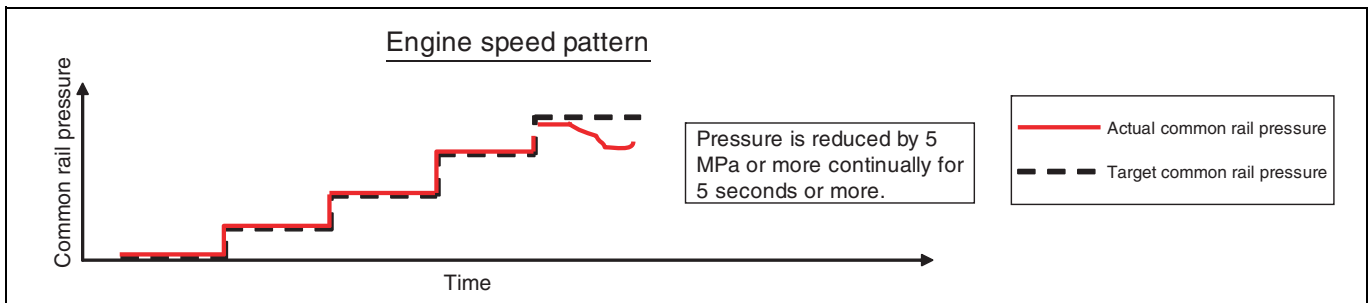
2 Types of Hino-DX data to be measured



SAPH16F010301012

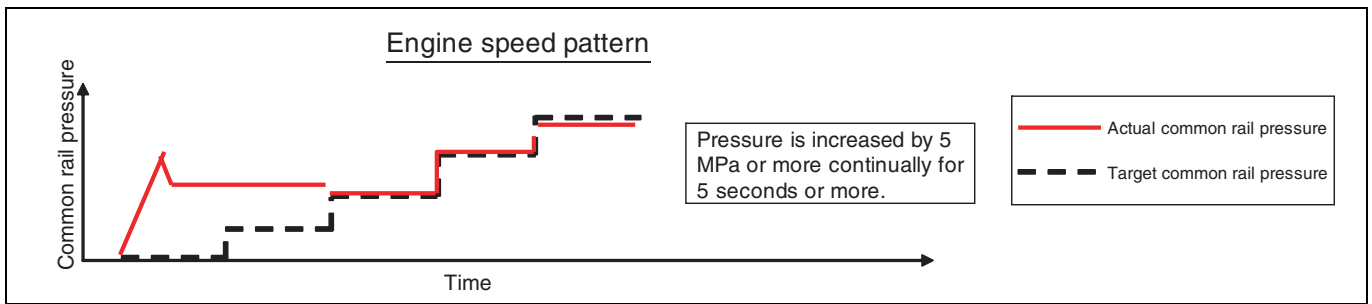
3 If the following symptoms occur, FAIL. If not, OK.

- a. Pressure is reduced by 5 MPa or more continually for 5 seconds or more. → Replace the supply pump.



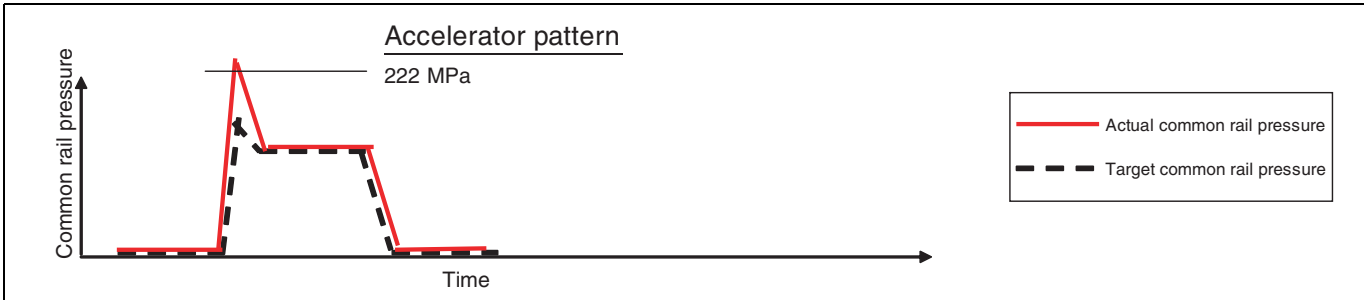
SAPH16F010301013

- b. Pressure is increased by 5 MPa or more continually for 5 seconds or more. → Replace the SCV.



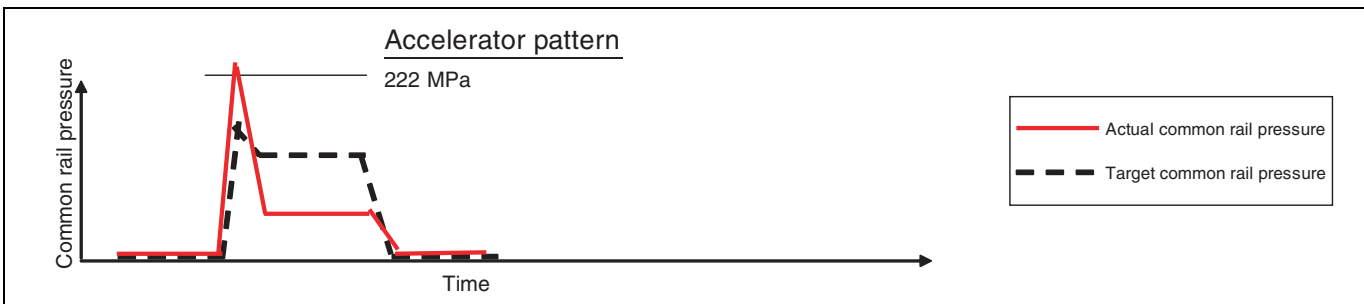
SAPH16F010301014

- c. The maximum common rail pressure exceeds 222 MPa for even a moment during pressure increase. → Replace the SCV.



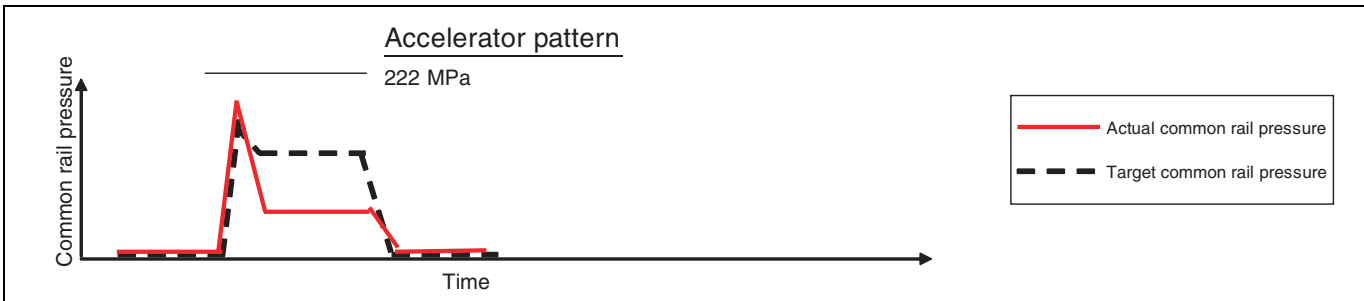
SAPH16F010301015

- d. After the maximum common rail pressure exceeds 222 MPa during pressure increase, the actual rail pressure falls below the target rail pressure. → Replace the SCV.



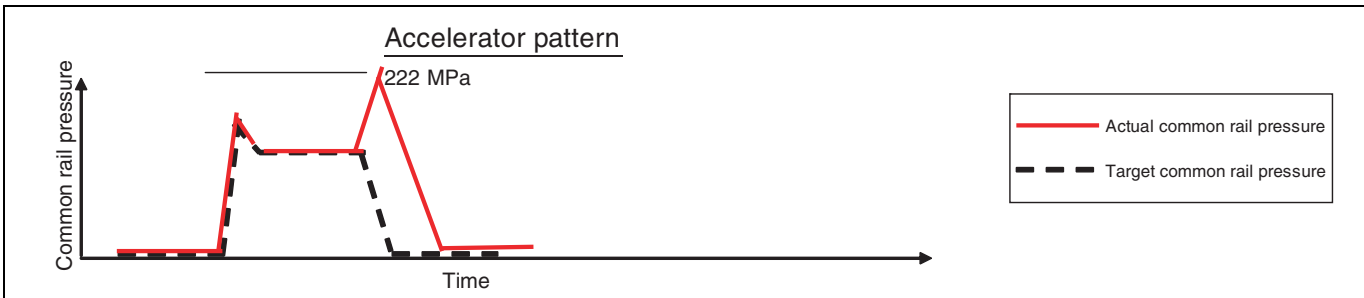
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- e. Before the maximum common rail pressure exceeds 222 MPa during pressure increase, the actual rail pressure falls below the target rail pressure rapidly. → Replace the common rail.



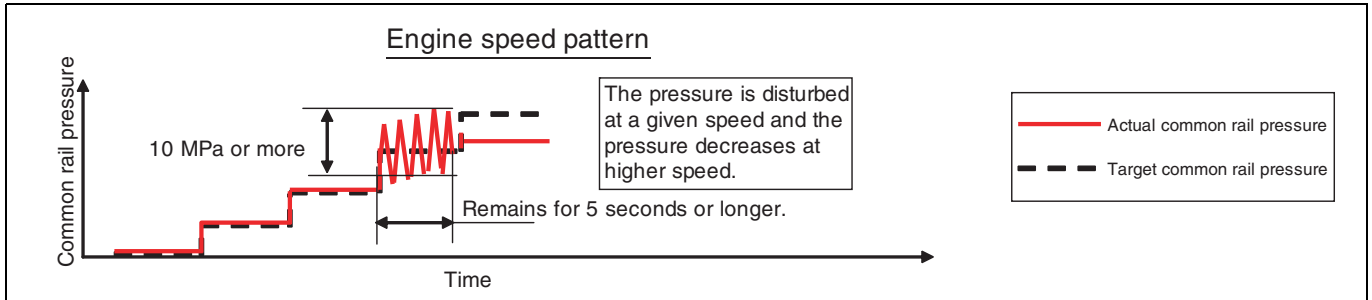
SAPH16F010301017

- f. The maximum common rail pressure exceeds 222 MPa during pressure drop. → Check the return pipe.



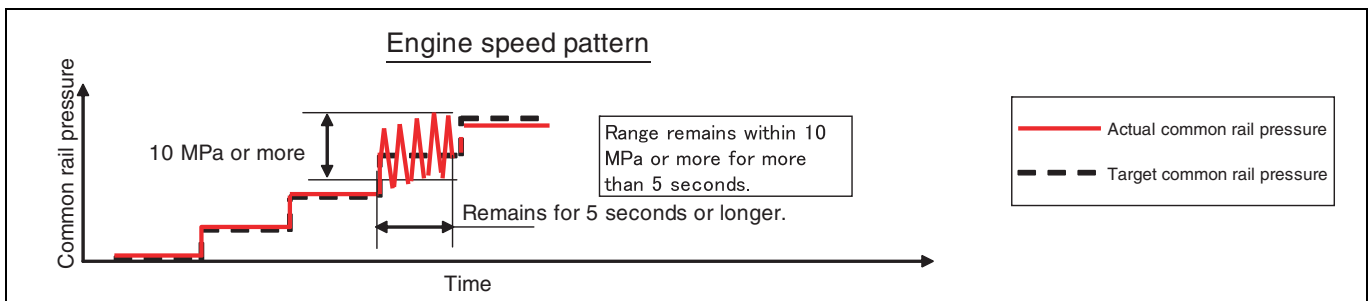
SAPH16F010301018

- g. The pressure is disturbed at a given speed and the pressure decreases at higher speed. → Replace the supply pump.



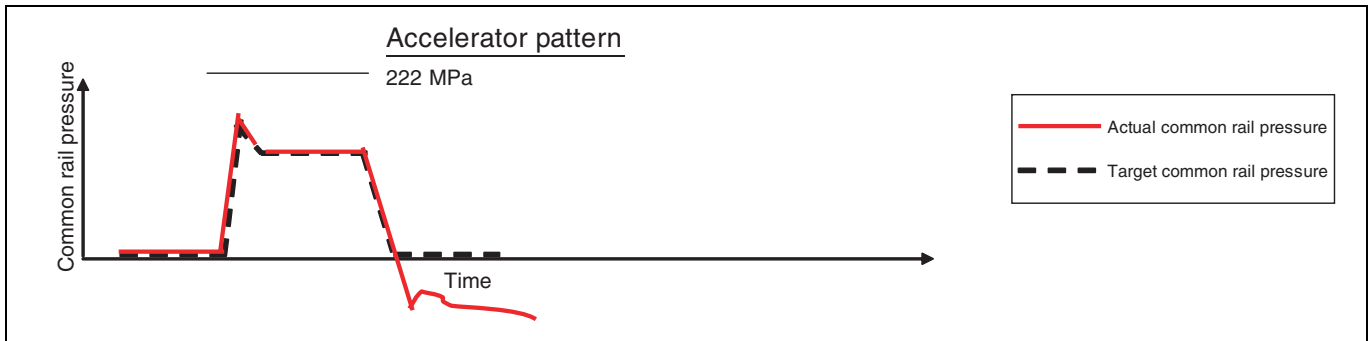
SAPH16F010301019

- h. Hunting remains within 10 MPa or more for more than 5 seconds. → Replace the SCV.



SAPH16F010301020

- i. The engine stops during pressure relief. → Replace the SCV.



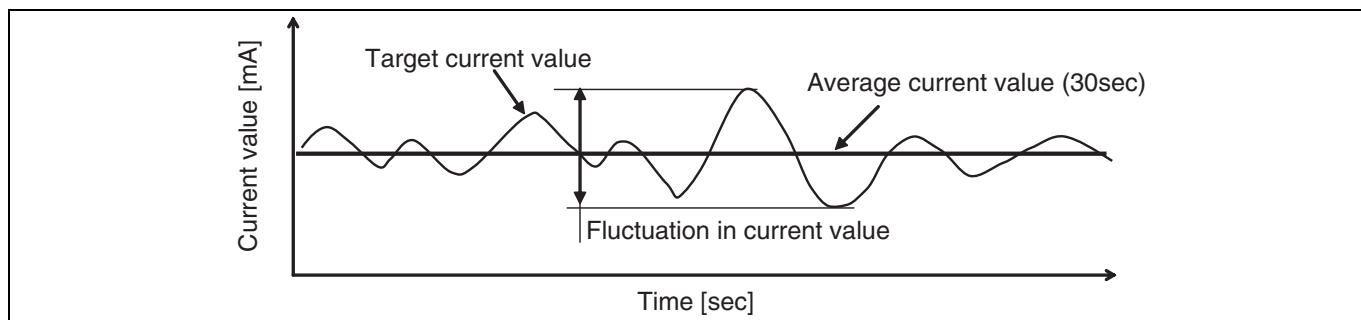
SAPH16F010301021

- j. Target common rail pressure during idling deviates from the standard value. → Replace the SCV.

<FINAL VALUE OF PUMP CURRENT TARGET test>

1. After engine has reached operating temperature. (more than 82 °C {179.6 °F})
2. After air compressor has completed building pressure.
3. A/C, Head lights are off.
4. All other devices turned off. (PTO, Refrigeration compressor. etc)
5. Engine speed : 750 r/min

Criteria		
FINAL VALUE OF PUMP CURRENT TARGET	Average current value	1740 ± 80 mA
	Fluctuation in current value	≤ 80 mA



SAPH16F010301022

CHECKLIST: P2635

DTC: P2635		Fuel Pump Low Flow/Performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the start of the engine	Inspect the start of the engine.	Engine started: Go to YES. Engine did not start: Go to NO.		Go to step 4.	Go to step 2.
2	Inspect the fuel pump	Check if fuel is leaking or seeping out of the fuel pump.	Failure found: Go to YES. No failure found: Go to NO.		Replace the fuel pump, and go to step 4 after replacement.	Go to step 3.
3	Function check of fuel pump [Hino-DX]	<ol style="list-style-type: none"> 1. Select [Actual common rail pressure] and [Target common rail pressure] in [Data Monitor]. 2. Start the engine while checking the common rail pressure. 	<p>After the actual common rail pressure is increased, it stabilized at a constant value: Go to YES.</p> <p>Unlike the above: Go to NO.</p>		Replace the fuel pump, and go to step 4 after replacement.	Inform to TMS. Perform "After-inspection work" of INFORMATION section.
4	SCV free acceleration test [Hino-DX]	<ol style="list-style-type: none"> 1. Select [Freeze Frame] of DTC P0088 in [Fault Information] in Hino-DX menu, and confirm the freeze-frame data. 2. Conduct an SCV test and confirm the existing data. <ul style="list-style-type: none"> • For a detailed procedure, refer to the separate "SCV free acceleration test" in the following pages. 	Data checked: Go to YES.		Go to step 5.	
5	Check the engine ECU	Check the engine ECU software part number (ECU part number) by Hino-DX. (Select [About System] in the [View] menu.) Confirm the latest software number with Hino national service manager.	<p>It is the latest version: Go to YES.</p> <p>It is not the latest version: Go to NO.</p>		Go to step 6.	Reprogram the engine ECU and then go to step 6. Refer to the section "Reprogramming work" in the chapter "HINO Reprog Manager".

DTC: P2635		Fuel Pump Low Flow/Performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
6	Inspect the fuel filter	<ol style="list-style-type: none"> Check the fuel filter. <ul style="list-style-type: none"> Has the replacement period expired? Is it dirty, damaged, or clogged? Is it a genuine Hino part? Check if the fuel inside the fuel filter is within the standard value. 	While engine is running, At least 25.4 mm {1 in.} above collar and below the element upper level. Fuel level does not continue to drop during wide open throttle.→YES		Replace the fuel filter element, and go to step 7.	Go to step 12.
7	Inspect the fuel pipe	<ol style="list-style-type: none"> Check if the fuel pipe and hose between the fuel tank and fuel filter are Make sure the fuel pipe joint bolts are not loose. 	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part, and go to step 8.	Go to step 8.
8	Inspect the fuel tank breather	<ol style="list-style-type: none"> Check if the breather hose is clogged, punctured, or bent. Make sure the check valve is functioning normally. 	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part, and go to step 9.	Go to step 9.
9	Inspect the fuel tank feed pipe	Make sure the fuel tank feed pipe is not clogged.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part, and go to step 10.	Go to step 10.
10	Inspect the fuel tank	Drain fuel out of the fuel tank and check if there are foreign objects inside the tank.	Failure found: Go to YES. No failure found: Go to NO.		Remove the foreign object and clean the fuel tank, then go to step 11 after cleaning.	Go to step 11.
11	Inspect the fuel pump gauze filter	Make sure the gauze filter (built into the fuel pump) is not clogged.	Failure found: Go to YES. No failure found: Go to NO.		Clean the gauze filter, and go to step 12.	Go to step 12.
12	Inspect the fuel high-pressure pipe	Make sure the fuel high-pressure pipe is not leaking fuel.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part, and go to step 13.	Go to step 13.

DTC: P2635		Fuel Pump Low Flow/Performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
13	Inspect the bubble separator	Make sure the bubble separator is not clogged.	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part, and go to step 14.	If failure was found in steps 7 to 12: Go to step 14. If failure was not found in steps 7 to 12: Go to step 15.
14	SCV free acceleration test [Hino-DX]	<ol style="list-style-type: none"> Perform an SCV test and a malfunction reproduction test. Compare the results with those obtained in step 4 and check if they improved. <ul style="list-style-type: none"> For a detailed procedure, refer to the separate "SCV free acceleration test". 	<p>The results improved: Go to YES.</p> <p>The results did not improve: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Go to step 15.
15	Inspect the SCV connector	Check the connection of the SCV connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part, and go to step 16.	Go to step 16.
16	Inspect the common rail pressure sensor connector	Check the connection of the common rail pressure sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part, and go to step 17.	Go to step 17.
17	Inspect the common rail pressure sensor power supply	<p>Disconnect the common rail pressure sensor connector and, measure the voltage between the terminals VCC and GND of the common rail pressure sensor vehicle-side connector.</p> <p><Tester connections> Common rail pressure sensor vehicle-side connector VCC2 – GND2</p> <p><Standard values> 4.5 – 5.5 V</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 18.	Repair the sensor and then go to step 18.
18	Inspect the crankshaft position sensor (engine speed main sensor) [Hino-DX]	<p>Select [NE sensor active flag] and [G sensor active flag] in [Data Monitor].</p> <p>Start the engine and confirm that the engine main speed sensor (NE) and sub speed sensor (G) operate (stay ON) continuously.</p>	Failure found: Go to YES. No failure found: Go to NO.		Check the faulty sensor and repair or replace if as needed. After inspection go to step 19.	Go to step 19.

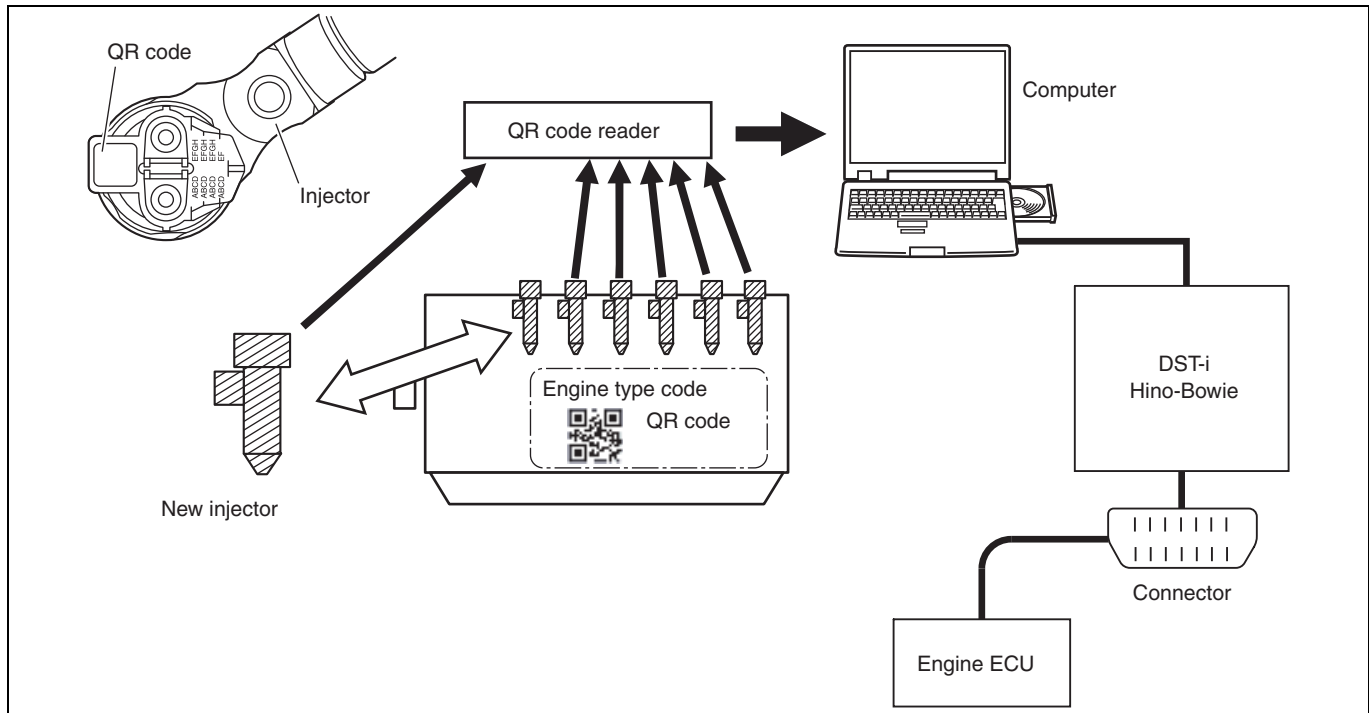
DTC: P2635		Fuel Pump Low Flow/Performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
19	SCV free acceleration test [Hino-DX]	<ol style="list-style-type: none"> Perform an SCV test and a malfunction reproduction test. <ul style="list-style-type: none"> For a detailed procedure, refer to the separate "SCV free acceleration test." Compare the test results with those obtained in step 4 and check if they improved. 	<p>The results improved: Go to YES.</p> <p>The results did not improve: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Go to step 20.
20	SCV free acceleration test [Hino-DX]	<ol style="list-style-type: none"> Check that the malfunction pattern from the malfunction reproduction test carried out in step 19, and replace the pertinent part. <p><Reproduction test results></p> <ul style="list-style-type: none"> a, g: Replace the fuel pump. b, c, d, h, i, j: Replace the SCV. e: Replace the common rail. f: Check the fuel return pipe/hose. Compare the test results with those obtained in step 4 and check if they improved. 	<p>The results improved: Go to YES.</p> <p>The results did not improve: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Go to step 21.
21	Inspect the fuel return pipe and hose	Check if the fuel return pipe and hose are clogged.	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Repair or replace the faulty part, and go to step 22.	Go to step 22.
22	SCV free acceleration test [Hino-DX]	<ol style="list-style-type: none"> Perform an SCV test and a malfunction reproduction test. <ul style="list-style-type: none"> For a detailed procedure, refer to the separate "SCV free acceleration test". Compare the test results with those obtained in step 4 and check if they improved. 	<p>The results improved: Go to YES.</p> <p>The results did not improve: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Go to step 23.
23	Check again the fuel pipe	Check the fuel pipe again (steps 7 to 13).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Repair or replace the faulty part, and go to step 24.	Go to step 24.

DTC: P2635		Fuel Pump Low Flow/Performance		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
24	SCV free acceleration test [Hino-DX]	<ol style="list-style-type: none"> 1. Perform an SCV test and a malfunction reproduction test. <ul style="list-style-type: none"> • For a detailed procedure, refer to the separate "SCV free acceleration test". 2. Compare the test results with those obtained in step 4 and check if they improved. 	<p>The results improved: Go to YES.</p> <p>The results did not improve: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Go to step 25.
25	SCV free acceleration test [Hino-DX]	Check the sensor system again (steps 15 to 18).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Repair or replace the faulty part, and go to step 26.	Go to step 26.
26	SCV free acceleration test [Hino-DX]	<ol style="list-style-type: none"> 1. Perform an SCV test and a malfunction reproduction test. <ul style="list-style-type: none"> • For a detailed procedure, refer to the separate "SCV free acceleration test". 2. Compare the test results with those obtained in step 4 and check if they improved. 	<p>The results improved: Go to YES.</p> <p>The results did not improve: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Contact the TMS. Perform "After-inspection work" of INFORMATION section.

DTC: P268A and P2696

EN01H16F01030F03001157

P268A: Fuel injector adjustment data error INFORMATION



SAPH16F010301023

1. Technical description

- The fuel injection rate is controlled by operation of the injector magnetic valve according to the injector valve-open interval instructions from the engine ECU. In order to correct for injector manufacturing variations, however, a variation correction value (injector correction value) is measured, and then written into the engine ECU, during the injector manufacturing process.

<Description of malfunction>

- Faulty injector correction value is detected.

2. DTC set condition

(1) DTC detection condition

- Correction data was not written in the engine ECU.
- Wrong correction data was written in the engine ECU.

(2) Judgement criteria

- Either of the two above detection conditions continues for at least 3 seconds.

3. Reset condition

- Just after restoration to normal condition.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

-

<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

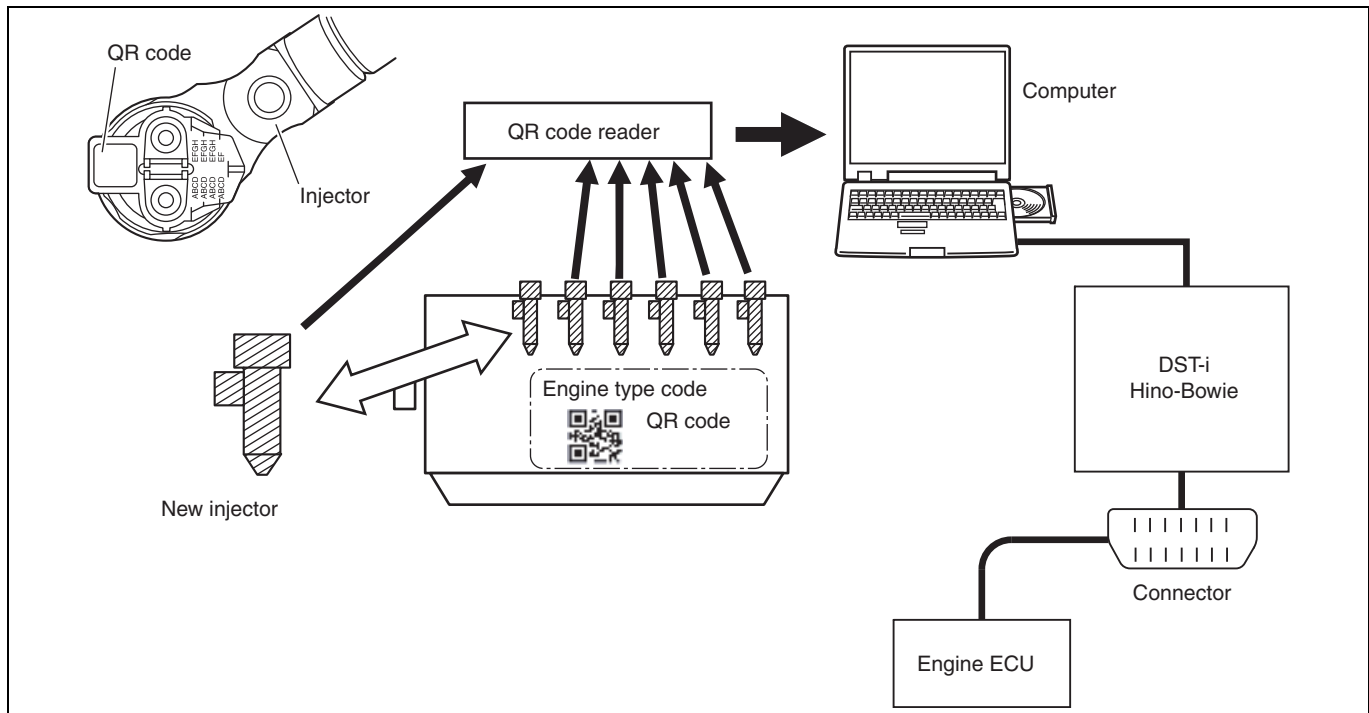
- Clear all past DTCs.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Data do not match correction data registered with the server.
- Correction data insertion error (Only when inserting the data by hand).
- Engine ECU failure

P2696: Fuel injector adjustment data error

INFORMATION



SAPH16F010301024

1. Technical description

- The fuel injection rate is controlled by operation of the injector magnetic valve according to the injector valve-opening interval instructions from the engine ECU. In order to correct for injector manufacturing variations, however, a variation correction value (injector correction value) is measured, and then written into the engine ECU, during the injector manufacturing process.

<Description of malfunction>

- Faulty injector correction value is detected.

2. DTC set condition

(1) DTC detection condition

- Injector correction data inside the engine ECU abnormal.

(2) Judgement criteria

- Any of the above detection conditions continues for at least 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

-

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Data do not match correction data registered with the server.
- Engine ECU failure

INSPECTION PROCEDURE: P268A and P2696**1 Check the injector replace record**

1. Check injector replaced record.

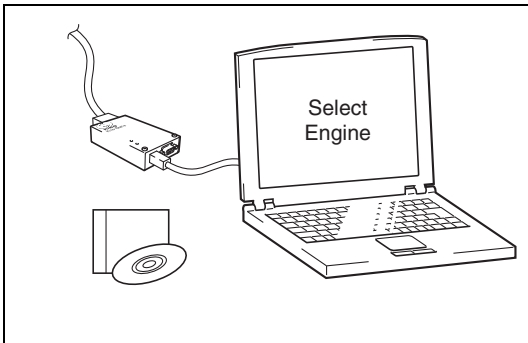
Does the injector have a replacement record?

YES

Go to step 3.

NO

Go to step 2.

2 Inspect the injector calibration data (QR CODE) [Hino-DX]

SAPH16F010301025

1. Re-input the registration injector calibration data (QR CODE) of the service server.
2. Erase the DTC memory, and check again DTC code. Check that (P268A or P2696) has not been displayed in [Fault Information].

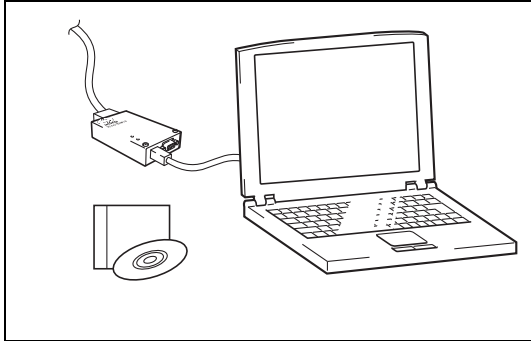
Has DTC (P268A or P2696) been detected?

YES

Go to step 3.

NO

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

3 Inspect the injector calibration data (QR CODE) [Hino-DX]

SAPH16F010301026

1. Read the injector calibration data (QR CODE) of the injectors using Hino-DX, re-input injector calibration data (QR CODE).
2. Erase the DTC memory, and check again DTC code. Check that (P268A or P2696) has not been displayed in [Fault Information].

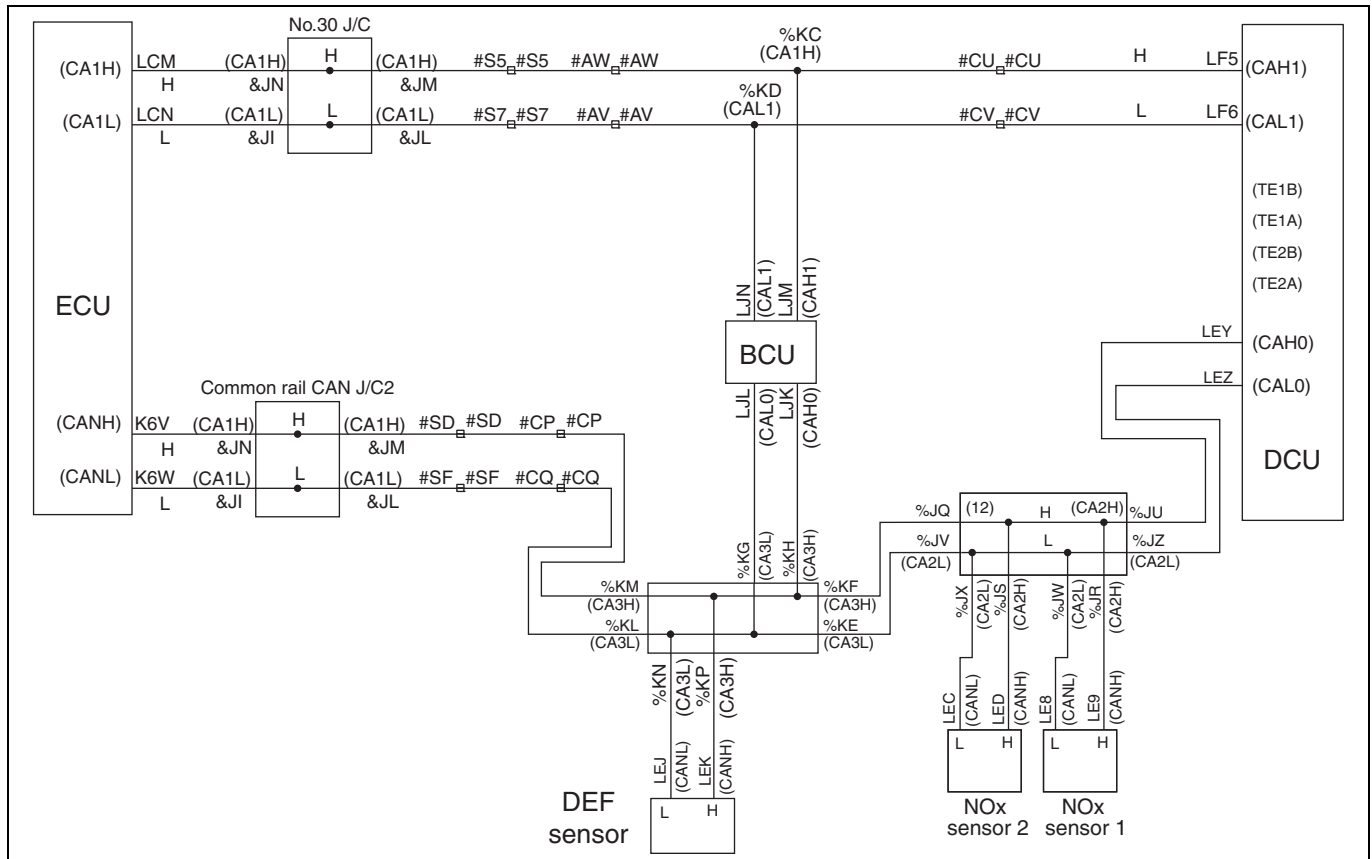
Has DTC (P268A or P2696) been detected?**YES****Replace the engine ECU.
Perform "After-inspection work" of INFORMATION section.****NO****Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P268A and P2696

DTC: P268A		Fuel injector adjustment data error		Inspection procedure		
DTC: P2696		Fuel injector adjustment data error				
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check injector replaced record	Check injector replaced record.	History of replacement found: Go to YES. History of replacement not found: Go to NO.		Go to step 3.	Go to step 2.
2	Inspect the injector calibration data (QR CODE) [Hino-DX]	<ol style="list-style-type: none"> 1. Re-input the registration injector calibration data (QR CODE) of the service server. 2. Erase the DTC memory, and check again DTC code. Check that DTC (P268A or P2696) is not displayed in [Fault Information]. 	<p>the DTC has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Go to step 3.	Procedure completed. Perform "After-inspection work" of INFORMATION section.
3	Inspect the injector calibration data (QR CODE) [Hino-DX]	Check if the DTC (P268A or P2696) has been detected in [Engine].	<p>DTC (P268A or P2696) has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the engine ECU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2BA9

EN01H16F01030F03001158

P2BA9: Insufficient Reagent Quality
INFORMATION

SAPH16F010301027

1. Technical description

- Poor DEF quality is determined by the DEF quality sensor, which measures the DEF concentration and determines its quality.

<Description of malfunction>

- Poor DEF quality is detected.

2. DTC set condition

(1) DTC detection condition

[Normal conditions]**Conditions below continue for 10 seconds:**

- Starter switch ON.
- DEF tank level > 25 %
- DEF tank temperature 1 > -5 °C {23 °F}
- DEF tank temperature 2 > -5 °C {23 °F}
- [DEF tank temperature 1 - temperature 2] < 15 °C {59 °F}
- Difference among exhaust temperature (DPR inlet), coolant temperature, and DEF tank temperature 2 is no greater than 15 °C {59 °F}.
- DEF pump is not operating.
- There is no record of vehicle speed > 2 km/h.
- There is no record of transmission being in any gear other than neutral.
- There is no record of malfunction determination after starter switch has been turned ON.

- Battery voltage > 11 V
- DEF tank sensor is working normally.
- There is no interruption between DEF tank sensor and CAN.

[After malfunction is detected]

- DEF has been refilled with the starter switch ON.

(2) Judgement criteria

- The average value of DEF concentration over 10 seconds is below the standard value.

3. Reset condition

- After restoration to normal condition.

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

- Diag lamp: ON (DEF quality malfunction lamp)
- Engine output is restricted.
- Vehicle speed is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.
- Vehicle does not speed up.

<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.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- Abnormal DEF concentration
- Dirt or foreign substance inside DEF tank
- DEF quality sensor failure

INSPECTION PROCEDURE: P2BA9

1	Inspect the DEF
----------	------------------------

1. Check the DEF concentration.

Standard values
Concentration: 32.5 ± 2.5 %

Do the measurements meet the standard value?

YES

Go to step 2.

NO

Replace the DEF.

If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, and then refill the tank with at least 5 liters {1.3 gallons} of DEF solution. Afterward, drive the vehicle and confirm that the problem does not recur under driving conditions.

Perform "After-inspection work" of INFORMATION section.

2	Perform a basic engine check
----------	-------------------------------------

1. Perform a basic engine check using the Engine Basic Checksheet. Refer to "ENGINE BASIC INSPECTION SHEET (ENGINE INSPECTION CHECK SHEET)".

Was any failure found?

YES

Repair or replace faulty parts.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3	Inspect the DEF tank
----------	-----------------------------

1. Remove the DEF tank from the vehicle.
2. Remove the DEF quality sensor from the DEF tank.
3. Drain the DEF solution from the DEF tank and check the tank interior for the presence of foreign substances.

Was any failure found?

YES

Remove the foreign substances and clean the DEF tank interior.

**CAUTION**

Use fresh water or a diluted DEF solution to clean the DEF tank interior.

Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Check the DEF quality sensor

1. Make sure there is no dirt or damage to the DEF quality sensor.

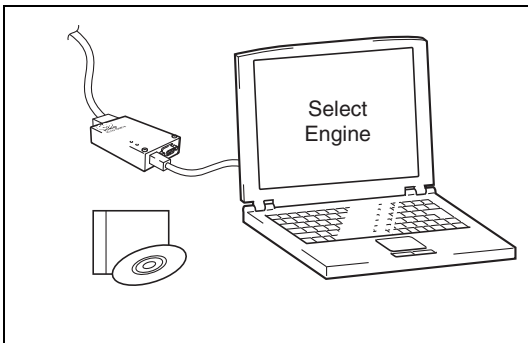
Was any failure found?

YES

Clean the DEF quality sensor.
Go to step 4.

NO

Go to step 5.

5 Check the DTC detected (Engine ECU) [Hino-DX]

SAPH16F010301028

1. Temporarily install the DEF quality sensor in the DEF tank and mount the tank on the vehicle. (This makes it possible to connect the DEF quality sensor connector.)
2. Fill the tank with the standard concentration of DEF solution.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [Engine] and check if DTC P2BA9 has been detected in [Fault Information].

Has DTC P2BA9 been detected?

YES

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

NO

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

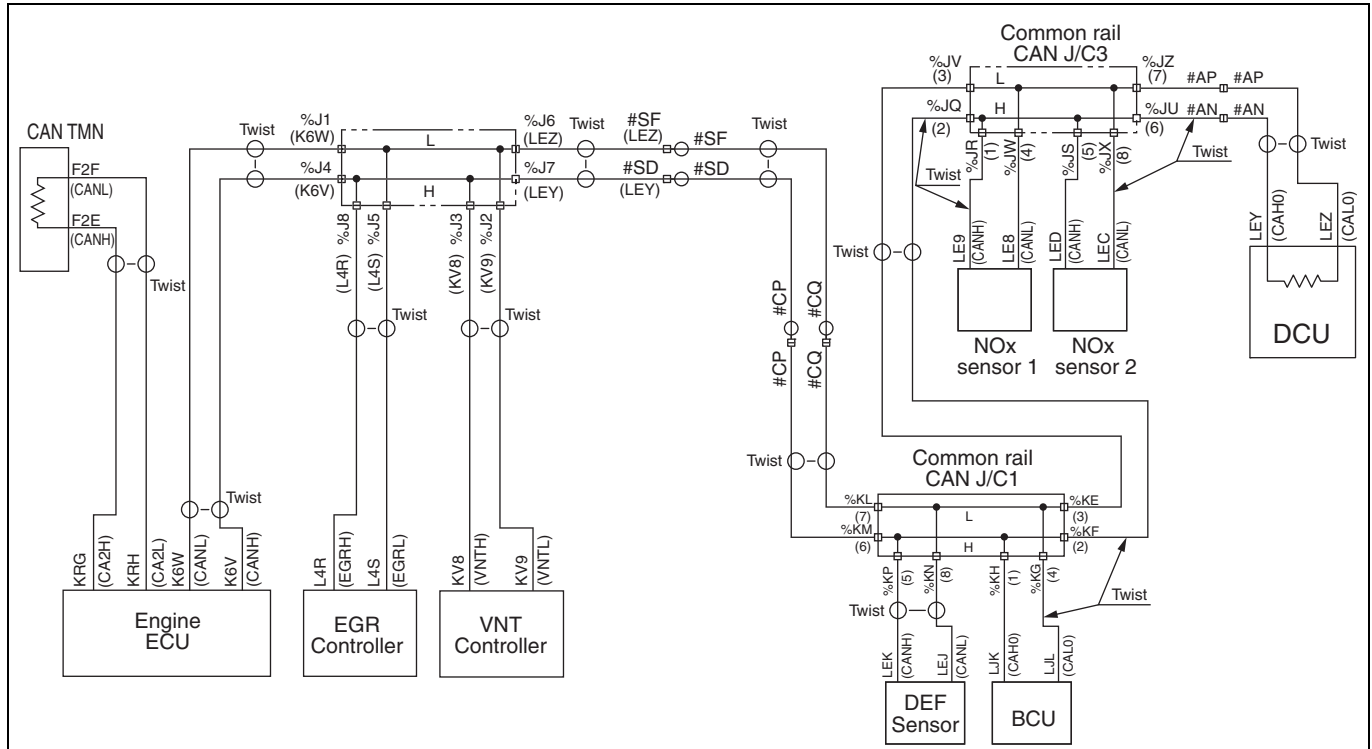
CHECKLIST: P2BA9

DTC: P2BA9		Insufficient Reagent Quality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF	Check the DEF concentration. <Standard values> 32.5 ± 2.5 %	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 2.	<p>Replace the DEF.</p> <p>If the DEF concentration is below the standard, drain the DEF solution through the tank drain with the starter switch ON, and then refill the tank with at least 5 liters {1.3 gallons} of DEF solution. Afterward, drive the vehicle and confirm that the problem does not recur under driving conditions. Perform "After-inspection work" of INFORMATION section.</p>
2	Perform a basic engine check	Perform a basic engine check using the Engine Basic Check-sheet.	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 3.

DTC: P2BA9		Insufficient Reagent Quality		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
3	Inspect the DEF tank	<ol style="list-style-type: none"> 1. Remove the DEF tank from the vehicle and remove the DEF quality sensor from the DEF tank. 2. Drain the DEF solution from the DEF tank and check the tank interior for the presence of foreign substances. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Remove the foreign substances and clean the DEF tank interior.</p> <p>⚠ CAUTION Use fresh water or a diluted DEF solution to clean the DEF tank interior.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 4.
4	Check the DEF quality sensor	Make sure there is no dirt or damage to the DEF quality sensor.	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the DEF quality sensor. Go to step 4.	Go to step 5.
5	Check the DTC detected (Engine ECU) [Hino-DX]	<ol style="list-style-type: none"> 1. Temporarily install the DEF quality sensor in the DEF tank and mount the tank on the vehicle. (This makes it possible to connect the DEF quality sensor connector.) 2. Fill the tank with the standard concentration of DEF solution. 3. Check if DTC P2BA9 has been detected in [Engine]. 	<p>DTC P2BA9 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the DEF quality sensor. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: U0073

EN01H16F01030F03001159

U0073: Engine ECU CAN communication bus for Emission control system - bus off INFORMATION

SAPH16F010301029

1. Technical description**<Description of malfunction>**

- Abnormal engine CAN communication (bus off) is detected.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- Buss off condition continues for 96 ms or longer.

3. Reset condition

- After normal operation is restored and the key is turned LOCK.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

-

6. Pre-inspection work

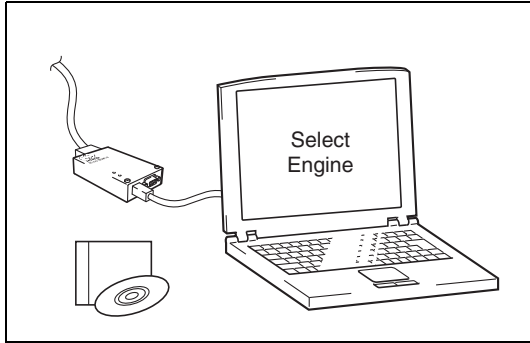
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- CAN communication harness failure (disconnection, short-circuit or terminating resistance)
- Poor connector contact or faulty connector fit
- Failure of unit connected to the engine ECU
- Engine ECU failure

INSPECTION PROCEDURE: U0073**1 Check the DTC detected (Engine ECU)**

SAPH16F010301030

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if U0073 has been detected in [Fault Information].

Has DTC U0073 been detected?**YES****Replace the engine ECU.****NOTICE**

If multiple CAN communication-related DTCs (U ***) are detected, it is considered failure of the main CAN communication line. Refer to "ENGINE CAN COMMUNICATION LINE / CAN COMMUNICATION LINE MALFUNCTION PART DETERMINATION TABLE" of "CAN chapter" and inspect the diagnosed item of the detected DTC.

NO**Procedure completed.**

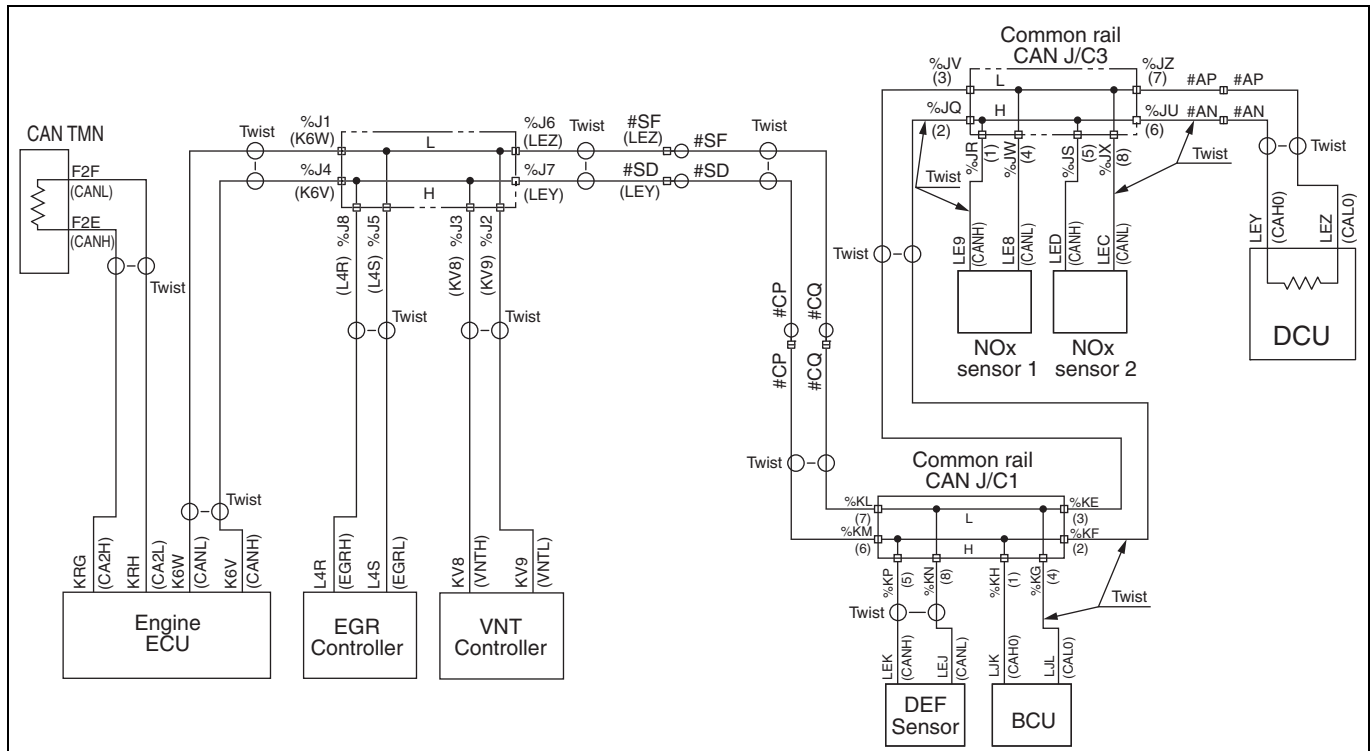
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: U0073

DTC: U0073		Engine ECU CAN communication bus for Emission control system - bus off		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine ECU)	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Connect the vehicle to Hino-DX. 3. Set the starter switch to the "ON" position. 4. Check if U0073 has been detected in [Engine]. 	<p>DTC U0073 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the engine ECU.</p> <p>NOTICE If multiple CAN communication-related DTCs (U ***) are detected, it is considered failure of the main CAN communication line. Refer to "ENGINE CAN COMMUNICATION LINE / CAN COMMUNICATION LINE MALFUNCTION PART DETERMINATION TABLE" of "CAN chapter" and inspect the diagnosed item of the detected DTC.</p>	<p>Procedure completed. Perform "After-inspection work" of INFORMATION section.</p>

DTC: U010A

EN01H16F01030F03001160

U010A: Engine ECU CAN communication (EGR valve control)
INFORMATION

SAPH16F010301031

1. Technical description

- -

<Description of malfunction>

- CAN communication with EGR control is interrupted.

2. DTC set condition

(1) DTC detection condition

- Starter switch is ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- No CAN data is received from EGR controller for at least 3 seconds.

3. Reset condition

- After normal operation is restored and the key is turned LOCK.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

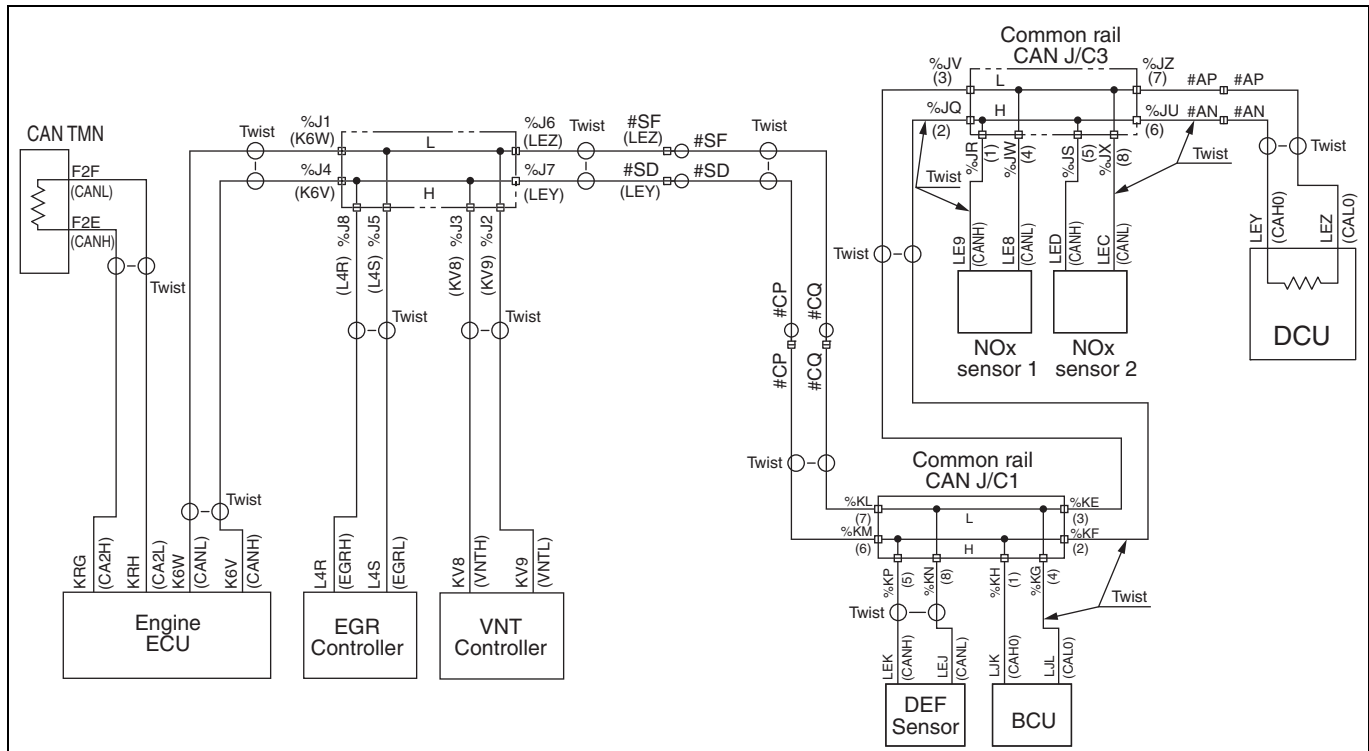
- CAN circuit failure (engine CAN)
- EGR controller failure
- Harness disconnection or short-circuit

INSPECTION PROCEDURE: U010A

Refer to the "ENGINE CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U010C

EN01H16F01030F03001161

U010C: VNT actuator CAN communication error
INFORMATION

SAPH16F010301032

1. Technical description

- -

<Description of malfunction>

- CAN communication between the VNT controller and engine ECU is interrupted.

2. DTC set condition

- (1) DTC detection condition
 - Starter switch is ON.
 - Engine ECU power supply voltage is in the range of 11 V to 16 V.
- (2) Judgement criteria
 - When CAN data from the engine ECU cannot be received by the VNT controller for at least 1 second.
 - When the CAN data sent from the engine ECU exceeds its range.
 - When CAN data from the VNT controller is not received by the engine ECU for at least 3 seconds.

3. Reset condition

- After normal operation is restored and the starter switch is turned OFF.

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

- MIL: ON
- Diag lamp: OFF
- Engine output is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

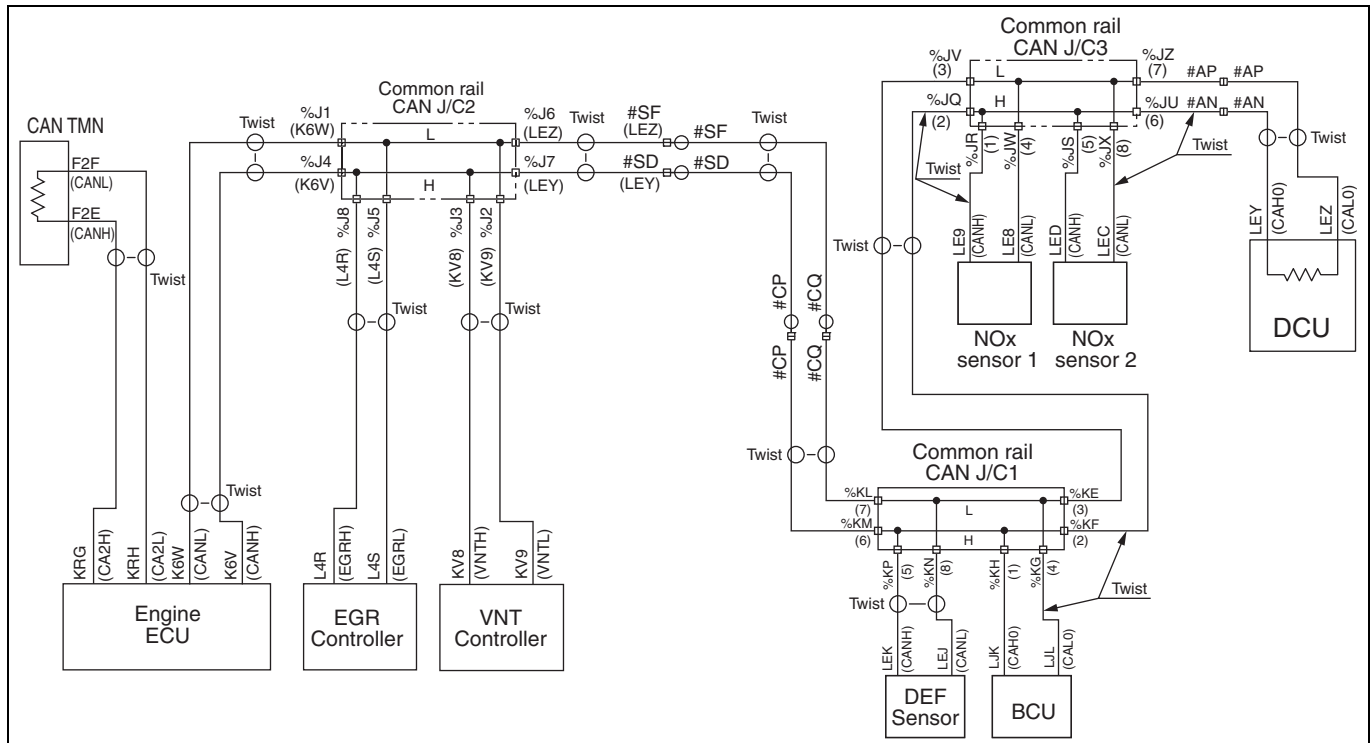
- CAN circuit failure (engine CAN)
- VNT controller failure
- Harness disconnection or short-circuit

INSPECTION PROCEDURE: U010C

Refer to the "ENGINE CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U010E

EN01H16F01030F03001162

**U010E: Engine ECU CAN communication (DeNOx ECU)
INFORMATION**

SAPH16F010301033

1. Technical description**<Description of malfunction>**

- CAN communication with DCU is interrupted.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- Disconnection between DCU and CAN bus line is detected for at least 3 seconds.

3. Reset condition

- After normal operation is restored and the starter switch is turned OFF.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<Symptoms on the vehicle due to malfunction>

- Several diagnoses are produced because of failure of main CAN communication harness.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

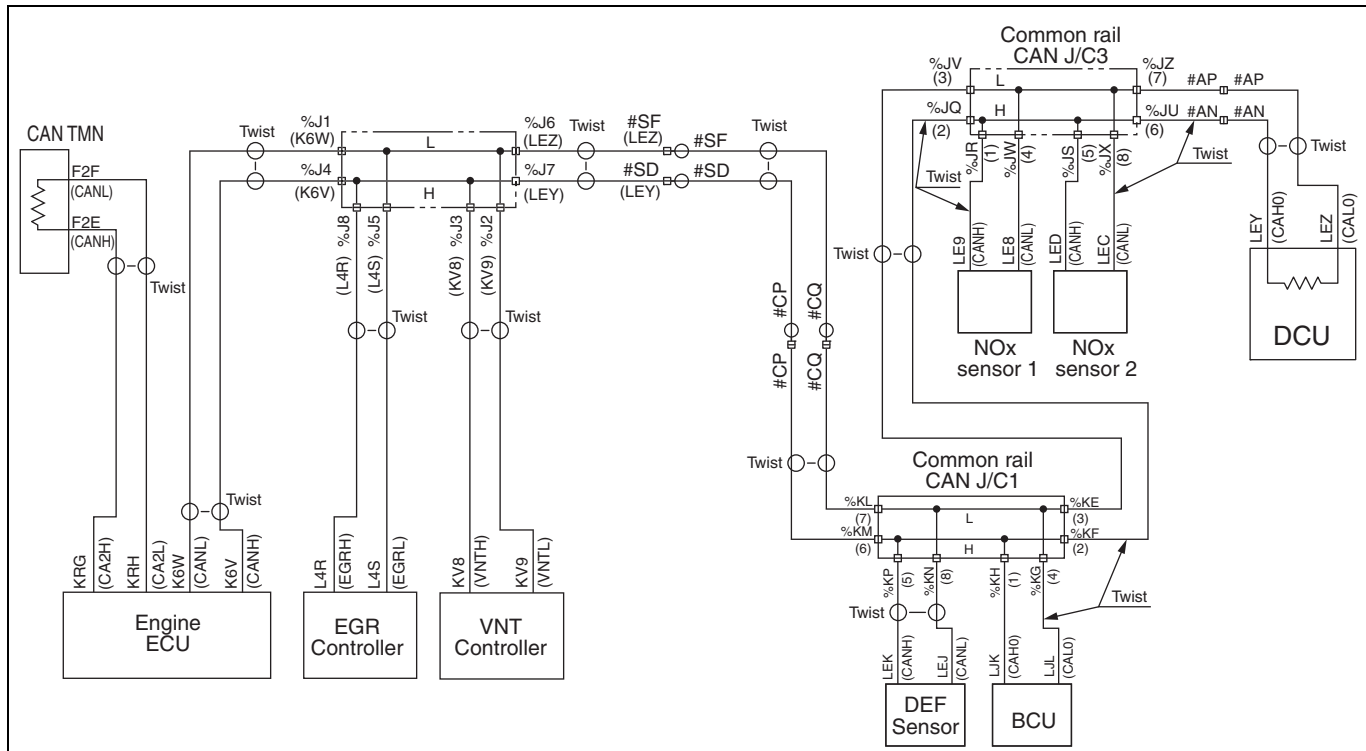
- CAN communication harness failure (disconnection, short-circuit, or terminating resistance)
- Poor connector contact or faulty connector fit
- DCU failure
- Engine ECU failure

INSPECTION PROCEDURE: U010E

Refer to the "ENGINE CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U029D

EN01H16F01030F03001163

U029D: Engine ECU CAN communication (NOx sensor (SCR upstream))
INFORMATION

SAPH16F010301034

1. Technical description

- The NOx sensor 1 (control part) is responsible for the CAN communication with the DCU.

<Description of malfunction>

- CAN communication failure is detected.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- Disconnection between NOx sensor 1 (SCR upstream) and CAN bus line is detected for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

-

<Symptoms on the vehicle due to malfunction>

- Multiple DTC are detected because of failure of main CAN communication harness.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

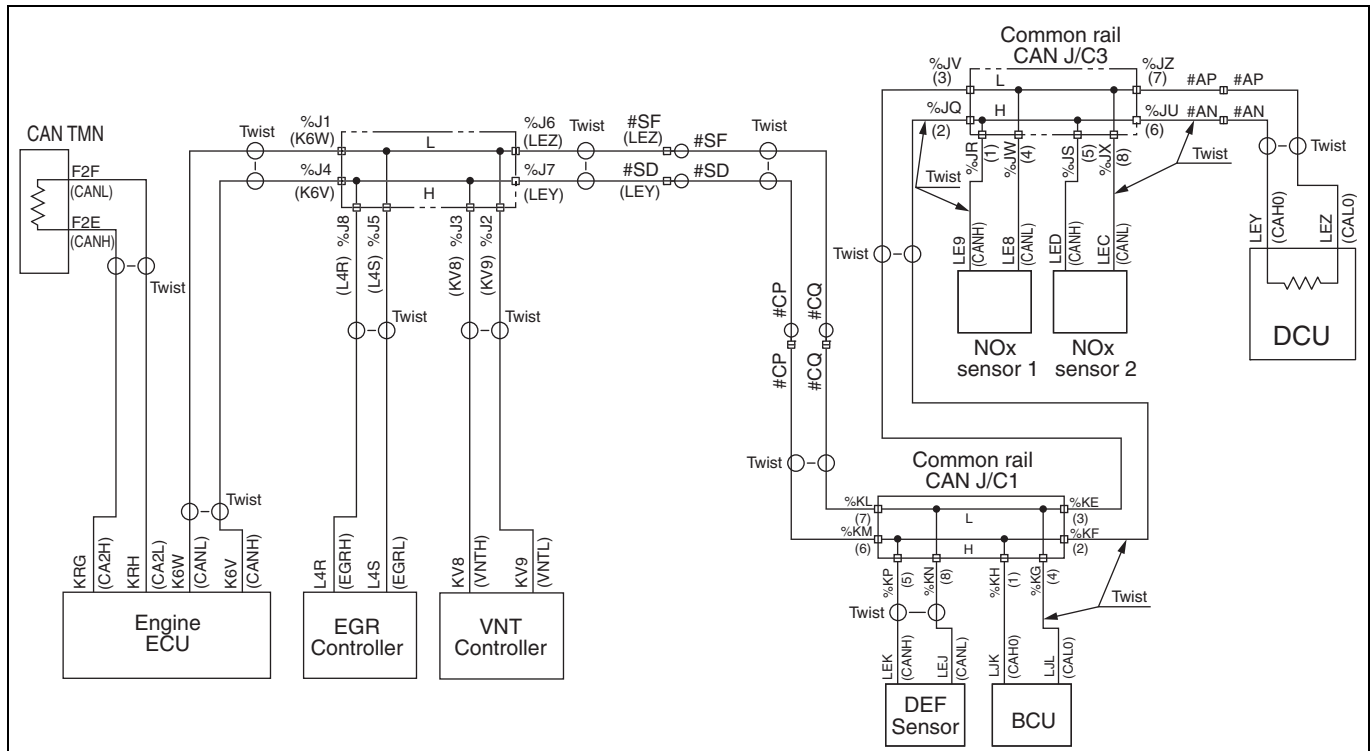
- CAN circuit failure (engine CAN)
- NOx sensor 1 (control part) failure
- Harness disconnection or short-circuit
- Controller power supply system failure

INSPECTION PROCEDURE: U029D

Refer to the "ENGINE CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U029E

EN01H16F01030F03001164

U029E: Engine ECU CAN communication (NOx sensor (SCR downstream))
INFORMATION

SAPH16F010301035

1. Technical description

- NOx sensor 2 (control part) is connected via the DCU and CAN communication.

<Description of malfunction>

- CAN communication failure is detected.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- Disconnection between NOx sensor 2 (SCR downstream) and CAN bus line is detected for 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<Symptoms on the vehicle due to malfunction>

- Multiple DTC are detected because of failure of main CAN communication harness.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

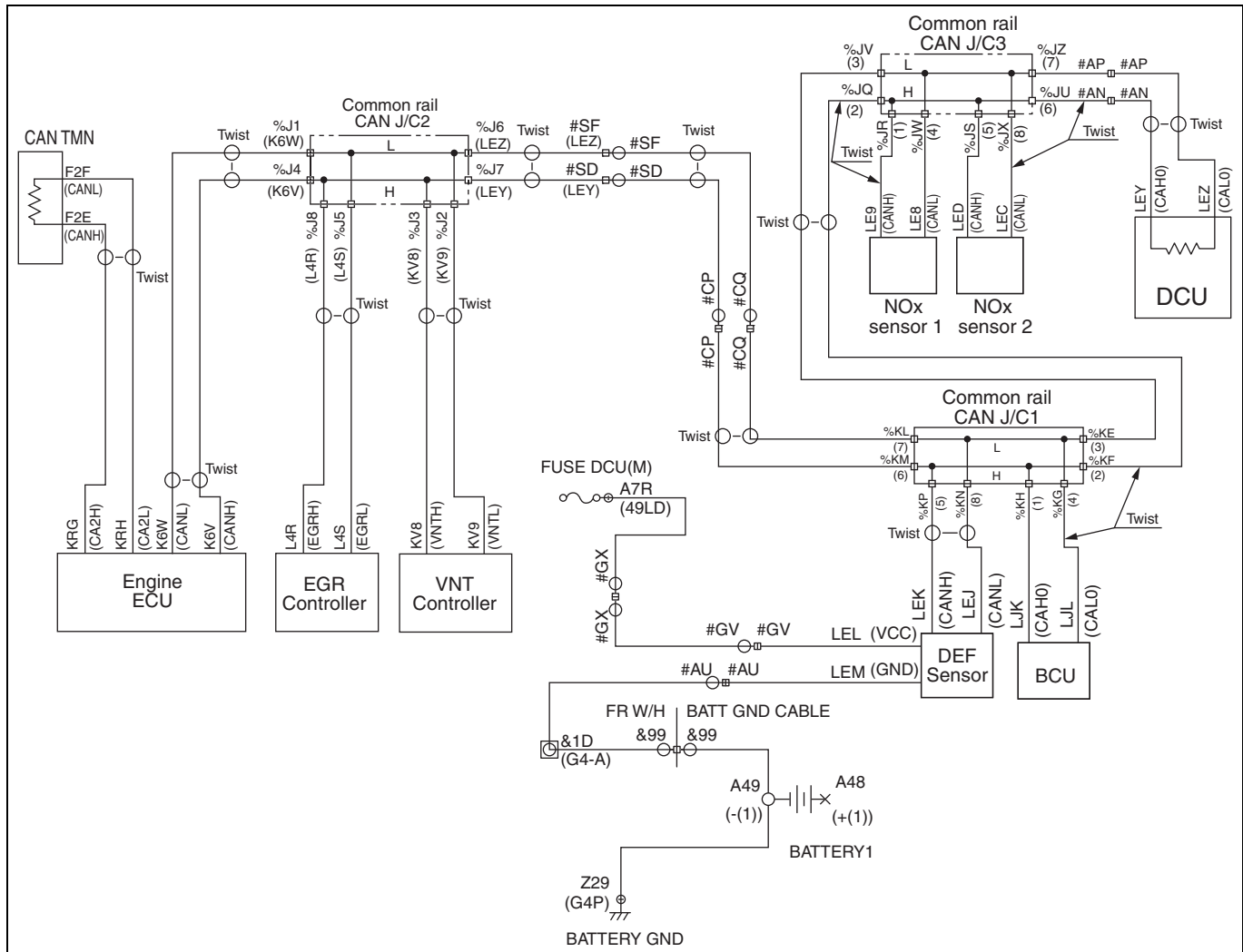
- CAN circuit failure (engine CAN)
- NOx sensor 2 (control part) failure
- Harness disconnection or short-circuit
- Controller power supply system failure

INSPECTION PROCEDURE: U029E

Refer to the "ENGINE CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U02A2

EN01H16F01030F03001165

U02A2: Engine ECU CAN communication (DEF tank sensor)
INFORMATION

SAPH16F010301036

1. Technical description

- -

<Description of malfunction>

- CAN communication with DEF sensor is interrupted.

2. DTC set condition

- (1) DTC detection condition
 - The starter switch is ON.
 - Engine ECU power supply voltage is 11 V – 16 V.
- (2) Judgement criteria
 - No CAN data is received from DEF sensor for at least 30 seconds.

3. Reset condition

- After normal operation is restored and the starter switch is turned LOCK.

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

- MIL: ON

- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

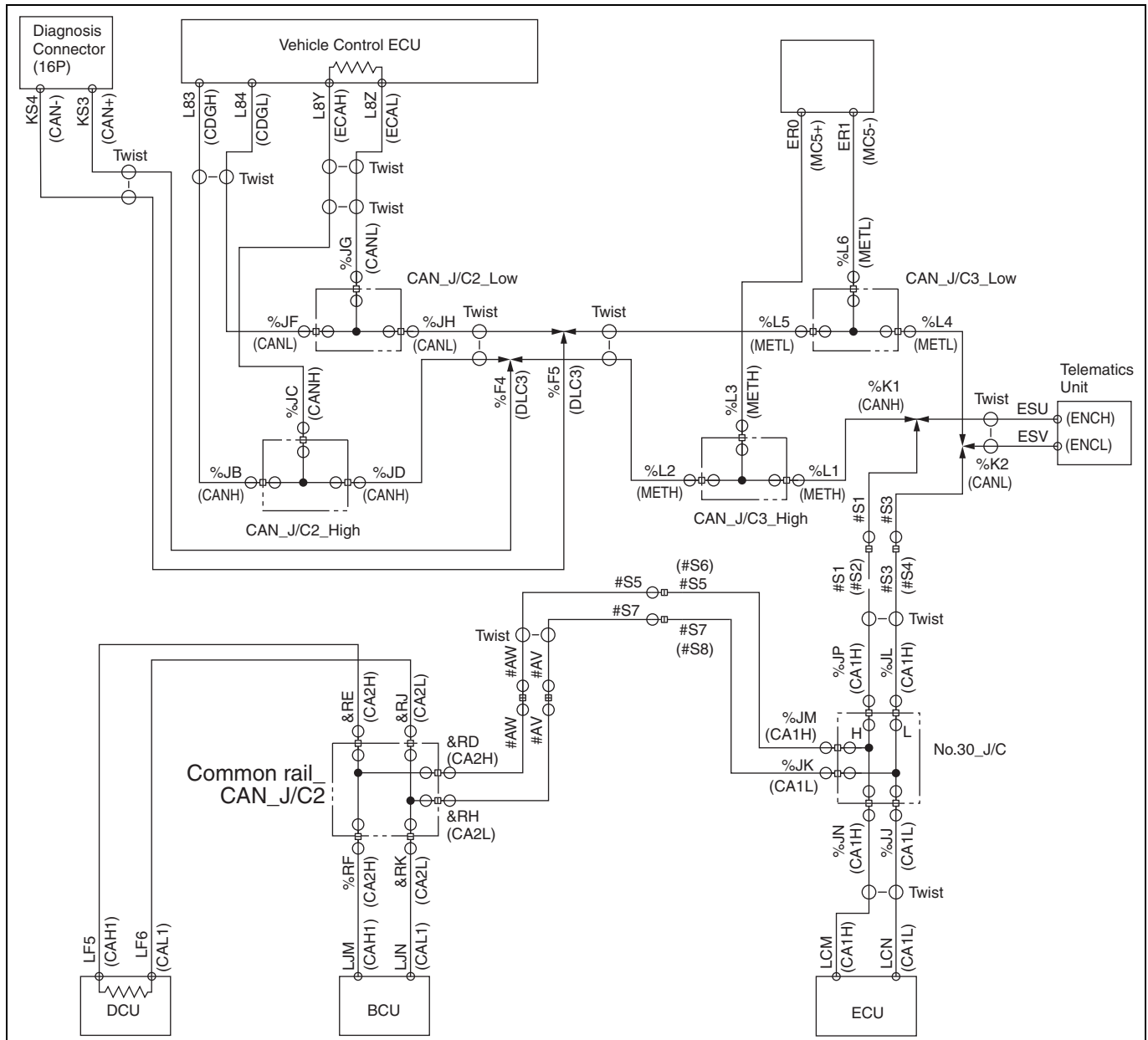
- CAN circuit failure (engine CAN)
- DEF sensor failure
- DEF sensor power supply/GND harness disconnection or short-circuit

INSPECTION PROCEDURE: U02A2

Refer to the "ENGINE CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U0301

EN01H16F01030F03001166

**U0301: Software Incompatibility With DeNOx ECU
INFORMATION**

SAPH16F010301037

1. Technical description

- The suitable data set is selected in the DCU depending on the data set number transmitted from the engine ECU via CAN.
- The DCU receives the data set number and checked if it matches the transmitted data set number.

<Description of malfunction>

- -

2. DTC set condition

- (1) DTC detection condition
 - Starter switch ON.
- (2) Judgement criteria
 - Transmitted data set No. [not=] received data set No.

3. Reset condition

- –

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

- –

5. Symptoms on the vehicle when the DTC is set

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

- –

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

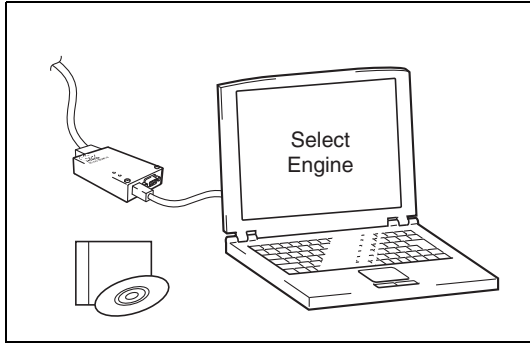
- Check that the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- DCU malfunction

INSPECTION PROCEDURE: U0301**1 Inspect the DCU [Hino-DX]**

SAPH16F010301038

1. Set the starter switch to the "LOCK" position.
2. Wait 1 minute and then set the starter switch to the "ON" position.
3. Erase the trouble history using Hino-DX.
4. Select [Engine] and check if U0301 has been detected in [Fault Information].

Has DTC U0301 been detected?**YES****Replace the DCU.****NOTICE**

If multiple CAN communication-related DTCs (U ***) are detected, it is considered failure of the main CAN communication line. Refer to "ENGINE CAN COMMUNICATION LINE / CAN COMMUNICATION LINE MALFUNCTION PART DETERMINATION TABLE" and "DIAGNOSIS CAN COMMUNICATION LINE / CAN COMMUNICATION LINE MALFUNCTION PART DETERMINATION TABLE" of CAN chapter, and inspect the diagnosed item of the detected DTC.

NO**Procedure completed.**

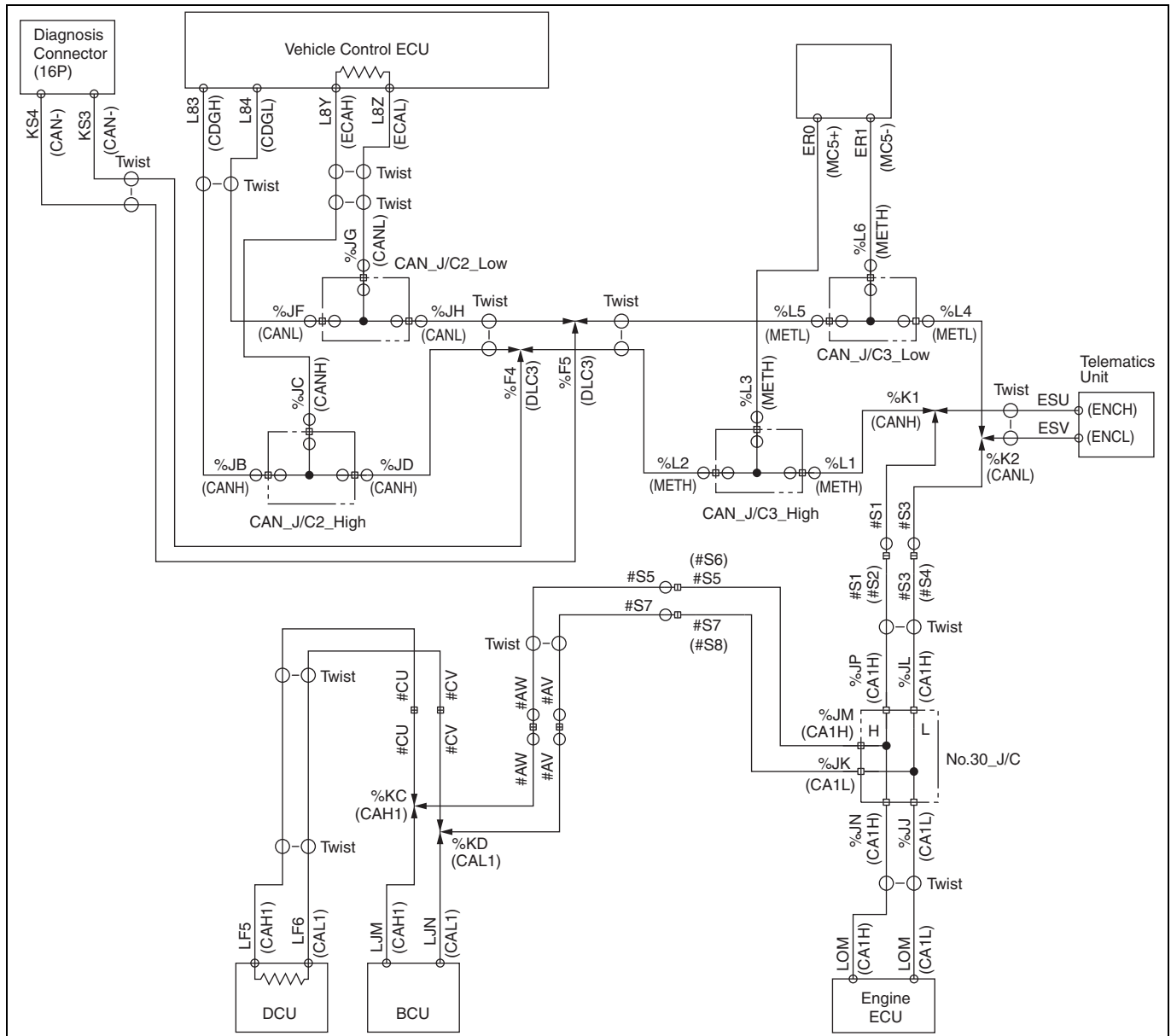
If DTC U0301 is not displayed again, existing conditions are okay.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: U0301

DTC: U0301		Software Incompatibility With DeNOx ECU		Inspection procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DCU [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position and, wait 1 minute and then turn the starter switch "ON". 2. Erase the trouble history using the Hino-DX. 3. Check if U0301 has been detected in [Engine]. 	<p>DTC U0301 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the DCU.</p> <p>NOTICE If multiple CAN communication-related DTCs (U ***) are detected, it is considered failure of the main CAN communication line. Refer to "ENGINE CAN COMMUNICATION LINE / CAN COMMUNICATION LINE MALFUNCTION PART DETERMINATION TABLE" and "DIAGNOSIS CAN COMMUNICATION LINE / CAN COMMUNICATION LINE MALFUNCTION PART DETERMINATION TABLE" of CAN chapter, and inspect the diagnosed item of the detected DTC.</p>	<p>Procedure completed. If DTC U0301 is not displayed again, existing conditions are okay. Perform "After-inspection work" of INFORMATION section.</p>

DTC: U1001

EN01H16F01030F03001167

U1001: Engine ECU CAN communication bus for Vehicle control - bus off
INFORMATION

SAPH16F010301039

1. Technical description

- -

<Description of malfunction>

- Abnormal vehicle CAN communication is detected.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- Buss off condition continues for 96 ms or longer.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Idling stop system is not available.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Idling stop system does not work.
- Cruise control does not work.
- Auxiliary brake does not work.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

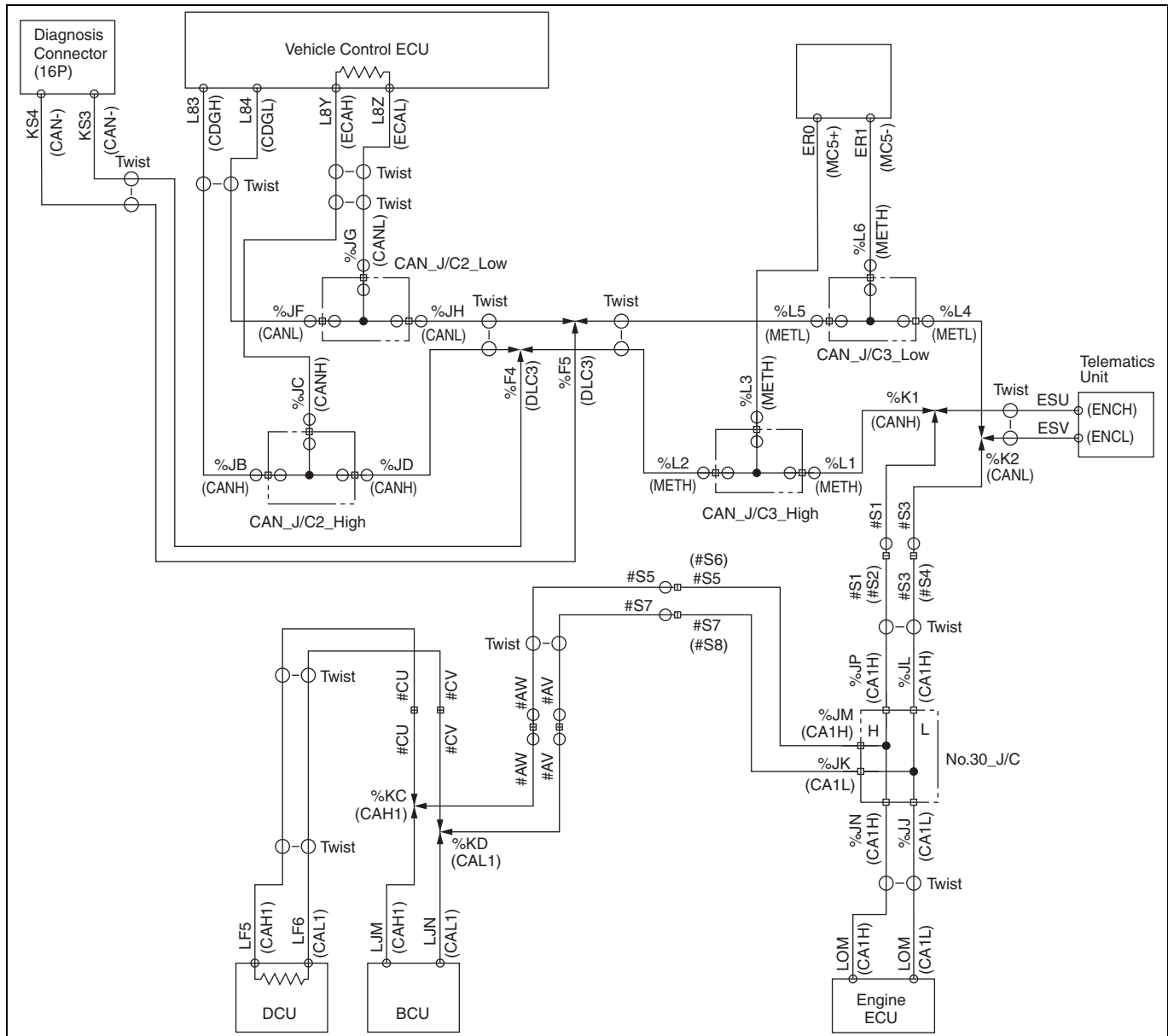
- CAN circuit failure (vehicle CAN)
- Vehicle control ECU failure
- Harness disconnection or short-circuit

INSPECTION PROCEDURE: U1001

Refer to the "DIAGNOSIS CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U110A

EN01H16F01030F03001168

**U110A: Engine ECU CAN communication (Vehicle ECU)
INFORMATION**

SAPH16F010301040

1. Technical description

- -

<Description of malfunction>

- CAN communication with the vehicle control ECU has blacked out.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- No CAN data is received from the vehicle control ECU for at least 3 seconds.

3. Reset condition

- Immediately after normal operation is restored.

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

- MIL: ON
- Diag lamp: OFF
- Idling stop system is not available.
- Cruise control function is not available.
- Auxiliary brake function is not available.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Idling stop system does not work.
- Cruise control does not work.
- Auxiliary brake does not work.

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

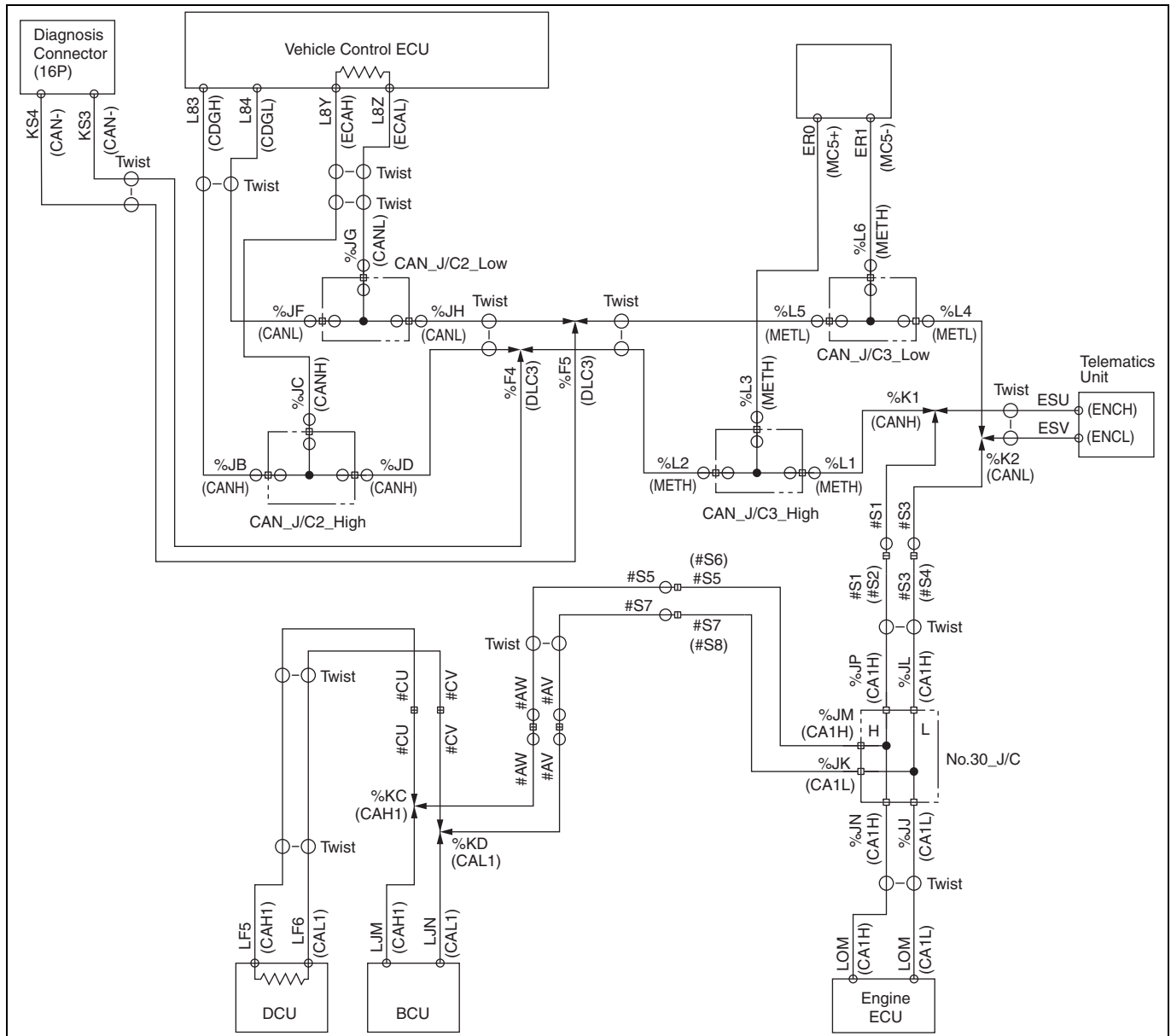
1. CAN circuit failure (vehicle CAN)
2. Vehicle control ECU failure
3. Harness disconnection or short-circuit

INSPECTION PROCEDURE: U110A

Refer to the "DIAGNOSIS CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DTC: U111E

EN01H16F01030F03001169

**U111E: Engine ECU CAN communication (Burner ECU)
INFORMATION**

SAPH16F010301041

1. Technical description

-

<Description of malfunction>

- CAN communication with BCU is interrupted.

2. DTC set condition**(1) DTC detection condition**

- Starter switch ON.
- Engine ECU power supply voltage is in the range of 11 V to 16 V.

(2) Judgement criteria

- No CAN data is received from the BCU for at least 20 seconds.

3. Reset condition

- After normal operation is restored and accelerator is not being operated.

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

- MIL: ON
- Diag lamp: OFF

5. Symptoms on the vehicle when the DTC is set

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

- -

<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.
- Check that no DTC is stored after test drive.

8. Estimated failure factors

- CAN circuit failure (engine CAN)
- BCU failure
- Harness disconnection or short-circuit

INSPECTION PROCEDURE: U111E

Refer to the "ENGINE CAN COMMUNICATION LINE" in the chapter "CAN COMMUNICATION".

DEF SCR SYSTEM (DCU)

5-001

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DEF SCR SYSTEM

PRECAUTIONS FOR DIAGNOSIS

EN01H16F02040F03001001

- Ensure that individual connectors are certainly connected before start of checking works.
- Make sure to set the starter switch to the "LOCK" position before disconnecting a connector.
- Replace the part or the component that have a failure or trouble. Do not fix and reuse it.
- Delete the past malfunction code after recording. Then conduct a diagnosis again to check for present failures.
- Delete the past failure memory after completion of a diagnostic analysis.

1. ILLUSTRATION OF CONNECTOR AND MEASUREMENT ON TERMINAL

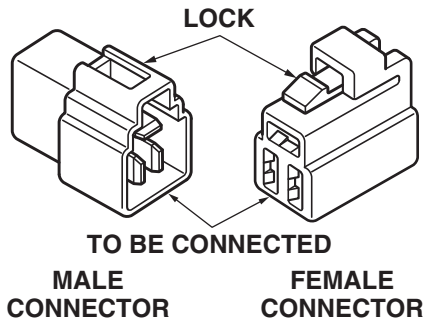
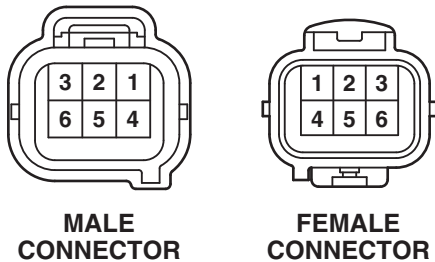


ILLUSTRATION OF CONNECTOR

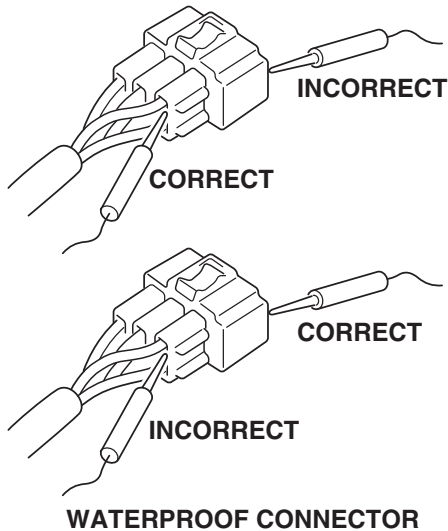
The illustration of a connector contained in this document represents an image of a connector with its lock positioned on top as viewed from the connecting face.



NUMBERING OF CONNECTOR TERMINALS

The terminals are symmetrically numbered (symmetrically reversed numbering) as viewed on the connecting faces of a pair of connectors.

The terminal #1 is located at the top right corner of a male connector and at the top left corner of a female connector respectively in this document.



PRECAUTIONS FOR TERMINAL MEASUREMENT

Unless otherwise specified in this document, the illustration of a connector represents an image of a connector as viewed from the connecting face. A test probe must access the back face of a connector.

However, some types of connector do not allow a test probe to contact with the back face such as a waterproof connector. In such case, a test probe may be allowed to access the front face of a connector but a special care must be used to avoid a risk of damage in terminals.

As to a connector that is designed to use the signal check harness for terminal measurement, do not place a test probe directly onto the front or back face. Use a contact box of the connected signal check harness to take measurement on terminals.

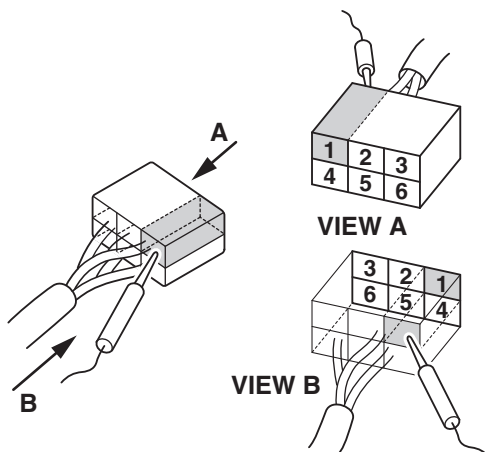


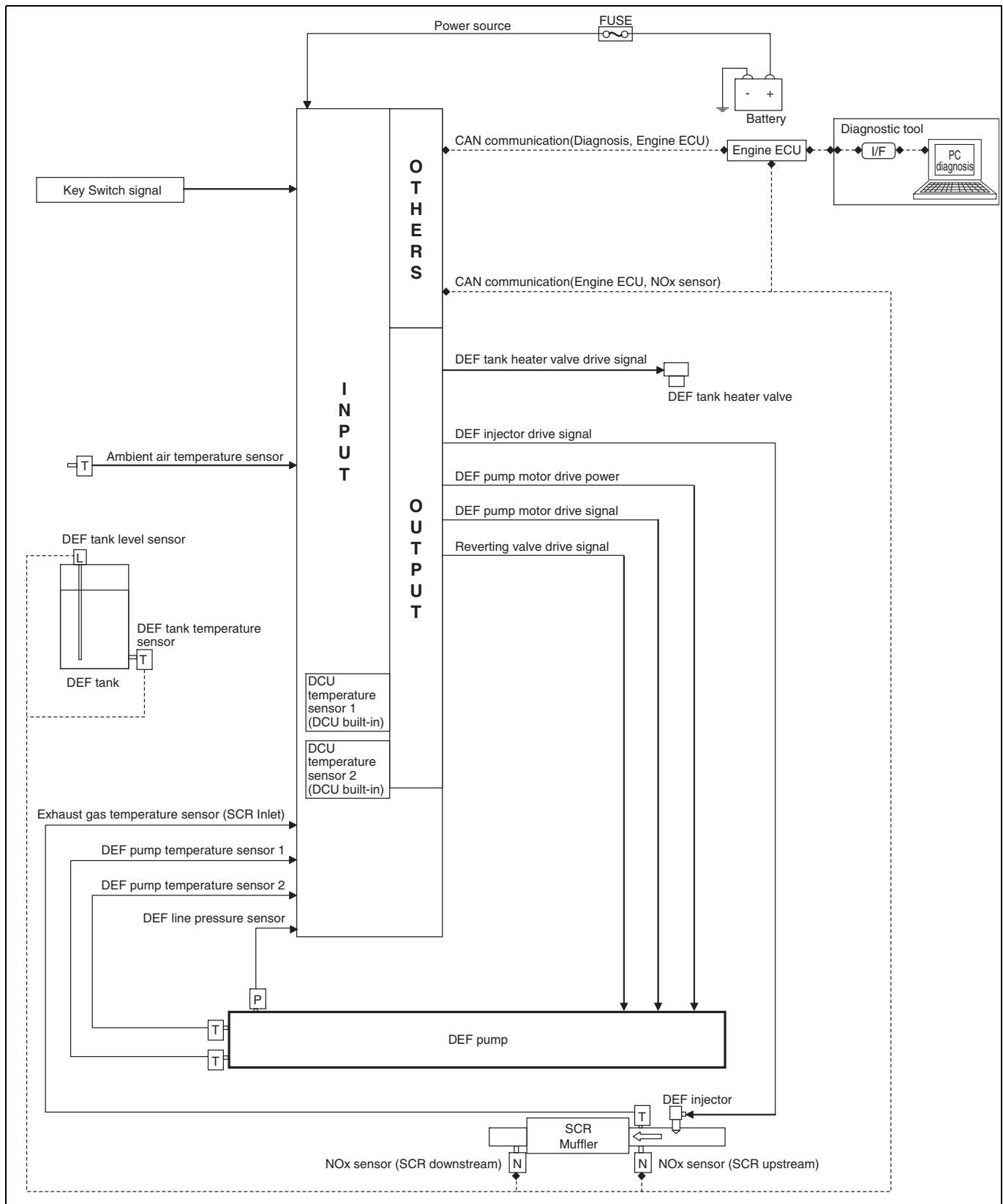
ILLUSTRATION OF CONNECTOR AND MEASUREMENT SURFACE

The illustration of a connector contained in this document represents an image of a connector as viewed from the connecting face. For example, the terminal #1 of a female connector is located at the top left corner of a connector as viewed from the connecting face.

In actual measurement on the terminal #1 of a female connector, a test probe must be placed onto the top right corner on the back face of a connector.

SYSTEM BLOCK DIAGRAM

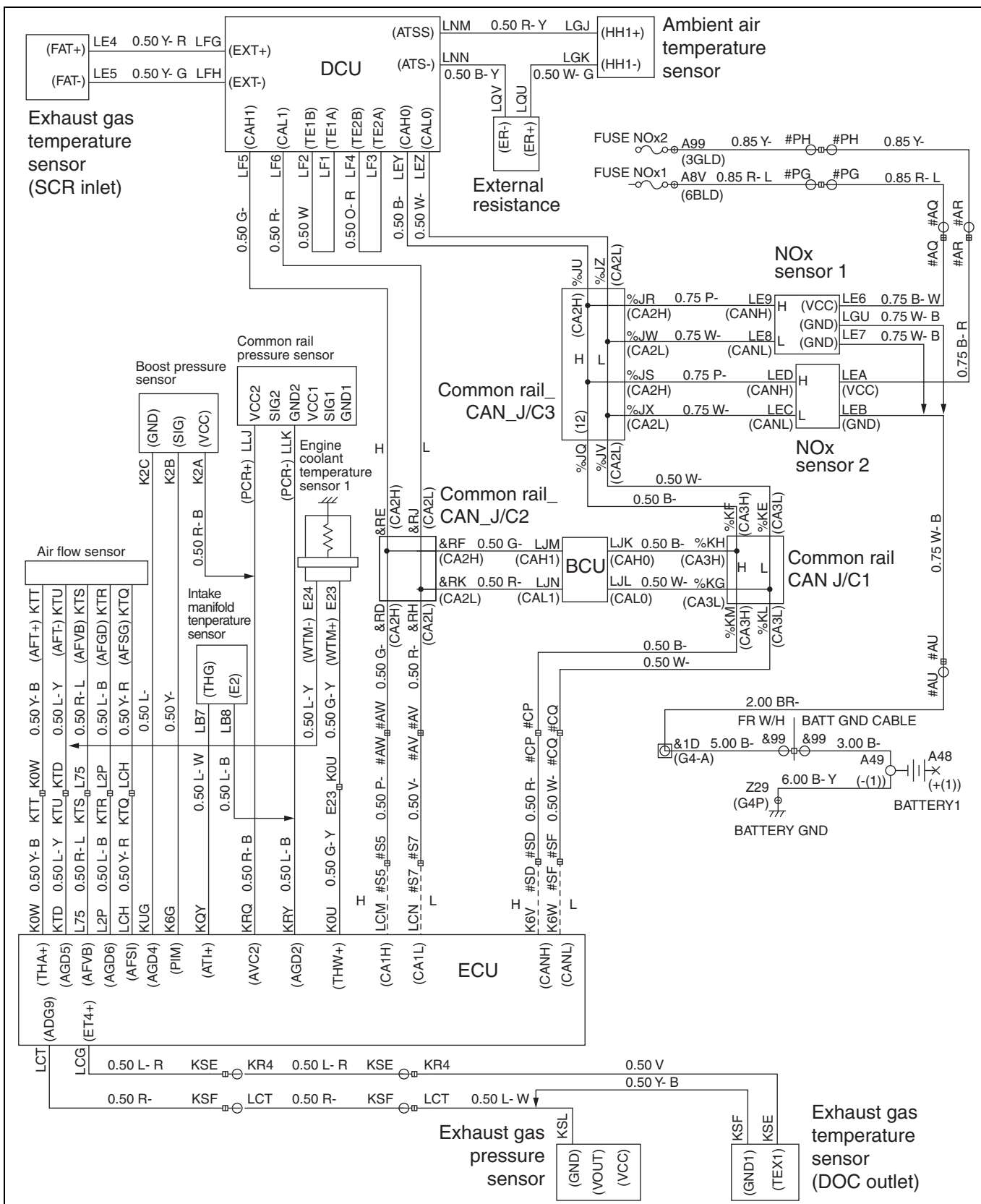
EN01H16F02040F03001002



SAPH16F020400002

SYSTEM DIAGRAM

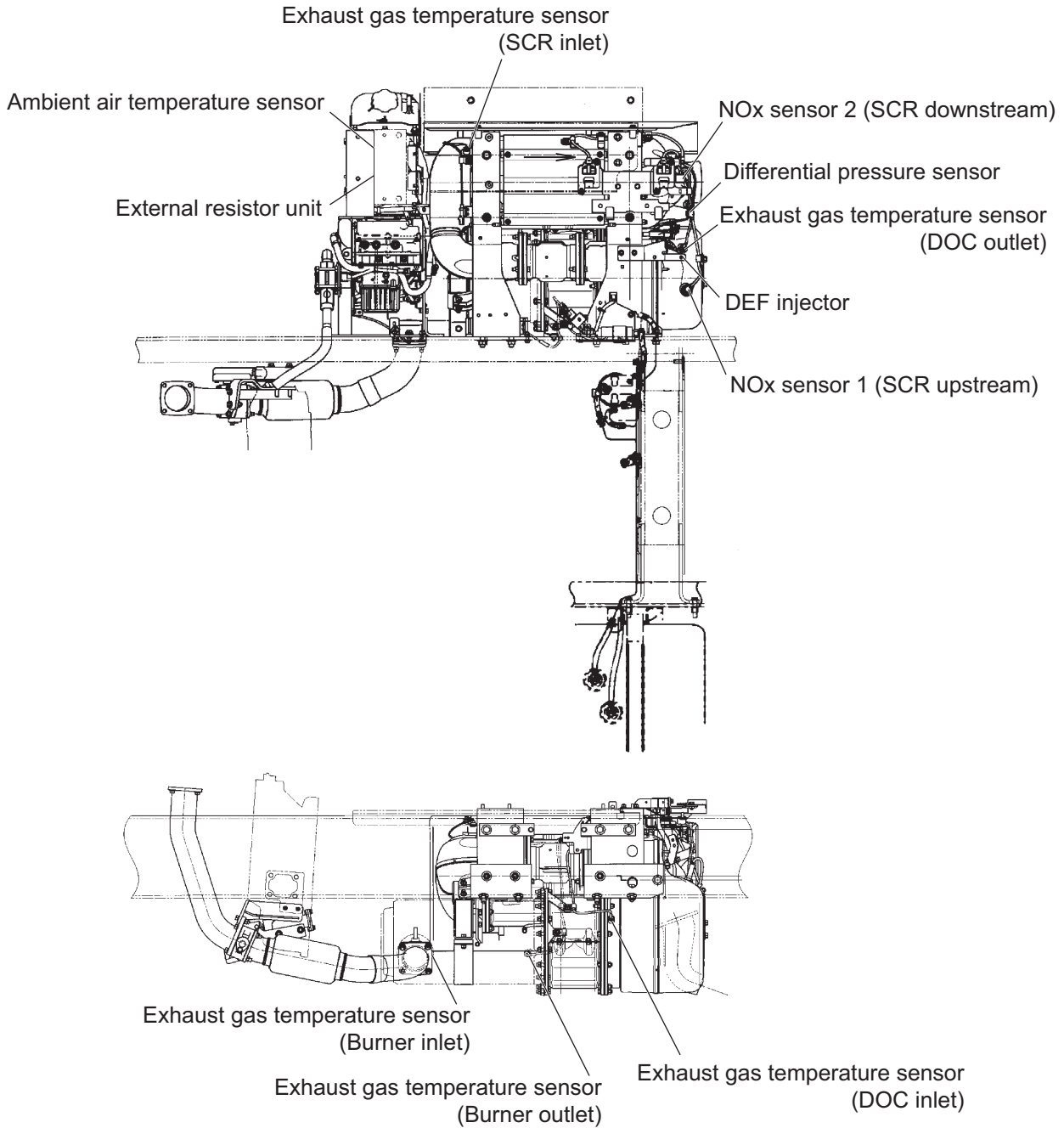
EN01H16F02040F03001003



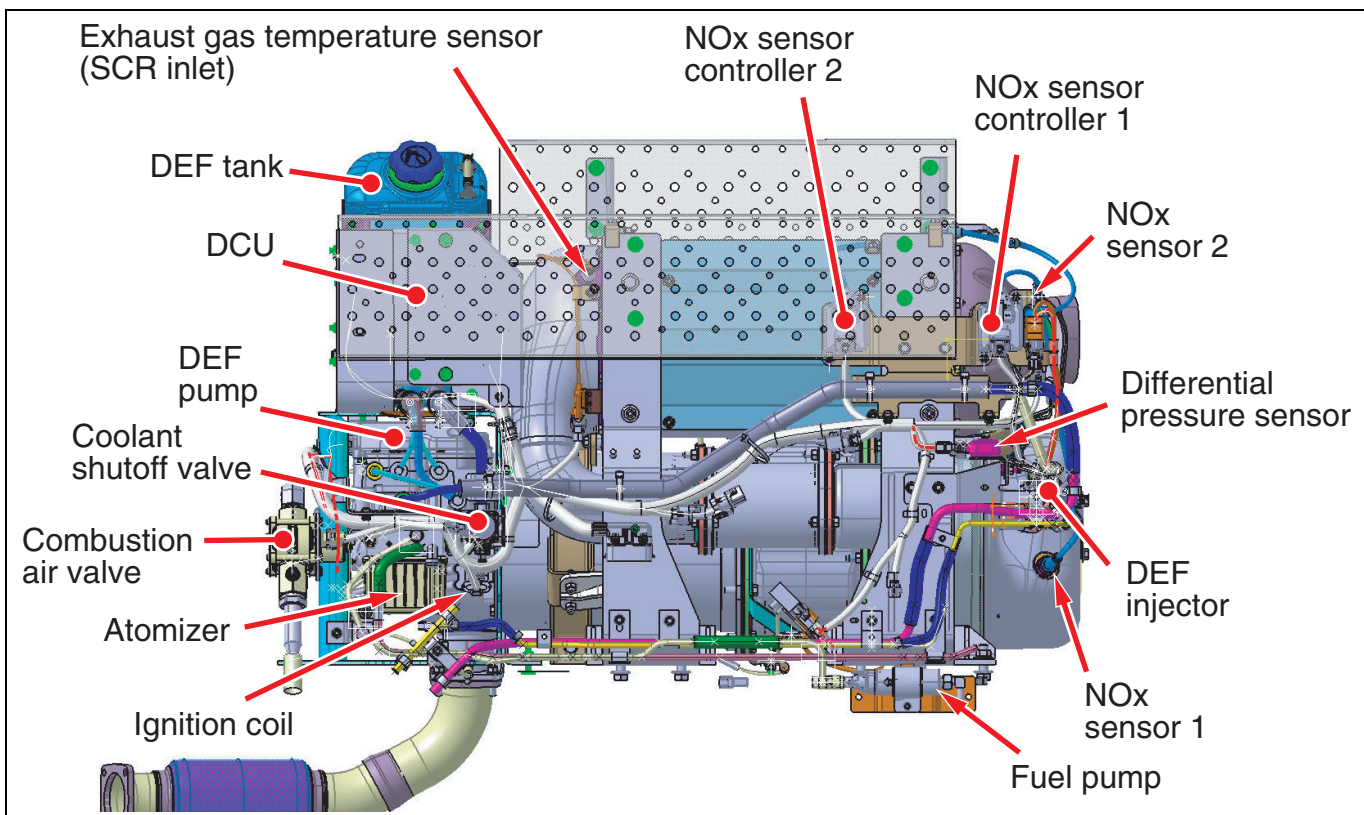
SENSOR LOCATION

EN01H16F02040F03001004

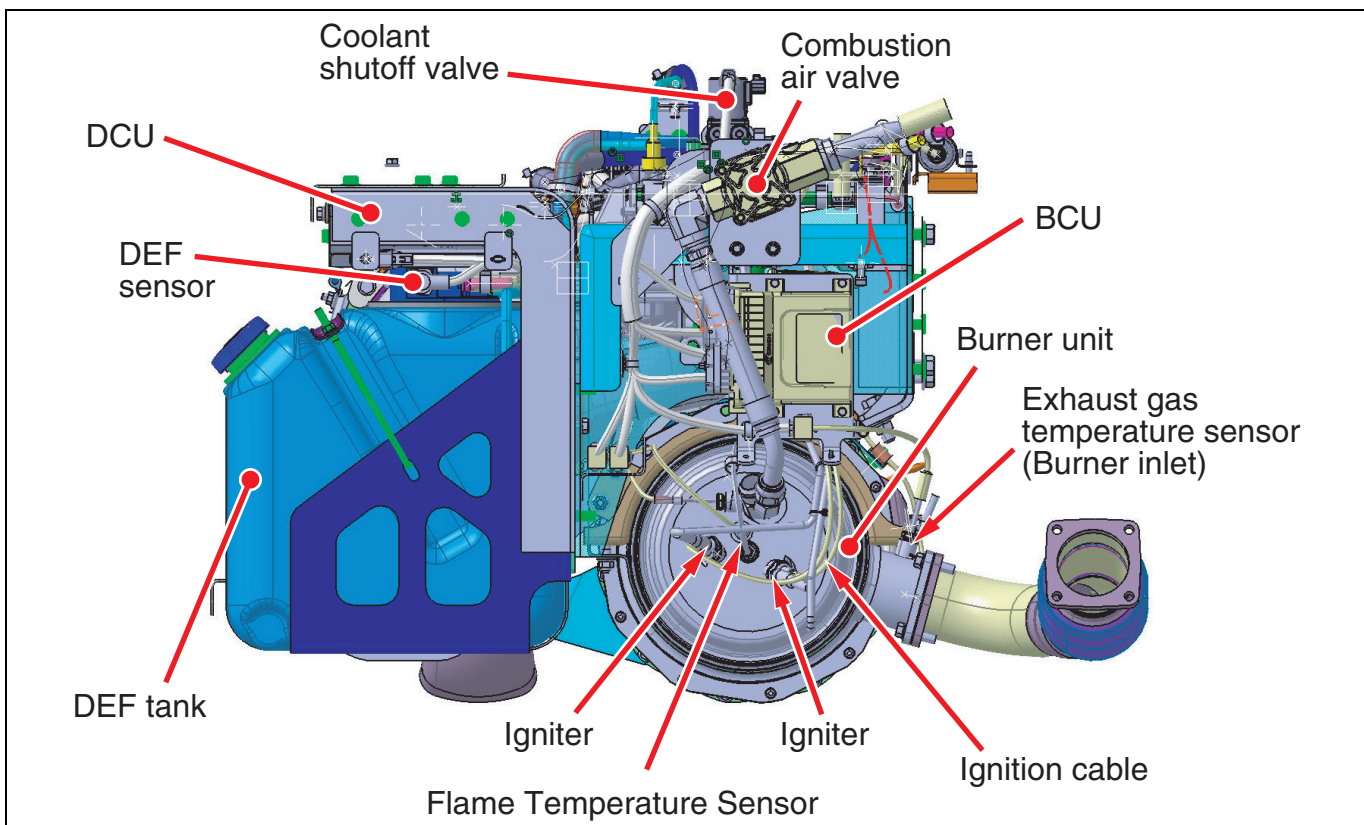
Exhaust gas After treatment system



SAPH16F020400004



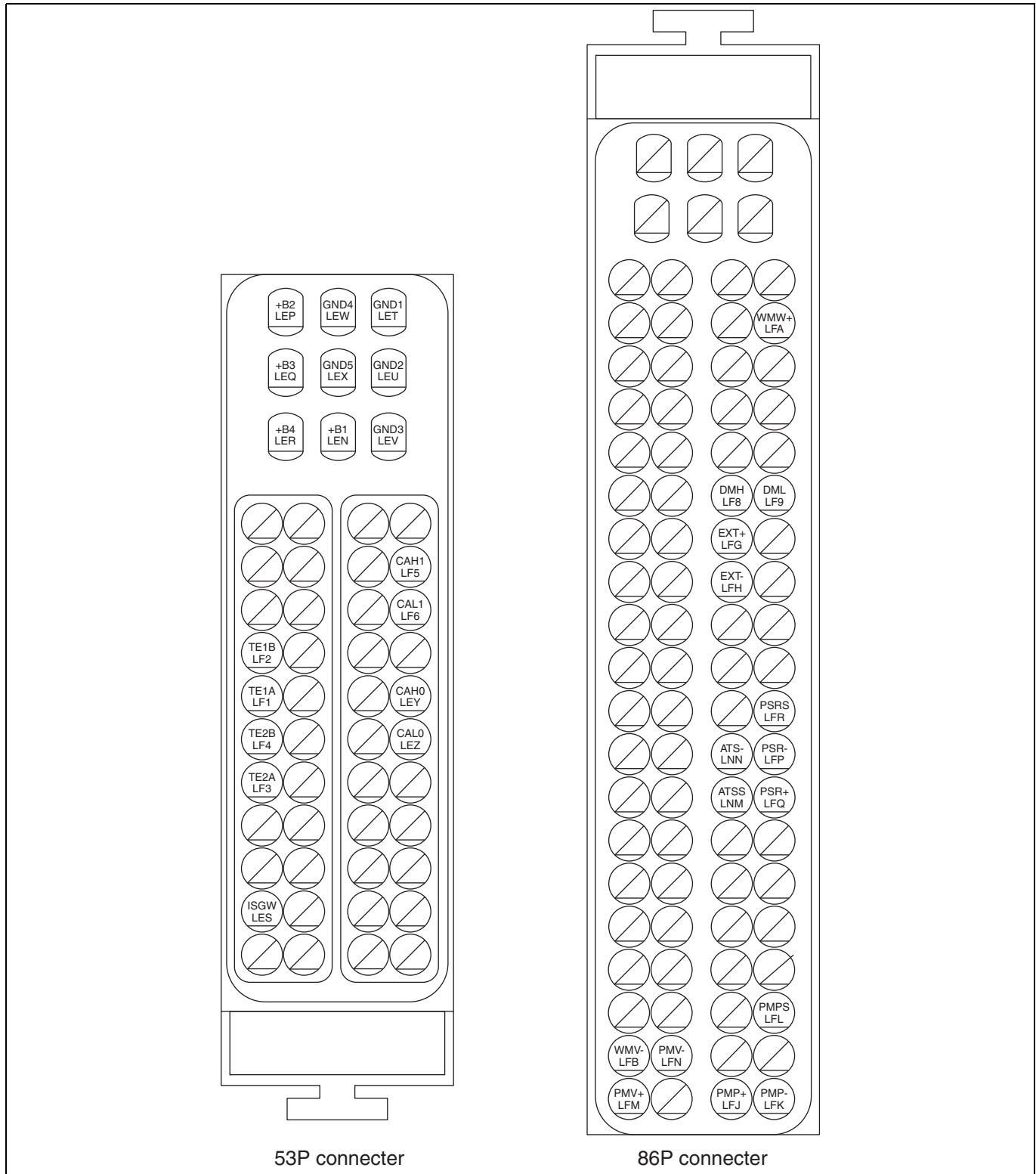
SAPH16F020400005



SAPH16F020400006

COMPUTER (DCU) WIRE HARNESS CONNECTOR PIN ASSIGNMENT

EN01H16F02040F03001005



53P connector

86P connector

SIGNAL CHECK HARNESS

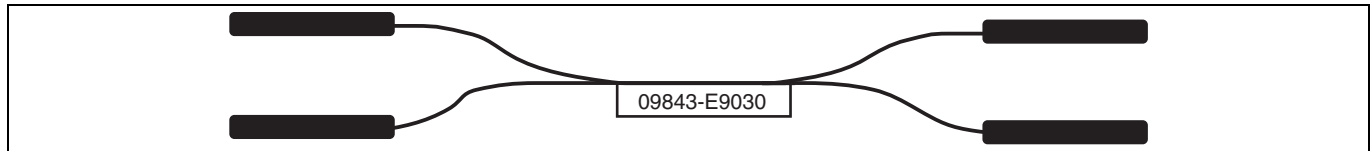
EN01H16F02040F03001006

1. MENTION OF THE SIGNAL CHECK HARNESS

- (1) HINO provides a signal check harness to check the DCU.

⚠ CAUTION

- To prevent damage of the DCU connector, connect the signal check harness and perform measuring by bringing the test probe into contact with the signal check harness side.



SAPH16F020400008

INSPECTION

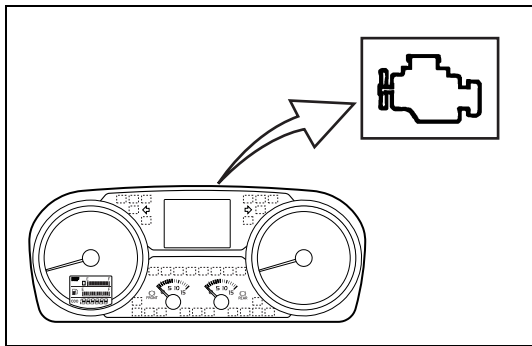
EN01H16F02040F03001007

MALFUNCTION INDICATOR LIGHT STATUS

1. INSPECTION PROCEDURE

- (1) Set the starter switch to the "ON" position (Do not start the engine) and confirm that the MIL (malfunction indicator light) in the indicator area light up.

If the DTC of P204F appears during meter multi-display, have the BCU communicate with the Hino-DX and check the detailed DTC.



SAPH16F020400009

HINT

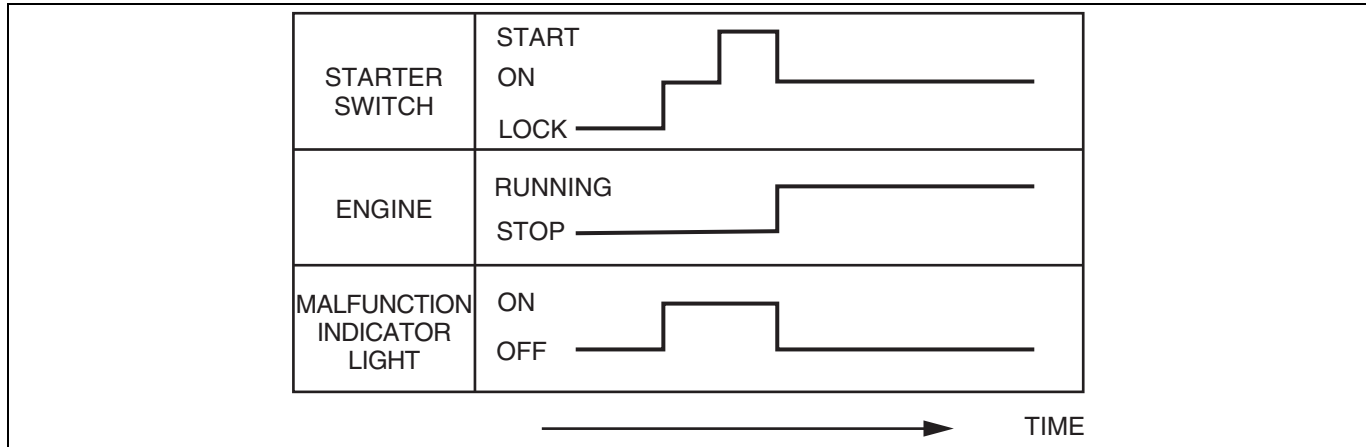
- If the MIL (Malfunction Indicator Light) is lit, perform a system check to see if the malfunction is of the past or present.
- In the case of the past malfunction, this light will turn off if a status is judged to be normal in 3 times of driving.
- DTC must be cleared on the Hino-DX, after MIL comes off.

(Definition of 1 time of driving)

- Begins with engine start and ends with engine shut off.
 - Begins with engine start and ends after four hours of continuous engine-on operation.
 - Begins at end of the previous four hours of continuous engine on operation and ends after four hours of continuous engine-on operation.
 - Begins at the end of the previous four hours of continuous engine-on operation and ends with engine shut off.
- Since the normal judgment method and time differ according to the malfunction code, a proper definition will be selected from the above 4 definitions.
 - If the MIL (malfunction indicator light) does not go out, the system is abnormal. Check the system according to diagnosis on the following page.

MALFUNCTION INDICATOR LIGHT ILLUMINATION PATTERN

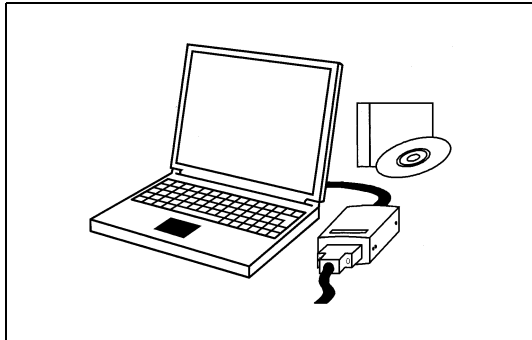
EN01H16F02040F03001008



SAPH16F020400010

DIAGNOSIS USING THE PC DIAGNOSIS TOOL

EN01H16F02040F03001009



SAPH16F020400011

1. DIAGNOSIS TOOL

- (1) Trouble diagnosis can be performed using the PC diagnosis tool. By connection to the diagnosis connector, the trouble location is indicated.

SST:

Computer interface (Hino-Bowie)

The main body and cables for RS232C and USB (09993-E9070)

Cable between vehicle and Hino-Bowie (S0904-21220)

(DENSO DST-i set without LCD)

Without Bluetooth® (95171-01020)

With Bluetooth® (95171-01040)

(DENSO DST-i set with LCD)

Without Bluetooth® (95171-01030)

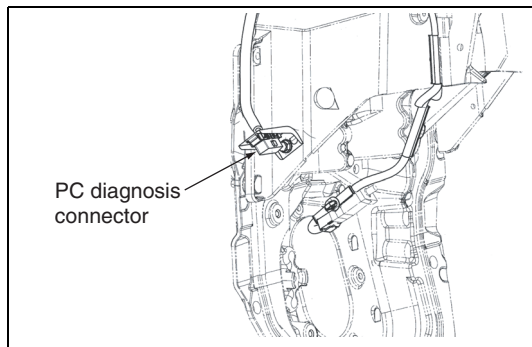
With Bluetooth® (95171-01050)

Diagnosis software: HINO Diagnostic explorer (DX)

Reprogramming software: HINO Reprog Manager

NOTICE

- Only ECU reprogramming can be performed by authorized HINO dealer.



SAPH16F020400012

2. CONNECT THE PC DIAGNOSIS TOOL

- (1) Set the starter switch to the "LOCK" position.
- (2) Connect the PC DIAGNOSIS TOOL to the diagnosis connector on the left side of steering column.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

EN01H16F02040F03001010

DIAGNOSTIC TROUBLE CODE (DTC) TABLE					
MALFUNCTION INDICATOR LIGHT	DTC NO.		DIAGNOSIS ITEM	INSPECTION ITEM	REFER PAGE
	ECU	DCU			
Light	P204F	P0071	Ambient air temperature sensor - rationality	<ul style="list-style-type: none"> Ambient air temperature sensor Wire harness DCU connector 	5-17
Light	P204F	P0072	Ambient air temperature sensor - out of range (Out of range low)	<ul style="list-style-type: none"> Ambient air temperature sensor Wire harness DCU connector 	5-32
Light	P204F	P0073	Ambient air temperature sensor - out of range (Out of range high)	<ul style="list-style-type: none"> Ambient air temperature sensor Wire harness DCU connector 	5-42
Light	P204F	P0562	Sensor supply voltage - out of range (Out of range low)	<ul style="list-style-type: none"> Battery DCU connector Wire harness 	5-52
Light	P204F	P0563	Sensor supply voltage - out of range (Out of range high)	<ul style="list-style-type: none"> Battery DCU connector Wire harness 	5-56
Light	P204F	P060C	DeNOx ECU error	<ul style="list-style-type: none"> DCU 	5-60
Light	P204F	P062F	Controller store data error	<ul style="list-style-type: none"> DCU 	5-63
Light	P204F	P0667	DeNOx ECU temperature sensor 1, 2 - rationality	<ul style="list-style-type: none"> DCU 	5-66
Light	P204F	P0668	DeNOx ECU temperature sensor (Out of range low)	<ul style="list-style-type: none"> DCU 	5-69
Light	P204F	P0669	DeNOx ECU temperature sensors - out of range (Out of range high)	<ul style="list-style-type: none"> DCU 	5-72
Light	P204F	P068A	Main relay	<ul style="list-style-type: none"> DCU 	5-75
Light	P204F	P142A	DEF pump temperature sensor 1 - out of range	<ul style="list-style-type: none"> DEF pump DCU Wire harness 	5-83
Light	P204F	P142B	DEF pump temperature sensor 1 - rationality	<ul style="list-style-type: none"> DEF pump 	5-88
Light	P204F	P202E	Reductant Delivery Performance	<ul style="list-style-type: none"> DEF injector DEF piping 	5-103
Light	P204F	P203C	DEF tank level sensor - out of range (Out of range low)	<ul style="list-style-type: none"> DEF tank level sensor DCU connector Wire harness 	5-110

DIAGNOSTIC TROUBLE CODE (DTC) TABLE					
MALFUNCTION INDICATOR LIGHT	DTC NO.		DIAGNOSIS ITEM	INSPECTION ITEM	REFER PAGE
	ECU	DCU			
Light	P204F	P203D	DEF tank level sensor - out of range (Out of range high)	<ul style="list-style-type: none"> DEF tank level sensor DCU connector Wire harness 	5-114
Light	P204F	P2044	DEF tank temperature sensor - out of range (Out of range low)	<ul style="list-style-type: none"> DEF tank temperature sensor 2 	5-118
Light	P204F	P2045	DEF tank temperature sensor - out of range (Out of range high)	<ul style="list-style-type: none"> DEF tank temperature sensor 2 	5-122
Light	P204F	P2047	DEF injector - functional	<ul style="list-style-type: none"> DEF injector 	5-126
Light	P204F	P2048	DEF injector - disconnection (Disconnection (low side))	<ul style="list-style-type: none"> DEF injector DCU connector Wire harness 	5-129
Light	P204F	P2049	DEF injector - disconnection (Disconnection (high side))	<ul style="list-style-type: none"> DEF injector DCU connector Wire harness 	5-135
Light	P204F	P204B	DEF pressure sensor - rationality	<ul style="list-style-type: none"> DCU pump 	5-142
Light	P204F	P204C	DEF pressure sensor - out of range (Out of range low)	<ul style="list-style-type: none"> DEF pump DCU Wire harness 	5-146
Light	P204F	P204D	DEF pressure sensor - out of range (Out of range high)	<ul style="list-style-type: none"> DEF pump DCU Wire harness 	5-153
Light	P204F	P205B	DEF tank temperature sensor - rationality	<ul style="list-style-type: none"> DEF tank temperature sensor DCU connector Wire harness 	5-160
Light	P204F	P205C	DEF tank temperature sensor - out of range (Out of range low)	<ul style="list-style-type: none"> DEF tank temperature sensor DCU connector Wire harness 	5-173
Light	P204F	P205D	DEF tank temperature sensor - out of range (Out of range high)	<ul style="list-style-type: none"> DEF tank temperature sensor DCU connector Wire harness 	5-177
Light	P204F	P206A	Reductant quality sensor - malfunction	<ul style="list-style-type: none"> DEF quality sensor 	5-181
Light	P204F	P208A	DEF pump motor - circuit (Open load)	<ul style="list-style-type: none"> DEF pump DCU Wire harness 	5-185
Light	P204F	P208B	DEF pump motor - functional	<ul style="list-style-type: none"> DEF pump 	5-190

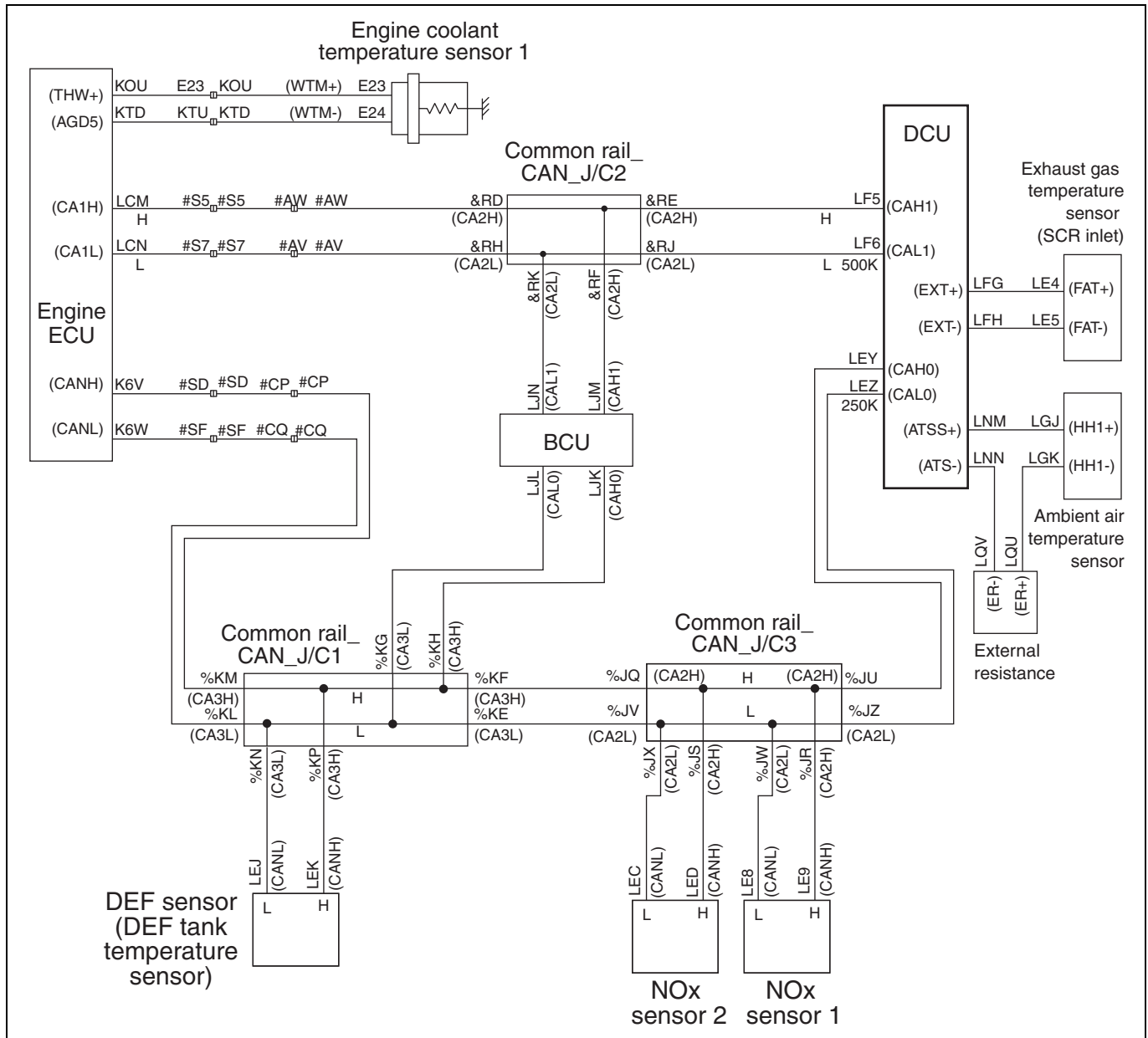
DIAGNOSTIC TROUBLE CODE (DTC) TABLE					
MALFUNCTION INDICATOR LIGHT	DTC NO.		DIAGNOSIS ITEM	INSPECTION ITEM	REFER PAGE
	ECU	DCU			
Light	P204F	P208C	DEF pump motor - circuit (Circuit low)	<ul style="list-style-type: none"> DEF pump DCU Wire harness 	5-193
Light	P204F	P208D	DEF pump motor - circuit (Circuit high)	<ul style="list-style-type: none"> DEF pump DCU connector Wire harness 	5-197
Light	P204F	P20A0	Reverting valve for DEF pump - circuit (Open load)	<ul style="list-style-type: none"> DEF pump DCU connector Wire harness 	5-201
Light	P204F	P20A1	Reverting valve for DEF pump stuck close	<ul style="list-style-type: none"> DEF pump 	5-208
Light	P204F	P20A2	Reverting valve for DEF pump - circuit (Circuit low)	<ul style="list-style-type: none"> DEF pump DCU connector Wire harness 	5-212
Light	P204F	P20A3	Reverting valve for DEF pump - circuit (Circuit high)	<ul style="list-style-type: none"> DEF pump DCU connector Wire harness 	5-219
Light	P204F	P20B1	DEF tank heater valve - circuit (Open load)	<ul style="list-style-type: none"> Coolant shutoff valve Wire harness DCU connector 	5-225
Light	P204F	P20B2	DEF tank heater valve stuck	<ul style="list-style-type: none"> Coolant shutoff valve DCU connector 	5-231
Light	P204F	P20B3	DEF tank heater valve - circuit (Circuit low)	<ul style="list-style-type: none"> Coolant shutoff valve Wire harness DCU connector 	5-243
Light	P204F	P20B4	DEF tank heater valve - circuit (Circuit high)	<ul style="list-style-type: none"> Coolant shutoff valve Wire harness DCU connector 	5-249
Light	P204F	P20E8	Suction line pressure build up check	<ul style="list-style-type: none"> DEF piping (pressure backflow) DEF pump Suction line 	5-255
Light	P204F	P20E9	Back flow line check	<ul style="list-style-type: none"> DEF piping (pressure backflow) DEF pump 	5-266
Light	P204F	P20F4	DEF consumption failure	<ul style="list-style-type: none"> DEF injector (Clogging) DEF pipe (Clogging) 	5-274
Light	P204F	P2201	NOx sensor (SCR upstream) - Performance and Monitoring capability	<ul style="list-style-type: none"> NOx sensor 1 	5-281

DIAGNOSTIC TROUBLE CODE (DTC) TABLE					
MALFUNCTION INDICATOR LIGHT	DTC NO.		DIAGNOSIS ITEM	INSPECTION ITEM	REFER PAGE
	ECU	DCU			
Light	P204F	P2202	NOx sensor (SCR upstream) and Heater - Circuit (Circuit open)	<ul style="list-style-type: none"> • NOx sensor 1 • DCU • Wire harness 	5-294
Light	P204F	P2203	NOx sensor (SCR upstream) and Heater - Circuit (Circuit short)	<ul style="list-style-type: none"> • NOx sensor 1 	5-298
Light	P204F	P2204	NOx sensor (SCR upstream) - Feedback	<ul style="list-style-type: none"> • NOx sensor 1 • Wire harness 	5-302
Light	P204F	P2209	NOx sensor (SCR upstream) - Heater performance	<ul style="list-style-type: none"> • NOx sensor 1 	5-312
Light	P204F	P2212	NOx sensor (SCR downstream) - Feedback	<ul style="list-style-type: none"> • NOx sensor 2 • Wire harness 	5-323
Light	P204F	P2215	NOx sensor (SCR downstream) and Heater - Circuit (Circuit open)	<ul style="list-style-type: none"> • NOx sensor 2 • DCU • Wire harness 	5-334
Light	P204F	P2216	NOx sensor (SCR downstream) and Heater - Circuit (Circuit short)	<ul style="list-style-type: none"> • NOx sensor 2 	5-338
Light	P204F	P2222	NOx sensor (SCR downstream) - Heater performance	<ul style="list-style-type: none"> • NOx sensor 2 	5-342
Light	P204F	P2481	Exhaust gas temperature sensor (SCR inlet) - out of range (Out of range low)	<ul style="list-style-type: none"> • Exhaust gas temperature sensor • Wire harness • DCU connector 	5-353
Light	P204F	P2482	Exhaust gas temperature sensor (SCR inlet) - out of range (Out of range high)	<ul style="list-style-type: none"> • Exhaust gas temperature sensor • Wire harness • DCU connector 	5-360
Light	P204F	P2483	Exhaust gas temperature sensor (SCR inlet) - rationality	<ul style="list-style-type: none"> • Exhaust gas temperature sensor • Wire harness • DCU connector 	5-368
Light	P204F	P2510	DeNOx Power Relay Sense Circuit Range/Performance	<ul style="list-style-type: none"> • DCU 	5-386
Light	P204F	P2BAE	Feedback control	<ul style="list-style-type: none"> • DEF • NOx sensor 	5-393
Light	P204F	U0029	Vehicle Communication Bus A Performance	<ul style="list-style-type: none"> • DCU connector • Wire harness 	5-404
Light	P204F	U0038	Vehicle Communication Bus B Performance	<ul style="list-style-type: none"> • DCU connector • Wire harness 	5-407
Light	P204F	U0100	DeNOx ECU CAN communication (ECM)	<ul style="list-style-type: none"> • DCU connector • Wire harness 	5-410

DIAGNOSTIC TROUBLE CODE (DTC) TABLE					
MALFUNCTION INDICATOR LIGHT	DTC NO.		DIAGNOSIS ITEM	INSPECTION ITEM	REFER PAGE
	ECU	DCU			
Light	P204F	U029D	DeNOx ECU CAN communication (NOx sensor (SCR upstream))	<ul style="list-style-type: none"> • NOx sensor • Wire harness 	5-415
Light	P204F	U029E	DeNOx ECU CAN communication (NOx sensor (SCR downstream))	<ul style="list-style-type: none"> • NOx sensor • Wire harness 	5-418
Light	P204F	U02A2	DeNOx ECU CAN communication (DEF tank sensor)	<ul style="list-style-type: none"> • DEF sensor • Wire harness 	5-421
Light	P204F	U0597	Invalid Data Received From AC to DC Converter (DeNOx ECU)	<ul style="list-style-type: none"> • DCU 	5-424

DTC: P0071

EN01H16F02040F03001011

DTC: P0071 Ambient air temperature sensor - rationality
INFORMATION

SAPH16F020400013

1. Technical description

- Ambient air temperature sensor rationality is checked by comparison with Engine coolant temperature.

<Description of malfunction>

- Malfunction of ambient air temperature sensor is detected.

2. DTC set condition**(1) DTC detection condition**

Starter switch ON.

Difference between DEF pump temperature and exhaust gas temperature (SCR inlet): $< 8\text{ }^{\circ}\text{C}$ {46.4 °F} and difference of DEF pump temperature between engine coolant temperature (from Engine ECU): $< 8\text{ }^{\circ}\text{C}$ {46.4 °F} and difference between exhaust gas temperature (SCR inlet) and engine coolant temperature (from Engine ECU): $< 8\text{ }^{\circ}\text{C}$ {46.4 °F}.

(2) Judgement criteria

Difference between ambient air temperature and engine coolant temperature (from Engine ECU): > 25 °C {77 °F} for 10 sec.

3. Reset condition

- When the starter switch is ON, and when the temperature difference between the DEF pump, the exhaust gas temperature and the engine coolant temperature is within 8 °C {46.4 °F}, the difference with the engine coolant temperature should be less than 25 °C {77 °F}.

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

- MIL: ON
- Stop of each temperature sensor failure diagnosis.

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

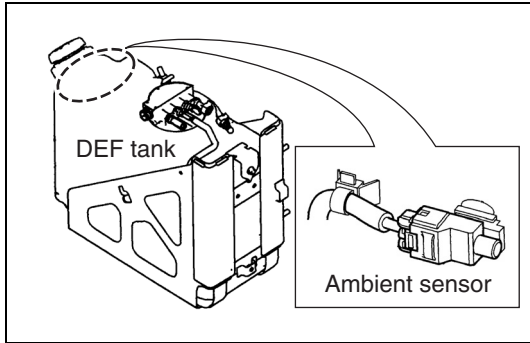
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Irregular contact (disconnection or poor fit of connector)
- Malfunction of ambient air temperature sensor
- Malfunction of engine coolant temperature sensor
- Malfunction of exhaust gas temperature sensor (SCR inlet)
- Malfunction of DEF pump temperature sensor

INSPECTION PROCEDURE: P0071**1 Inspect the ambient air temperature sensor connector**

SAPH16F020400014

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

Was any failure found?**YES**

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2

2 Inspect the connector of the external resistor

1. Check the connection of the external resistor connector (Looseness and poor contact).

Was any failure found?**YES**

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the DCU 86P connector

1. Check the connection of the DCU 86P connector (Looseness and poor contact).

Was any failure found?**YES**

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the ambient air temperature sensor

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

Was any failure found?

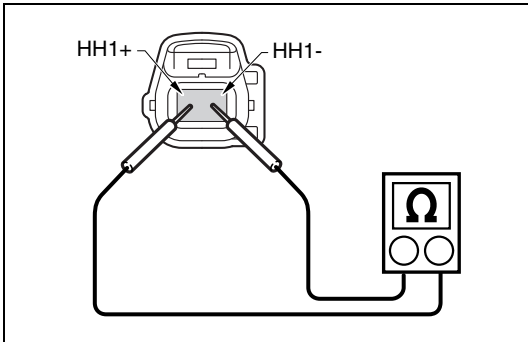
YES

Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the ambient air temperature sensor unit



SAPH16F020400015

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Ambient air temperature sensor HH1+ – HH1-	25 °C {77 °C}: 1.7 kΩ

Do the measurements meet the standard value?

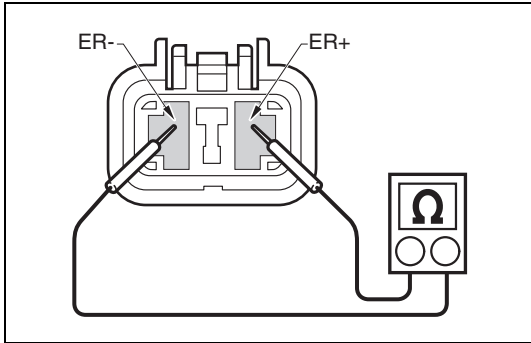
YES

Go to step 6.

NO

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

6 Inspect the external resistor unit



SAPH16F020400016

1. Disconnect the external resistor connector.
2. Use the electrical tester to measure the resistance between the terminals of the external resistor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	External resistor ER+ – ER-	2 kΩ

Do the measurements meet the standard value?

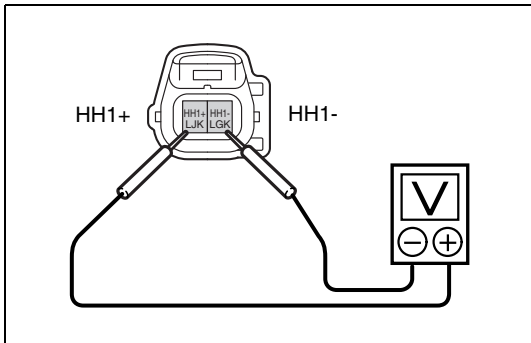
YES

Go to step 7.

NO

Replace the external resistor. Perform "After-inspection work" of INFORMATION section.

7 Inspect the sensor power supply



SAPH16F020400017

1. Connect the external resistor connector.
2. Set the starter switch to the "ON" position.
3. Use the electrical tester to measure the voltage between the terminals of the ambient air temperature sensor vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Ambient air temperature sensor vehicle-side connector HH1+ – HH1-	4.5 – 5.5 V

Do the measurements meet the standard value?

YES

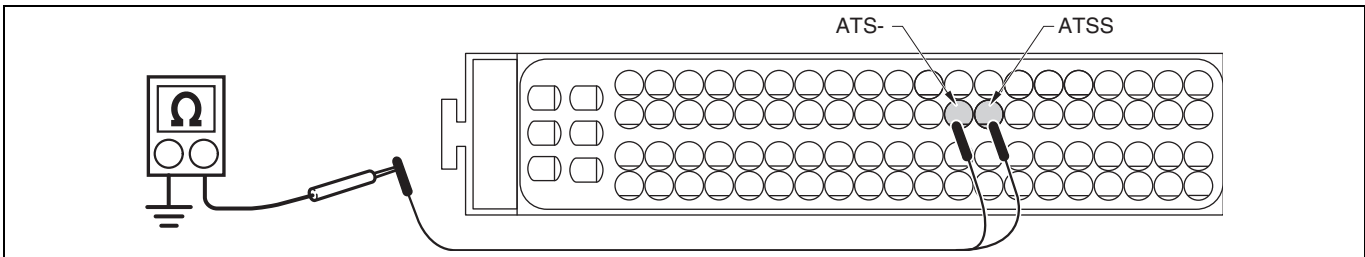
Go to step 10.

NO

Go to step 8.

8 Inspect for short-circuit in the ambient air temperature sensor harness

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 86P connector.
3. 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.



SAPH16F020400018

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

Do the measurements meet the standard value?

YES

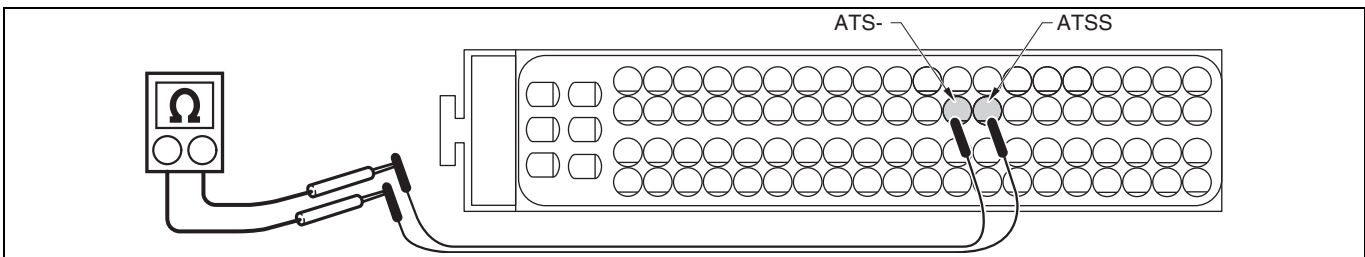
NO

Go to step 9.

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

9 Inspect for disconnections of the ambient air temperature sensor harness

1. Connect the ambient air temperature sensor 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.



SAPH16F020400019

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector ATSS – ATS-	25 °C {77 °F}: 3.7 kΩ

Do the measurements meet the standard value?

YES

Go to step 10.

NO

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

10 Inspect the engine coolant temperature sensor connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

11 Inspect the engine coolant temperature sensor

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

Was any failure found?

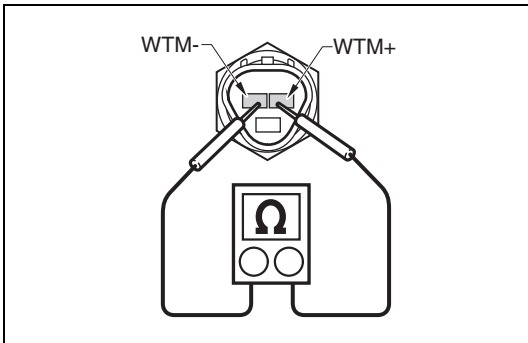
YES

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 12.

12 Inspect the engine coolant temperature sensor unit



SAPH16F020400020

1. Disconnect the engine coolant temperature sensor connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine coolant temperature sensor 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 13.

NO

Replace the engine coolant temperature sensor.
Perform "After-inspection work" of INFORMATION section.

13 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.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 14.

14 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).

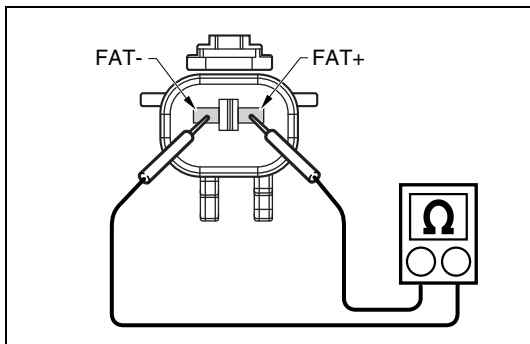
Was any failure found?

YES

Clean the exhaust gas temperature sensor and install it properly. If damaged, replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 15.

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

SAPH16F020400021

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 16.

NO

Replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

16 Inspect the DEF pump temperature sensor connector

1. Check the connection of the DEF pump temperature sensor connector (Looseness and poor contact).

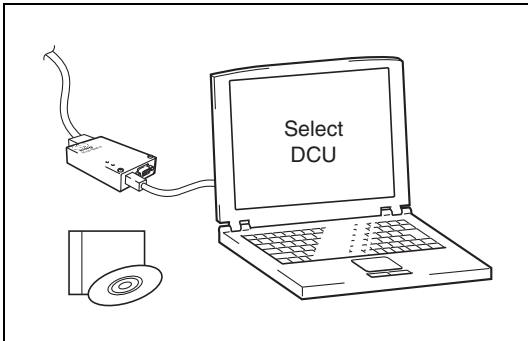
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 17.

17 Check the DTC detected (DCU)

SAPH16F020400022

1. Perform an engine warm-up. (Water temperature: 60 °C {140 °F} or more)
2. Stop the engine.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P0071 has been detected in [Fault Information].

Has DTC P0071 been detected?

YES

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

NO

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

CHECKLIST: P0071

DTC: P0071		Ambient air temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the ambient air temperature sensor connector	Check the connection of the ambient air temperature sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the connector of the external resistor	Check the connection of the external resistor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the DCU 86P connector	Check the connection of the DCU 86P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the ambient air temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the ambient air temperature sensor. 2. Make sure there is no dirt or damage to the ambient air temperature sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 5.

DTC: P0071		Ambient air temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the ambient air temperature sensor unit	Measure the resistance between the terminals of the ambient air temperature sensor. <Tester connections> Ambient air temperature sensor HH1+ – HH1- <Standard values> 25 °C {77 °F}: 1.7 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.
6	Inspect the external resistor unit	Measure the resistance between the terminals of the external resistor. <Tester connections> External resistor terminals ER+ – ER- <Standard values> 2 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Replace the external resistor. Perform "After-inspection work" of INFORMATION section.
7	Inspect the sensor power supply	Measure the voltage between the terminals of the ambient air temperature sensor vehicle-side connector. <Tester connections> Ambient air temperature sensor vehicle-side connector HH1+ – HH1- <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 10.	Go to step 8.
8	Inspect short-circuit of the ambient air temperature sensor harness	Measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. (Use the signal check harness) <Tester connections> DCU 86P vehicle-side connector ATSS – Ground ATS- – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 9.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P0071		Ambient air temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Inspect disconnection of the ambient air temperature sensor harness	<p>Measure the resistance between the terminals of the DCU 86P vehicle-side connector.</p> <ol style="list-style-type: none"> 1. Connect the ambient air temperature sensor connector. 2. Disconnect the DCU 86P connector from DCU. Connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector. <p><Tester connections> DCU 86P vehicle-side connector ATSS – ATS- <Standard values> 25 °C {77 °F}: 3.7 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 10.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
10	Inspect the engine coolant temperature sensor connector	Check the connection of the engine coolant temperature sensor connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 11.
11	Inspect the engine coolant temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the engine coolant temperature sensor. 2. Make sure there is no dirt or damage to the engine coolant temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 12.
12	Inspect the engine coolant temperature sensor unit	<p>Measure the resistance between the terminals of the engine coolant temperature sensor.</p> <p><Tester connections> Engine coolant temperature sensor WTM+ – WTM- <Standard values> 20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 13.	Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P0071		Ambient air temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
13	Inspect the exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 14.
14	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 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). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.	Go to step 15.
15	Inspect the exhaust gas temperature sensor (SCR inlet) unit	Measure the resistance between the terminals of the exhaust gas temperature sensor (SCR inlet). <Tester connections> Exhaust gas temperature sensor (SCR inlet) FAT+ – FAT- <Standard values> 20 °C {68 °F}: 220 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 16.	Replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.
16	Inspect the DEF pump temperature sensor connector	Check the connection of the DEF pump temperature sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair or replace if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 17.

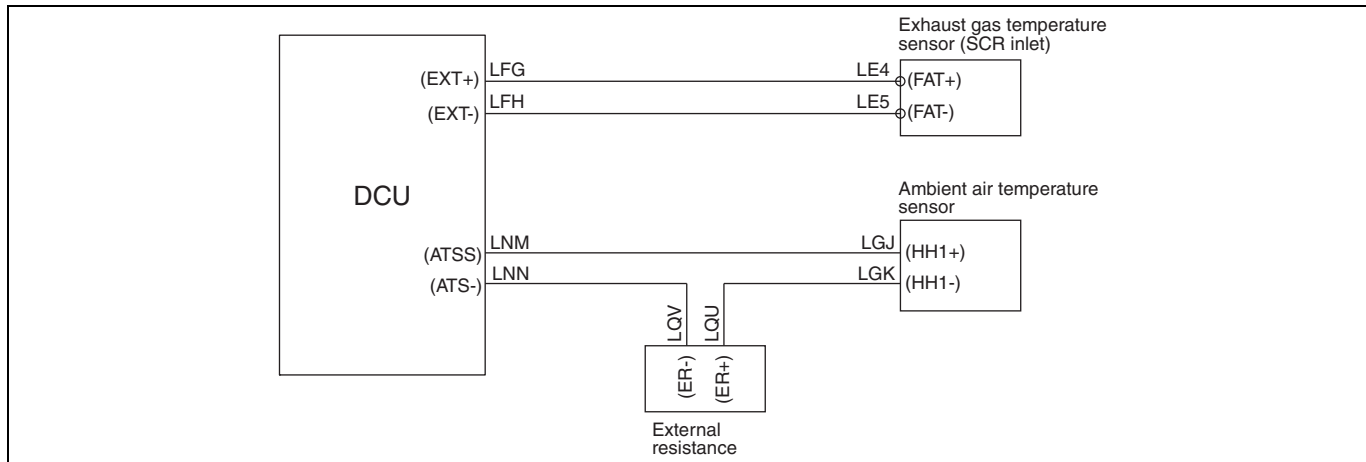
DTC: P0071		Ambient air temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
17	Check the DTC detected (DCU)	Warm-up the engine (Water temperature: 60 °C {140 °F} or more). Check if P0071 have been detected in [DCU].	DTC P0071 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P0072

EN01H16F02040F03001012

DTC: P0072 Ambient air temperature sensor - out of range (Out of range low)

INFORMATION



SAPH16F020400023

1. Technical description

- The ambient air temperature sensor inputs the outside air temperature data into the DCU to determine the heating time when performing thawing or thermal insulation of the DEF in the DEF system pipes.
- The ambient air temperature sensor is connected to the external resistor at 2 kΩ to reduce the current flowing value through the sensor circuit.

<Description of malfunction>

- Ambient air temperature sensor malfunction detected.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
Ambient air temperature sensor voltage: Less than 3.4 V

3. Reset condition

- After having restored to the normal condition.

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

- MIL: ON
- Each temperature sensors failure diagnosis is stopped.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe)>**

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

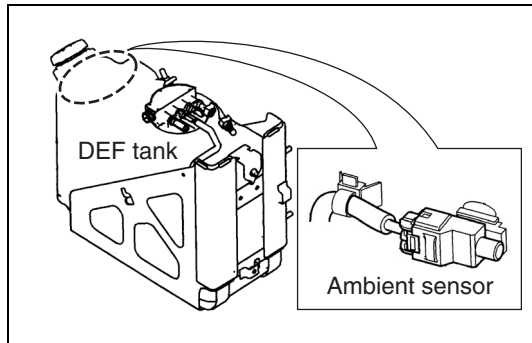
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in the sensor harness
- Disconnection or poor fit of connector
- Malfunction of the ambient air temperature sensor
- Failure of the external resistor

INSPECTION PROCEDURE: P0072**1 Inspect the ambient air temperature sensor connector**

SAPH16F020400024

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

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 2.

2 Inspect the connector of the external resistor

1. Check the connection of the external resistor connector (Looseness and poor contact).

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 3.

3 Inspect the ambient air temperature sensor

1. Check the installation of the ambient air temperature sensor.
2. Make sure there is no dirt or damage to the sensing unit of the ambient air temperature sensor.

Was any failure found?

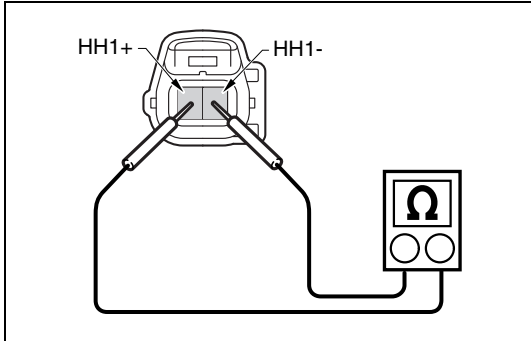
YES

Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the ambient air temperature sensor unit



SAPH16F020400025

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Ambient air temperature sensor HH1+ – HH1-	25 °C {77 °F}: 1.7 kΩ

Do the measurements meet the standard value?

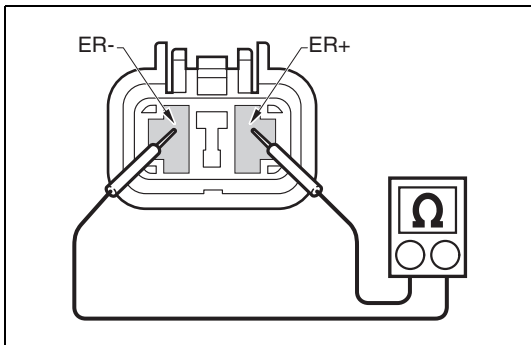
YES

Go to step 5.

NO

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

5 Inspect the external resistor unit



SAPH16F020400026

1. Disconnect the external resistor connector.
2. Use the electrical tester to measure the resistance between the terminals of the external resistor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	External resistor ER+ – ER-	2 kΩ

Do the measurements meet the standard value?

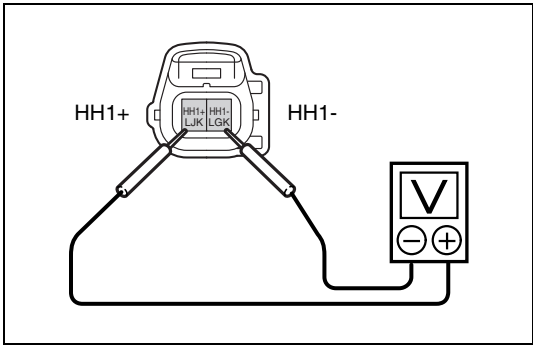
YES

NO

Go to step 6.

Replace the external resistor.
Perform "After-inspection work" of INFORMATION section.

6 Inspect the sensor power supply



SAPH16F020400027

1. Connect the external resistor connector.
2. Set the starter switch to the "ON" position.
3. Use the electrical tester to measure the voltage between the terminals of the ambient air temperature vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Ambient air temperature sensor vehicle-side connector HH1+ – HH1-	4.5 – 5.5 V

Do the measurements meet the standard value?

YES

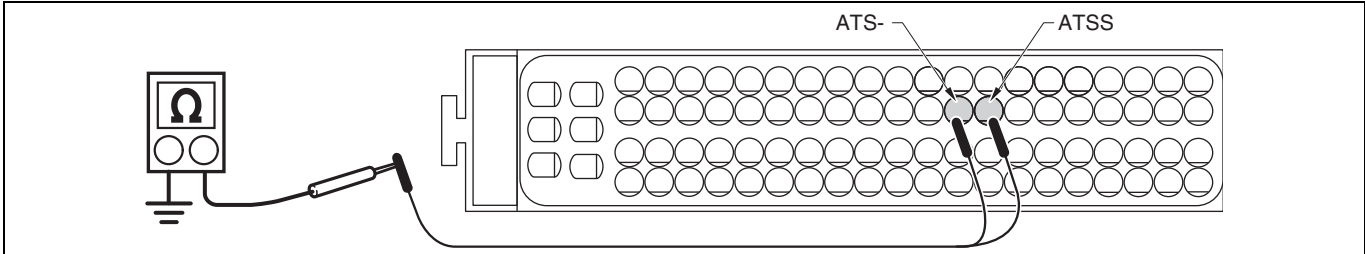
NO

Go to step 9.

Go to step 7.

7 Inspect for short-circuit in the ambient air temperature sensor harness

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 86P connector.
3. 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.



SAPH16F020400028

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

Do the measurements meet the standard value?

YES

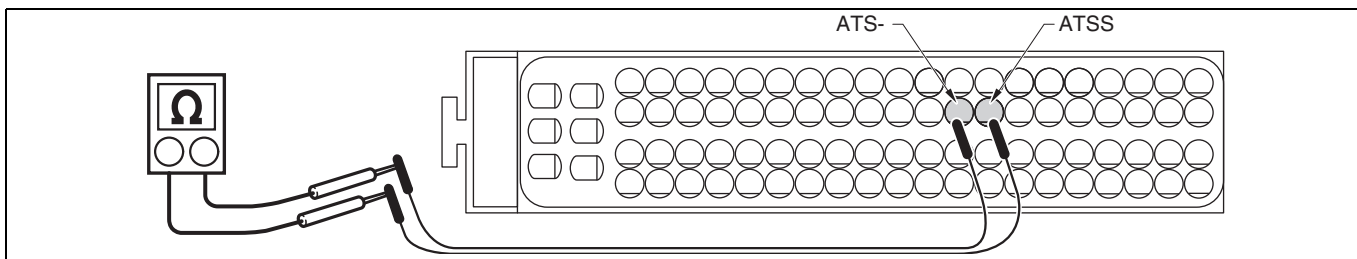
Go to step 8.

NO

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

8 Inspect for disconnection in the ambient air temperature sensor harness

1. Connect the ambient air temperature sensor 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.



SAPH16F020400029

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector ATSS – ATS-	25 °C {77 °F}: 3.7 kΩ

Do the measurements meet the standard value?

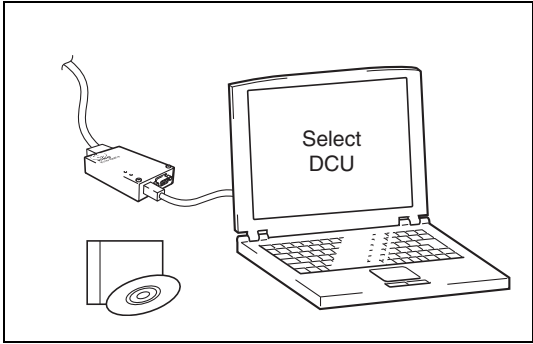
YES

Go to step 9.

NO

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

9 Check the DTC detected [DCU]



SAPH16F020400030

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P0072 has been detected in [Fault Information].

Has DTC P0072 been detected?

YES

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

NO

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

CHECKLIST: P0072

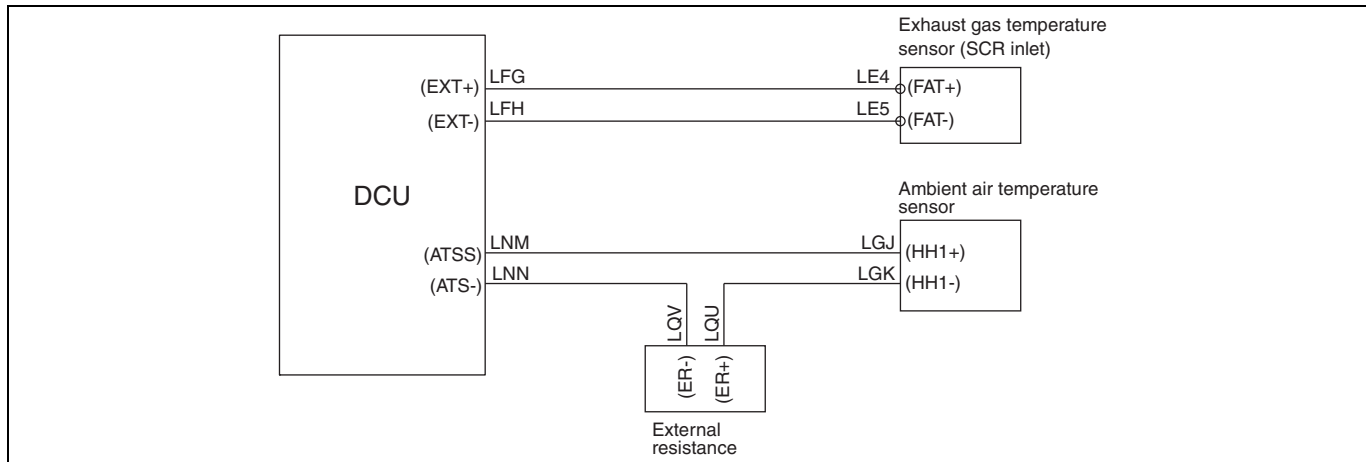
DTC: P0072		Ambient air temperature sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the ambient air temperature sensor connector	Check the connection of the ambient air temperature sensor connector (Looseness or poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the connector of the external resistor	Check the connection of the external resistor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the ambient air temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the ambient air temperature sensor. 2. Make sure there is no dirt or damage to the ambient air temperature sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the ambient air temperature sensor unit	Measure the resistance between the terminals of the ambient air temperature sensor. <Tester connections> Ambient air temperature sensor HH1+ – HH1- <Standard values> 25 °C {77 °F}: 1.7 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the ambient temperature sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P0072		Ambient air temperature sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the external resistor unit	Measure the resistance between the terminals of the external resistor. <Tester connections> External resistor ER+ – ER- <Standard values> 2 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Replace the external resistor. Perform "After-inspection work" of INFORMATION section.
6	Inspect the sensor power supply	Measure the voltage between the terminals of the ambient air temperature vehicle-side connector. <Tester connections> Ambient air temperature sensor vehicle-side connector HH1+ – HH1- <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 9.	Go to step 7.
7	Inspect for short-circuit in the ambient air temperature sensor harness	Measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. (Use the signal check harness) <Tester connections> DCU 86P vehicle-side connector ATSS – Ground ATS- – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 8.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
8	Inspect for disconnection in the ambient air temperature sensor harness	Measure the resistance of the wire harness and sensor between the DCU 86P vehicle-side connector and the ambient air temperature sensor. 1. Connect the ambient air temperature sensor connector. 2. Connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector. <Tester connections> DCU 86P vehicle-side connector ATSS – ATS- <Standard values> 25 °C {77 °F}: 3.7 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 9.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P0072		Ambient air temperature sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Check the DTC detected (DCU)	Check if P0072 has been detected in [DCU].	DTC P0072 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P0073

EN01H16F02040F03001013

DTC: P0073 Ambient air temperature sensor - out of range (Out of range high)
INFORMATION

SAPH16F020400031

1. Technical description

- The ambient air temperature sensor inputs the outside air temperature data into the DCU to determine the heating time when performing thawing or thermal insulation of the DEF in the DEF system pipes.
- The ambient air temperature sensor is connected to the external resistance at 2 kΩ to reduce the current flowing value through the sensor circuit.

<Description of malfunction>

- Ambient air temperature sensor malfunction detected.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
Ambient air temperature sensor voltage: More than 4.783 V

3. Reset condition

- After having restored to the normal condition.

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

- MIL: ON
- SCR system failure lamp: LIT
- If the failure is not corrected within 500 miles: Engine power limited.
- If the failure is not corrected within 2,000 miles: Vehicle speed limited.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe)>**

- Lack of engine power (If the failure is not corrected within 500 miles).
- Vehicle speed does not increase (If the failure is not corrected within 2,000 miles).

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

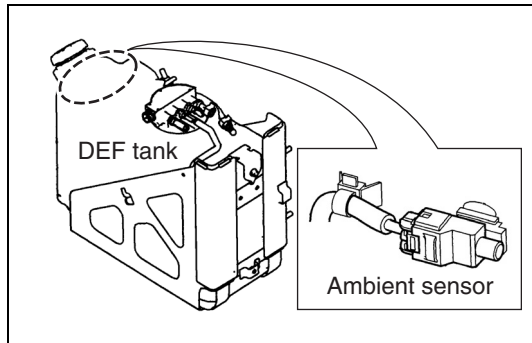
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in the sensor harness
- Disconnection or poor fit of connector
- Malfunction of the ambient air temperature sensor
- Failure of the external resistor

INSPECTION PROCEDURE: P0073**1 Inspect the ambient air temperature sensor connector**

SAPH16F020400032

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

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 2.****2 Inspect the connector of the external resistor**

1. Check the connection of the external resistor connector (Looseness and poor contact).

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 3.****3 Inspect the ambient air temperature sensor**

1. Check the installation of the ambient air temperature sensor.
2. Make sure there is no dirt or damage to the sensing unit of the ambient air temperature sensor.

Was any failure found?

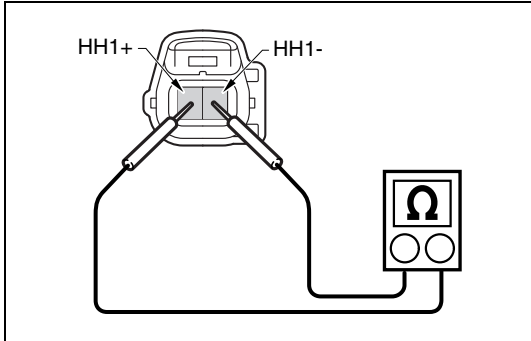
YES

Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the ambient air temperature sensor unit



SAPH16F020400033

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Ambient air temperature sensor HH1+ – HH1-	25 °C {77 °F}: 1.7 kΩ

Do the measurements meet the standard value?

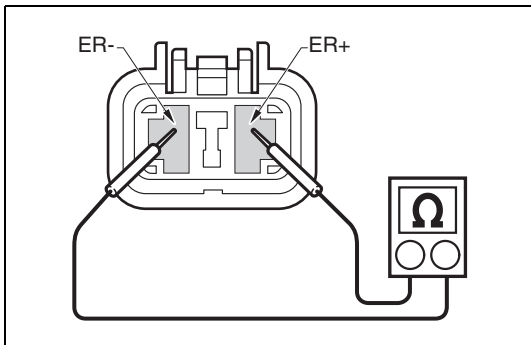
YES

Go to step 5.

NO

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

5 Inspect the external resistor unit



SAPH16F020400034

1. Disconnect the external resistor connector.
2. Use the electrical tester to measure the resistance between the terminals of the external resistor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	External resistor ER+ – ER-	2 kΩ

Do the measurements meet the standard value?

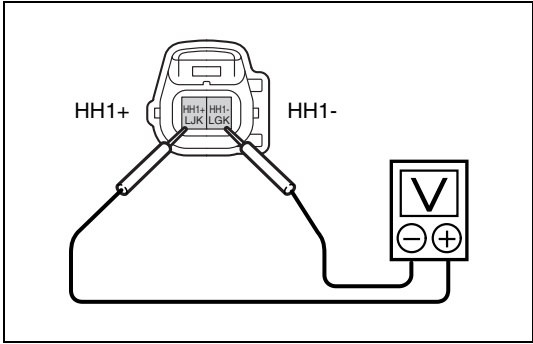
YES

Go to step 6.

NO

Replace the external resistor.
Perform "After-inspection work" of INFORMATION section.

6 Inspect the sensor power supply



SAPH16F020400035

1. Connect the external resistor connector.
2. Set the starter switch to the "ON" position.
3. Use the electrical tester to measure the voltage between the terminals of the ambient air temperature sensor vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Ambient air temperature sensor vehicle-side connector HH1+ - HH1-	4.5 - 5.5 V

Do the measurements meet the standard value?

YES

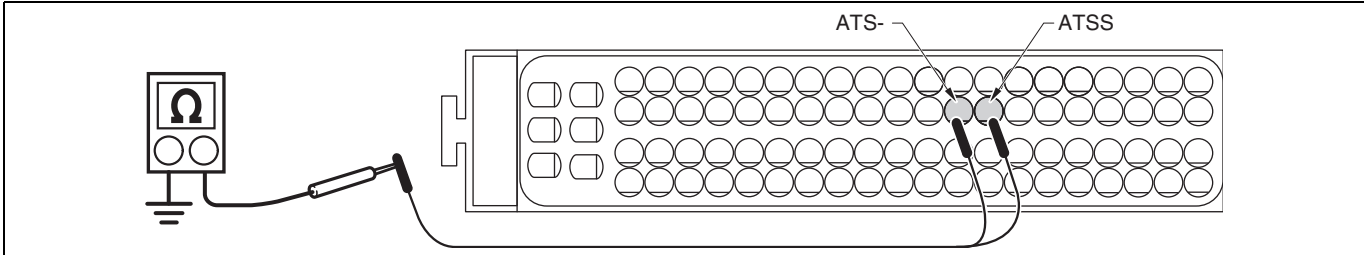
Go to step 9.

NO

Go to step 7.

7 Inspect for short-circuit in the ambient air temperature sensor harness

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 86P connector.
3. Use the electrical tester to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground.



SAPH16F020400036

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

Do the measurements meet the standard value?

YES

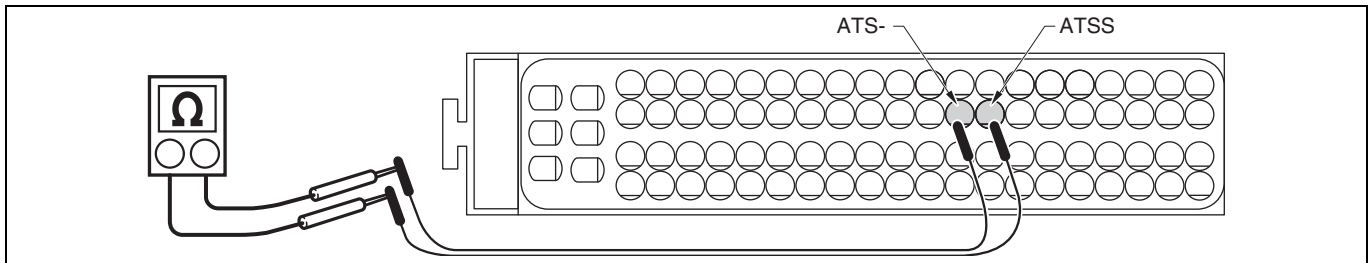
NO

Go to step 8.

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

8 Inspect for disconnection in the ambient air temperature sensor harness

1. Connect the ambient air temperature sensor 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.



SAPH16F020400037

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector ATSS – ATS-	25 °C {77 °F}: 3.7 kΩ

Do the measurements meet the standard value?

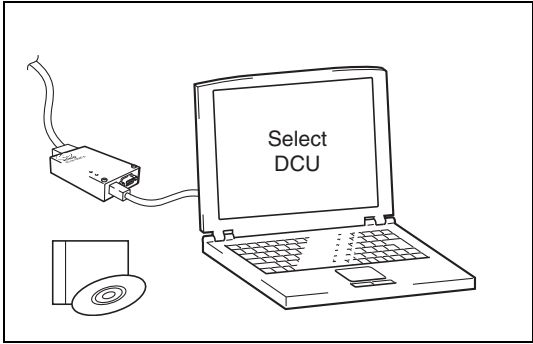
YES

Go to step 9.

NO

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

9 Check the DTC detected (DCU)



SAPH16F020400038

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P0073 has been detected in [Fault Information].

Has DTC P0073 been detected?

YES

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

NO

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

CHECKLIST: P0073

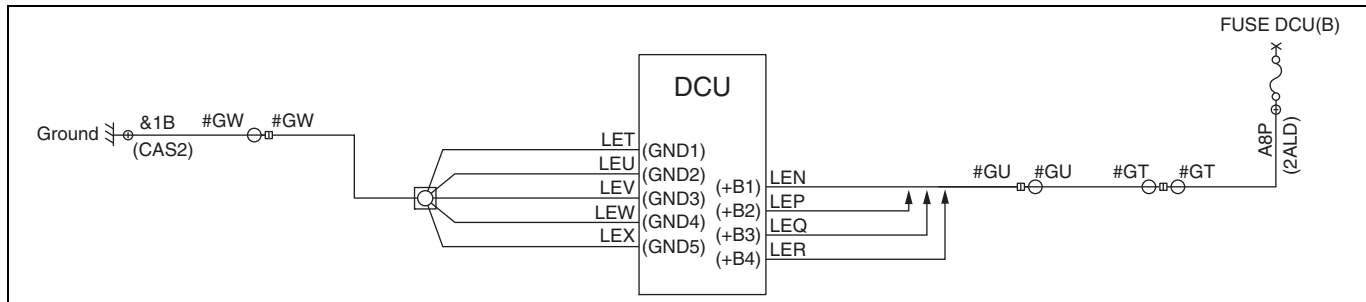
DTC: P0073		Ambient air temperature sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the ambient air temperature sensor connector	Check the connection of the ambient air temperature sensor connector (Looseness or poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the connector of the external resistor	Check the connection of the external resistor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the ambient air temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the ambient air temperature sensor. 2. Connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the ambient air temperature sensor unit	Measure the resistance between the terminals of the ambient air temperature sensor. <Tester connections> Ambient air temperature sensor HH1+ – HH1- <Standard values> 25 °C {77 °F}: 1.7 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the ambient temperature sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P0073		Ambient air temperature sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the external resistor unit	Measure the resistance between the terminals of the external resistor. <Tester connections> External resistor ER+ – ER- <Standard values> 2 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Replace the external resistor Perform "After-inspection work" of INFORMATION section.
6	Inspect the sensor power supply	Measure the voltage between the terminals of the ambient air temperature sensor vehicle-side connector. <Tester connections> Ambient air temperature sensor vehicle-side connector HH1+ – HH1- <Standard values> 4.5 – 5.5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 9.	Go to step 7.
7	Inspect for short-circuit in the ambient air temperature sensor harness	Measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. (Use the signal check harness) <Tester connections> DCU 86P vehicle-side connector ATSS – Ground ATS- – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 8.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
8	Inspect for disconnection in the ambient air temperature sensor harness	Measure the resistance of the wire harness and sensor between the DCU 86P vehicle-side connector and the ambient air temperature sensor. 1. Connect the ambient air temperature sensor connector. 2. Connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector. <Tester connections> DCU 86P vehicle-side connector ATSS – ATS- <Standard values> 25 °C {77 °F}: 3.7 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 9.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P0073		Ambient air temperature sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Check the DTC detected (DCU)	Check if P0073 has been detected in [DCU].	DTC P0073 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P0562

EN01H16F02040F03001014

DTC: P0562 Sensor supply voltage - out of range (Out of range low)**INFORMATION**

SAPH16F020400039

1. Technical description

- DCU receives electric power from battery.

<Description of malfunction>

- Low voltage malfunction is detected in battery voltage (DCU power circuit).

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

(2) Judgement criteria

Battery voltage is less than 9 V.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR system malfunction lamp on.
- 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 if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Battery terminal harness is disconnected.
- Battery is dead.
- Harness connection is faulty.

INSPECTION PROCEDURE: P0562**1 Inspect the DCU 53P connector**

1. Check the connection of the DCU 53P connector (Looseness and poor contact).

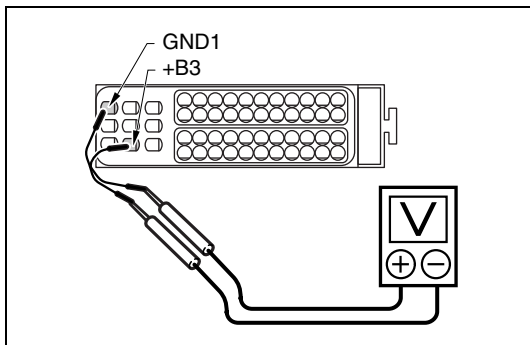
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the voltage of the DCU power supply

SAPH16F020400040

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 53P connector.
3. Connect the signal check harness and use the electrical tester to measure the voltage between the terminals of the DCU 53P vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 53P vehicle-side connector +B3 – GND1	9 – 16 V

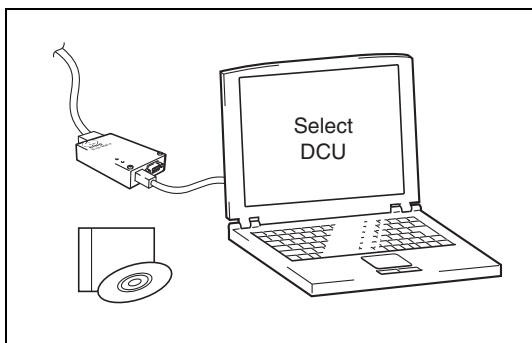
Do the measurements meet the standard value?

YES

Go to step 3.

NO

Repair or replace the DCU power supply circuit (FUSE to DCU).
Perform "After-inspection work" of INFORMATION section.

3 Check the DTC detected (DCU) [Hino-DX]

SAPH16F020400041

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if the P0562 has been detected in [Fault Information].

Has DTC P0562 been detected?**YES**

**Replace the DCU. (After replacing the DCU, perform a forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

NO

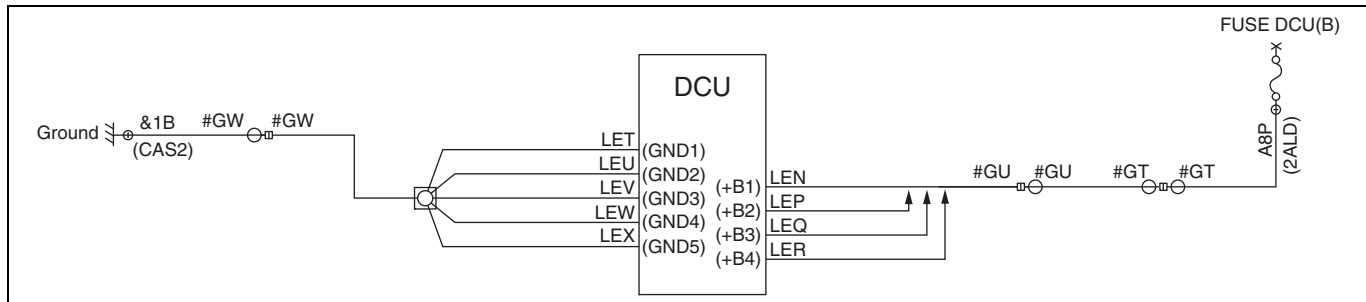
**Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P0562

DTC: P0562		Sensor supply voltage - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DCU 53Pin connector	Check the connection of the DCU 53P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the voltage of DCU power supply	Connect the signal check harness and use the electrical tester to measure the voltage between the terminals of the DCU 53P vehicle-side connector. <Tester connections> DCU 53P vehicle-side connector. +B3 – GND1 <Standard values> 9 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Repair or replace the DCU power supply circuit (Fuse – DCU). Perform "After-inspection work" of INFORMATION section.
3	Check the DTC detected (DCU) [Hino-DX]	Check if P0562 has been detected in [DCU].	DTC P0562 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P0563

EN01H16F02040F03001015

DTC: P0563 Sensor supply voltage - out of range (Out of range high)**INFORMATION**

SAPH16F020400042

1. Technical description

- DCU receives electric power from battery.

<Description of malfunction>

- High voltage malfunction detected in battery voltage (DCU power circuit).

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
Battery voltage is more than 16 V.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR system malfunction lamp on.
- 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 if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Battery terminal harness is disconnected.
- Battery is dead.
- Harness connection is faulty.

INSPECTION PROCEDURE: P0563**1 Inspect the DCU 53P connector**

1. Check the connection of the DCU 53P connector (Looseness and poor contact).

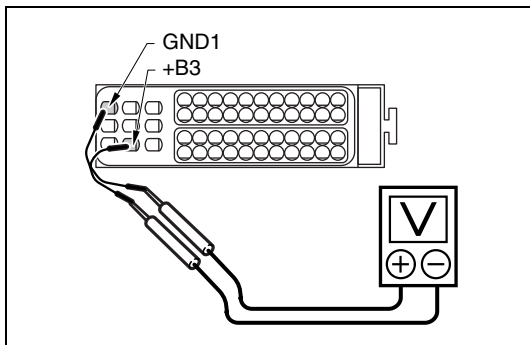
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the voltage of DCU power supply

SAPH16F020400043

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 53P connector.
3. Connect the signal check harness and use the electrical tester to measure the voltage between the terminals of the DCU 53P vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 53P vehicle-side connector +B3 – GND1	9 – 16 V

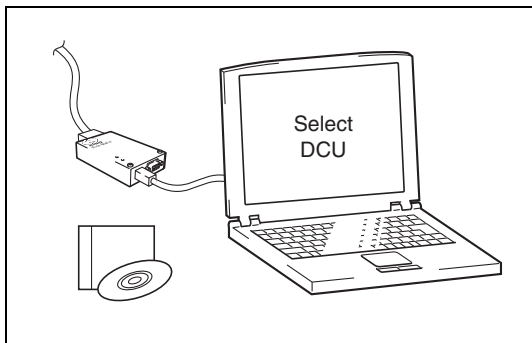
Do the measurements meet the standard value?

YES

Go to step 3.

NO

Repair or replace DCU power supply circuit (FUSE to DCU).
Perform "After-inspection work" of INFORMATION section.

3 Check the DTC detected (DCU) [Hino-DX]

SAPH16F020400044

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P0563 has been detected in [Fault Information].

Has DTC P0563 been detected?**YES**

**Replace the DCU. (After replacing the DCU, perform a forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

NO

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

CHECKLIST: P0563

DTC: P0563		Sensor supply voltage - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DCU 53Pin connector	Check the connection of the DCU 53P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the voltage of DCU power supply	Connect the signal check harness and use the electrical tester to measure the voltage between the terminals of the DCU 53P vehicle-side connector. <Tester connections> DCU 53P vehicle-side connector. +B3 – GND1 <Standard values> 9 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Repair or replace the DCU power supply circuit (Fuse – DCU). Perform "After-inspection work" of INFORMATION section.
3	Check the DTC detected (DCU) [Hino-DX]	Check if P0563 has been detected in [DCU].	DTC P0563 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P060C

EN01H16F02040F03001016

DTC: P060C DeNOx ECU error INFORMATION

1. Technical description

- DCU internal chip error is being checked in DCU.

<Description of malfunction>

- DCU internal malfunction has been detected.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
DCU internal chip errors are judged by DCU itself.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 if the battery voltage is in the normal range.

7. After-inspection work

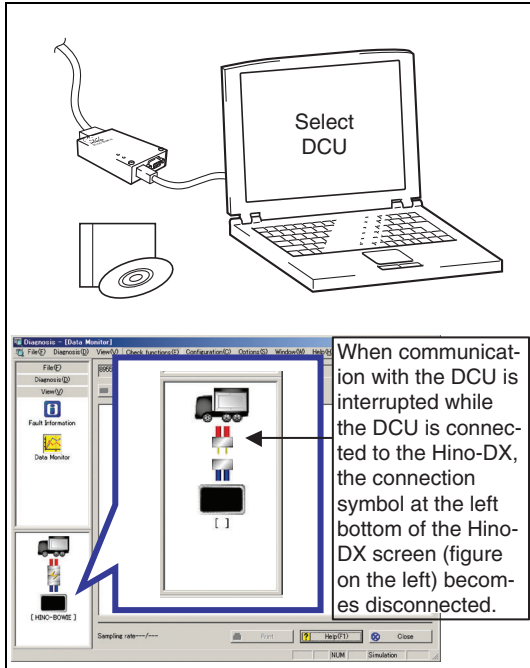
- Clear all past DTCs.
- Check if the DTC is stored after test drive.

8. Estimated failure factors

- DCU malfunction

INSPECTION PROCEDURE: P060C

1 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400045

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if Hino-DX is communicating with the DCU.
4. Erase the malfunction history.
5. Set the starter switch to the "LOCK" position.
6. Check if the DCU main relay is OFF in the Hino-DX menu. (This cuts off the communication between Hino-DX and the DCU.)

NOTICE

- **The main relay turns OFF 1 minute after the exhaust gas temperature (SCR inlet) drops below 200 °C {392 °F}.**
7. Set the starter switch to the "ON" position.
 8. Select [DCU] and check if P060C has been detected in [Fault Information].

Has DTC P060C been detected?

YES

Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.

NO

Erase the malfunction history and recheck the DTC.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P060C

DTC: P060C		DeNOx ECU error		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	<ol style="list-style-type: none"> 1. Connect the vehicle to Hino-DX. 2. Set the starter switch to the "ON" position. 3. Select [DCU] and check if Hino-DX is communicating with the DCU. 4. Erase the malfunction history. 5. Set the starter switch to the "LOCK" position. 6. Check if the DCU main relay is OFF in the Hino-DX menu. (This cuts off the communication between Hino-DX and the DCU.) <p>NOTICE</p> <ul style="list-style-type: none"> • The main relay turns OFF 1 minute after the exhaust gas temperature (SCR inlet) drops below 200 °C {392 °F}. <ol style="list-style-type: none"> 7. Set the starter switch to the "ON" position. 8. Check if P060C has been detected in [DCU]. 	<p>DTC P060C has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.</p>	<p>Erase the malfunction history and recheck the DTC. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P062F

EN01H16F02040F03001017

DTC: P062F Controller store data error INFORMATION

1. Technical description

- DCU internal ROM is being checked in DCU.

<Description of malfunction>

- DCU internal malfunction has been detected.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
DCU internal chip errors are judged by DCU itself.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

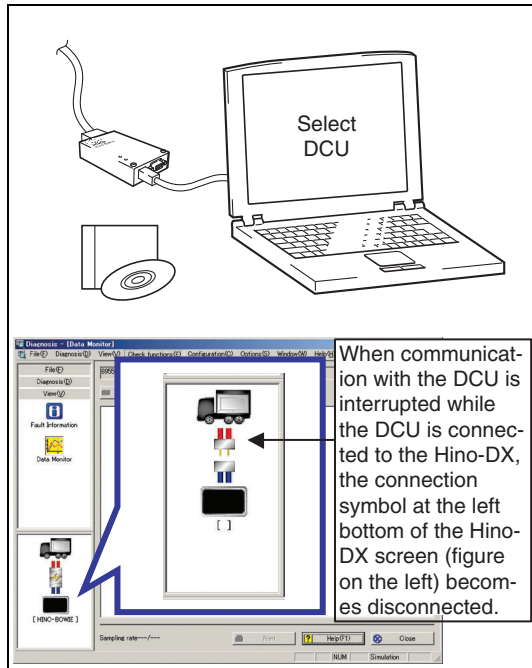
- DCU malfunction

NOTICE

- If the DCU power supply is shut off forcibly, such as by disconnecting the battery before the pump operation ends, and the DCU main relay turns off after the starter switch is turned OFF, P062F may be detected.

INSPECTION PROCEDURE: P062F

1 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400046

1. Connect the vehicle to Hino-DX.
 2. Set the starter switch to the "ON" position.
 3. Select [DCU] and check if the menu is communicating with the DCU.
 4. Erase the malfunction history.
 5. Set the starter switch to the "LOCK" position.
 6. Check if the DCU main relay is OFF in the Hino-DX menu. (This cuts off the communication between Hino-DX and the DCU.)
- NOTICE**
- The main relay turns OFF 1 minute after the exhaust gas temperature (SCR inlet) drops below 200 °C {392 °F}.
7. Set the starter switch to the "ON" position.
 8. Select [DCU] and check if P062F has been detected in [Fault Information].

Has DTC P062F been detected?

YES

Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.

NO

Erase the malfunction history and recheck the DTC.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P062F

DTC: P062F		Controller store data error		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	<ol style="list-style-type: none"> 1. Connect the vehicle to Hino-DX. 2. Set the starter switch to the "ON" position. 3. Select [DCU] and check if Hino-DX is communicating with the DCU. 4. Erase the malfunction history. 5. Set the starter switch to the "LOCK" position. 6. Check if the DCU main relay is OFF in the Hino-DX menu. (This cuts off the communication between Hino-DX and the DCU.) <p>NOTICE</p> <ul style="list-style-type: none"> • The main relay turns OFF 1 minute after the exhaust gas temperature (SCR inlet) drops below 200 °C {392 °F}. <ol style="list-style-type: none"> 7. Set the starter switch to the "ON" position. 8. Check if P062F has been detected in [DCU]. 	<p>DTC P062F has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.</p>	<p>Erase the malfunction history and recheck the DTC. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P0667

EN01H16F02040F03001018

DTC: P0667 DeNOx ECU temperature sensor 1, 2 - rationality INFORMATION

1. Technical description

- Sensor values of the 2 temperature sensors in the DCU are compared.
- Malfunction is indicated if the temperature differential exceeds a set value.

<Description of malfunction>

- DCU temperature sensor malfunction has been detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

Battery voltage range is in the 9 V to 16 V range.

(2) Judgement criteria

The absolute value of (temperature sensor 1 - temperature sensor 2) > 15°C (59°F) for more than 10 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DCU failure inspection 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

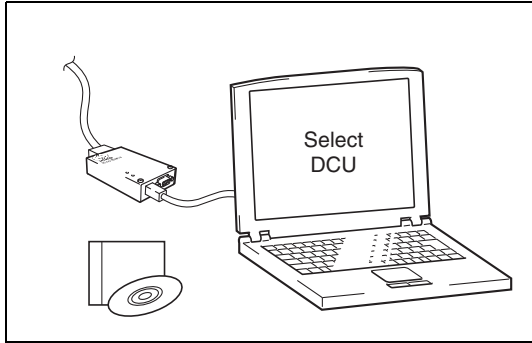
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DCU (Internal temperature sensor) malfunction

INSPECTION PROCEDURE: P0667**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400047

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P0667 has been detected in [Fault Information].

Has DTC P0667 been detected?**YES**

**Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

NO

**Erase the malfunction history. Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P0667

DTC: P0667		DeNOx ECU temperature sensor 1, 2 - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if P0667 has been detected in [DCU].	DTC P0667 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.	Erase the malfunction history. Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P0668

EN01H16F02040F03001019

DTC: P0668 DeNOx ECU temperature sensor (Out of range low) INFORMATION

1. Technical description

- DCU internal temperature sensor is being checked in DCU.

<Description of malfunction>

- -

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.

- (2) Judgement criteria

DCU (Internal temperature sensor) voltage:

- Voltage of the Sensor 1 is less than 0.85 V for 0.4 sec or more.
- Voltage of the Sensor 2 is less than 0.85 V for 0.4 sec or more.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DCU malfunction diagnosis has been stopped.

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

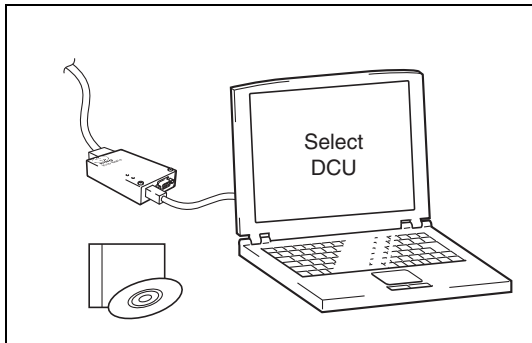
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DCU (Internal temperature sensor) malfunction.

INSPECTION PROCEDURE: P0668**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400048

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P0668 has been detected in [Fault Information].

Has DTC P0668 been detected?**YES**

**Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

NO

**Erase the malfunction history. Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P0668

DTC: P0668		DeNOx ECU temperature sensor (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if P0668 has been detected in [DCU].	DTC P0668 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.	Erase the malfunction history. Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P0669

EN01H16F02040F03001020

DTC: P0669 DeNOx ECU temperature sensors - out of range (Out of range high) INFORMATION

1. Technical description

- DCU internal temperature sensor is being checked in DCU.

<Description of malfunction>

- DCU internal temperature sensor malfunction is detected.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.

- (2) Judgement criteria

DCU (Internal temperature sensor) voltage:

- Voltage of the Sensor 1 is more than 2.0 V for 0.4 sec or more.
- Voltage of the Sensor 2 is more than 2.0 V for 0.4 sec or more.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DCU malfunction diagnosis has been stopped.

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

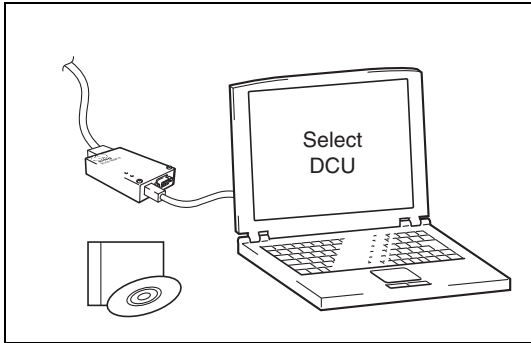
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DCU (Internal temperature sensor) malfunction.

INSPECTION PROCEDURE: P0669**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400049

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P0669 has been detected in [Fault Information].

Has DTC P0669 been detected?**YES**

**Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

NO

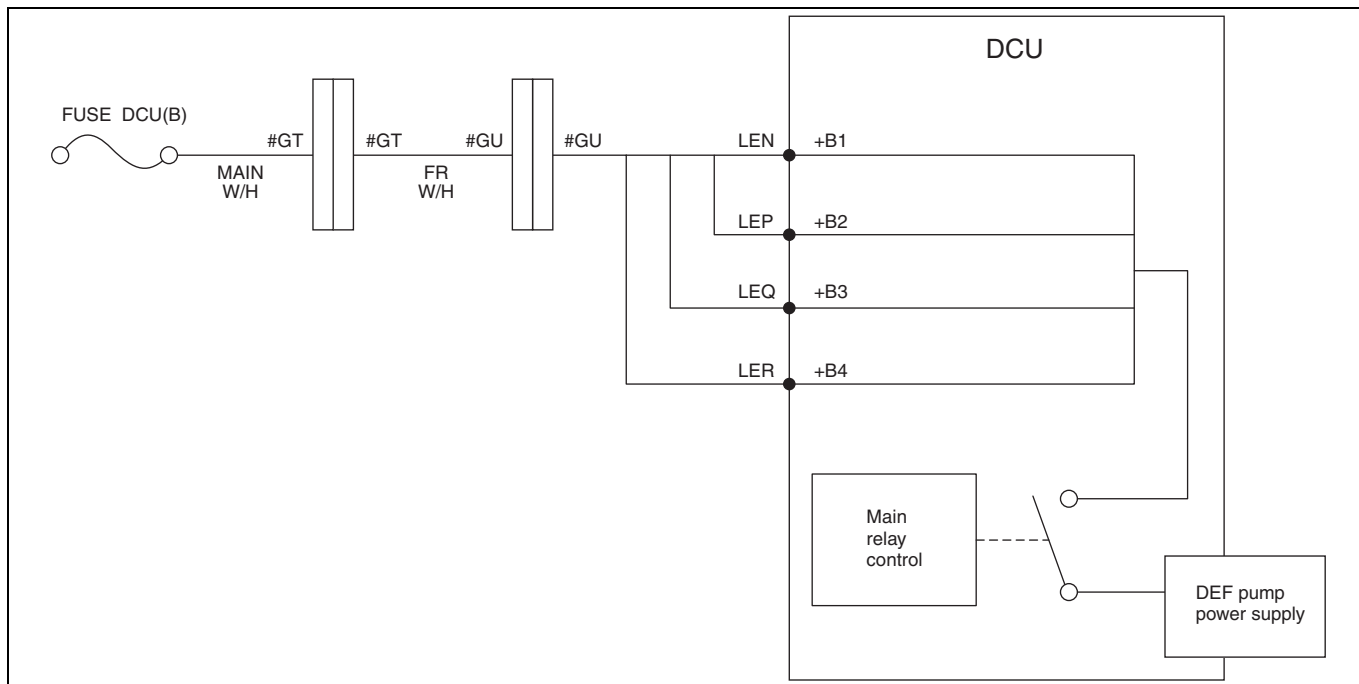
**Erase the malfunction history. Procedure completed.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P0669

DTC: P0669		DeNOx ECU temperature sensors - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if P0669 has been detected in [DCU].	DTC P0669 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.	Erase the malfunction history. Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P068A

EN01H16F02040F03001021

DTC: P068A Main relay
INFORMATION

SAPH16F020400050

1. Technical description

- After turning off the starter switch, the DCU stays active for few minutes to evacuation DEF from lines to tank, then writes the data to the DCU ROM before shut-down.
- After ROM data writing is complete, the DCU switches the main relay (built-in into the DCU) off.
- The DCU confirms the ROM and checks that the preceding ROM data writing as being completed correctly.

NOTICE

- **If the battery switch is turned OFF or a battery terminal is disconnected during the DCU shutdown process, Diagnostic Code P068A may be detected.**

<Description of malfunction>

- ROM data reading error detected.

2. DTC set condition

- (1) DTC detection condition
Engine running.
- (2) Judgement criteria
If the ROM data writing status was incomplete before the preceding DCU shut-down.

3. Reset condition

- DCU detects normal termination prior to operation.

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

- MIL: ON
- 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)>**

- Exhaust gas purification function has deteriorated.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

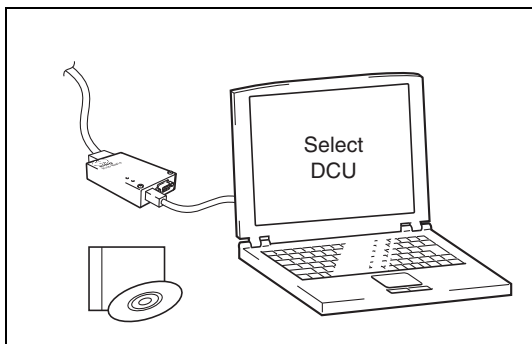
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Battery
 - Abnormal voltage (16 V or more, 6 V or less)
 - Battery was replaced before DCU shutdown was completed.
 - Battery voltage was cut before DCU shutdown was completed.
- DCU malfunction

INSPECTION PROCEDURE: P068A**1 Check the DTC detected (DCU)**

SAPH16F020400051

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if any DTC other than P068A (for example, P0562) has been detected in [Fault Information].

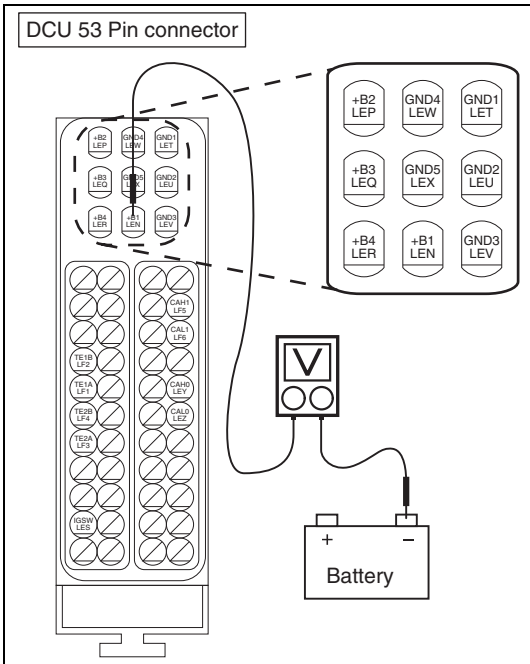
NOTICE

- If the battery switch is turned OFF or a battery terminal is disconnected during the DCU shutdown process, Diagnostic Code P068A may be detected.

Has a DTC other than P068A been detected?**YES****Go to the diagnosis procedure of a related DTC.****NO****Go to step 2.**

2 Inspect the DCU power supply circuit

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 53P connector.
3. Set the starter switch to the "ON" position.
4. Use the electrical tester to measure the voltage between the terminals of the DCU 53P connector (Engine subharness side) and battery minus (BAT-).



SAPH16F020400052

Measurement conditions	Tester connections	Standard values
Starter switch: ON	DCU 53P connector (Engine sub harness side) +B1 – BAT- +B2 – BAT- +B3 – BAT- +B4 – BAT-	9 V – 16 V (All)

Do the measurements meet the standard value?

YES

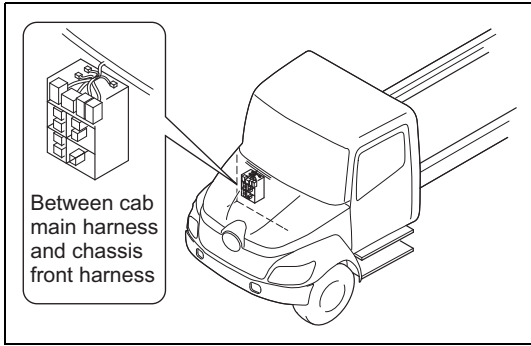
NO

Go to step 3.

Repair or replace the battery power supplying circuit (harness, fuse etc).
Perform "After-inspection work" of INFORMATION section.

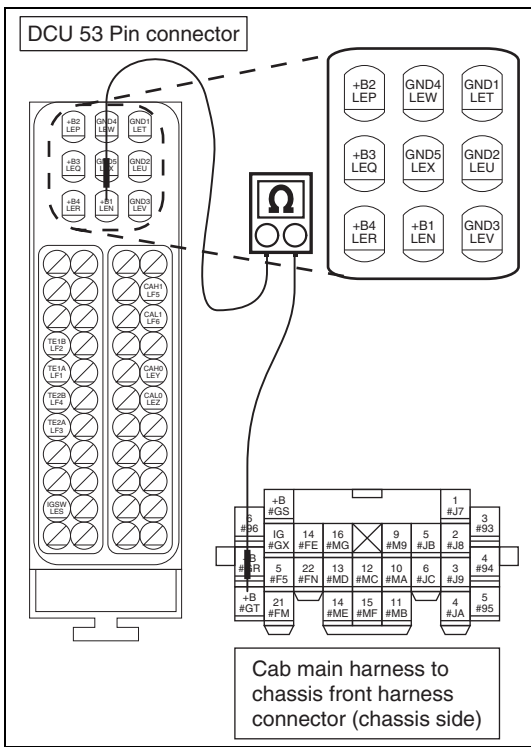
3 Inspect the DCU harness

1. Set the starter switch to the "LOCK" position.
2. Disconnect the connector between the cab main harness and the chassis front harness.



SAPH16F020400053

3. Using the electrical tester, measure the resistance between the terminals from the DCU 53P vehicle-side connector to the chassis side connector of the cab main harness connector to chassis front harness connector.



SAPH16F020400054

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 53P connector (vehicle-side) to cab main harness connector (chassis-side) +B1 – #GT +B2 – #GT +B3 – #GT +B4 – #GT	1 Ω or less

Do the measurements meet the standard value?

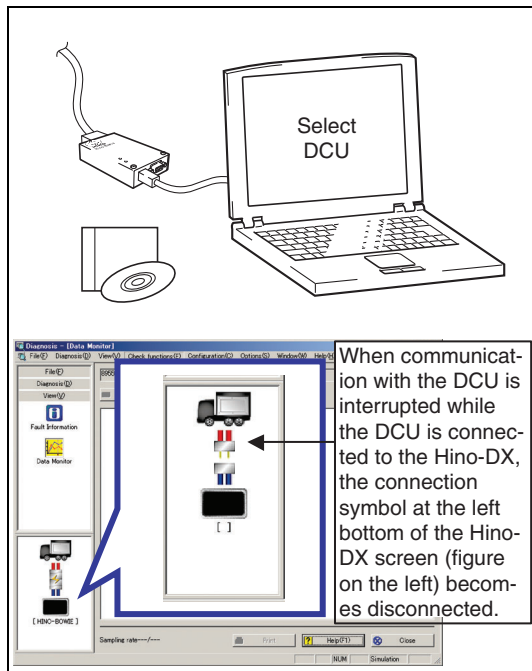
YES

NO

Reconnect DCU 53P connector and cab main harness connector. Go to step 4.

Repair or replace the battery power supplying circuit (harness). Perform "After-inspection work" of INFORMATION section.

4 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400055

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Erase the malfunction history using Hino-DX.
4. Start the engine.
5. Select [DCU] and check if P068A has been detected in [Fault Information].
6. Turn the starter switch OFF while still connected to Hino-DX.
7. After checking that the communication between the Hino-DX and the DCU has been disconnected, turn the starter switch ON again.
8. Select [DCU] and check if P068A has been detected in [Fault Information].

Has P068A been detected?

YES

Replace the DCU. Confirm DCU is programmed to latest software level. Perform "After-inspection work" of INFORMATION section.

NO

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

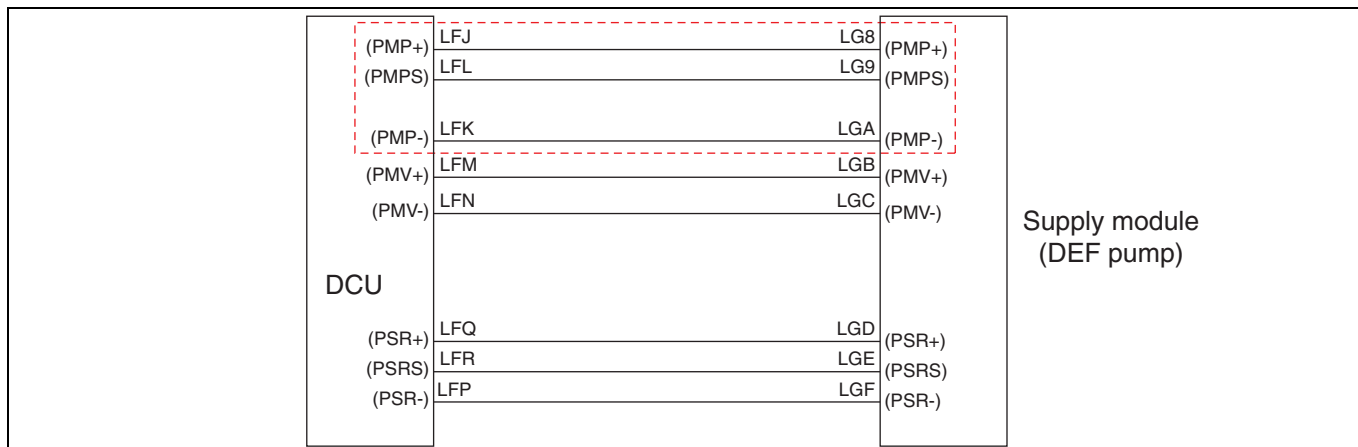
CHECKLIST: P068A

DTC: P068A		Main relay		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU)	<p>Check if any DTC other than P068A (for example, P0562) has been detected in [DTC].</p> <p>NOTICE If the battery switch is turned OFF or a battery terminal is disconnected during the DCU shutdown process, Diagnostic Code P068A may be detected.</p>	<p>DTC other than P068A (for example, P0562) has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the DCU power supply circuit	<p>Connect the signal check harness to measure the voltage between the terminals of the DCU 53P connector (Engine sub harness-side) and the battery minus (BAT-).</p> <p><Tester connections> DCU 53P connector (Engine sub harness side)- +B1 – BAT- +B2 – BAT- +B3 – BAT- +B4 – BAT- <Standard values> 9 V – 16 V</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 3.	Repair or replace the battery power supplying circuit (harness, fuse etc). Perform "After-inspection work" of INFORMATION section.
3	Inspect the DCU harness	<p>Using the electrical tester, measure the resistance between the terminals from the DCU 53P vehicle side connector to the chassis-side connector of the cab main harness connector to chassis front harness connector.</p> <p><Tester connections> DCU 53P connector (Vehicle side) to chassis side connector of the cab main harness +B1 – #GT +B2 – #GT +B3 – #GT +B4 – #GT <Standard values> 1 Ω or less</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 3.	Repair or replace the battery power supplying circuit (harness, fuse etc). Perform "After-inspection work" of INFORMATION section.

DTC: P068A		Main relay		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Check the DTC detected (DCU) [Hino-DX]	<ol style="list-style-type: none"> 1. Connect the vehicle to Hino-DX. 2. Set the starter switch to the "ON" position. 3. Erase the malfunction history using Hino-DX. 4. Start the engine. 5. Check if P068A has been detected in [DCU]. 6. Turn the starter switch OFF while still connected to Hino-DX. 7. After checking that the communication between the Hino-DX and the DCU has been disconnected, turn the starter switch ON again. 8. Check if P068A has been detected in [DCU]. 	<p>DTC P068A has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the DCU.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	<p>Procedure completed.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>

DTC: P142A

EN01H16F02040F03001022

DTC: P142A DEF pump temperature sensor 1 - out of range
INFORMATION

SAPH16F020400056

1. Technical description

- There are 2 temperature sensors in the DEF pump.
- The DEF pump temperature sensor is judged with the DEF pump temperature sensor voltage by the DCU via harness.

<Description of malfunction>

- Failure of temperature sensor inside DEF pump is detected.

2. DTC set condition

- (1) DTC detection condition
Engine ON.

- (2) Judgement criteria

DEF Supply module Temperature Sensor duty:– Temperature sensor 1 duty: Below 15% for 5 sec. or longer– Temperature sensor 1 duty: Over 85% for 5 sec. or longer– Temperature sensor 2 duty: Below 15% for 5 sec. or longer– Temperature sensor 2 duty: Over 85% for 5 sec. or longer

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- –

<Symptoms on the vehicle due to malfunction>

- Control will not work properly if the DEF freezes.

6. Pre-inspection work

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

7. After-inspection work

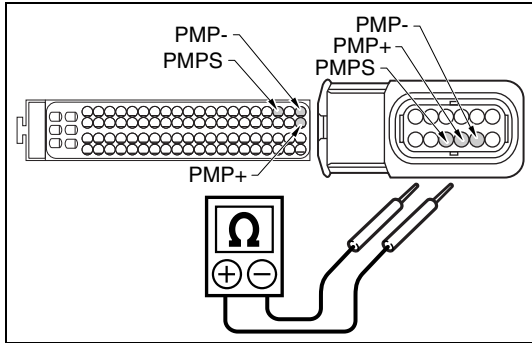
- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Malfunction of DEF pump temperature sensor

INSPECTION PROCEDURE: P142A

1 Inspect the DEF pump temperature sensor harness



SAPH16F020400057

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF pump temperature sensor and DCU 86P connector.
3. Connect the signal check harness and use the electrical tester to measure the resistance between the DEF pump vehicle-side connector and each terminal of the DCU 86P vehicle side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump vehicle-side connector – DCU 86P vehicle side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS	1 Ω or less

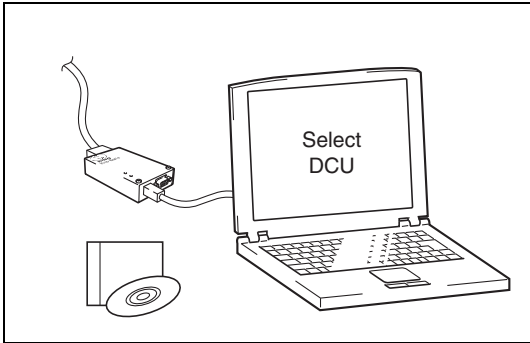
Do the measurements meet the standard value?

YES

Go to step 2.

NO

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

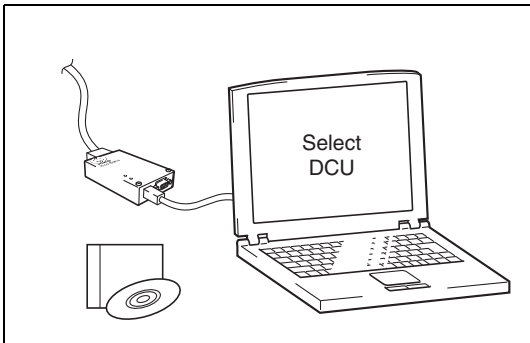
2 Check the DTC detected (DCU) 1 [Hino-DX]

SAPH16F020400058

1. Connect a new DCU.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P142A has been detected in [Fault Information].

Has DTC P142A been detected?**YES****Go to step 3.****NO**

**Procedure completed.(Install a new DCU.)
Perform "After-inspection work" of INFORMATION section.**

3 Check the DTC detected (DCU) 2

SAPH16F020400059

1. Set the starter switch to the "LOCK" position.
2. Replace an old DCU.
3. Replace a new DEF pump.
4. Set the starter switch to the "ON" position.
5. Select [DCU] and check if P142A has been detected in [Fault Information].

Has DTC P142A been detected?**YES**

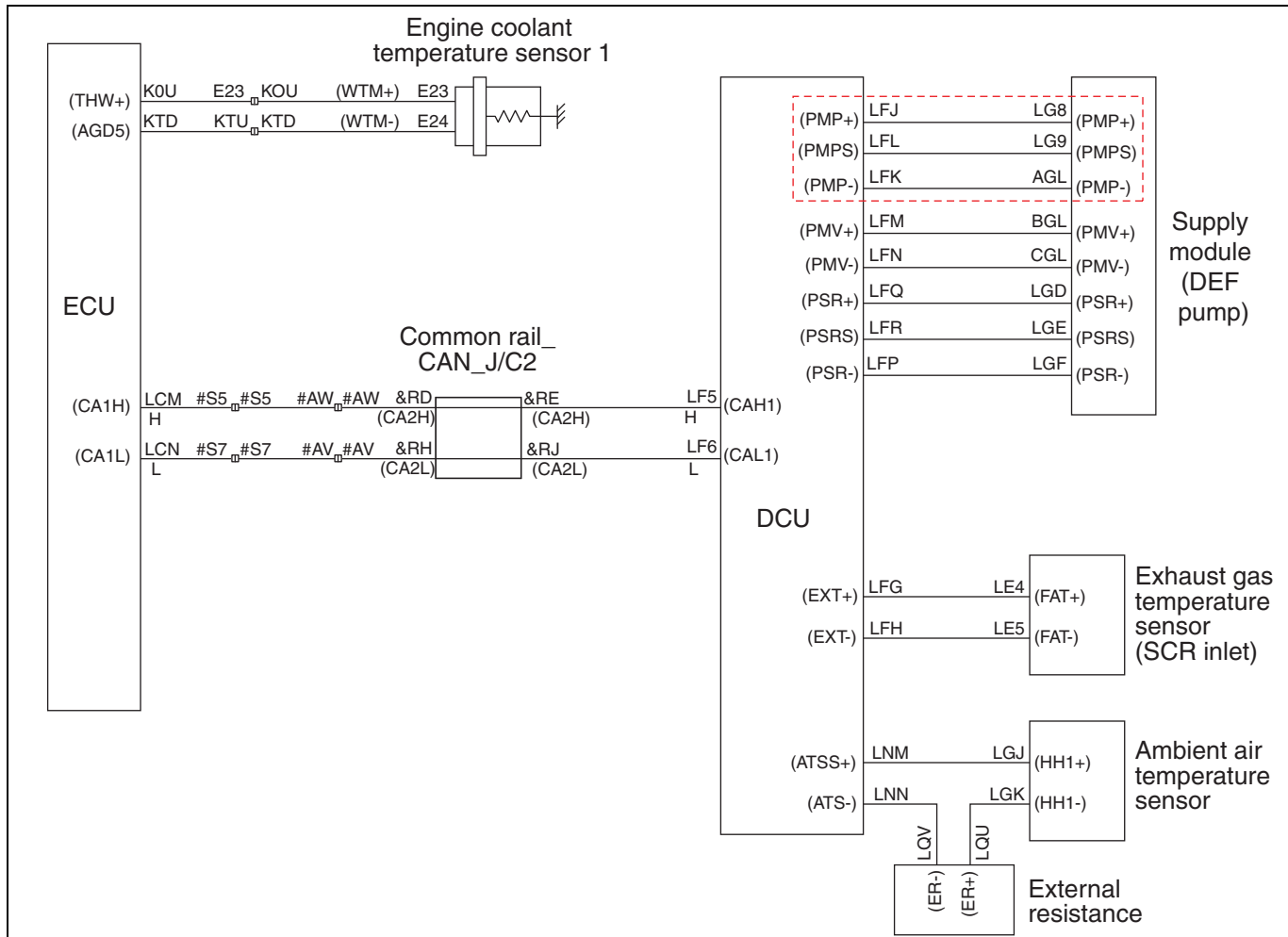
**Replace the DCU.
Perform "After-inspection work" of INFORMATION section.**

NO

**Procedure completed. (Install a new DEF pump temperature sensor.)
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P142A

DTC: P142A		DEF pump temperature sensor 1 - out of range		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump temperature sensor harness	Connect the signal check harness and use the electrical tester to measure the resistance between the DEF pump vehicle-side connector and each terminal of the DCU 86P vehicle side connector. <Tester connections> DEF pump vehicle-side connector – DCU 86P vehicle-side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS <Standard values> 1 Ω or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 2.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
2	Check the DTC detected (DCU) 1 [Hno-DX]	<ol style="list-style-type: none"> 1. Connect a new DCU. 2. Connect the vehicle to the Hino-DX. 3. Set the starter switch to the "ON" position. 4. Check if P142A has been detected in [DCU]. 	DTC P142A has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Procedure completed. (Install a new DCU.) Perform "After-inspection work" of INFORMATION section.
3	Check the DTC detected (DCU) 2	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Replace an old DCU. 3. Replace a new DEF pump. 4. Set the starter switch to the "ON" position. 5. Check if P142A has been detected in [DCU]. 	DTC P142A has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. (Install a new DEF pump temperature sensor.) Perform "After-inspection work" of INFORMATION section.

DTC: P142B**DTC: P142B DEF pump temperature sensor 1 - rationality**
INFORMATION

SAPH16F020400060

1. Technical description

- DEF pump temperature sensor checks for validity by comparing with the outside temperature.
- DEF pump temperature sensor checks for validity by monitoring whether the temperature rises when the coolant shutoff valve is released (when DEF defrosts).
- While the engine is cold, engine coolant will be sent to the pump to defrost the DEF.

<Description of malfunction>

- Failure of temperature sensor inside DEF pump is detected.

2. DTC set condition**(1) DTC detection condition**

When the starter switch is ON, difference among the outside temperature, exhaust temperature (SCR inlet) and coolant temperature is within 8 °C {46.4 °F}.

The coolant shutoff valve is released (DEF defrosts). Coolant temperature is over 40 °C {104 °F}.

The above condition continues for 10 minutes or longer.

(2) Judgement criteria

Difference between the DEF pump temperature and the outside temperature: over 22 °C {71.6 °F}

Rise in the DEF pump temperature: less than 1.5 °C {34.7 °F}

3. Reset condition

- When the starter switch is ON and the difference among the outside temperature, exhaust temperature, and coolant temperature is less than 8 °C {46.7 °F}, the difference from the coolant temperature will be less than 22 °C {71.6 °F}.
- When the shutoff valve is open (defrosting), the temperature rise after 10 minutes will be at least 2 °C {35.6 °F}.

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

- MIL: ON

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- Control will not work properly if the DEF freezes.

6. Pre-inspection work

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

7. After-inspection work

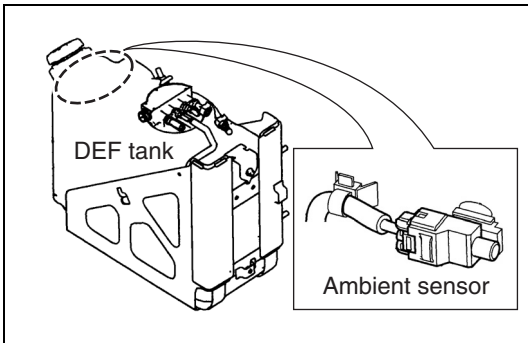
- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Coolant shutoff valve: Stuck closed
- Coolant piping: Clogging or leaks
- Malfunction of DEF pump temperature sensor
- Malfunction of ambient air temperature sensor
- Malfunction of exhaust gas temperature sensor (SCR inlet)
- Malfunction of engine coolant temperature sensor

NOTICE

- **Also see the malfunction codes of the shutoff valve.**

INSPECTION PROCEDURE: P142B**1 Inspect the ambient air temperature sensor connector**

SAPH16F020400061

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

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 2.

2 Inspect the connector of the external resistor

1. Check the connection of the external resistor connector (Looseness and poor contact).

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 3.

3 Inspect the DCU 86P connector

1. Check the connection of the DCU 86P connector (Looseness and poor contact).

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 4.

4 Inspect the ambient air temperature sensor

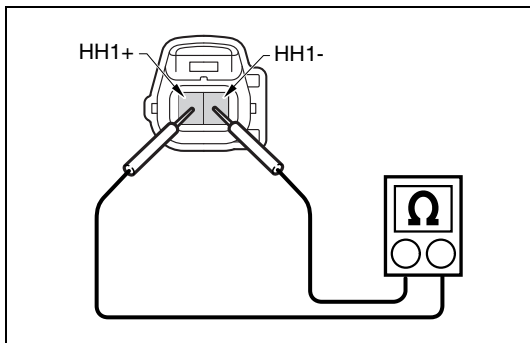
1. Check the installation of the ambient air temperature sensor.
2. Make sure there is no dirt or damage to the ambient temperature sensor.

Was any failure found?**YES**

Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the ambient air temperature sensor unit

SAPH16F020400062

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Ambient air temperature sensor HH1+ – HH1-	25 °C {77 °F}: 1.7 kΩ

Do the measurements meet the standard value?**YES**

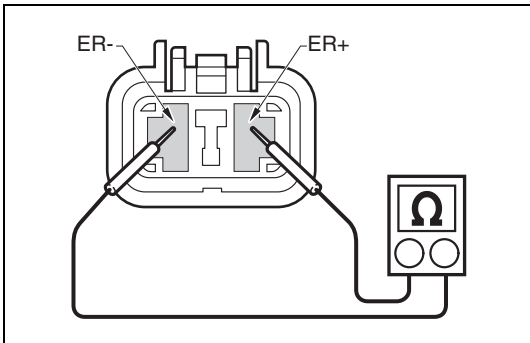
Go to step 6.

NO

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

6 Inspect the external resistor unit

1. Disconnect the external resistor connector.
2. Use the electrical tester to measure the resistance between the terminals of the external resistor.



SAPH16F020400063

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	External resistor ER+ – ER-	2 kΩ

Do the measurements meet the standard value?

YES

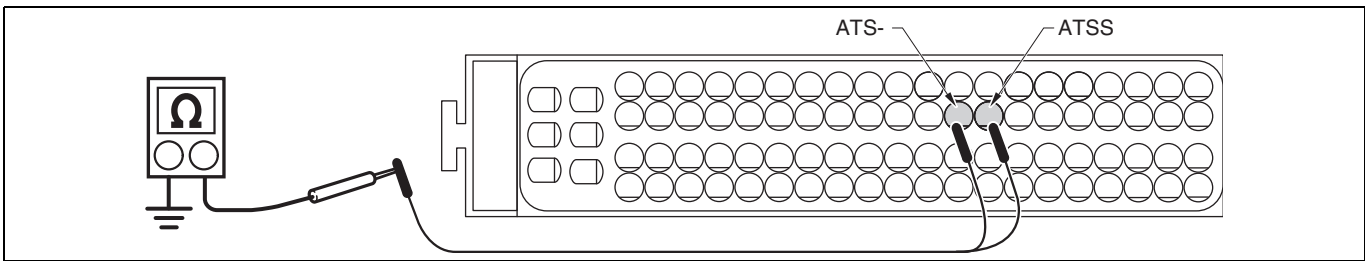
NO

Go to step 7.

Replace the external resistor.
Perform "After-inspection work" of INFORMATION section.

7 Inspect disconnection of the ambient air temperature sensor harness

1. Connect the ambient air temperature sensor connector.
2. Disconnect the DCU 86P connector.
3. Connect the signal check harness, and use the electrical tester to measure the resistance between the terminals of the DCU 86P vehicle-side connector.



SAPH16F020400064

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector ATSS – ATS-	25 °C {77 °F}: 3.7 kΩ

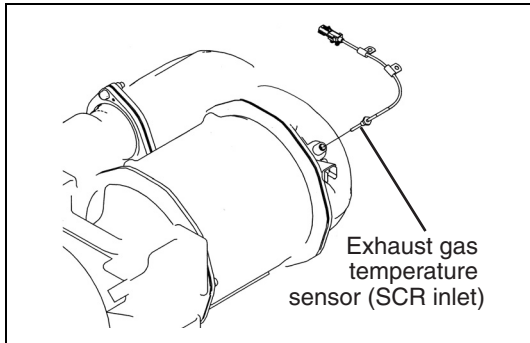
Do the measurements meet the standard value?

YES

Go to step 8.

NO

Replace the external resistor.
Perform "After-inspection work" of INFORMATION section.

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


SAPH16F020400065

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

NO

Go to step 9.

9 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).

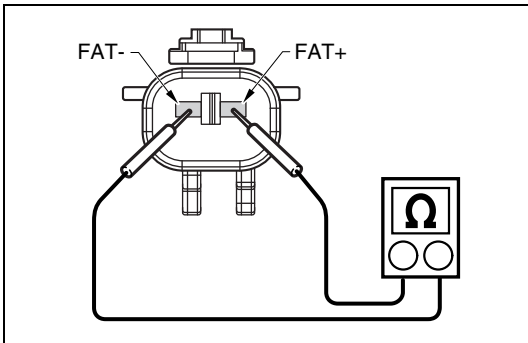
Was any failure found?

YES

Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

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

SAPH16F020400066

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

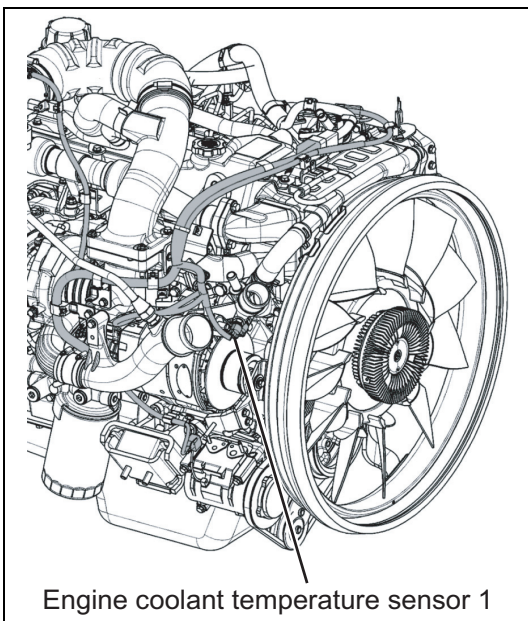
Do the measurements meet the standard value?

YES

Go to step 11.

NO

Replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

11 Inspect the engine coolant temperature sensor connector

SAPH16F020400067

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

Was any failure found?

YES

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 12.

12 Inspect the engine coolant temperature sensor

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

Was any failure found?

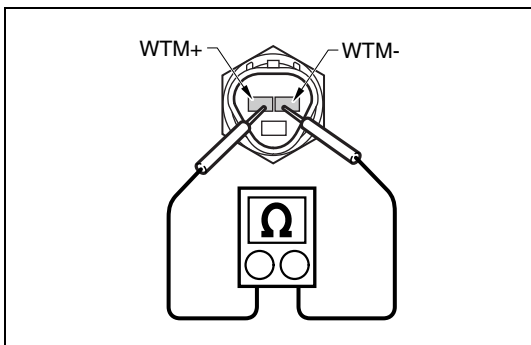
YES

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 13.

13 Inspect the engine coolant temperature sensor unit



SAPH16F020400068

1. Disconnect the engine coolant temperature sensor connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor.

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

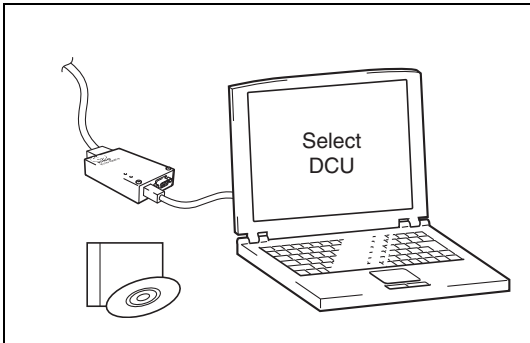
Do the measurements meet the standard value?

YES

Go to step 14.

NO

Replace the engine coolant temperature sensor.
Perform "After-inspection work" of INFORMATION section.

14 Check the operation of the coolant shutoff valve [Hino-DX]


SAPH16F020400069

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] from the menu.
4. Select [Coolant shutoff valve] from the [Activation Test] menu and operate the coolant shutoff valve.
 - (1) When the valve is open: Check if the pressure inside the downstream coolant line is rising by feeling the line with your hand.
 - (2) When the valve is closed: Check if the pressure inside the downstream coolant line is dropping by feeling the line with your hand.

⚠ CAUTION

- Be careful not to burn yourself when the coolant is hot.

Is operation normal?

YES

Go to step 15.

NO

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

15 Inspect the engine coolant lines & hoses

1. Make sure there are no leaks in the engine cooling system (lines and hoses).
2. Check the engine cooling system (lines and hoses) and check if there are no disconnections, clogging, punctures, or cracks.

Was any failure found?

YES

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

NO

Go to step 16.

16**Inspect the DEF pump**

1. Disconnect the coolant hoses (upstream and downstream) from the DEF pump.
2. Blow air from one side and make sure it comes out from the other side.

Was any failure found?**YES**

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

NO

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

CHECKLIST: P142B

DTC: P142B		DEF pump temperature sensor 1 - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the ambient air temperature sensor connector	Check the connection of the ambient air temperature sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the connector of the external resistor	Check the connection of the external resistor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the DCU 86P connector	Check the connection of the DCU 86P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the ambient air temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the ambient air temperature sensor. 2. Make sure there is no dirt or damage to the ambient temperature sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 5.

DTC: P142B		DEF pump temperature sensor 1 - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the ambient air temperature sensor unit	Measure the resistance between the terminals of the ambient air temperature sensor. <Tester connections> Ambient air temperature sensor HH1+ – HH1- <Standard values> 25 °C {77 °F}: 1.7 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 6.	Replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.
6	Inspect the external resistor unit	Measure the resistance between the terminals of the external resistor. <Tester connections> External resistor ER+ – ER- <Standard values> 2 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Replace the external resistor. Perform "After-inspection work" of INFORMATION section.
7	Inspect disconnection of the ambient air temperature sensor harness	Measure the resistance of the wire harness and sensor between the DCU 86P vehicle-side connector and the ambient air temperature sensor. 1. Connect the ambient air temperature sensor connector. 2. Disconnect the DCU 86P connector. 3. Connect the signal check harness, and measure the resistance between the terminals of the DCU 86P vehicle-side connector. <Tester connections> DCU 86P vehicle-side connector ATSS – ATS- <Standard values> 25 °C {77 °F}: 3.7 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 8.	Replace the external resistor Perform "After-inspection work" of INFORMATION section.
8	Inspect the exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 9.

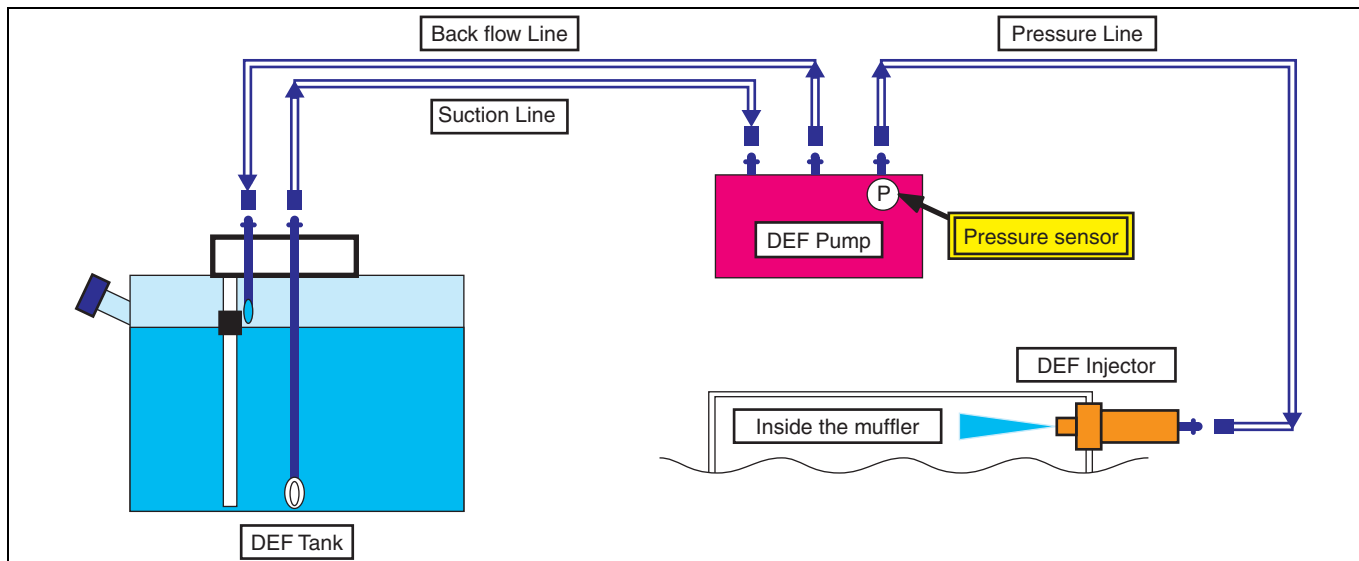
DTC: P142B		DEF pump temperature sensor 1 - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 1. Check the installation of the exhaust gas temperature sensor (SCR inlet). 2. Make sure there is no dirt or damage to the exhaust gas temperature sensor (SCR inlet). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Clean the exhaust gas temperature sensor (SCR inlet) and install it properly.</p> <p>If damaged, replace the exhaust gas temperature sensor (SCR inlet).</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 10.
10	Inspect the exhaust gas temperature sensor (SCR inlet) unit	<p>Measure the resistance between the terminals of the exhaust gas temperature sensor (SCR inlet).</p> <p><Tester connections> Exhaust gas temperature sensor (SCR inlet) FAT+ – FAT-</p> <p><Standard values> 20 °C {68 °F}; 220 Ω</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 11.	<p>Replace the exhaust gas temperature sensor (SCR inlet).</p> <p>Perform "After-inspection work" of INFORMATION section.</p>
11	Inspect the engine coolant temperature sensor connector	Check the connection of the engine coolant temperature sensor connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Connect securely, repair if needed.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 12.

DTC: P142B		DEF pump temperature sensor 1 - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
12	Inspect the engine coolant temperature sensor	<ol style="list-style-type: none"> Check the installation of the engine coolant temperature sensor. Make sure there is no dirt or damage to the engine coolant temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the engine coolant temperature sensor and install it properly. If damage was found, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 13.
13	Inspect the engine coolant temperature sensor unit	<p>Measure the resistance between the terminals of the engine coolant temperature sensor.</p> <p><Tester connections> Engine coolant temperature sensor WTM+ – WTM- <Standard values> 20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 14.	Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.
14	Check the operation of the coolant shutoff valve [Hino-DX]	<p>Select [Coolant shutoff valve] from the [Activation Test] menu and operate the coolant shutoff valve.</p> <p>* When the valve is open: Check if the pressure inside the downstream coolant line is rising by feeling the line with your hand.</p> <p>* When the valve is closed: Check if the pressure inside the downstream coolant line is dropping by feeling the line with your hand.</p>	<p>There is a change in pressure when opening and closing the valve: Go to YES.</p> <p>There is no change in pressure when opening and closing the valve: Go to NO.</p>		Go to step 15.	Replace the coolant shutoff valve. Perform "After-inspection work" of INFORMATION section.
15	Inspect the engine coolant lines & hoses	<ol style="list-style-type: none"> Make sure there are no leaks in the engine cooling system (lines and hoses). Check the engine cooling system (lines and hoses) and check if there are no disconnections, clogging, punctures, or cracks. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 16.

DTC: P142B		DEF pump temperature sensor 1 - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
16	Inspect the DEF pump	<ol style="list-style-type: none"> 1. Disconnect the coolant hoses (upstream and downstream) from the DEF pump. 2. Blow air from one side and make sure it comes out from the other side. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.	Replace the coolant shut-off valve. Perform "After-inspection work" of INFORMATION section.

DTC: P202E

EN01H16F02040F03001024

DTC: P202E Reductant Delivery Performance
INFORMATION

SAPH16F020400070

1. Technical description

- The amount of added DEF is diagnosed as abnormal.
- The amount of added DEF is controlled by the DEF pressure and the opening of the DEF injector.

<Description of malfunction>

- Failure of DEF injector at system startup is detected.

2. DTC set condition**(1) DTC detection condition****<At system start up>**

The engine is ON.

Exhaust gas temperature sensor (SCR inlet) > 150 °C {302 °F}

DEF pump pressure is stable for 8 sec. when it is between 850 kPa {123 psi} and 950 kPa {138 psi}.

(2) Judgement criteria**<At system start up>**

Pressure line check start: DEF pump speed: keep and DEF injector: full open

If DEF pressure is > 750 kPa {108 psi} after 4 sec. from DEF injector open, failure counter is count up.

When Failure counts ≥ 22 , DTC is detected.**3. Reset condition**

- After having restored to the normal conditions.

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

- MIL: ON
- SCR system malfunction lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- Output restricted instantaneously.
- If malfunction does not improve within 50 min.: vehicle speed is restricted.

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 is declined.
- Engine output is insufficient.
- Vehicle does not speed up (when malfunction does not improve within 50 min.).

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Clogging of the DEF injector
- Clogging of the DEF pipe

INSPECTION PROCEDURE: P202E

1	Inspect the DEF pipe (pressure line) between the DEF pump and the DEF injector.
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1. Check the DEF pipe (pressure line) and check if there are no disconnections, clogging, corrosion, or cracks.

Was any failure found?

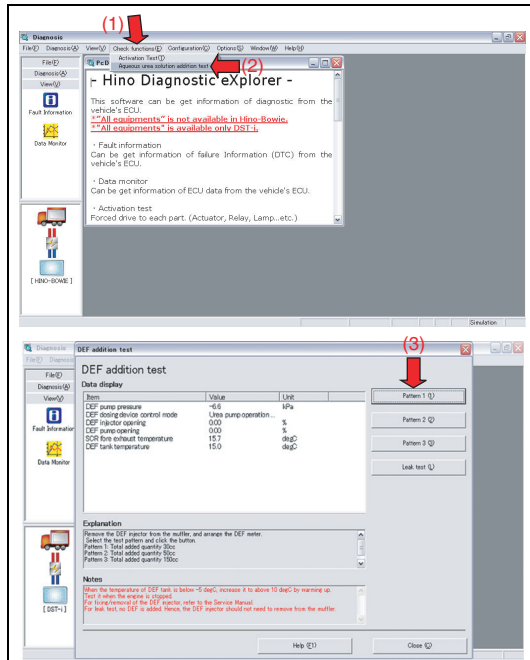
YES

NO

<p>Replace the DEF pipe. Perform "After-inspection work" of INFORMATION section.</p>

<p>Go to step 2.</p>

2	Inspect DEF injector (1) [Hino-DX]
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SAPH16F020400071

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 the muffler.

HINT

Refer to the workshop manual "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.

3. Set the starter switch to the "ON" position.
4. Select [DCU].
5. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector.
<Inspection procedure>
(1) Select [Check functions].
(2) Select [DEF addition test].
(3) Perform addition test as instructed on the Hino-DX screen.
(Perform all three patterns)

NOTICE

When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.

HINT

Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.

Is operation normal?

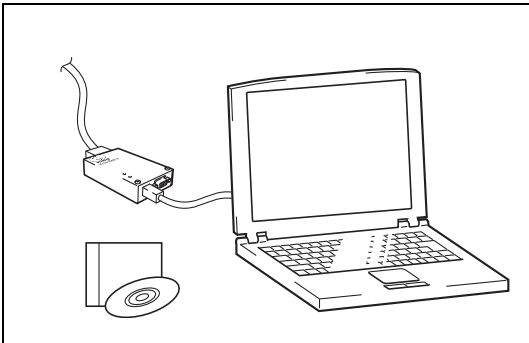
YES

Procedure completed. DEF crystal clogging is considered resolved.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the DEF injector (2) [Hino-DX]



SAPH16F020400072

1. Set the starter switch to the "LOCK" position.
2. Replace DEF injector with a new one. (Do not install it on the muffler.)
3. Perform step 2 again.

Is operation normal?

YES

New injector installed in the muffler, procedure completed. After installing the injector, idle the engine (for about 10 min.) and on the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.
Perform "After-inspection work" of INFORMATION section.

NO

Replace the DEF pipe (pressure line). After replacing the pipe, idle the engine (for about 10 min.) and on the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P202E

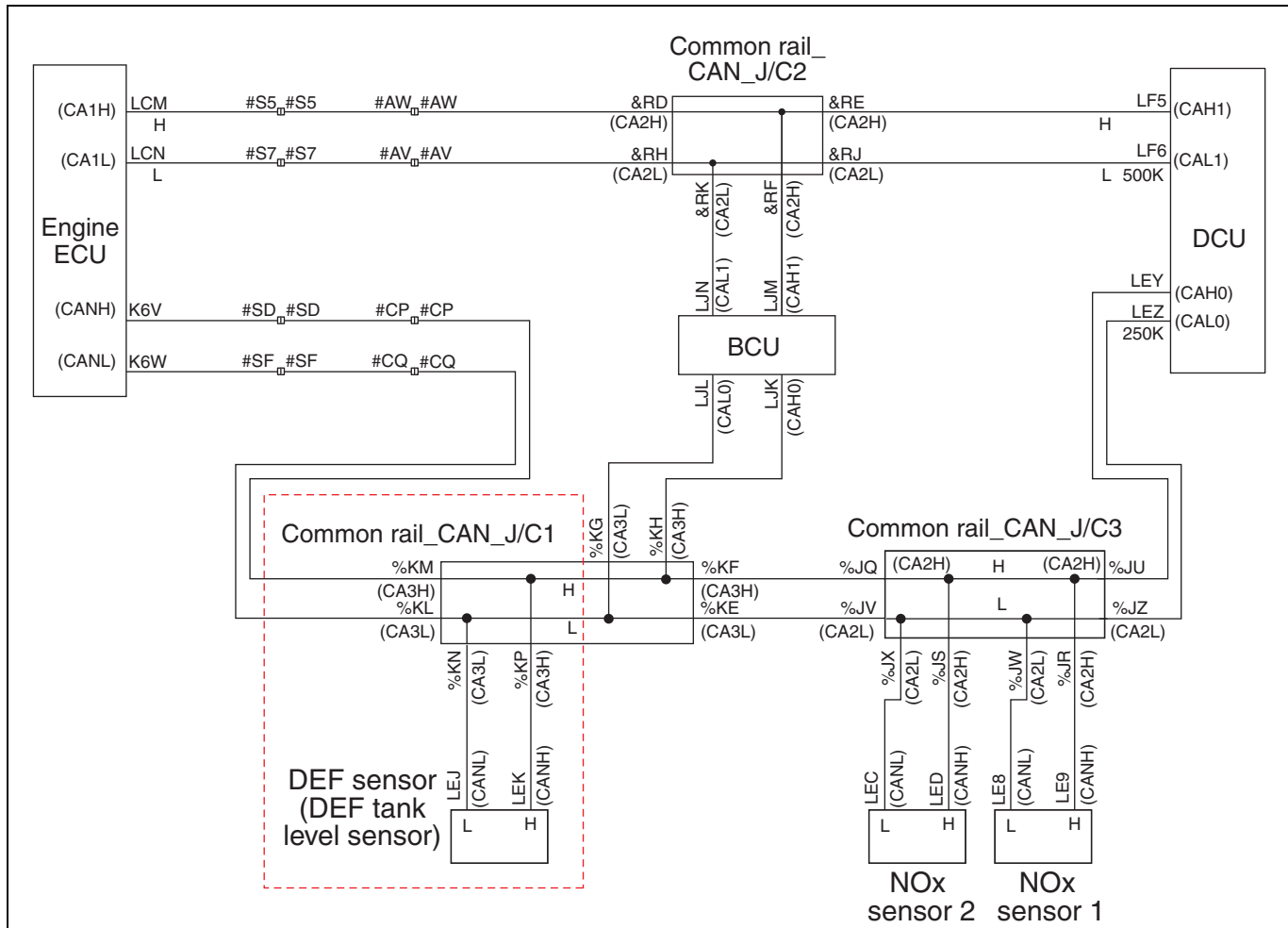
DTC: P202E		Reductant Delivery Performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pipe (DEF pump ↔ injector)	Check the DEF pipe (pressure line) and check if there are no disconnections, clogging, corrosion, or cracks.	Failure found: Go to YES. No failure found: Go to NO.		Replace the DEF pipe (pressure line). Perform "After-inspection work" of INFORMATION section.	Go to step 2.

DTC: P202E		Reductant Delivery Performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
2	Inspect the DEF injector (1) [Hino-DX]	<p>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.)</p> <ol style="list-style-type: none"> Set the starter switch to the "LOCK" position. Remove the DEF injector from the muffler. <p>HINT Refer to the workshop manual "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.</p> <ol style="list-style-type: none"> Set the starter switch to the "ON" position. Select [DCU]. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector. <p><Inspection procedure> (1) Select [Check functions]. (2) Select [DEF addition test]. (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)</p> <p>NOTICE When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.</p> <p>HINT Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.</p>	<p>Operation is normal: Go to YES.</p> <p>Operation is abnormal: Go to NO.</p>		<p>Procedure completed. DEF crystal clogging is considered resolved. Perform "After-inspection work" of INFORMATION section.</p>	<p>Go to step 3.</p>

DTC: P202E		Reductant Delivery Performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
3	Inspect the DEF injector (2) [Hino-DX]	Replace DEF injector with a new one (Do not install it on the muffler). Check again step 2.	<p>Operation is normal: Go to YES.</p> <p>Operation is abnormal: Go to NO.</p>		<p>New injector installed in the muffler, procedure completed. After installing the injector, idle the engine (for about 10 min.) and on the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.</p>	<p>Replace the DEF pipe (pressure line). After replacing the pipe, idle the engine (for about 10 min.) and on the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P203C

EN01H16F02040F03001025

DTC: P203C DEF tank level sensor - out of range (Out of range low)
INFORMATION

SAPH16F020400073

1. Technical description

- The DEF tank level sensor is connected via the engine ECU, DCU, and CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of DEF tank level sensor is received from CAN data.

2. DTC set condition

- DTC detection condition
Starter switch ON.
- Judgement criteria
Failure of DEF tank level sensor (flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DEF level indicator is stopped.

5. Symptoms on the vehicle when the DTC is set

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

- –

<Symptoms on the vehicle due to malfunction>

- DEF level indicator is OFF.

6. Pre-inspection work

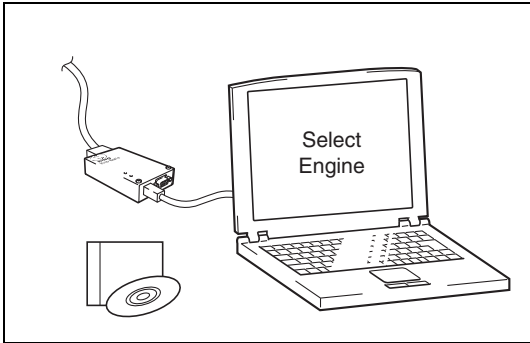
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF tank level sensor failure.

INSPECTION PROCEDURE: P203C**1 Check the DTC detected (Engine) [Hino-DX]**

SAPH16F020400074

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

Has DTC U02A2 been detected?**YES**

Go to the diagnostic procedure of a related DTC.

NO

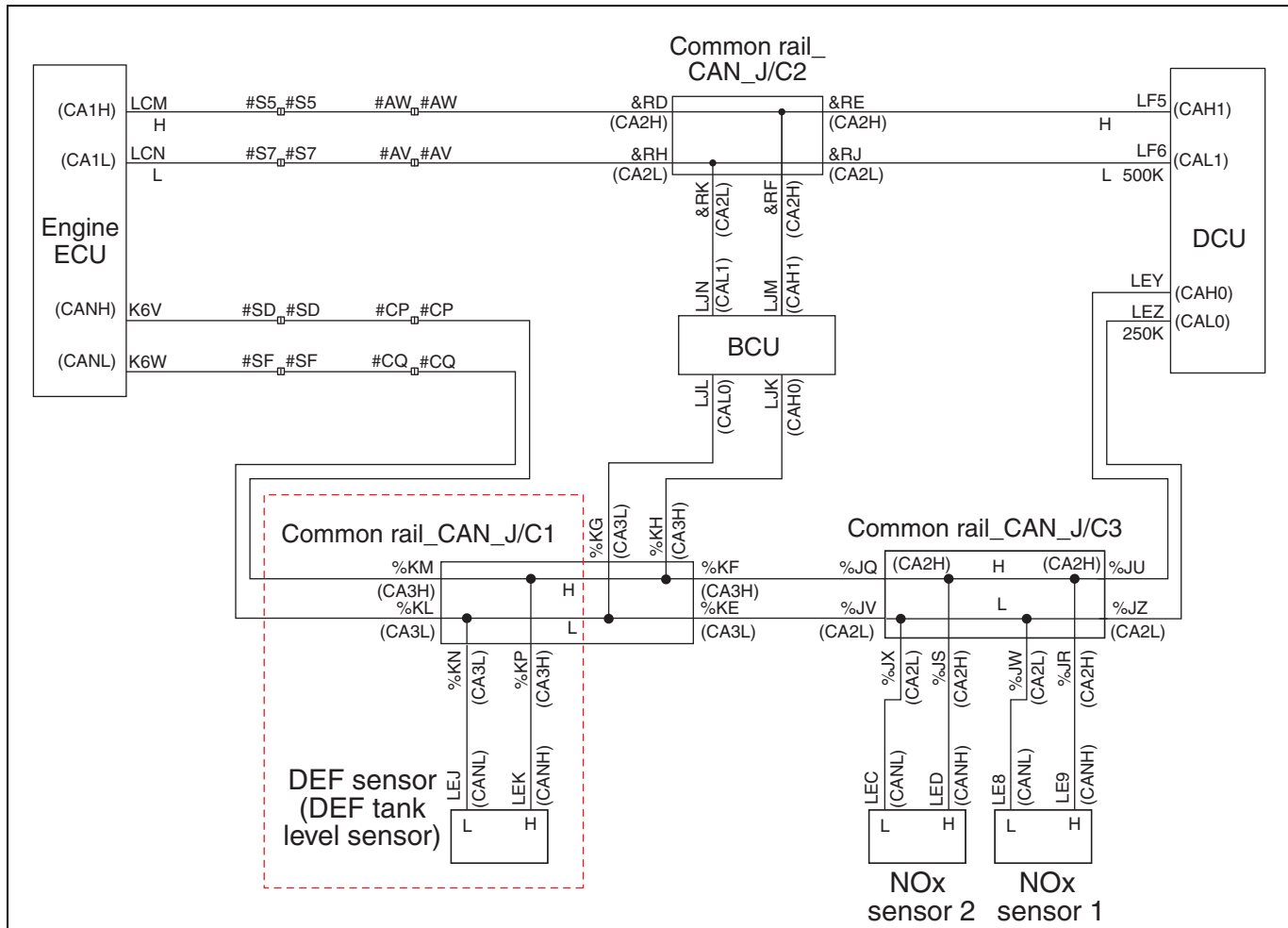
**Replace the DEF tank level sensor.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P203C

DTC: P203C		DEF tank level sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine) [Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF tank level sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P203D

EN01H16F02040F03001026

DTC: P203D DEF tank level sensor - out of range (Out of range high)
INFORMATION

SAPH16F020400075

1. Technical description

- The DEF tank level sensor is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of DEF tank level sensor is received from CAN data.

2. DTC set condition

- DTC detection condition
Starter switch ON.
- Judgement criteria
Failure of DEF tank level sensor (High failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DEF level indicator is stopped.

5. Symptoms on the vehicle when the DTC is set

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

- –

<Symptoms on the vehicle due to malfunction>

- DEF level indicator is OFF.

6. Pre-inspection work

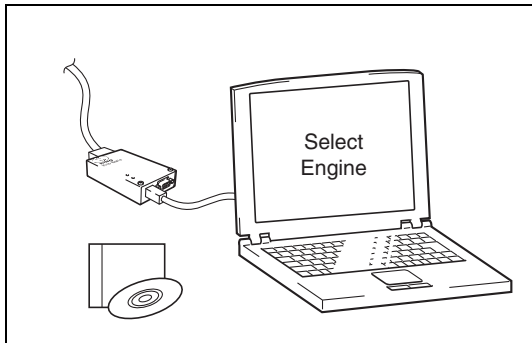
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF tank level sensor failure.

INSPECTION PROCEDURE: P203D**1 Check the DTC detected (Engine) [Hino-DX]**

SAPH16F020400076

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

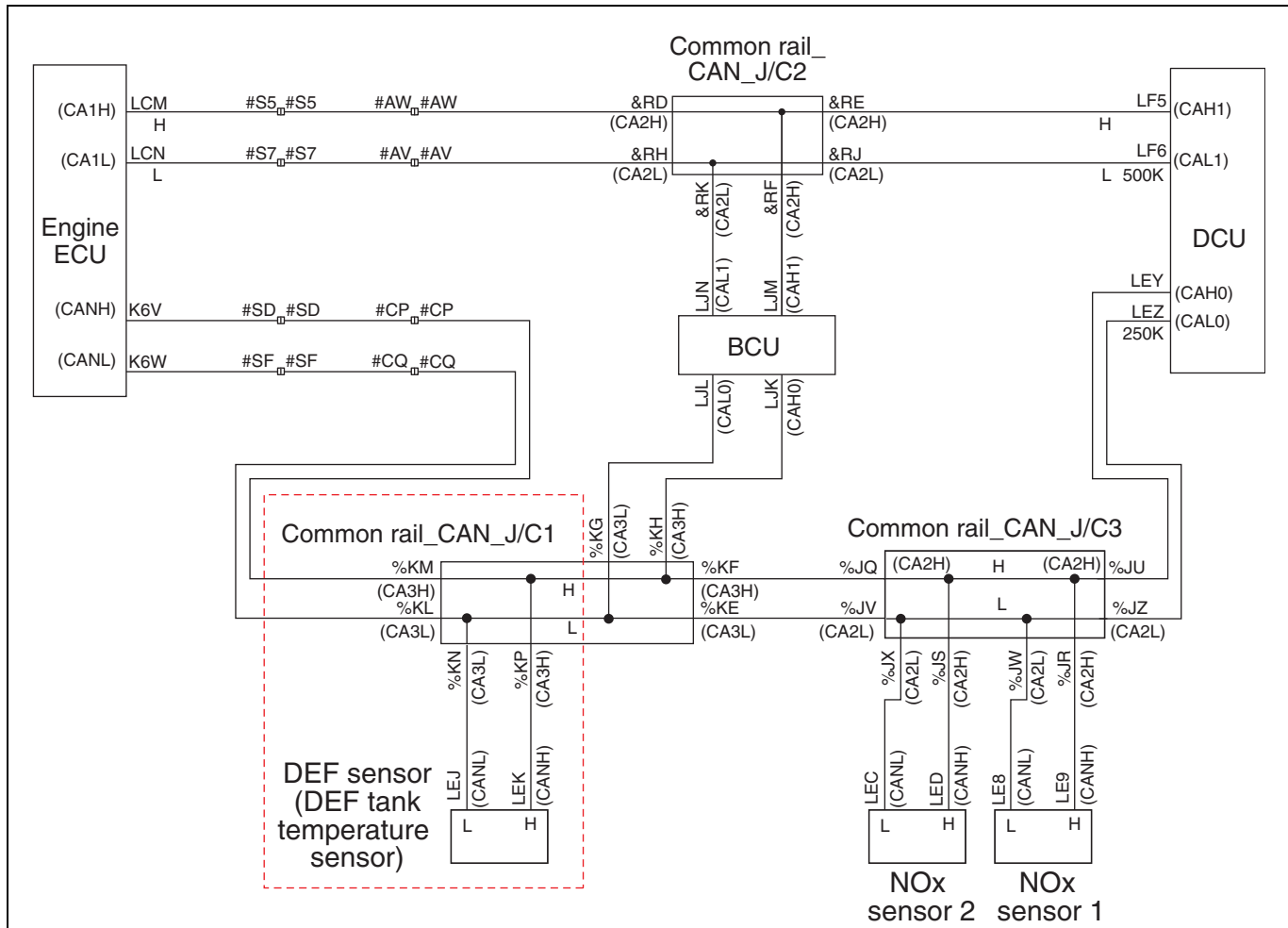
Has DTC U02A2 been detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Replace the DEF tank level sensor.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P203D

DTC: P203D		DEF tank level sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine) [Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF tank level sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2044

EN01H16F02040F03001027

DTC: P2044 DEF tank temperature sensor - out of range (Out of range low)**INFORMATION**

SAPH16F020400077

1. Technical description

- The DEF tank temperature sensor is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of DEF tank temperature sensor 2 is received from CAN data.

2. DTC set condition

- DTC detection condition
Starter switch ON.
- Judgement criteria
Failure of DEF tank temperature sensor 2 (Low failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DEF level indicator is stopped.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- DEF level indicator is OFF.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

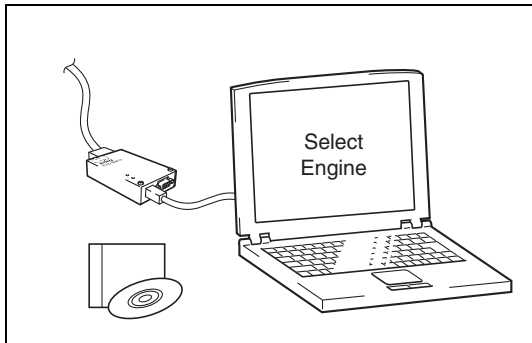
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF tank temperature sensor 2 failure.

INSPECTION PROCEDURE: P2044**1 Check the DTC detected (Engine) [Hino-DX]**

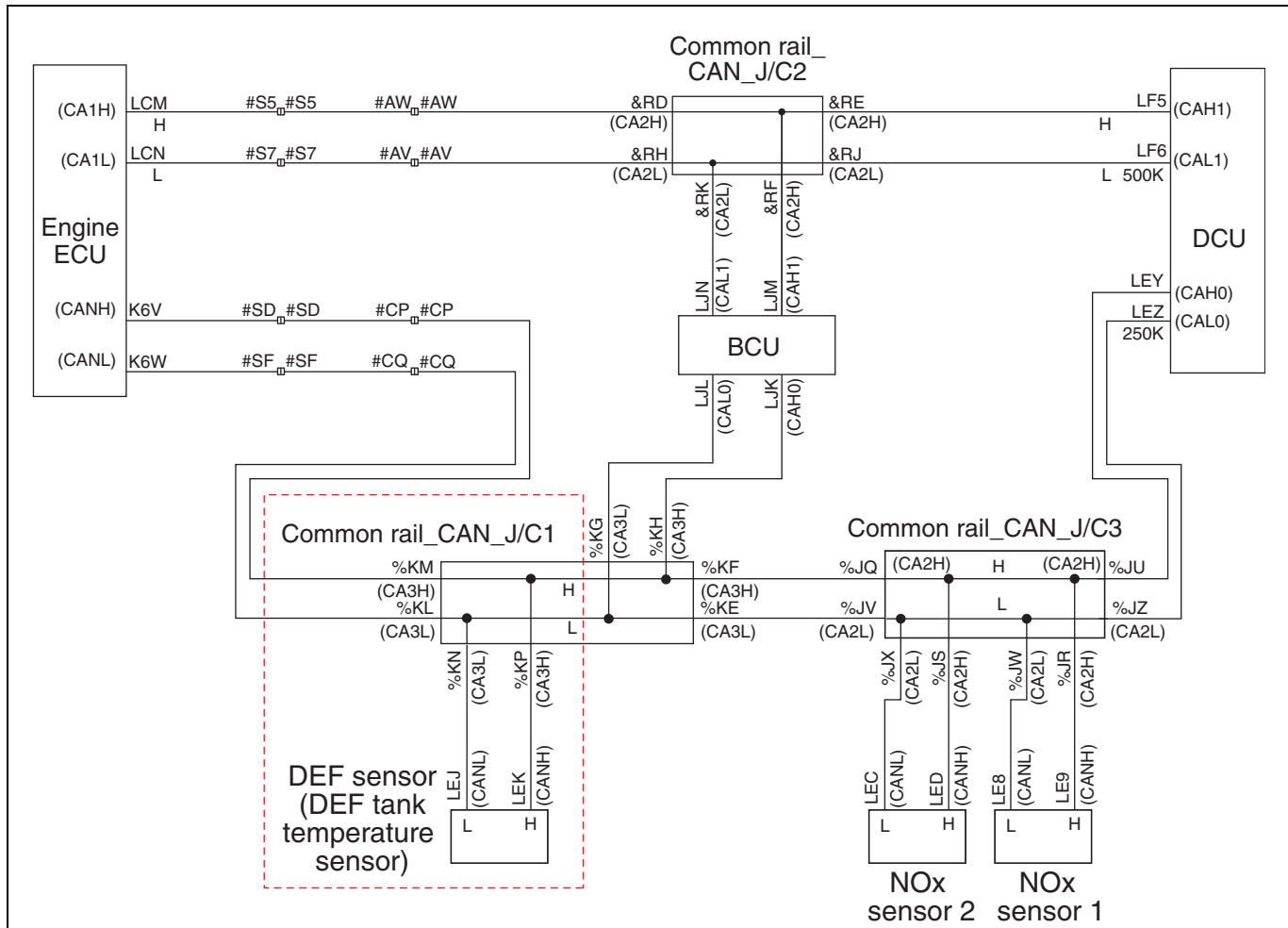
SAPH16F020400078

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

Has DTC U02A2 detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Replace the DEF tank temperature sensor.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P2044

DTC: P2044		DEF tank temperature sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine)[Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2045**DTC: P2045 DEF tank temperature sensor - out of range (Out of range high)**
INFORMATION

SAPH16F020400079

1. Technical description

- The DEF tank temperature sensor is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of DEF tank temperature sensor 2 is received from CAN data.

2. DTC set condition

- DTC detection condition
Starter switch ON.
- Judgement criteria
Failure of DEF tank temperature sensor 2 (High failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DEF level indicator is stopped.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- DEF level indicator is OFF.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

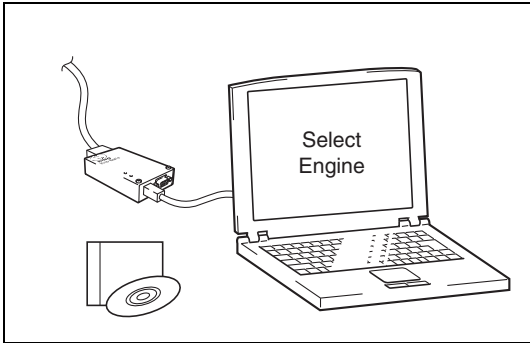
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF tank temperature sensor 2 failure.

INSPECTION PROCEDURE: P2045**1 Check the DTC detected (Engine) [Hino-DX]**

SAPH16F020400080

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

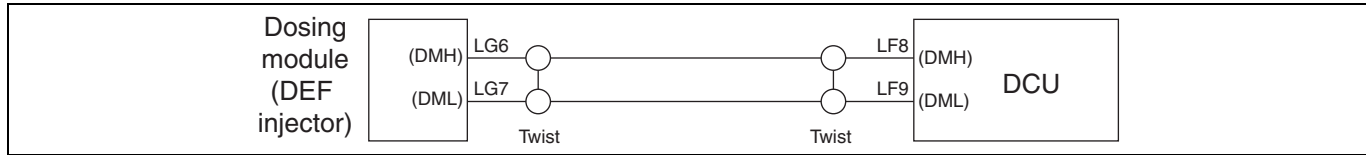
Has DTC U02A2 been detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Replace the DEF tank temperature sensor.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P2045

DTC: P2045		DEF tank temperature sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine) [Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2047

EN01H16F02040F03001029

**DTC: P2047 DEF injector - functional
INFORMATION**

SAPH16F020400081

1. Technical description

- DEF dosing valve is controlled by DCU.
- Operation of the DEF dosing valve is checked by DCU based on the circuit current waveform.

<Description of malfunction>

- DEF injector failure is detected.

2. DTC set condition**(1) DTC detection condition**

The engine is ON.

DEF injector duty cycle: > 0%, and DEF Pressure > 350 kPa {51 psi}, and 9 V < Battery < 16 V, and Time elapsed since DEF injector opening ≤ 0.0025 sec.

(2) Judgement criteria

Second order differential in the DEF injector circuit current waveform: Below 80 A/sec² detected 50 times consecutively.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR system malfunction lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- If malfunction does not improve within 500 miles: engine output is restricted.
- If malfunction does not improve within 2,000 miles: vehicle speed is restricted.

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.
- Engine output is insufficient (when malfunction does not improve within 500 miles).
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles).

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

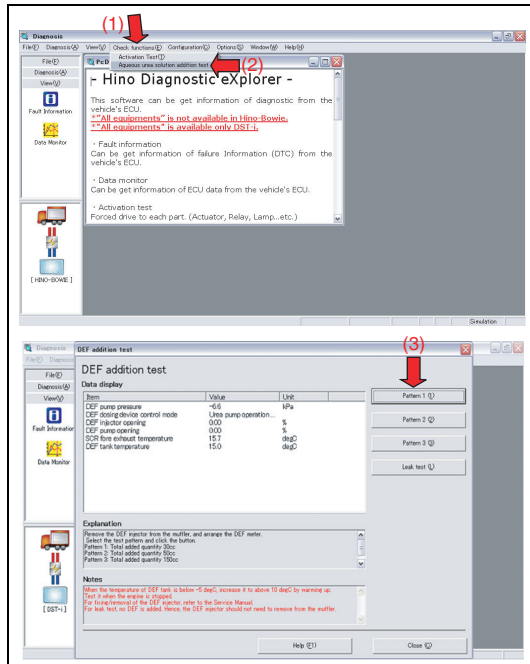
- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF injector: Malfunction of injector
- * Clogging of crystallized DEF is suspected.

INSPECTION PROCEDURE: P2047

1 Inspect DEF injector (1) [Hino-DX]



SAPH16F020400082

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 the muffler.

HINT

Refer to the workshop manual "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.

3. Set the starter switch to the "ON" position.
4. Select [DCU].
5. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector.

<Inspection procedure>

- (1) Select [Check functions].
- (2) Select [DEF addition test].
- (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)

NOTICE

When the DEF tank temperature is -5°C (23°F) or lower, perform warm-up to raise it to 10°C (50°F) or higher.

HINT

Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.

Is operation normal?

YES

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

NO

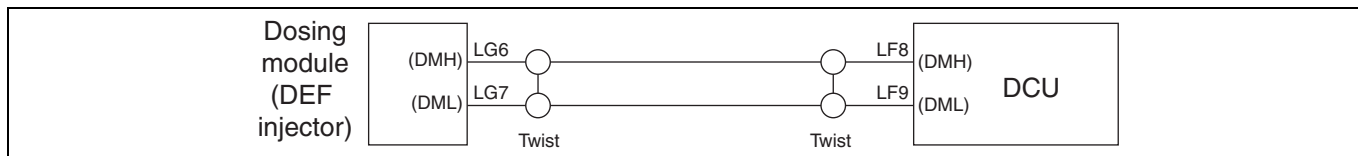
Replace the DEF injector. (Perform DPR forced regeneration after replacement.)
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P2047

DTC: P2047		DEF injector - functional		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF injector (1) [Hino-DX]	<p>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.)</p> <ol style="list-style-type: none"> Set the starter switch to the "LOCK" position. Remove the DEF injector from the muffler. <p>HINT Refer to the workshop manual "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.</p> <ol style="list-style-type: none"> Set the starter switch to the "ON" position. Select [DCU]. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector. <p><Inspection procedure> (1) Select [Check functions]. (2) Select [DEF addition test]. (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)</p> <p>NOTICE When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.</p> <p>HINT Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.</p>	<p>Operation is normal: Go to YES.</p> <p>Operation is abnormal: Go to NO.</p>		<p>Procedure completed. Perform "After-inspection work" of INFORMATION section.</p>	<p>Replace the DEF injector. (Perform DPR forced regeneration after replacement.) Perform "After-inspection work" of INFORMATION section.</p>

DTC: P2048

EN01H16F02040F03001030

DTC: P2048 DEF injector - disconnection (Disconnection (low side))**INFORMATION**

SAPH16F020400083

1. Technical description

- DEF dosing valve is controlled by DCU.
- DEF dosing valve detects disconnection and short-circuit based on the circuit voltage and signals in DCU.

<Description of malfunction>

- DEF injector failure is detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

DEF injector duty cycle > 0%

(2) Judgement criteria

DEF dosing valve circuit voltage (Low side): Below 0.2 V for more than 0.05 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Abnormal resistance of DEF injector
- Malfunction in DEF injector

INSPECTION PROCEDURE: P2048

1 Inspect for short-circuit in the DEF injector harness

1. Check the connection of the DEF injector connector (Looseness and poor contact).

Was any failure found?

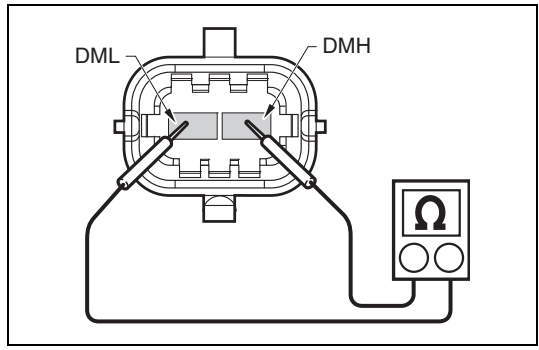
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the DEF injector unit



1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF injector connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF injector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF injector DML – DMH	20 °C {68 °F}:11.4 – 12.6 Ω

Do the measurements meet the standard value?

YES

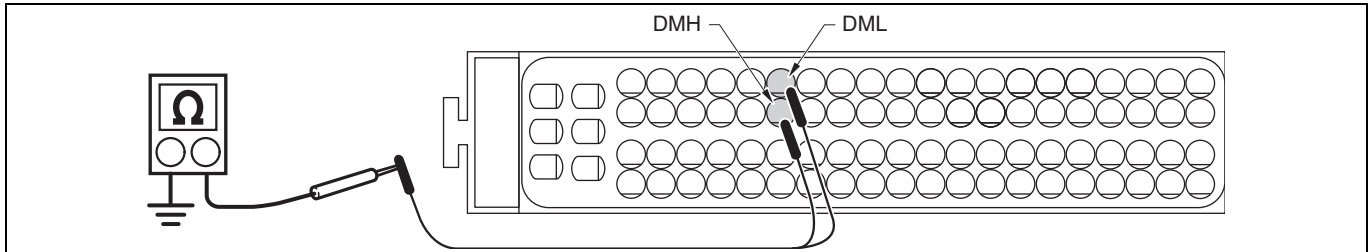
NO

Go to step 3.

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

3 Inspect for short-circuit in the DEF injector 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.



SAPH16F020400085

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

Do the measurements meet the standard value?

YES

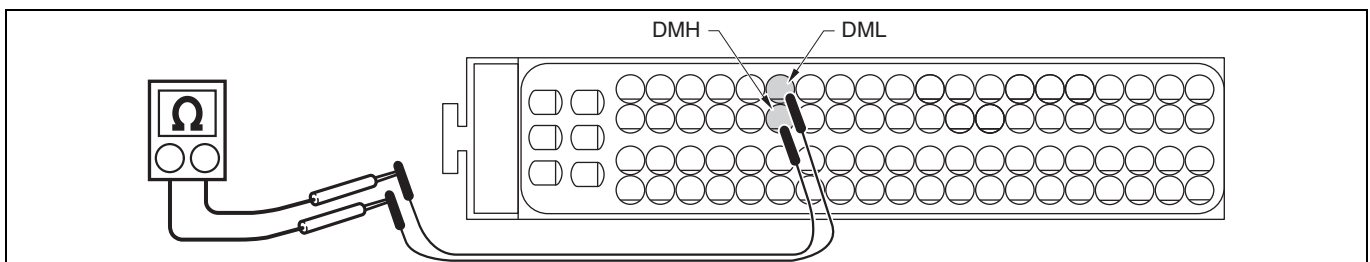
Go to step 4.

NO

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

4 Inspect disconnection of the DEF injector harness

1. Connect the DEF injector 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.



SAPH16F020400086

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector DML – DMH	20 °C {68 °F}: 11.4 – 12.6 Ω

Do the measurements meet the standard value?

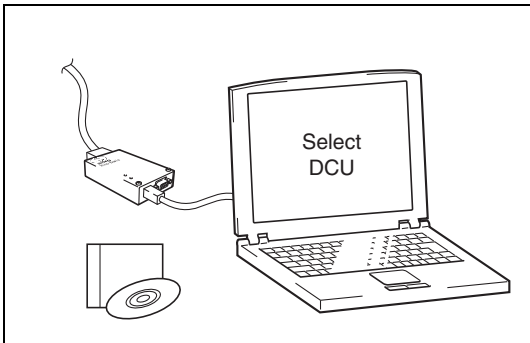
YES

Go to step 5.

NO

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

5 Check the DTC detected (DCU)



SAPH16F020400087

1. Perform an engine warm-up. (Water temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [DCU] and check if P2048 has been detected in [Fault Information].

Has DTC P2048 been detected?

YES

Replace the DCU. (Perform DPR forced regeneration after replacement.)
Perform "After-inspection work" of INFORMATION section.

NO

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

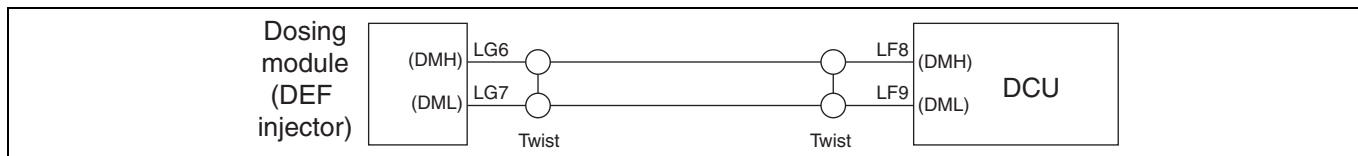
CHECKLIST: P2048

DTC: P2048		DEF injector - disconnection (Disconnection (low side))		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF injector connector	Check the connection of the DEF injector connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF injector unit	Measure the resistance between the terminals of the DEF injector. <Tester connections> DEF injector DML – DMH <Standard values> 20 °C {68 °F}: 11.4 – 12.6 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the DEF injector. Perform "After-inspection work" of INFORMATION section.
3	Inspect short-circuit of the DEF injector harness	Disconnect the DCU 86P connector, connect the signal check harness, and measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. <Tester connections> DCU 86P vehicle-side connector DML – Ground DMH – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect disconnection of the DEF injector harness	Measure the resistance of the wire harness and sensor between the DCU 86P vehicle-side connector and the DEF injector. 1. Connect the DEF injector 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. <Tester connections> DCU 86P vehicle-side connector DML – DMH <Standard values> 20 °C {68 °F}: 11.4 – 12.6 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P2048		DEF injector - disconnection (Disconnection (low side))		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the DTC detected (DCU)	Perform engine warm-up. (Water temperature: 60 °C {140 °F} or more), and check if P2048 has been detected in [DCU].	DTC P2048 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. (Perform DPR forced regeneration after replacement.) Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2049

EN01H16F02040F03001031

DTC: P2049 DEF injector - disconnection (Disconnection (high side))
INFORMATION

SAPH16F020400088

1. Technical description

- DEF dosing valve is controlled by DCU.
- DEF dosing valve detects disconnection and short-circuit based on the circuit voltage and signals in DCU.

<Description of malfunction>

- DEF injector failure is detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

DEF injector duty cycle > 0 %

(2) Judgement criteria

DEF dosing valve circuit voltage (High side): Below 2 V for more than 0.05 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR system malfunction lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- If malfunction does not improve within 500 miles: engine output is restricted.
- If malfunction does not improve within 2,000 miles: vehicle speed is restricted.

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 is declined.
- Engine output is insufficient (when malfunction does not improve within 500 miles).
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles).

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness.
- Abnormal resistance of DEF injector.
- Malfunction in DEF injector.

INSPECTION PROCEDURE: P2049**1 Inspect the DEF injector connector**

1. Check the connection of the DEF injector connector (Looseness and poor contact).

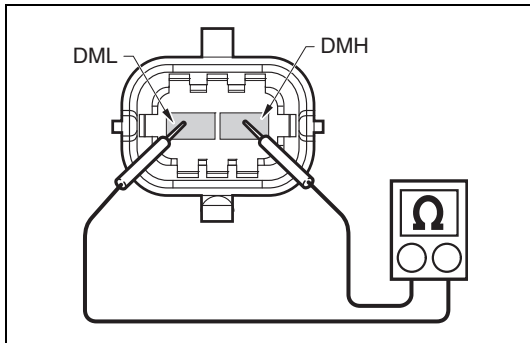
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the DEF injector unit

SAPH16F020400089

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF injector connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF injector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF injector DML – DMH	20 °C {68 °F}: 11.4 – 12.6 Ω

Do the measurements meet the standard value?

YES

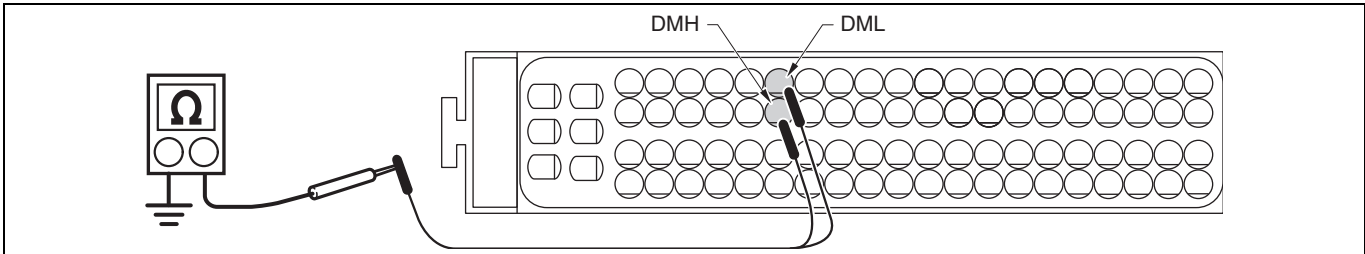
Go to step 3.

NO

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

3 Inspect for short-circuit in the DEF injector 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.



SAPH16F020400090

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

Do the measurements meet the standard value?

YES

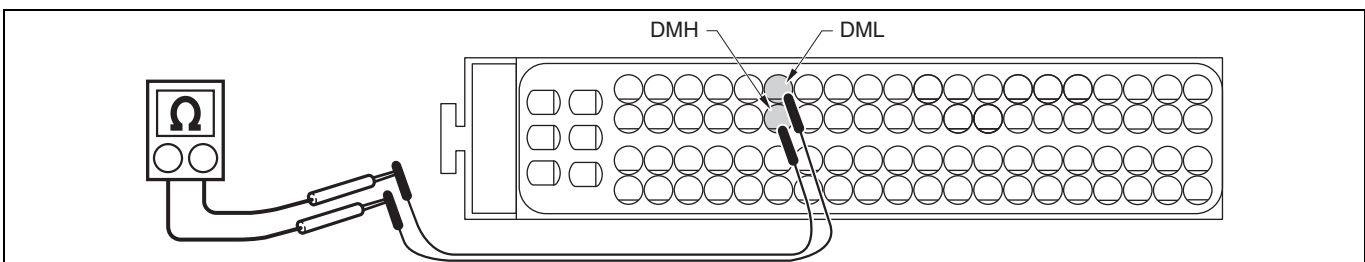
Go to step 4.

NO

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

4 Inspect disconnection of the DEF injector harness

1. Connect the DEF injector 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.



SAPH16F020400091

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector DML – DMH	20 °C {68 °F}: 11.4 – 12.6 Ω

Do the measurements meet the standard value?

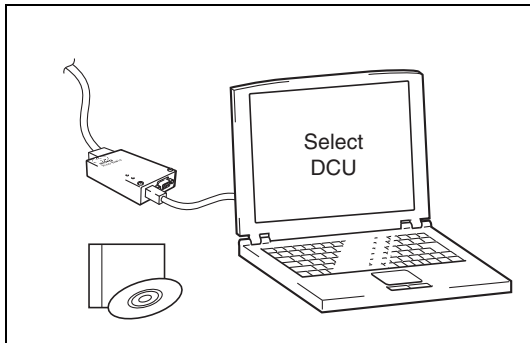
YES

Go to step 5.

NO

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

5 DTC the DTC detected (DCU) [Hino-DX]



SAPH16F020400092

1. Perform an engine warm-up. (Water temperature: 60 °C {140 °F} or more)
2. Stop the engine and set the starter switch to the "LOCK" position.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [DCU] and check if P2049 has been detected in [Fault Information].

Has DTC P2049 been detected?

YES

Replace the DCU. (Perform DPR forced regeneration after replacement.)
Perform "After-inspection work" of INFORMATION section.

NO

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

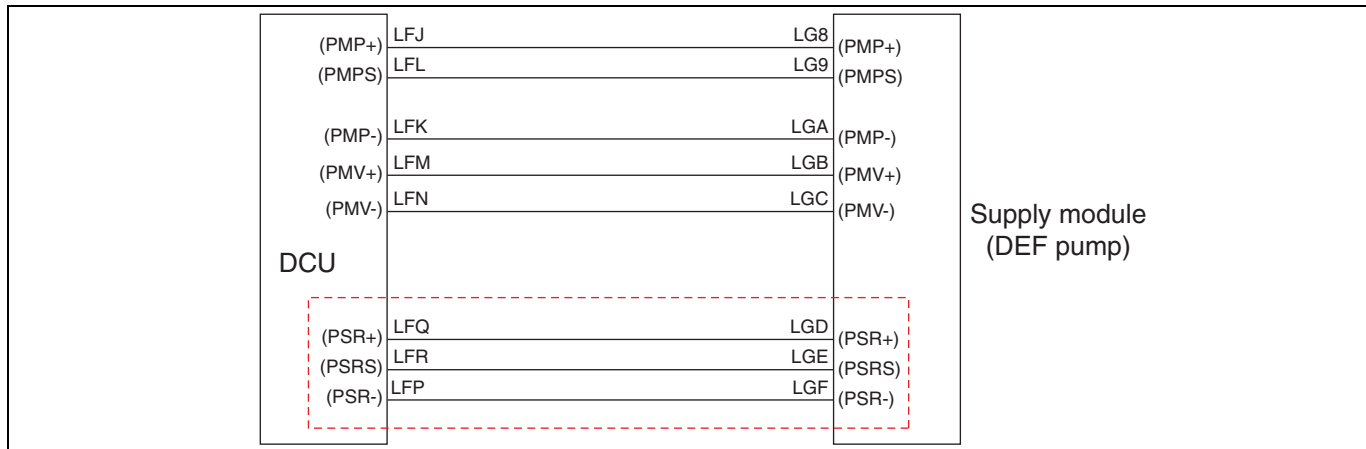
CHECKLIST: P2049

DTC: P2049		DEF injector - disconnection (Disconnection (high side))		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF injector connector	Check the connection of the DEF injector connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF injector unit	Measure the resistance between the terminals of the DEF injector. <Tester connections> DEF injector DML – DMH <Standard values> 20 °C {68 °F}: 11.4 – 12.6 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the DEF injector. Perform "After-inspection work" of INFORMATION section.
3	Inspect short-circuit of the DEF injector harness	Disconnect the DCU 86P connector, connect the signal check harness, and measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. <Tester connections> DCU 86P vehicle-side connector DML – Ground DMH – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect disconnection of the DEF injector harness	Measure the resistance of the wire harness and sensor between the DCU 86P vehicle-side connector and the DEF injector. 1. Connect the DEF injector 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. <Tester connections> DCU 86P vehicle-side connector DML – DMH <Standard values> 20 °C: 11.4 – 12.6 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P2049		DEF injector - disconnection (Disconnection (high side))		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the DTC detected (DCU) [Hino-DX]	Perform engine warm-up. (Water temperature: 60 °C {140 °F} or more), and check if P2049 has been detected in [DCU].	DTC P2049 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P204B

EN01H16F02040F03001032

DTC: P204B DEF pressure sensor - rationality
INFORMATION

SAPH16F020400093

1. Technical description

- The pressure sensor in the DEF pump is used to confirm the pressure in the DEF pipe.

<Description of malfunction>

- DEF pressure sensor failure is detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

Minimum DEF pressure during previous afterrun > -50 kPa {-7.3 psi}

DEF defrosting is completed, and

Exhaust Gas Temperature (SCR inlet) < 150 °C {302 °F}, and

DEF Pressure line No DEF, and

No malfunction

(2) Judgement criteria

DEF pressure > 50 kPa {7.3 psi} or < -50 kPa {-7.3 psi} for 10 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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

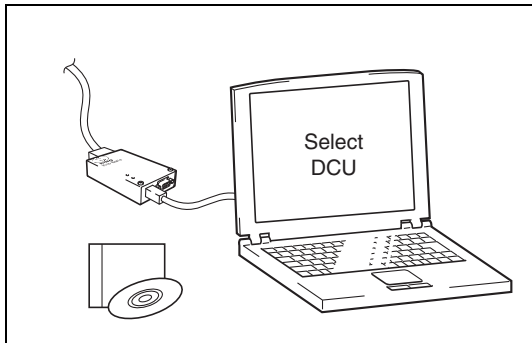
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF pump (pressure sensor) malfunction

INSPECTION PROCEDURE: P204B**1 Check the DTC detected (DCU)**

SAPH16F020400094

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. After three minutes, set the starter switch to the "ON" position.
4. Select [DCU] and check if P204B has been detected in [Fault Information].

Has DTC P204B been detected?**YES**

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

NO

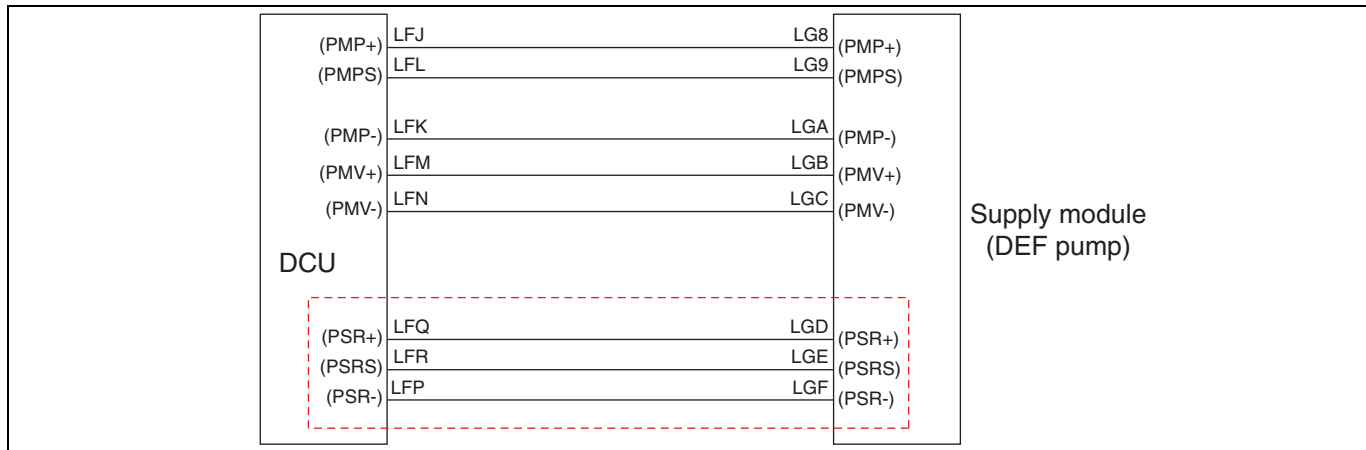
Replace the DEF pump.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P204B

DTC: P204B		DEF pressure sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU)	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Connect the vehicle to Hino-DX. 3. After three minutes, set the starter switch to the "ON" position. 4. Check if P204B has been detected in [DCU]. 	<p>DTC P204B has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.

DTC: P204C

EN01H16F02040F03001033

DTC: P204C DEF pressure sensor - out of range (Out of range low)
INFORMATION

SAPH16F020400095

1. Technical description

- The pressure sensor in the DEF pump is used to confirm the pressure in the DEF pump.
- A short-circuit or disconnection in the DEF pump pressure sensor is detected with the DCU.

<Description of malfunction>

- Failure of the pressure sensor in the DEF pump is detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

(2) Judgement criteria

DEF pump pressure sensor circuit voltage < 0.25 V for more than 0.4 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Malfunction of DEF pump (pressure sensor)
 - Internal circuit disconnection or short-circuit
 - Abnormal output voltage

INSPECTION PROCEDURE: P204C

1 Inspect the DEF pump connector

1. Check the connection of the DEF pump connector (Looseness and poor contact).

Was any failure found?

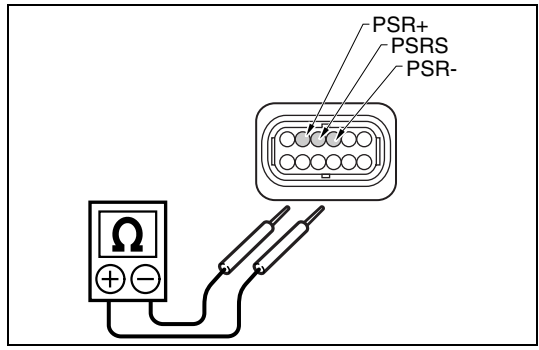
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the DEF pump (pressure sensor) unit



SAPH16F020400096

1. Set the starter switch to the "LOCK" position.
2. Remove the DEF pump connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF pump pressure sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump connector	
	(1) PSR+ – PSR-	(1) 185 – 215 kΩ
	(2) PSR+ – PSRS	(2) 148 – 172 kΩ
	(3) PSR- – PSRS	(3) 333 – 387 kΩ

Do the measurements meet the standard value?

YES

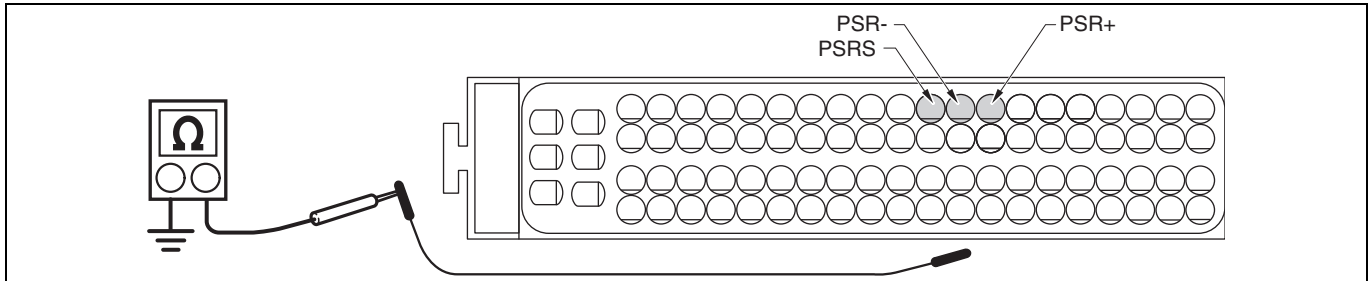
NO

Go to step 3.

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

3 Check for short-circuit in wire harness of DEF pump (pressure sensor)

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.



SAPH16F020400097

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

Do the measurements meet the standard value?

YES

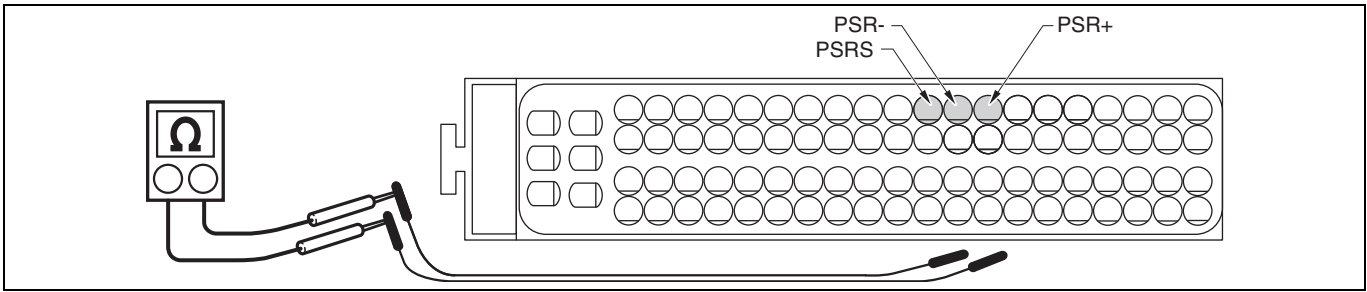
Go to step 4.

NO

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

4 Check for disconnection in wire harness of DEF pump (pressure sensor)

1. Connect the DEF pump 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.



SAPH16F020400098

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector (1) PSR+ – PSR- (2) PSR+ – PSRS (3) PSR- – PSRS	(1) 185 – 215 kΩ (2) 148 – 172 kΩ (3) 333 – 387 kΩ

Do the measurements meet the standard value?

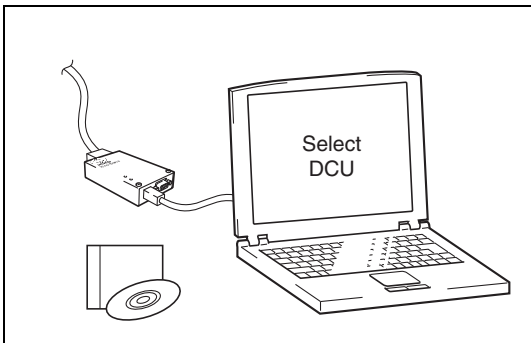
YES

NO

Go to step 5.

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

5 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400099

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if DTC P204C has been detected in [Fault Information].

Has DTC P204C been detected?

YES

NO

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

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

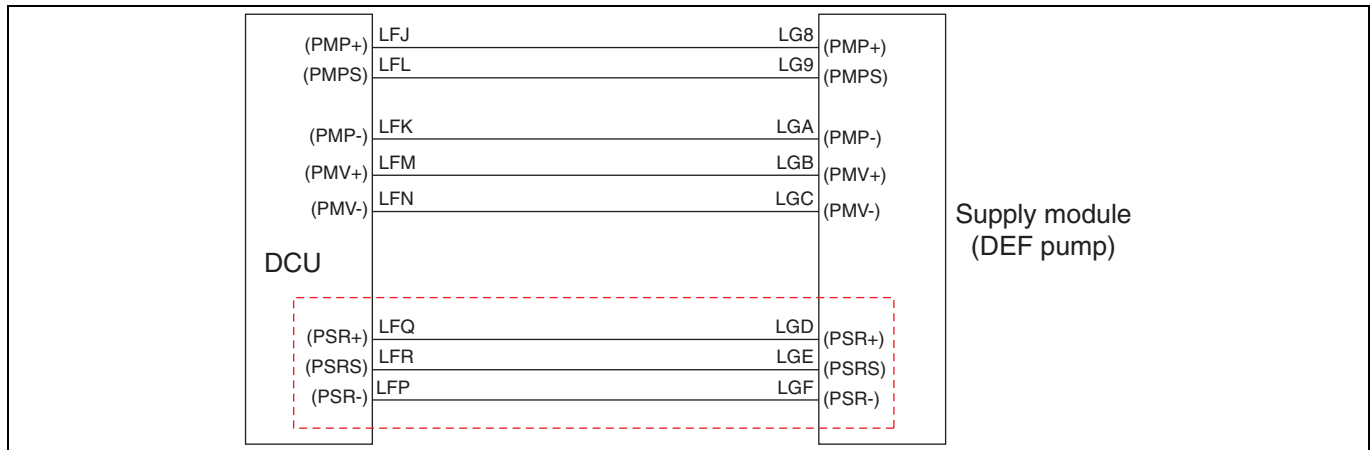
CHECKLIST: P204C

DTC: P204C		DEF pressure sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump connector	Check the connection of the DEF pump connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF pump (pressure sensor) unit	Measure the resistance between the terminals of the DEF pump (pressure sensor). <Tester connections> 1. PSR+ – PSR- 2. PSR+ – PSRS 3. PSR- – PSRS <Standard values> 1. 185 – 215 k Ω 2. 148 – 172 k Ω 3. 333 – 387 k Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.
3	Check for short-circuit in wire harness of DEF pump (pressure sensor)	1. Set the starter switch to the "LOCK" position. 2. Disconnect the DCU 86P connector. 3. 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. <Tester connections> PSR+ – Ground PSRS – Ground PSR- – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P204C		DEF pressure sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Check for disconnection in wire harness of DEF pump (pressure sensor)	<p>Measure the resistance between the terminal of the DCU 86P vehicle-side connector and DEF pump.</p> <ol style="list-style-type: none"> 1. Connect the DEF pump 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. <p><Tester connections> DCU 86P vehicle-side connector</p> <ol style="list-style-type: none"> 1. PSR+ – PSR- 2. PSR+ – PSRS 3. PSR- – PSRS <p><Standard values></p> <ol style="list-style-type: none"> 1. 185 – 215 kΩ 2. 148 – 172 kΩ 3. 333 – 387 kΩ 	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
5	Check the DTC detected (DCU) [Hino-DX]	Check if P204C has been detected in [DCU].	<p>DTC P204C has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P204D

EN01H16F02040F03001034

DTC: P204D DEF pressure sensor - out of range (Out of range high)
INFORMATION

SAPH16F020400100

1. Technical description

- The pressure sensor in the DEF pump is used to confirm the pressure in the DEF pump.
- A short-circuit or disconnection in the DEF pump pressure sensor is detected with the DCU.

<Description of malfunction>

- Failure of the pressure sensor in the DEF pump is detected.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
DEF pump pressure sensor circuit voltage > 4.75 V for more than 0.4 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR system malfunction lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- If malfunction does not improve within 500 miles: engine output is restricted.
- If malfunction does not improve within 2,000 miles: vehicle speed is restricted.

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.
- Engine output is insufficient (when malfunction does not improve within 500 miles).
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles).

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Malfunction of DEF pump (pressure sensor)
 - Internal circuit disconnection or short-circuit
 - Abnormal output voltage

INSPECTION PROCEDURE: P204D**1 Inspect the DEF pump connector**

1. Check the connection of the DEF pump connector. (Looseness and poor contact).

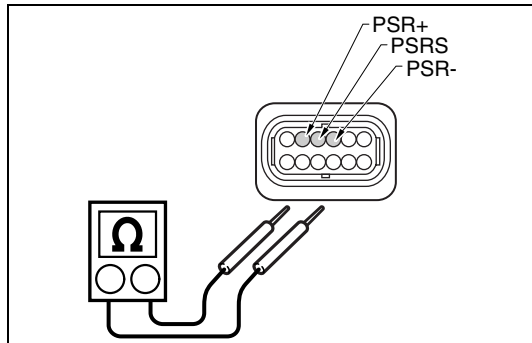
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the DEF pump (pressure sensor) unit

SAPH16F020400101

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF pump connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF pump pressure sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump connector (1) PSR+ – PSR- (2) PSR+ – PSRS (3) PSR- – PSRS	(1) 185 – 215 kΩ (2) 148 – 172 kΩ (3) 333 – 387 kΩ

Do the measurements meet the standard value?

YES

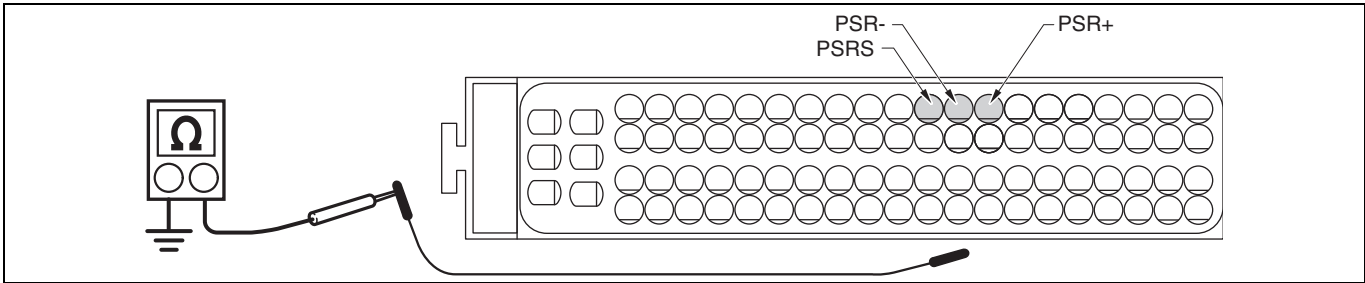
Go to step 3.

NO

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

3 Check for short-circuit in wire harness of DEF pump (pressure sensor)

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.



SAPH16F020400102

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

Do the measurements meet the standard value?

YES

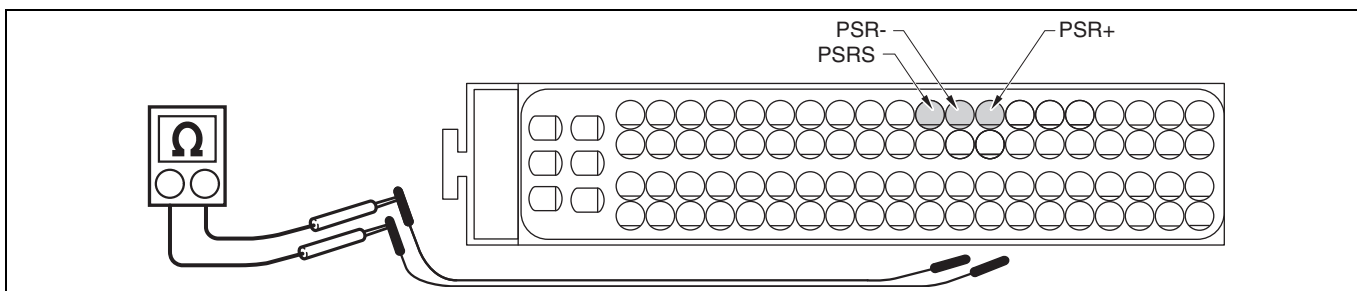
NO

Go to step 4.

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

4 Check for disconnection in wire harness of DEF pump (pressure sensor)

1. Connect the DEF pump 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.



SAPH16F020400103

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector (1) PSR+ – PSR- (2) PSR+ – PSRS (3) PSR- – PSRS	(1) 185 – 215 kΩ (2) 148 – 172 kΩ (3) 333 – 387 kΩ

Do the measurements meet the standard value?

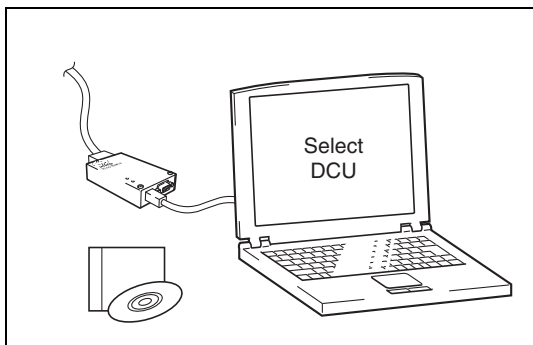
YES

Go to step 5.

NO

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

5 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400104

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P204D has been detected in [Fault Information].

Has P204D been detected?

YES

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

NO

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

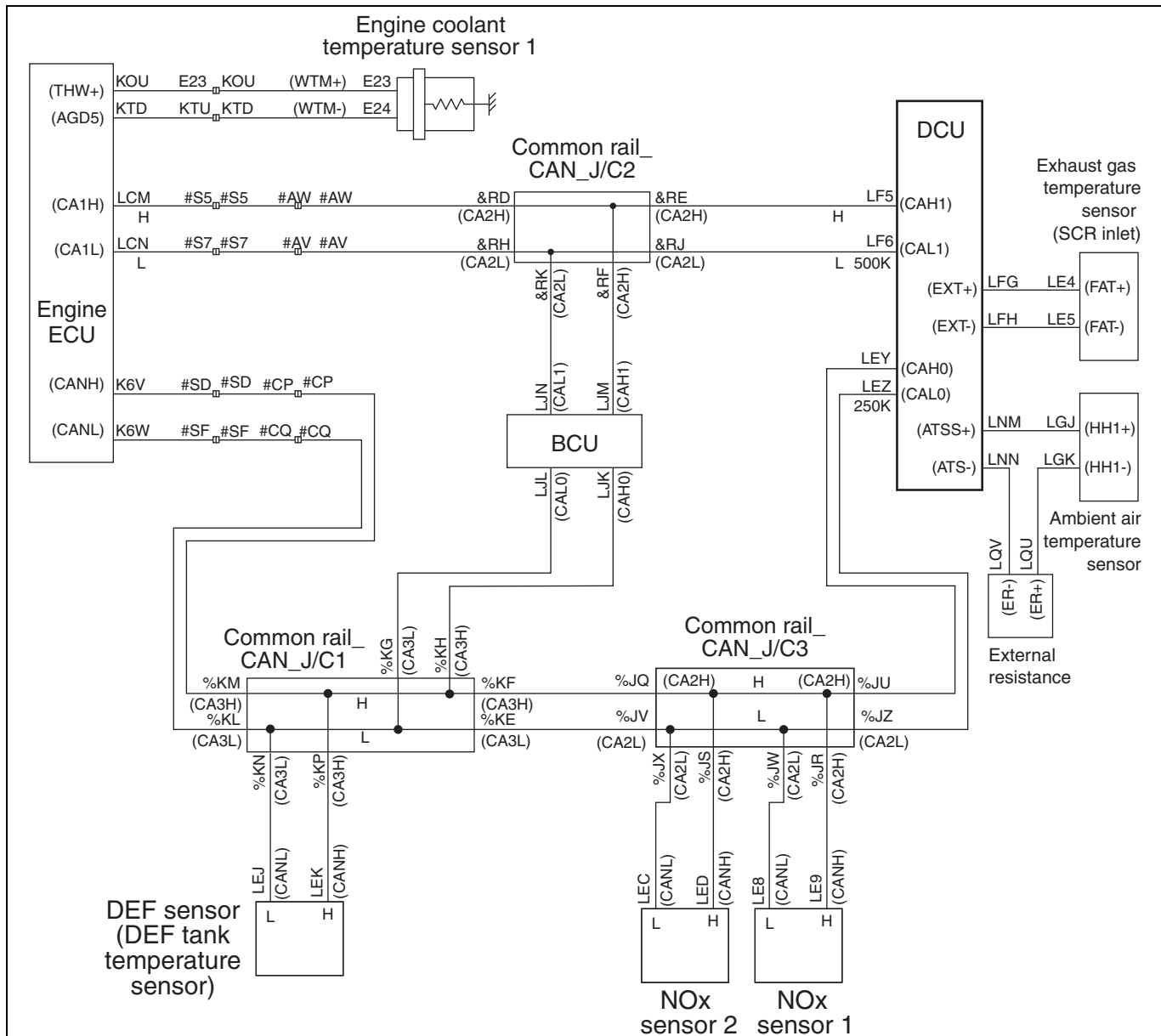
CHECKLIST: P204D

DTC: P204D		DEF pressure sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump connector	Check the connection of the DEF pump connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF pump (pressure sensor) unit	Measure the resistance between the terminals of the DEF pump (pressure sensor). <Tester connections> DEF pump connector 1. PSR+ – PSR- 2. PSR+ – PSRS 3. PSR- – PSRS <Standard values> 1. 185 – 215 kΩ 2. 148 – 172 kΩ 3. 333 – 387 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.
3	Check for short-circuit in wire harness of DEF pump (pressure sensor)	1. Set the starter switch to the "LOCK" position. 2. Disconnect the DCU 86P connector. 3. 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. <Tester connections> DCU 86P vehicle-side connector PSR+ – Ground PSRS – Ground PSR- – Ground <Standard values> $\infty \Omega$	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P204D		DEF pressure sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Check for disconnection in wire harness of DEF pump (pressure sensor)	<p>Measure the resistance between the terminal of the DCU 86P vehicle-side connector and DEF pump.</p> <ol style="list-style-type: none"> 1. Connect the DEF pump 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. <p><Tester connections> DCU 86P vehicle-side connector</p> <ol style="list-style-type: none"> 1. PSR+ – PSR- 2. PSR+ – PSRS 3. PSR- – PSRS <p><Standard values></p> <ol style="list-style-type: none"> 1. 185 – 215 kΩ 2. 148 – 172 kΩ 3. 333 – 387 kΩ 	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
5	Check the DTC detected (DCU) [Hino-DX]	Check if P204D has been detected in [DCU].	<p>DTC P204D has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P205B

EN01H16F02040F03001035

DTC: P205B DEF tank temperature sensor - rationality
INFORMATION

SAPH16F020400105

1. Technical description

- DEF tank temperature sensor rationality is checked by comparison with Ambient air temperature.

<Description of malfunction>

- Failure of DEF tank temperature sensor is detected.

2. DTC set condition**(1) DTC detection condition**

Starter switch ON.

Difference between Ambient air temperature and Exhaust gas temperature (SCR inlet): < 8 °C {46.4 °F}

Difference of Ambient air temperature between Engine coolant temperature (from Engine ECU): < 8 °C {46.4 °F}

Difference between Exhaust gas temperature (SCR inlet) and Engine coolant temperature (from Engine ECU): < 8 °C {46.4 °F}

(2) Judgement criteria

Difference between DEF tank temperature and Ambient air temperature: > 50 °C {122 °F} for 2 sec.

3. Reset condition

- When the starter switch is ON and the difference among the outside temperature, exhaust temperature, and coolant temperature is less than 8 °C {46.4 °F}, the difference between the DEF tank temperature and the outside temperature is less than 50 °C {122 °F}.

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

- MIL: ON

5. Symptoms on the vehicle when the DTC is set

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

- -

<Symptoms on the vehicle due to malfunction>

- Control does not work properly when DEF freezes.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Poor connector contact or faulty connector fit
- Failure of DEF tank temperature sensor
- Failure of ambient air temperature sensor
- Failure of exhaust gas temperature sensor (SCR inlet)
- Failure of engine coolant temperature sensor

INSPECTION PROCEDURE: P205B**1 Inspect the DEF tank temperature sensor connector**

1. Check the connection of the DEF tank temperature sensor connector (Looseness and poor contact).

Was any failure found?

YES

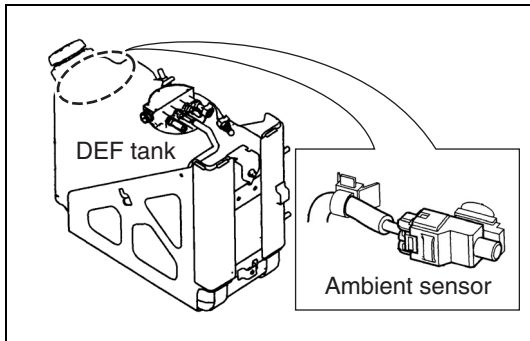
Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the ambient air temperature sensor connector

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



SAPH16F020400106

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the ambient air temperature sensor

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

Was any failure found?

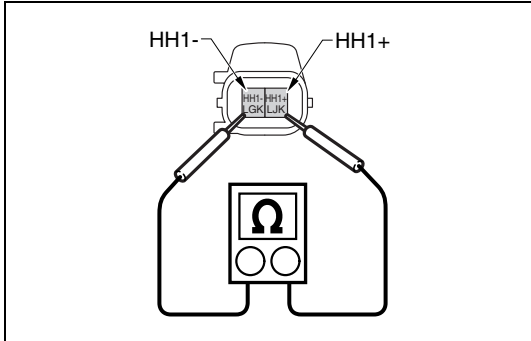
YES

Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the ambient air temperature sensor unit



SAPH16F020400107

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Ambient air temperature sensor HH1+ – HH1-	1.7 kΩ

Do the measurements meet the standard value?

YES

Go to step 5.

NO

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

5 Inspect the DCU 86P connector

1. Check the connection of the DCU 86P connector (Looseness and poor contact).

Was any failure found?

YES

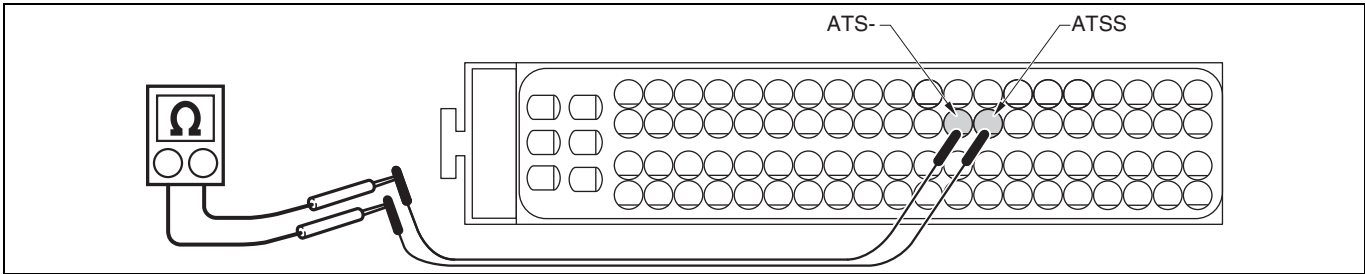
Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the ambient air temperature sensor harness

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



SAPH16F020400108

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector ATSS – ATS-	3.7 kΩ

Do the measurements meet the standard value?

YES

NO

Go to step 9.

Go to step 7.

7 Inspect the connector of the external resistor

1. Check the connection of the external resistor connector (Looseness and poor contact).

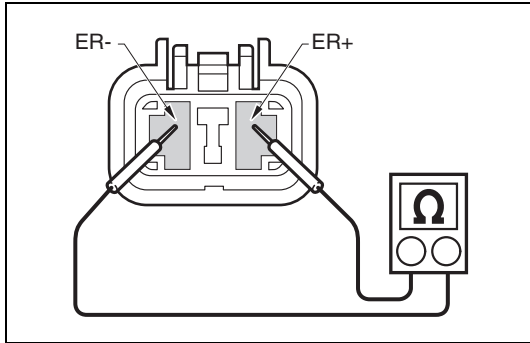
Was any failure found?

YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 8.

8 Inspect the external resistor connector unit

SAPH16F020400109

1. Disconnect the external resistor connector.
2. Use the electrical tester to measure the resistance between the terminals of the external resistor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	External resistor ER+ – ER-	2 k Ω

Do the measurements meet the standard value?

YES

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

NO

Replace the external resistor.
Perform "After-inspection work" of INFORMATION section.

9 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.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 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?

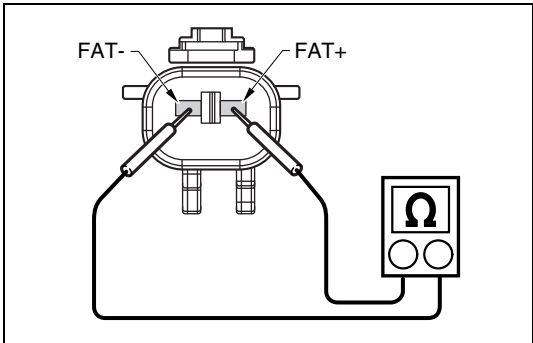
YES

Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

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



1. Disconnect the exhaust gas temperature sensor connector.
2. 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-	220 Ω

Do the measurements meet the standard value?

YES

Go to step 12.

NO

Replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.

12 Inspect the engine coolant temperature sensor connector

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

Was any failure found?**YES**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

NO

Go to step 13.

13 Inspect the engine coolant temperature sensor

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

Was any failure found?**YES**

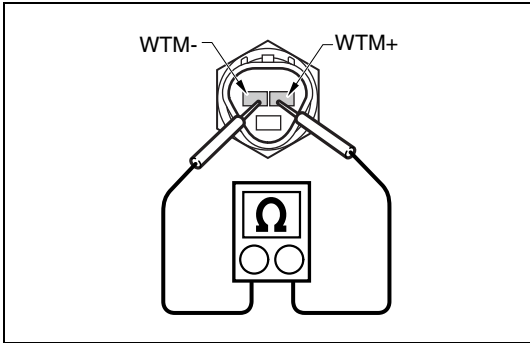
Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 14.

14 Inspect the engine coolant temperature sensor unit

1. Disconnect an engine coolant temperature sensor connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor.



SAPH16F020400111

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine coolant temperature sensor 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

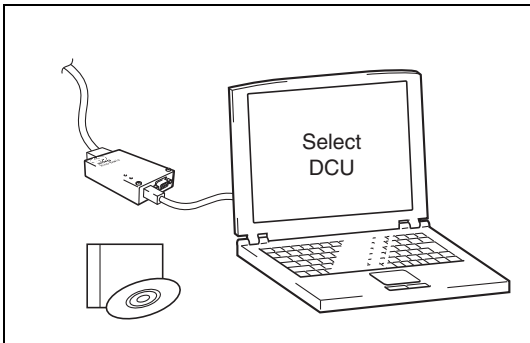
Go to step 15.

NO

Replace the engine coolant temperature sensor.
Perform "After-inspection work" of INFORMATION section.

15 Check the DTC detected (DCU)

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P205B has been detected in [Fault Information].



SAPH16F020400112

Has DTC P205B been detected?

YES

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

NO

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

CHECKLIST: P205B

DTC: P205B		DEF tank temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF tank temperature sensor connector	Check the connection of the DEF tank temperature sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the ambient air temperature sensor connector	Check the connection of the ambient air temperature sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the ambient air temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the ambient air temperature sensor. 2. Make sure there is no dirt or damage to the ambient air temperature sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the ambient air temperature sensor and install it properly. If damaged, replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the ambient air temperature sensor unit	Measure the resistance between the terminals of the ambient air temperature sensor. <Tester connections> Ambient air temperature sensor HH1+ – HH1- <Standard values> 1.7 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Replace the ambient air temperature sensor. Perform "After-inspection work" of INFORMATION section.

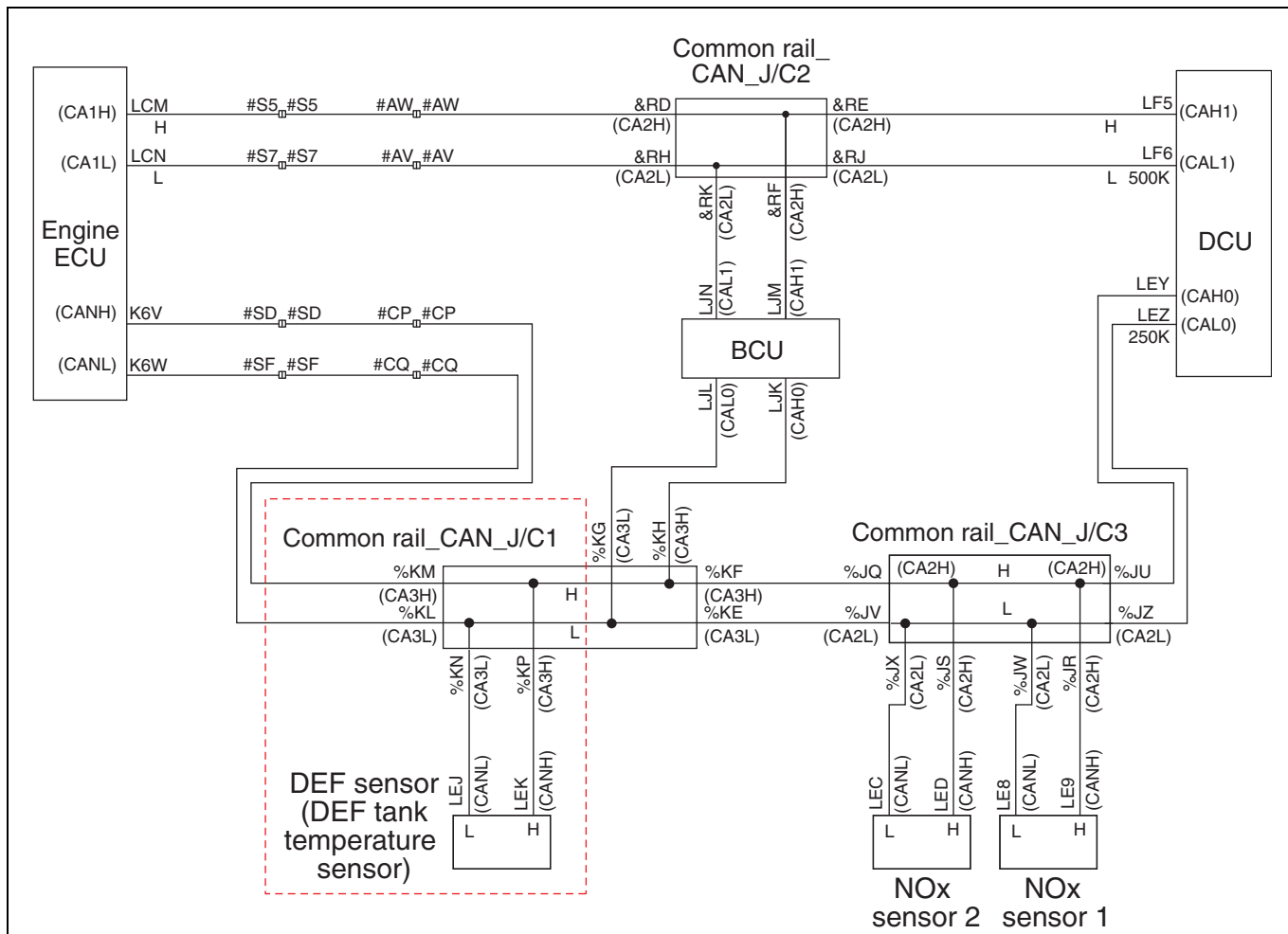
DTC: P205B		DEF tank temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the DCU 86P connector	Check the connection of the DCU 86P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the ambient air temperature sensor harness	Measure the resistance between the terminal of the DCU 86P vehicle-side connector and SCR ambient air temperature sensor. 1. Connect the ambient air temperature sensor connector. 2. Disconnect the DCU 86P connector, connect the signal check harness, and measure the resistance between the terminals of the DCU 86P vehicle-side connector. <Tester connections> DCU 86P vehicle-side connector ATSS – ATS- <Standard values> 3.7 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 9.	Go to step 7.
7	Inspect the connector of the external resistor	Check the connection of the external resistor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 8.
8	Inspect the external resistor connector unit	Measure the resistance between the terminals of the external resistor. <Tester connections> External resistor ER+ – ER- <Standard values> 2 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.	Replace the external resistor. Perform "After-inspection work" of INFORMATION section.

DTC: P205B		DEF tank temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Inspect the exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 10.
10	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 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). 	Failure found: Go to YES. No failure found: Go to NO.		Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. Perform "After-inspection work" of INFORMATION section.	Go to step 11.
11	Inspect the exhaust gas temperature sensor (SCR inlet) unit	Measure the resistance between the terminals of the exhaust gas temperature sensor (SCR inlet). <Tester connections> Exhaust gas temperature sensor (SCR inlet) FAT+ – FAT- <Standard values> 220 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 12.	Replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.
12	Inspect the engine coolant temperature sensor connector	Check the connection of the engine coolant temperature sensor connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 13.

DTC: P205B		DEF tank temperature sensor - rationality		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
13	Inspect the engine coolant temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the engine coolant temperature sensor. 2. Make sure there is no dirt or damage to the engine coolant temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 14.
14	Inspect the engine coolant temperature sensor unit	<p>Measure the resistance between the terminals of the engine coolant temperature sensor.</p> <p><Tester connections> Engine coolant temperature sensor WTM+ – WTM-</p> <p><Standard values> 20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 15.	Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.
15	Check the DTC detected (DCU)	Check if P205B has been detected in [DCU].	<p>DTC P205B has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P205C

EN01H16F02040F03001036

DTC: P205C DEF tank temperature sensor - out of range (Out of range low)
INFORMATION

SAPH16F020400113

1. Technical description

- The DEF tank temperature sensor is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of DEF tank temperature sensor 1 is received from CAN data.

2. DTC set condition

- DTC detection condition
Starter switch ON.
- Judgement criteria
Failure of DEF tank temperature sensor 1 (Low failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DEF level indicator is stopped.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- DEF level indicator is OFF.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

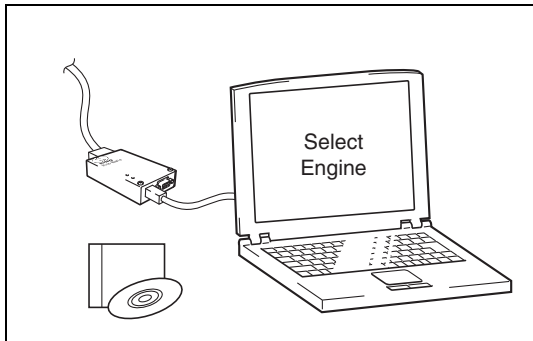
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF tank temperature sensor 1 failure.

INSPECTION PROCEDURE: P205C**1 Check the DTC detected (Engine) [Hino-DX]**

SAPH16F020400114

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

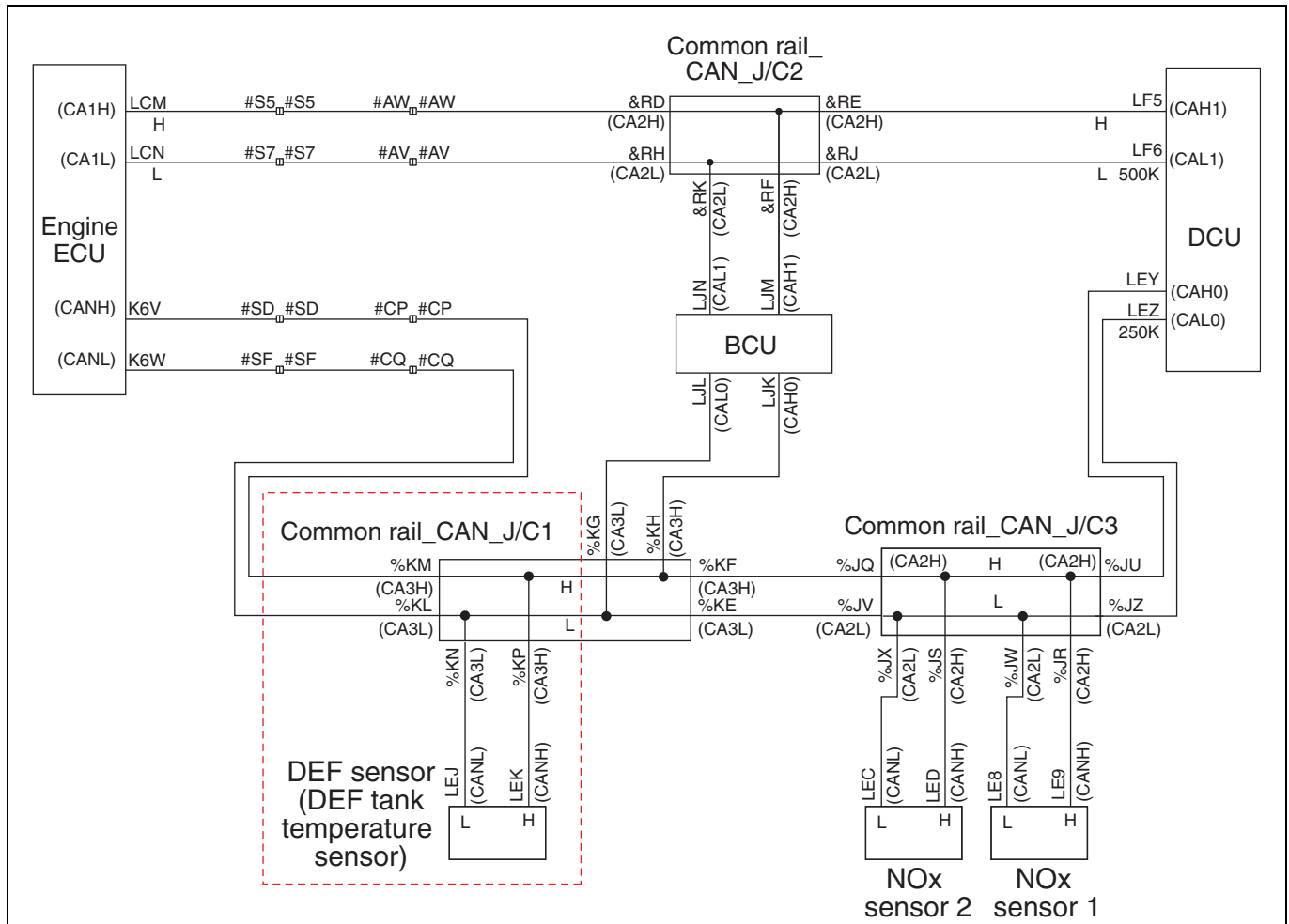
Has DTC U02A2 been detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Replace the DEF tank temperature sensor 1. Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P205C

DTC: P205C		DEF tank temperature sensor - out of range (Out of range low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine) [Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P205D

EN01H16F02040F03001037

DTC: P205D DEF tank temperature sensor - out of range (Out of range high)
INFORMATION

SAPH16F020400115

1. Technical description

- The DEF tank temperature sensor is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of DEF tank temperature sensor 1 is received from CAN data.

2. DTC set condition

- DTC detection condition
Starter switch ON.
- Judgement criteria
Failure of DEF tank temperature sensor 1 (High failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DEF level indicator is stopped.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- DEF level indicator is OFF.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

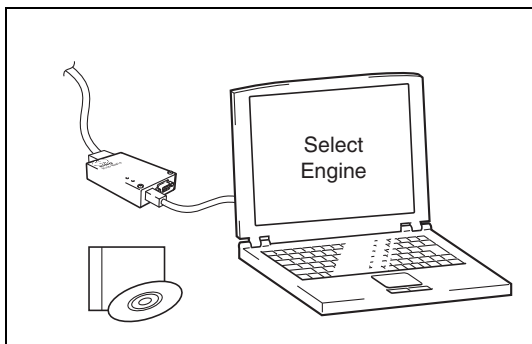
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF tank temperature sensor 1 failure.

INSPECTION PROCEDURE: P205D**1 Check the DTC detected (Engine) [Hino-DX]**

SAPH16F020400116

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

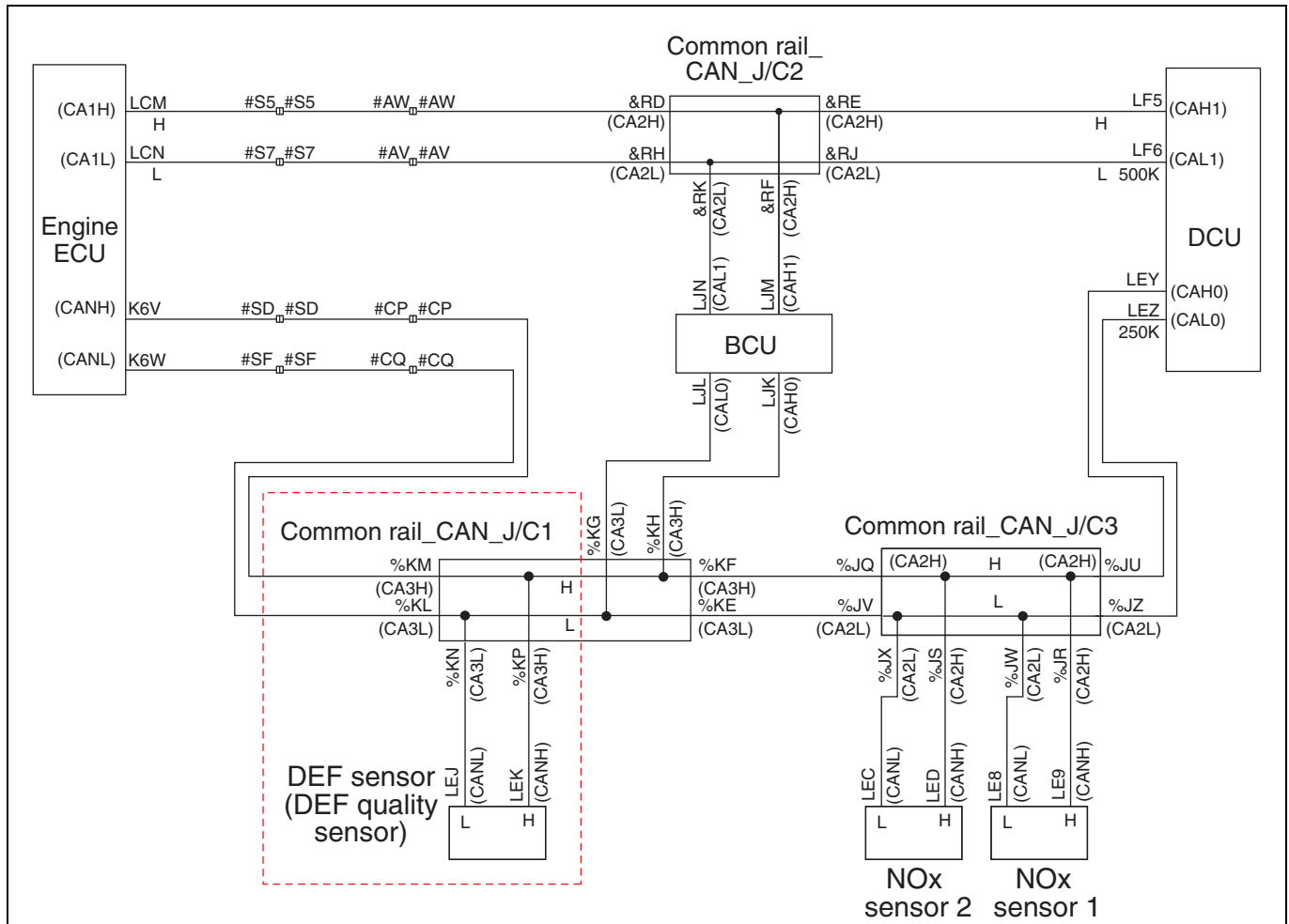
Has DTC U02A2 been detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Replace the DEF tank temperature sensor 1.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P205D

DTC: P205D		DEF tank temperature sensor - out of range (Out of range high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine) [Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P206A

EN01H16F02040F03001038

DTC: P206A Reductant quality sensor - malfunction
INFORMATION

SAPH16F020400117

1. Technical description

- The DEF quality sensor is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of DEF quality sensor is received from CAN data.

2. DTC set condition

- DTC detection condition
Starter switch ON.
- Judgement criteria
Failure of DEF quality sensor (flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- DEF level indicator is stopped.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- DEF level indicator is OFF.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

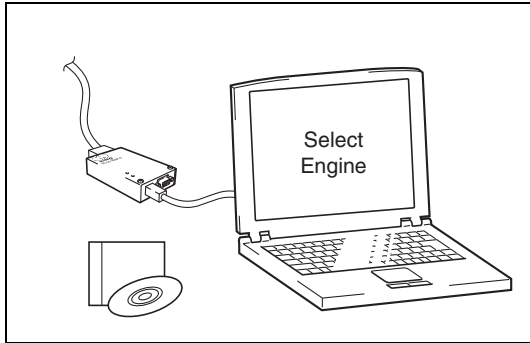
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF quality sensor failure.

INSPECTION PROCEDURE: P206A**1 Check the DTC detected (Engine) [Hino-DX]**

SAPH16F020400118

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if a CAN communication system malfunction (U02A2) has been detected in [Fault Information].

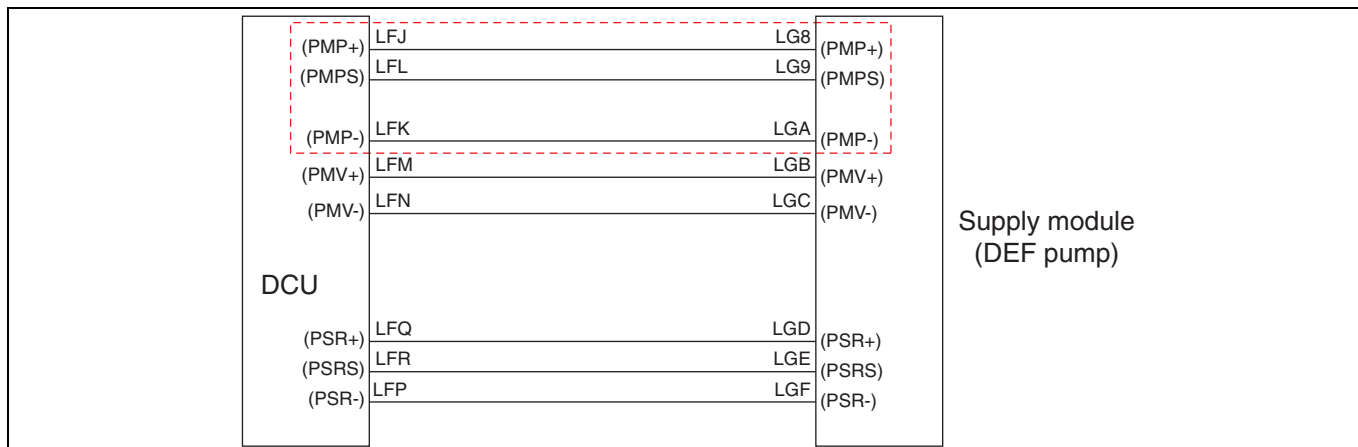
Has DTC U02A2 been detected?**YES****Go to diagnostic procedure of a related DTC.****NO****Replace the DEF sensor.
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P206A

DTC: P206A		Reductant quality sensor - malfunction		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (Engine) [Hino-DX]	Check if a CAN communication system malfunction (U02A2) has been detected in [Engine].	DTC U02A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the DEF sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P208A

EN01H16F02040F03001039

DTC: P208A DEF pump motor - circuit (Open load)
INFORMATION

SAPH16F020400119

1. Technical description

- DCU determines failure of DEF pump motor based on DEF pump circuit voltage.

<Description of malfunction>

- Actuator malfunction of DEF pump module is detected.

2. DTC set condition**(1) DTC detection condition**

Starter switch ON.

DEF pump module actuator Duty cycle > 0 %

(2) Judgement criteria

DEF pump module actuator voltage is in 2.7 V to 5 V range for 2 sec. or more.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR System failure lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- If malfunction does not improve within 500 miles: engine output is restricted.
- If malfunction does not improve within 2,000 miles: vehicle speed is restricted.

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.
- Engine output is insufficient (when malfunction does not improve within 500 miles)
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles)

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- DEF pump motor malfunction

INSPECTION PROCEDURE: P208A

1	Inspect the DEF pump connector
----------	---------------------------------------

1. Check the connection of the DEF pump connector (Looseness and poor contact).

Was any failure found?

YES

NO

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2	Inspect the DCU 86P connector
----------	--------------------------------------

1. Check the connection of the DCU 86P connector (Looseness and poor contact).

Was any failure found?

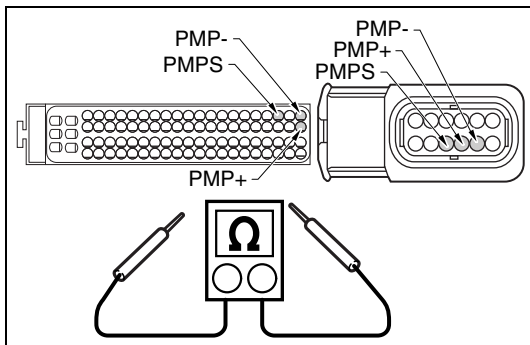
YES

NO

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

Go to step 3.

3 Inspect the DEF pump harness



SAPH16F020400120

1. Set the starter switch to the "LOCK" position.
2. Disconnect DCU 86P connector.
3. Connect the signal check harness and use the electrical tester to measure the resistance between the DEF pump vehicle-side connector and each terminal of the DCU 86P vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump vehicle-side connector – DCU 86P vehicle-side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS	1 Ω or less

Do the measurements meet the standard value?

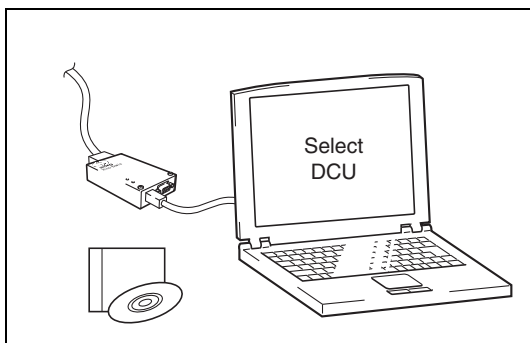
YES

Replace the DEF pump, and go to step 4.

NO

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

4 Check the DTC detected (DCU)



SAPH16F020400121

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P208A has been detected in [Fault Information].

Has DTC P208A been detected?

YES

Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.

NO

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

CHECKLIST: P208A

DTC: P208A		DEF pump motor - circuit (Open load)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump connector	Check the connection of the DEF pump connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DCU 86P connector	Check the connection of the DCU 86P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the DEF pump harness	Measure the resistance between the DEF pump and the DCU 86P vehicle-side connector. 1. Disconnect the DEF pump connector. 2. Disconnect DCU 86P connector. Connect the signal check harness and use the electrical tester to measure the resistance between the DEF pump and each terminal of the DCU 86P vehicle-side connector. <Tester connections> DEF pump vehicle-side connector – DCU 86P vehicle-side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS <Standard values> 1 Ω or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the DEF pump, and go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected (DCU)	Check if P208A has been detected in [DCU].	DTC P208A has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P208B

EN01H16F02040F03001040

**DTC: P208B DEF pump motor - functional
INFORMATION**

DCU	(PMP+)	LFJ	LG8	(PMP+)	Supply module (DEF pump)
	(PMPS)	LFL	LG9	(PMPS)	
	(PMP-)	LFK	LGA	(PMP-)	
	(PMV+)	LFM	LGB	(PMV+)	
	(PMV-)	LFN	LGC	(PMV-)	
	(PSR+)	LFQ	LGD	(PSR+)	
	(PSRS)	LFR	LGE	(PSRS)	
	(PSR-)	LFP	LGF	(PSR-)	

SAPH16F020400122

1. Technical description

- DEF pump motor is used to send DEF to the DEF injector.
- DEF pump motor operates according to the command values from DCU.

<Description of malfunction>

- Motor malfunction of DEF pump is detected.

2. DTC set condition

(1) DTC detection condition

Engine is running.

DEF has finished thawing and SCR inlet temperature > 150 °C {302 °F}

(2) Judgement criteria

|Target pump speed – actual speed| > 300 rpm for 5 sec. continuously.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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

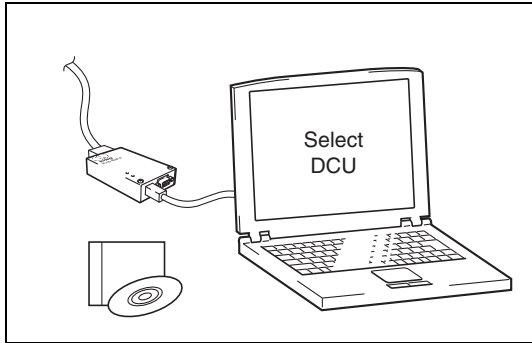
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF pump motor malfunction.

INSPECTION PROCEDURE: P208B**1 Inspection of the DEF pump pressure [Hino-DX]**

SAPH16F020400123

1. Set the starter switch to the "LOCK" position.
2. Replace the DEF pump with a new one.
3. Connect the vehicle to Hino-DX.
4. Start up the engine and keep the engine idling (about 10 minutes).
5. Select [DCU].
6. Select [DEF pump pressure] from the [Data Monitor] and check if the DEF pressure is maintained around 900 kPa (800 kPa – 1050 kPa) {131 psi (116 psi – 152 psi)}.

Standard values

DEF pressure:
900 kPa (800 kPa – 1,050 kPa) {131 psi (116 psi – 152 psi)}

Do the measurements meet the standard value?

YES

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

NO

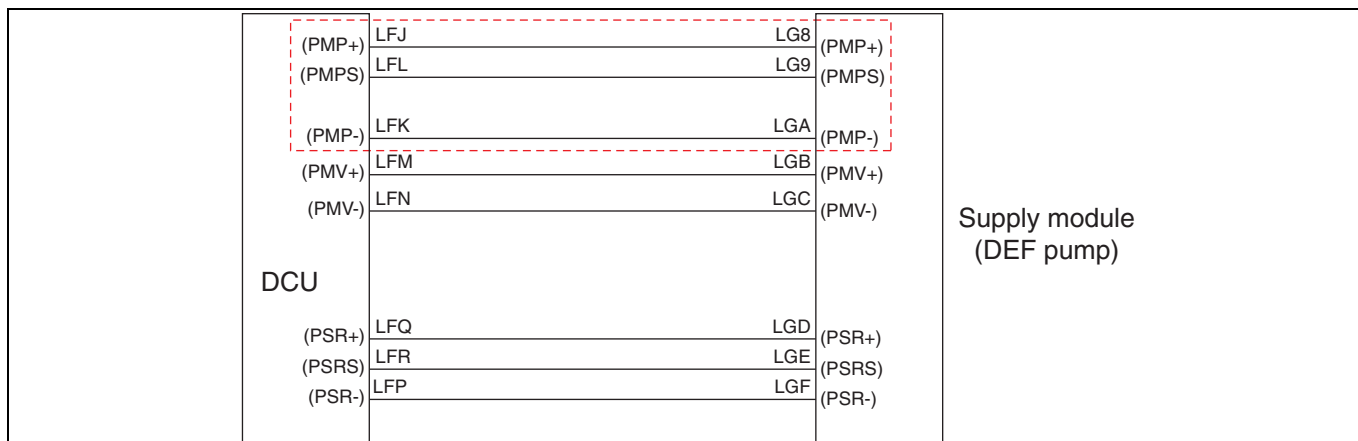
Replace the DCU.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P208B

DTC: P208B		DEF pump motor - functional		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump [Hino-DX]	<p>Replace with a new DEF pump, and check the DEF pressure stability on Hino-DX's [Data Monitor].</p> <ol style="list-style-type: none"> 1. Replace the DEF pump with a new one. Start up the engine and keep the engine idling (about 10 minutes). 2. Select [DEF pump pressure] from the [Data Monitor] and check if the DEF pressure is maintained around 900 kPa (800 kPa – 1,050 kPa) {131 psi (116 psi – 152 psi)}. <p><Standard values> DEF pressure: 900 kPa (800 kPa – 1,050 kPa) {131 psi (116 psi – 152 psi)}.</p>	<p>Measured value stabilized within the standard value: Go to YES.</p> <p>Measured value not stabilized within the standard value: Go to NO.</p>		<p>Procedure completed. Perform "After-inspection work" of INFORMATION section.</p>	<p>Replace the DCU. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P208C

EN01H16F02040F03001041

DTC: P208C DEF pump motor - circuit (Circuit low)
INFORMATION

SAPH16F020400124

1. Technical description

- DCU determines failure of DEF pump motor based on DEF pump circuit voltage.

<Description of malfunction>

- Motor malfunction of DEF pump is detected.

2. DTC set condition

(1) DTC detection condition

Engine is running.

DEF pump is operating.

(2) Judgement criteria

DEF pump motor voltage: Less than 0.66 V for 2 sec. or more

DEF pump is actuating.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- DEF pump motor malfunction

INSPECTION PROCEDURE: P208C**1 Inspect the DEF pump connector**

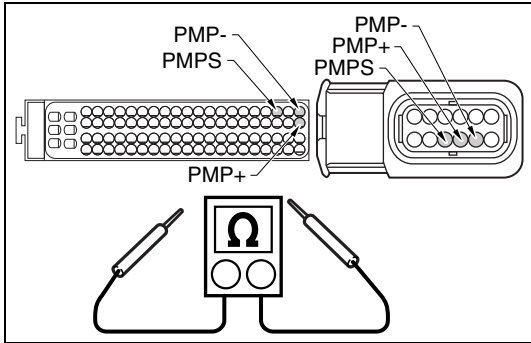
1. Check the connection of the DEF pump connector (Looseness and poor contact).

Was any failure found?**YES****Connect securely, repair if needed.
Perform "After-inspection work" of INFOR-
MATION section.****NO****Go to step 2.****2 Inspect the DCU 86P connector**

1. Check the connection of the DCU 86P connector (Looseness and poor contact).

Was any failure found?**YES****Connect securely, repair if needed.
Perform "After-inspection work" of INFOR-
MATION section.****NO****Go to step 3.**

3 Check the DEF pump wire harness



SAPH16F020400125

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 86P connector and the DEF pump connector.
3. Connect the signal check harness and use the electrical tester to measure the resistance between the DEF pump and each terminal of the DCU 86P vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump vehicle-side connector – DCU 86P vehicle-side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS	1 Ω or less

Do the measurements meet the standard value?

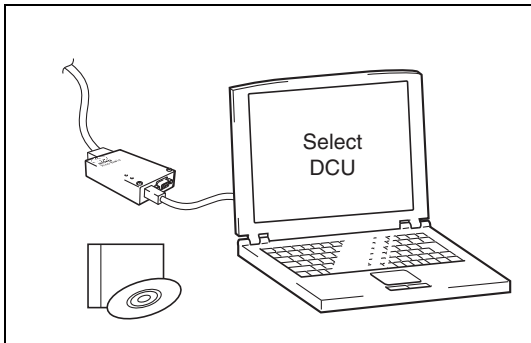
YES

Replace the DEF pump, and go to step 4.

NO

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

4 Check the DTC detected (DCU)



SAPH16F020400126

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P208C has been detected in [Fault Information].

Has DTC P208C been detected?

YES

Replace the DCU. (After replacing, perform DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.

NO

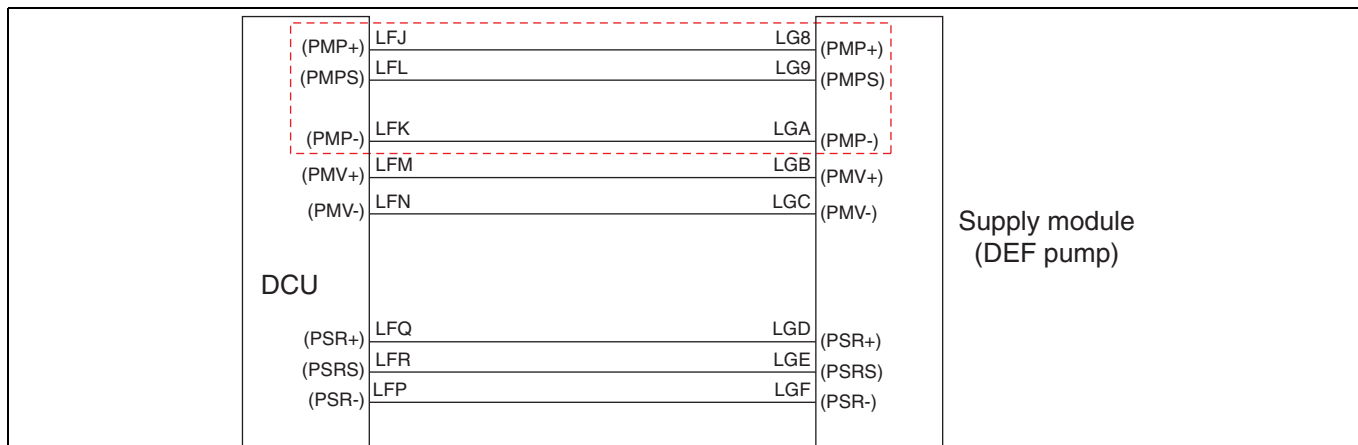
Procedure completed. Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P208C

DTC: P208C		DEF pump motor - circuit (Circuit low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump connector	Check the connection of the DEF pump connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DCU 86P connector	Check the connection of the DCU 86P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Check the DEF pump wire harness	Measure the resistance between the DEF pump and each terminal of the DCU 86P vehicle-side connector. 1. Disconnect the DEF pump connector. 2. Disconnect the DCU 86P connector, connect the signal check harness, measure the resistance between the DEF pump and each terminal of the DCU 86P vehicle-side connector. <Tester connections> DEF pump vehicle-side connector – DCU 86P vehicle-side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS <Standard values> 1 Ω or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the DEF pump, and go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected (DCU) [Hino-DX]	Check if P208C has been detected in [DCU].	DTC P208C has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. (After replacing, operate DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P208D

EN01H16F02040F03001042

DTC: P208D DEF pump motor - circuit (Circuit high)
INFORMATION

SAPH16F020400127

1. Technical description

- DCU determines failure of DEF pump motor based on DEF pump circuit voltage.

<Description of malfunction>

- Motor malfunction of DEF pump is detected.

2. DTC set condition**(1) DTC detection condition**

Engine is running.

DEF pump is operating.

(2) Judgement criteria

DEF pump motor voltage: 2.7 V for 2 sec. or more

DEF pump is actuating.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or poor contact of connector
- DEF pump motor malfunction

INSPECTION PROCEDURE: P208D**1 Inspect the DEF pump connector**

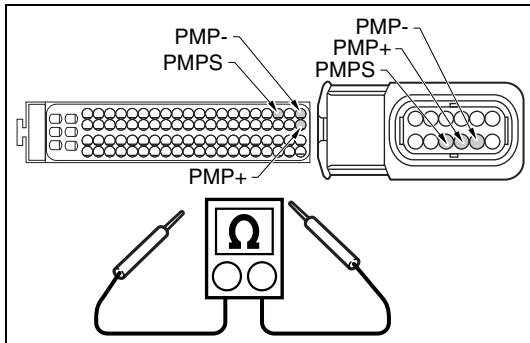
1. Check the connection of the DEF pump connector (Looseness and poor contact).

Was any failure found?**YES****Connect securely, repair if needed.
Perform "After-inspection work" of INFOR-
MATION section.****NO****Go to step 2.****2 Inspect the DCU 86P connector**

1. Check the connection of the DCU 86P connector (Looseness and poor contact).

Was any failure found?**YES****Connect securely, repair if needed.
Perform "After-inspection work" of INFOR-
MATION section.****NO****Go to step 3.**

3 Check the DEF pump wire harness



SAPH16F020400128

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DCU 86P connector and the DEF pump connector.
3. Connect the signal check harness and use the electrical tester to measure the resistance between the DEF pump and each terminal of the DCU 86P vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump vehicle-side connector – DCU 86P vehicle- side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS	1 Ω or less

Do the measurements meet the standard value?

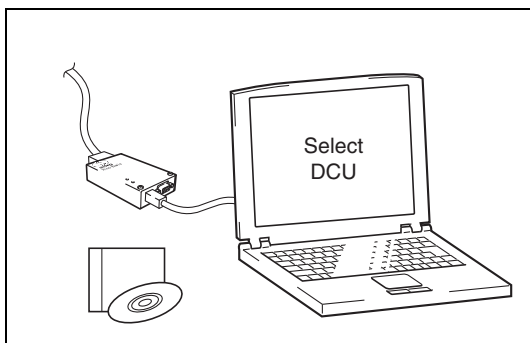
YES

Replace the DEF pump, and go to step 4.

NO

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

4 Check the DTC detected (DCU)



SAPH16F020400129

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P208D has been detected in [Fault Information].

Has DTC P208D been detected?

YES

Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.

NO

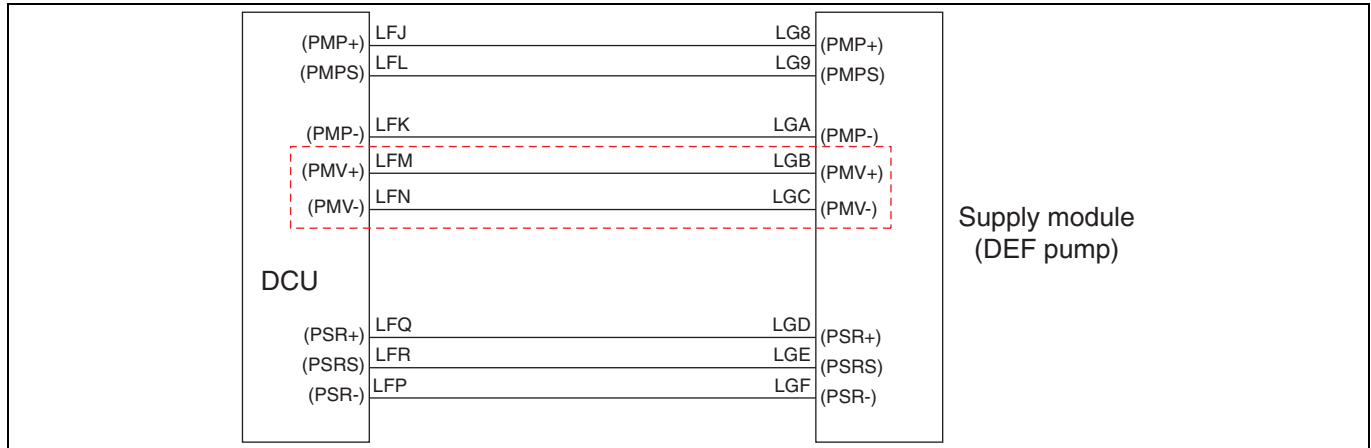
Procedure completed.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P208D

DTC: P208D		DEF pump motor - circuit (Circuit high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump connector	Check the connection of the DEF pump connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect DCU 86P connector	Check the connection of the DCU 86P connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Check the DEF pump wire harness	Measure the resistance between the DEF pump and terminal of the DCU 86P vehicle-side connector. 1. Disconnect the DEF pump connector. 2. Disconnect the DCU 86P connector, connect the signal check harness, measure the resistance between the DEF pump and each terminal of the DCU 86P vehicle-side connector. <Tester connections> DEF pump vehicle-side connector – DCU 86P vehicle-side connector PMP+ – PMP+ PMP- – PMP- PMPS – PMPS <Standard values> 1 Ω or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the DEF pump, and go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Check the DTC detected (DCU)	Check if P208D has been detected in [DCU].	DTC P208D has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. (After replacing, operate DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P20A0

EN01H16F02040F03001043

DTC: P20A0 Reverting valve for DEF pump - circuit (Open load)
INFORMATION

SAPH16F020400130

1. Technical description

- DCU detects the circuit failure based on the circuit voltage of the DEF pump reverting valve.

<Description of malfunction>

- Failure of reverting valve inside DEF pump is detected.

2. DTC set condition

- (1) DTC detection condition
 - Starter switch ON.
 - DEF reverting valve is activated.
- (2) Judgement criteria
 - DEF reverting valve voltage: > 2.7 V, and < 5 V for 2.0 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR System failure lamp: ON
- Output restriction is applied when malfunction does not improve within 500 miles.
- Vehicle speed restriction is applied when malfunction does not improve within 2,000 miles.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient (when malfunction does not improve within 500 miles).
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles).

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Malfunction of DEF reverting valve

INSPECTION PROCEDURE: P20A0**1 Inspect the DEF pump (reverting valve) connector**

1. Check the connection of the DEF pump (reverting valve) connector (Looseness and poor contact).

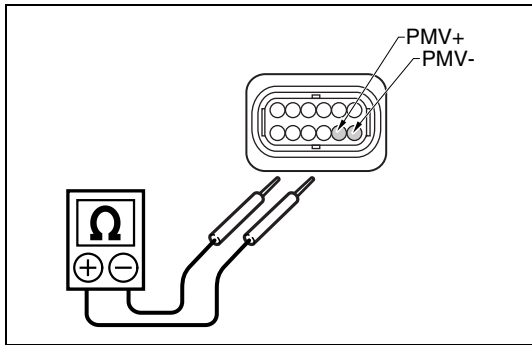
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the DEF pump (reverting valve) unit

SAPH16F020400131

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF pump connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF pump (reverting valve).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump (reverting valve) connector PMV+ – PMV-	23 °C {73.4 °F}: 2.05 – 12.05 Ω

Do the measurements meet the standard value?

YES

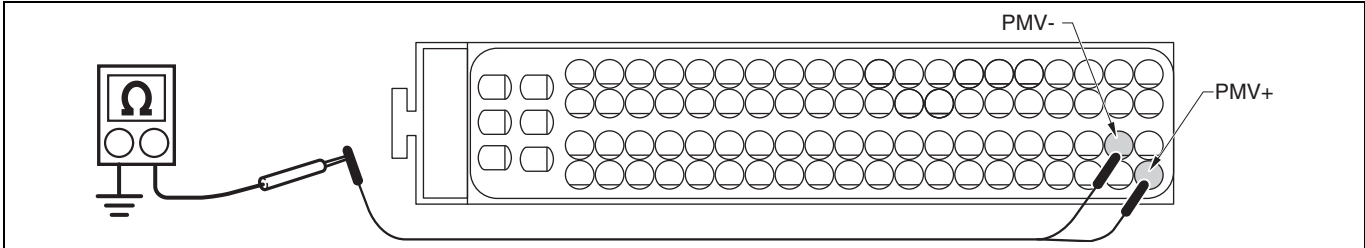
Go to step 3.

NO

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

3 Inspect for short-circuit in the DEF pump (reverting valve) harness

1. Disconnect the DCU 86P connector.
2. Use the electrical tester to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground.



SAPH16F020400132

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

Do the measurements meet the standard value?

YES

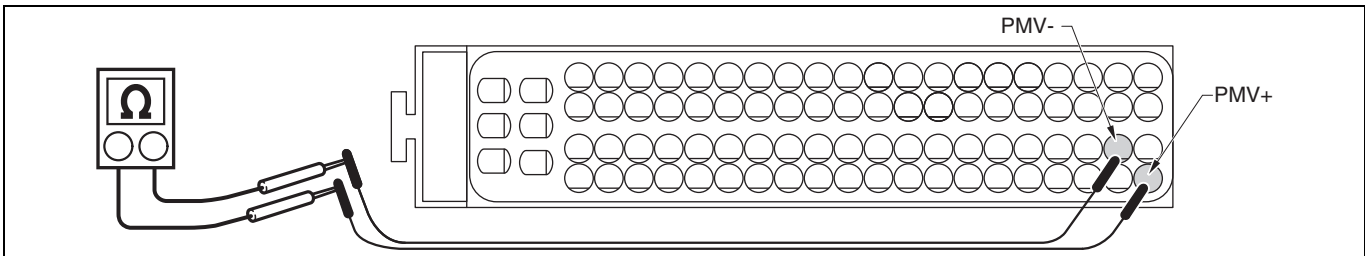
NO

Go to step 4.

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

4 Inspect disconnection of the DEF pump (reverting valve) harness

1. Connect the DEF pump 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.



SAPH16F020400133

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector PMV+ – PMV-	23 °C {73.4 °F}: 2.05 – 12.05 Ω

Do the measurements meet the standard value?

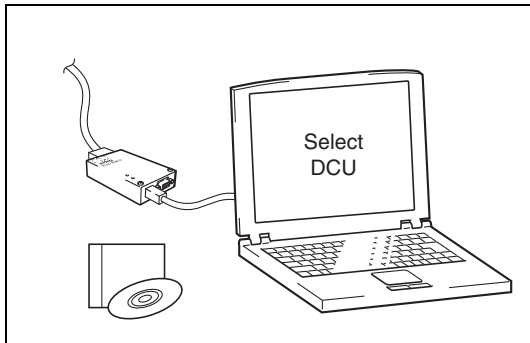
YES

Go to step 5.

NO

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

5 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400134

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P20A0 has been detected in [Fault Information].

Has DTC P20A0 been detected?

YES

Replace the DCU. (Perform a DPR forced regeneration after replacement.)
Perform "After-inspection work" of INFORMATION section.

NO

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

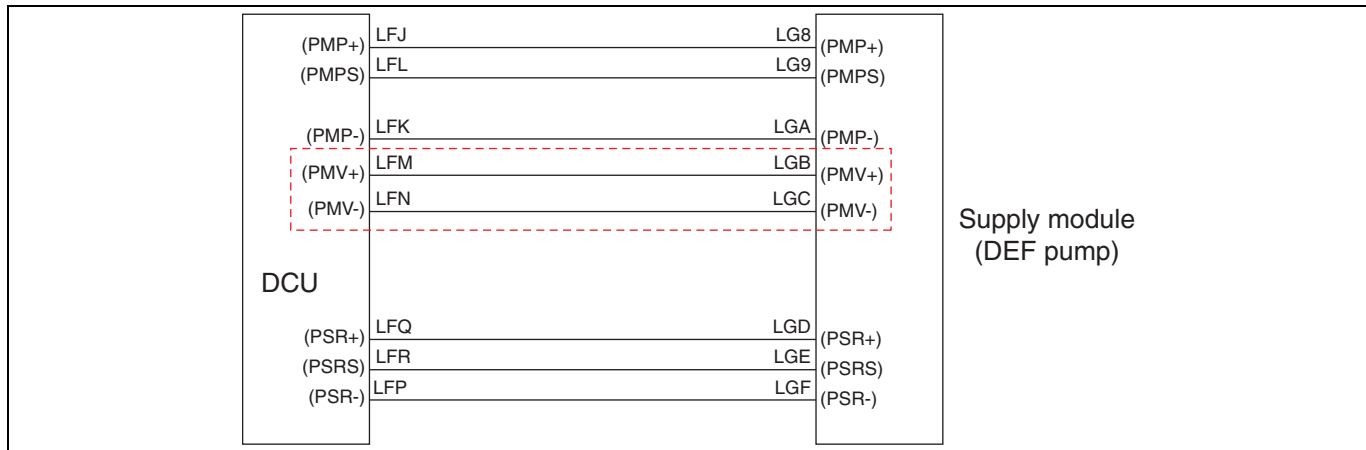
CHECKLIST: P20A0

DTC: P20A0		Reverting valve for DEF pump - circuit (Open load)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump (reverting valve) connector	Check the connection of the DEF pump (reverting valve) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF pump (reverting valve) unit	Measure the resistance between the terminals of the DEF pump (reverting valve). <Tester connections> DEF pump connector PMV+ – PMV- <Standard values> 23 °C {73.4 °F}: 2.05 – 12.05 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.
3	Inspect short-circuit of the DEF pump (reverting valve) harness	Disconnect the DCU 86P connector. Connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. <Tester connections> DCU 86P vehicle-side connector PMV+ – Ground PMV- – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P20A0		Reverting valve for DEF pump - circuit (Open load)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect dis-connection of the DEF pump (reverting valve) harness	<p>Measure the resistance of the wire harness and DEF pump (reverting valve) between the DCU 86P vehicle-side connector and the DEF pump.</p> <ol style="list-style-type: none"> 1. Connect the DEF pump connector. 2. Connect the signal check harness to the DCU 86P vehicle-side connector to measure the resistance between the terminals of the DCU 86P vehicle-side connector. <p><Tester connections> DCU 86P vehicle-side connector PMV+ – PMV-</p> <p><Standard values> 23 °C {73.4 °F}: 2.05 – 12.05 Ω</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
5	Check the DTC detected (DCU) [Hino-DX]	Check if P20A0 has been detected in [DCU].	<p>DTC P20A0 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the DCU.(Perform a DPR forced regeneration after replacement.)</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P20A1

EN01H16F02040F03001044

DTC: P20A1 Reverting valve for DEF pump stuck close
INFORMATION

SAPH16F020400135

1. Technical description

- Reverting valve for DEF pump stuck close is checked by DEF pressure.

<Description of malfunction>

- Failure of reverting valve inside DEF pump is detected.

2. DTC set condition**(1) DTC detection condition**

Battery voltage is in the range of 10V to 16V.

800 kPa {116 psi} < DEF pressure < 1,050 kPa {152 psi}.

(2) Judgement criteria

The pressure sensor indicates 50 kPa {7.3 psi} or higher 25 seconds after the starter switch is turned OFF.

3. Reset condition

- DEF pump pressure sensor drop to 50 kPa {7.3 psi} is detected within 25 seconds after starter switch is turned OFF.

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

- MIL: ON
- DEF injector and DEF pipe may rupture when DEF freezes.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

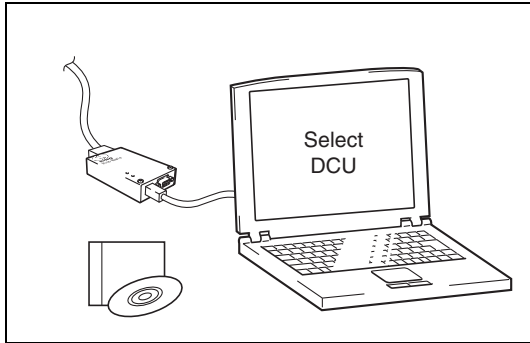
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Malfunction of reverting valve for DEF pump

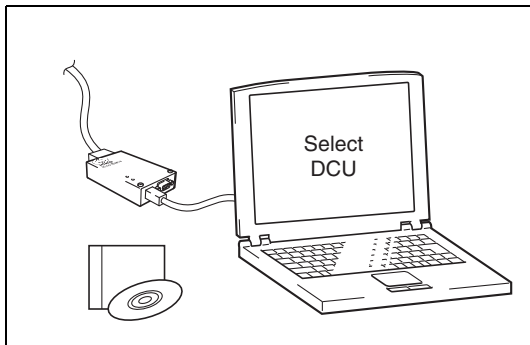
INSPECTION PROCEDURE: P20A1**1 Check the operation of the DEF pump (reverting valve) [Hino-DX]**

SAPH16F020400136

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] from the menu.
5. Select [Reverting valve] from [Activation Test] and check the operating sound of the reverting valve.

Did you hear the operating sound?**YES****Go to step 2.****NO**

**Replace DEF pump.
Perform "After-inspection work" of INFORMATION section.**

2 Inspect the DEF pump (reverting valve) [Hino-DX]

SAPH16F020400137

1. Select [DEF pump position] from the [Activation Test] menu and operate the DEF pump.
2. Select [DEF pump pressure] from the [Data Monitor] menu and check the DEF pressure.

Standard values**DEF pressure: less than 50 kPa {7.3 psi}****Do the measurements meet the standard value?****YES****Go to step 3.****NO**

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

3 Inspect the DEF tank

1. Disconnect the breather hose and check if it is not clogged, punctured, or cracked.

Was any failure found?

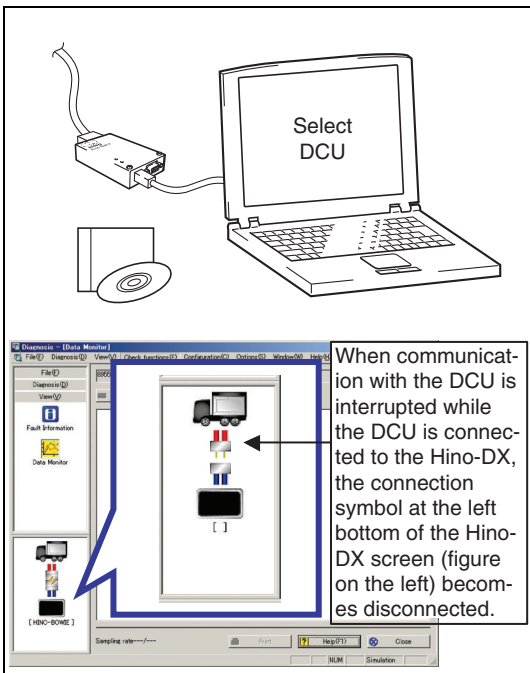
YES

Replace the breather hose. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400138

1. Start the engine and idle it for 10 minutes while you check if the DEF pressure is maintained around 900 kPa {131 psi} in [Data Monitor] (800 kPa – 1,050 kPa) {(116 psi – 152 psi)}.
2. Set the starter switch to the "LOCK" position.
3. Check if the DCU main relay is OFF in the Hino-DX menu. (This cuts off the communication between Hino-DX and the DCU.)
4. Select [DCU] and check if P20A1 is detected in [Fault Information].

Has DTC P20A1 been detected?

YES

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

NO

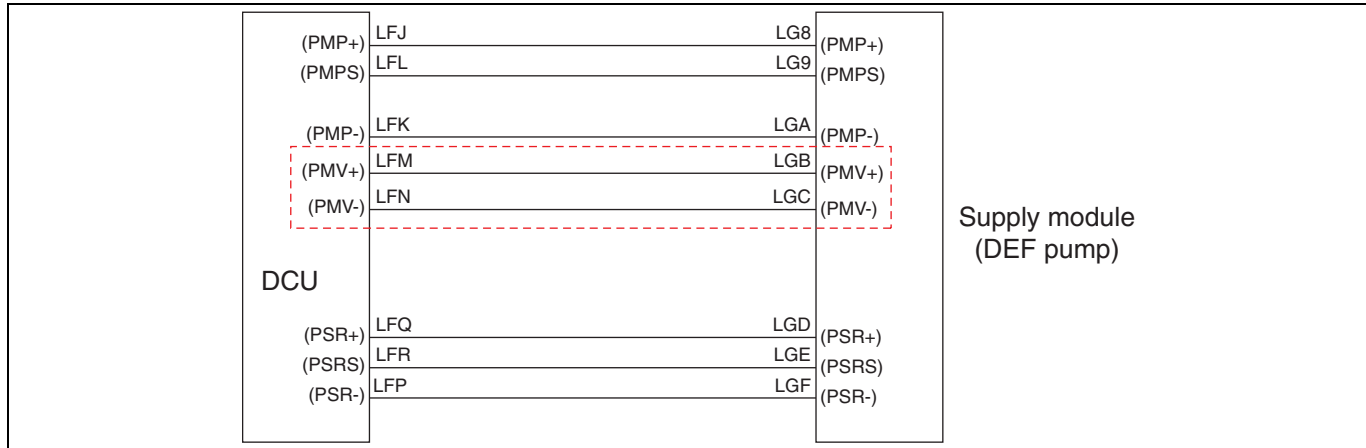
Procedure completed. Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P20A1

DTC: P20A1		Reverting valve for DEF pump stuck close		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the operation of the DEF pump (reverting valve) [Hino-DX]	Check the operating sound of the reverting valve using [Activation Test] on Hino-DX. Set the starter switch to the "ON" position, Select [Reverting valve] from [Activation Test] and check the operating sound of the reverting valve.	Operation sound was able to be heard: Go to YES. It was not audible: Go to NO.		Go to step 2.	Replace DEF pump. Perform "After-inspection work" of INFORMATION section.
2	Inspect the DEF pump (reverting valve) [Hino-DX]	Check the DEF pressure using [Activation Test] and Data monitor on Hino-DX 1. Select [DEF pump position] from the [Activation Test] menu and operate the DEF pump. 2. Select [DEF pump pressure] from the [Data Monitor] menu and check the DEF pressure. <Standard values> DEF pressure: less than 50 kPa {7.3 psi}	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace DEF pump. Perform "After-inspection work" of INFORMATION section.
3	Inspect the DEF tank	Check if the breather hose is not disconnected, clogged, punctured or cracked.	Failure found: Go to YES. No failure found: Go to NO.		Replace the breather hose. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Check the DTC detected (DCU) [Hino-DX]	1. Start the engine and idle it for 10 minutes while you check if the DEF pressure is maintained around 900 kPa {131 psi} in [Data Monitor] (800 kPa – 1,050 kPa) {(116 psi – 152 psi)}. 2. Set the starter switch to the "LOCK" position. 3. Check if the DCU main relay is OFF in the Hino-DX menu. (This cuts off the communication between Hino-DX and the DCU.) 4. Set the starter switch in the "LOCK" position and turn it the "ON" again. 5. Check if P20A1 has been detected.	DTC P20A1 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P20A2

EN01H16F02040F03001045

DTC: P20A2 Reverting valve for DEF pump - circuit (Circuit low)
INFORMATION

SAPH16F020400139

1. Technical description

- DCU detects the circuit failure based on the circuit voltage of the DEF pump reverting valve.

<Description of malfunction>

- Failure of reverting valve in DEF pump is detected.

2. DTC set condition**(1) DTC detection condition**

Starter switch ON.

DEF reverting valve is activated.

(2) Judgement criteria

DEF reverting valve voltage: < 0.66 V for 2 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Malfunction of DEF reverting valve

INSPECTION PROCEDURE: P20A2

1 Inspect the DEF pump (reverting valve) connector

1. Check the connection of the DEF pump connector (Looseness and poor contact).

Was any failure found?

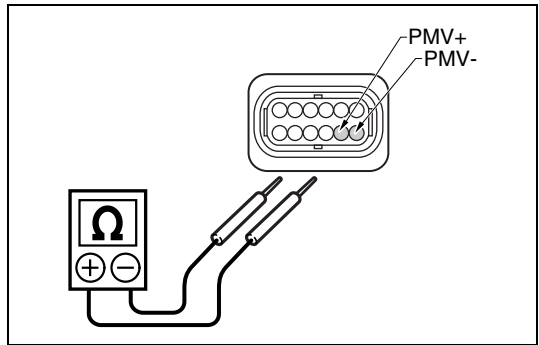
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the DEF pump (reverting valve) unit



SAPH16F020400140

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF pump connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF pump (reverting valve).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump (Reverting valve) connector PMV+ – PMV-	23 °C {73.4 °F}: 2.05 – 12.05 Ω

Do the measurements meet the standard value?

YES

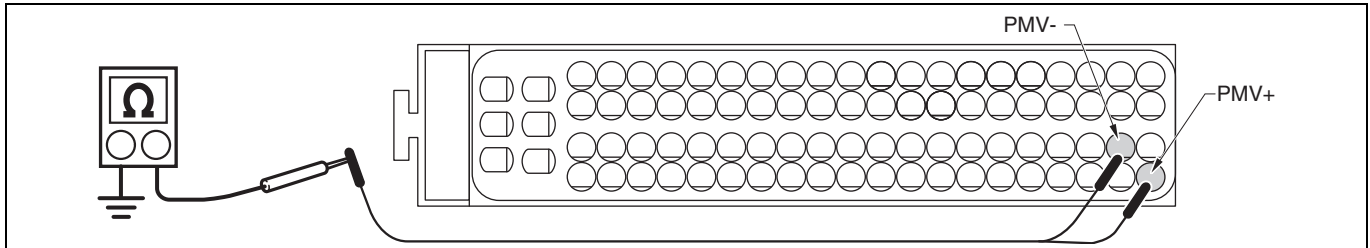
NO

Go to step 3.

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

3 Inspect for short-circuit in the DEF pump (reverting valve) harness

1. Disconnect the DCU 86P connector.
2. Use the electrical tester to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground.



SAPH16F020400141

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

Do the measurements meet the standard value?

YES

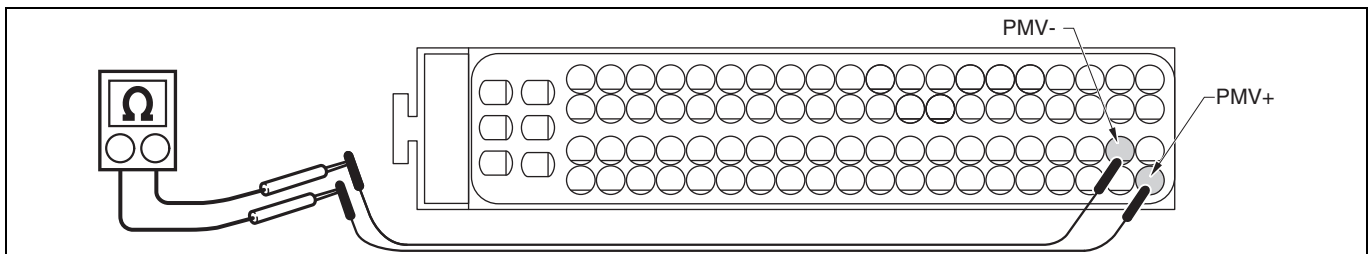
Go to step 4.

NO

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

4 Inspect disconnection of the DEF pump (reverting valve) harness

1. Connect the DEF pump 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.



SAPH16F020400142

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector PMV+ – PMV-	23 °C {73.4 °F}: 2.05 – 12.05 Ω

Do the measurements meet the standard value?

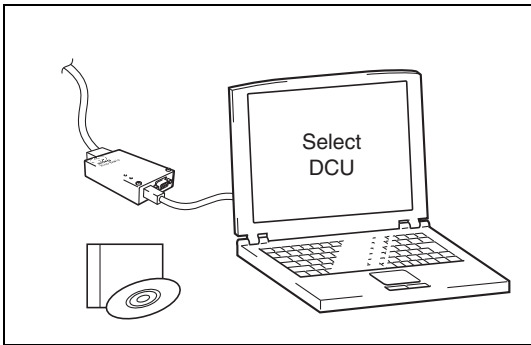
YES

NO

Go to step 5.

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

5 Check the DTC detected (DCU)



SAPH16F020400143

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P20A2 has been detected in [Fault Information].

Has DTC P20A2 been detected?

YES

NO

**Replace the DCU. (Perform a DPR forced regeneration after replacement.)
Perform "After-inspection work" of INFORMATION section.**

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

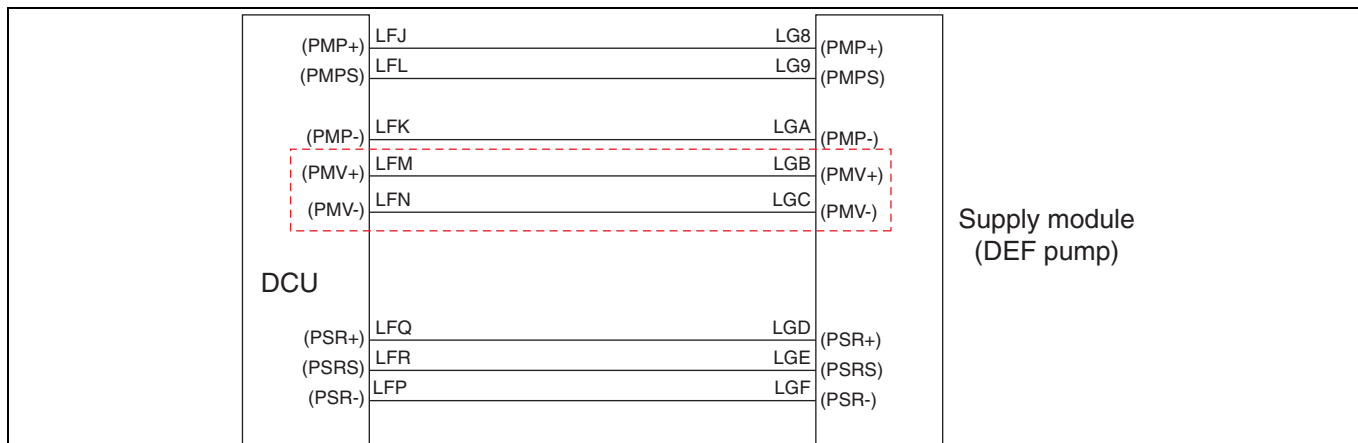
CHECKLIST: P20A2

DTC: P20A2		Reverting valve for DEF pump - circuit (Circuit low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump (reverting valve) connector	Check the connection of the DEF pump connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF pump (reverting valve) unit	Measure the resistance between the terminals of the DEF pump (reverting valve). <Tester connections> DEF pump connector PMV+ – PMV- <Standard values> 23 °C {73.4 °F}: 2.05 – 12.05 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.
3	Inspect short-circuit of the DEF pump (reverting valve) harness	Disconnect the DCU 86P connector and connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. <Tester connections> DCU 86P vehicle-side connector PMV+ – Ground PMV- – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect disconnection of the DEF pump (reverting valve) harness	Measure the resistance of the wire harness and DEF pump (reverting valve) between the DCU 86P vehicle-side connector and the DEF pump. 1. Connect the DEF pump connector. 2. Connect the signal check harness to DCU 86P vehicle-side connector to measure the resistance between the terminals of the DCU 86P vehicle-side connector. <Tester connections> DCU 86P vehicle-side connector PMV+ – PMV- <Standard values> 23 °C {73.4 °F}: 2.05 – 12.05 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P20A2		Reverting valve for DEF pump - circuit (Circuit low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the DTC detected (DCU)	Check if P20A2 has been detected in [DCU].	DTC P20A2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU.(Perform a DPR forced regeneration after replacement.) Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P20A3

EN01H16F02040F03001046

DTC: P20A3 Reverting valve for DEF pump - circuit (Circuit high)**INFORMATION**

SAPH16F020400144

1. Technical description

- DCU detects the circuit failure based on the circuit voltage of the DEF pump reverting valve.

<Description of malfunction>

- Failure of reverting valve in DEF pump is detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

DEF reverting valve is activated.

(2) Judgement criteria

DEF reverting valve voltage: ≤ 2.7 V for 2 sec.**3. Reset condition**

- After having restored to the normal conditions.

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

- MIL: ON
- DEF injector and DEF pipe may rupture when DEF freezes.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Irregular contact (disconnection or poor fit of connector)
- Malfunction of DEF reverting valve

INSPECTION PROCEDURE: P20A3

1 Inspect the DEF pump (reverting valve) connector

1. Check the connection of the DEF pump connector (Looseness and poor contact).

Was any failure found?

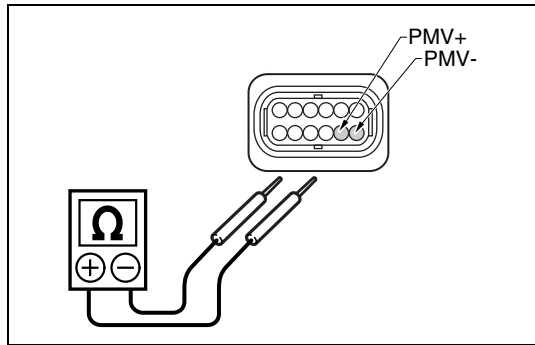
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the DEF pump (reverting valve) unit



SAPH16F020400145

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF pump connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF pump (reverting valve).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DEF pump (Reverting valve) connector PMV+ – PMV-	23 °C {73.4 °F}: 2.05 – 12.05 Ω

Do the measurements meet the standard value?

YES

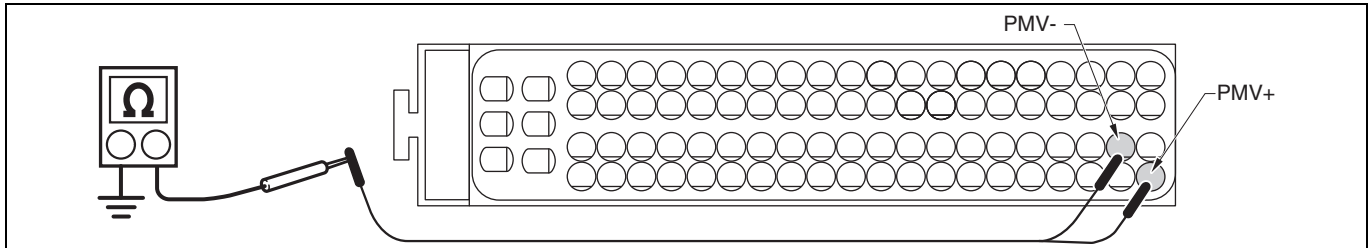
NO

Go to step 3.

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

3 Inspect for short-circuit in the DEF pump (reverting valve) 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.



SAPH16F020400146

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

Do the measurements meet the standard value?

YES

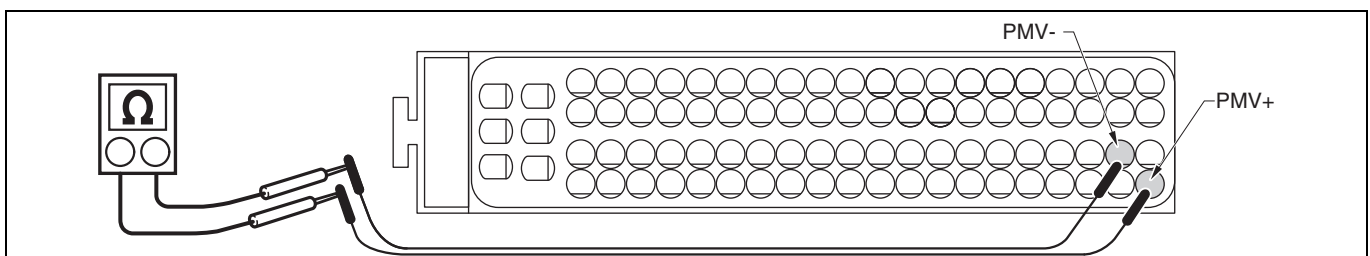
Go to step 4.

NO

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

4 Inspect disconnection of the DEF pump (reverting valve) harness

1. Connect the DEF pump 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.



SAPH16F020400147

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector PMV+ – PMV-	23 °C {73.4 °F}: 2.05 – 12.05 Ω

Do the measurements meet the standard value?

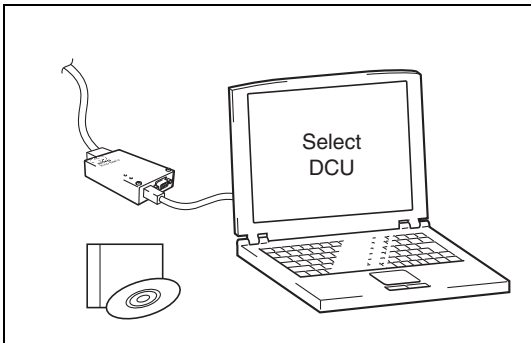
YES

NO

Go to step 5.

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

5 Check the DTC detected [DCU]



SAPH16F020400148

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P20A3 has been detected in [Fault Information].

Has DTC P20A3 been detected?

YES

NO

**Replace the DCU. (Perform a DPR forced regeneration after replacement.)
Perform "After-inspection work" of INFORMATION section.**

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

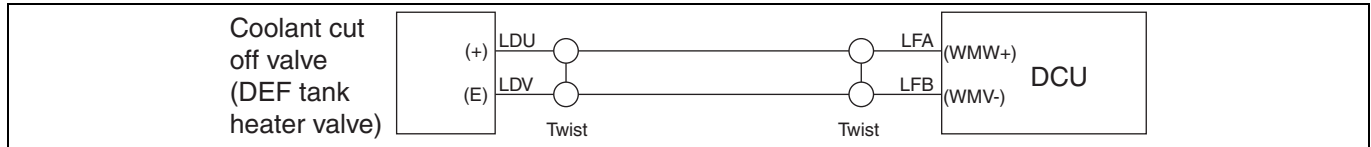
CHECKLIST: P20A3

DTC: P20A3		Reverting valve for DEF pump - circuit (Circuit high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pump (reverting valve) connector	Check the connection of the DEF pump connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the DEF (reverting valve) pump unit	Measure the resistance between the terminals of the DEF pump (reverting valve) <Tester connections> DEF pump connector PMV+ – PMV- <Standard values> 23 °C {73.4 °F}: 2.05 – 12.05 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.
3	Inspect short-circuit of the DEF pump (reverting valve) harness	Disconnect the DCU 86P connector. Connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. <Tester connections> DCU 86P vehicle-side connector PMV+ – Ground PMV- – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect disconnection of the DEF pump (reverting valve) harness	Measure the resistance of the wire harness and DEF pump (reverting valve) between the DCU 86P vehicle-side connector and the DEF pump. 1. Connect the DEF pump connector. 2. Connect the signal check harness to the DCU 86P vehicle-side connector and measure the resistance between the terminals of the DCU 86P vehicle-side connector. <Tester connections> DCU 86P vehicle-side connector PMV+ – PMV- <Standard values> 23 °C {73.4 °F}: 2.05 – 12.05 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P20A3		Reverting valve for DEF pump - circuit (Circuit high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the DTC detected (DCU)	Check if P20A3 has been detected in [DCU].	DTC P20A3 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU.(Perform a DPR forced regeneration after replacement.) Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P20B1

EN01H16F02040F03001047

DTC: P20B1 DEF tank heater valve - circuit (Open load)
INFORMATION

SAPH16F020400149

1. Technical description

- DCU detects malfunctions based on the coolant cut off valve (DEF tank heater valve) circuit voltage.

<Description of malfunction>

- Malfunction of coolant cut off valve (DEF tank heater valve) is detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

Coolant cut off valve (DEF tank heater valve) duty > 0%

(2) Judgement criteria

Coolant cut off valve (DEF tank heater valve) voltage is more than 2.7 V and less than 5 V for 0.5 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR System failure lamp: ON.
- If malfunction does not improve within 500 miles: engine output is restricted.
- If malfunction does not improve within 2,000 miles: vehicle speed is restricted.

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- Engine output is insufficient (when malfunction does not improve within 500 miles).
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles).

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or unsteady contact of connectors
- Coolant cut off valve (DEF tank heater valve) malfunction

INSPECTION PROCEDURE: P20B1**1 Inspect the coolant cut off valve (DEF tank heater valve) connector**

1. Check the connection of the coolant cut off valve (DEF tank heater valve) connector (Looseness and poor contact).

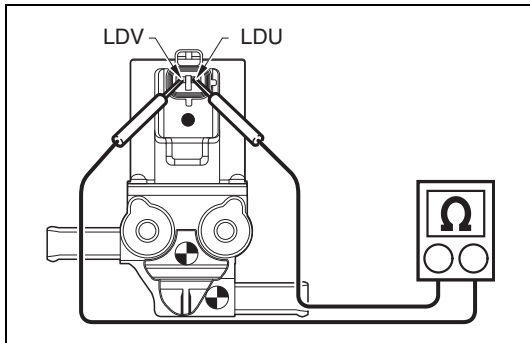
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Check the coolant cut off valve (DEF tank heater valve) unit

SAPH16F020400150

1. Set the starter switch to the "LOCK" position.
2. Disconnect the connector of the coolant cut off valve (DEF tank heater valve).
3. Use the electrical tester to measure the resistance between the terminals of the coolant cut off valve (DEF tank heater valve).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Coolant cut off valve (DEF tank heater valve) connector LDU – LDV	20 °C {68 °F}: 9.04 – 9.52 Ω

Do the measurements meet the standard value?

YES

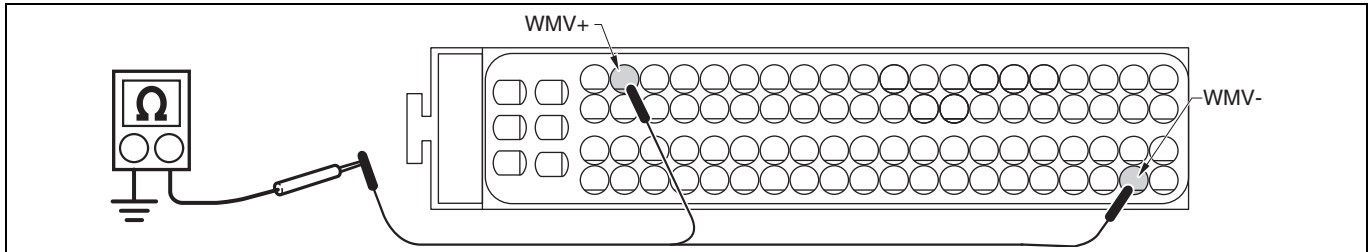
Go to step 3.

NO

Replace the coolant cut off valve (DEF tank heater valve).
Perform "After-inspection work" of INFORMATION section.

3 Check for short-circuit in the coolant cut off valve (DEF tank heater valve) wire harness

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



SAPH16F020400151

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

Do the measurements meet the standard value?

YES

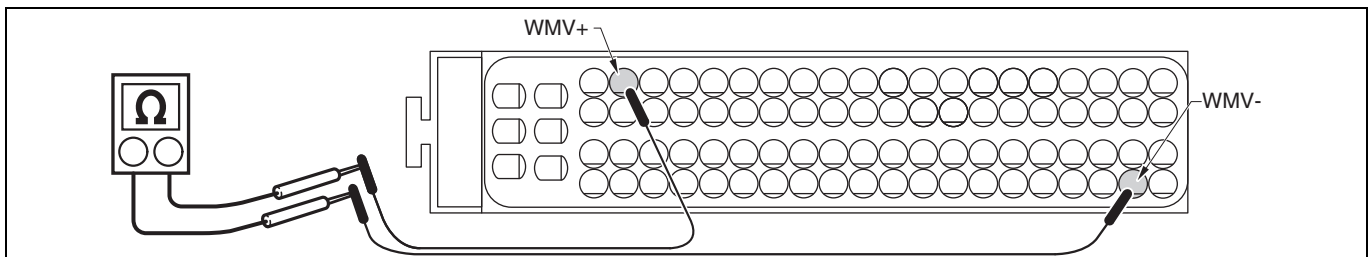
Go to step 4.

NO

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

4 Check for disconnection in the coolant cut off valve (DEF tank heater valve) wire harness

1. Connect the coolant cut off valve (DEF tank heater valve) 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.



SAPH16F020400152

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector WMV+ – WMV-	20 °C {68 °F}: 9.04 – 9.52 Ω

Do the measurements meet the standard value?

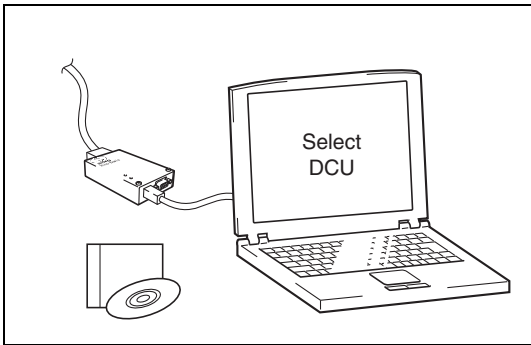
YES

NO

Go to step 5.

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

5 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400153

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [Engine] and check if P20B1 has been detected in [Fault Information].

Has DTC P20B1 been detected?

YES

NO

**Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

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

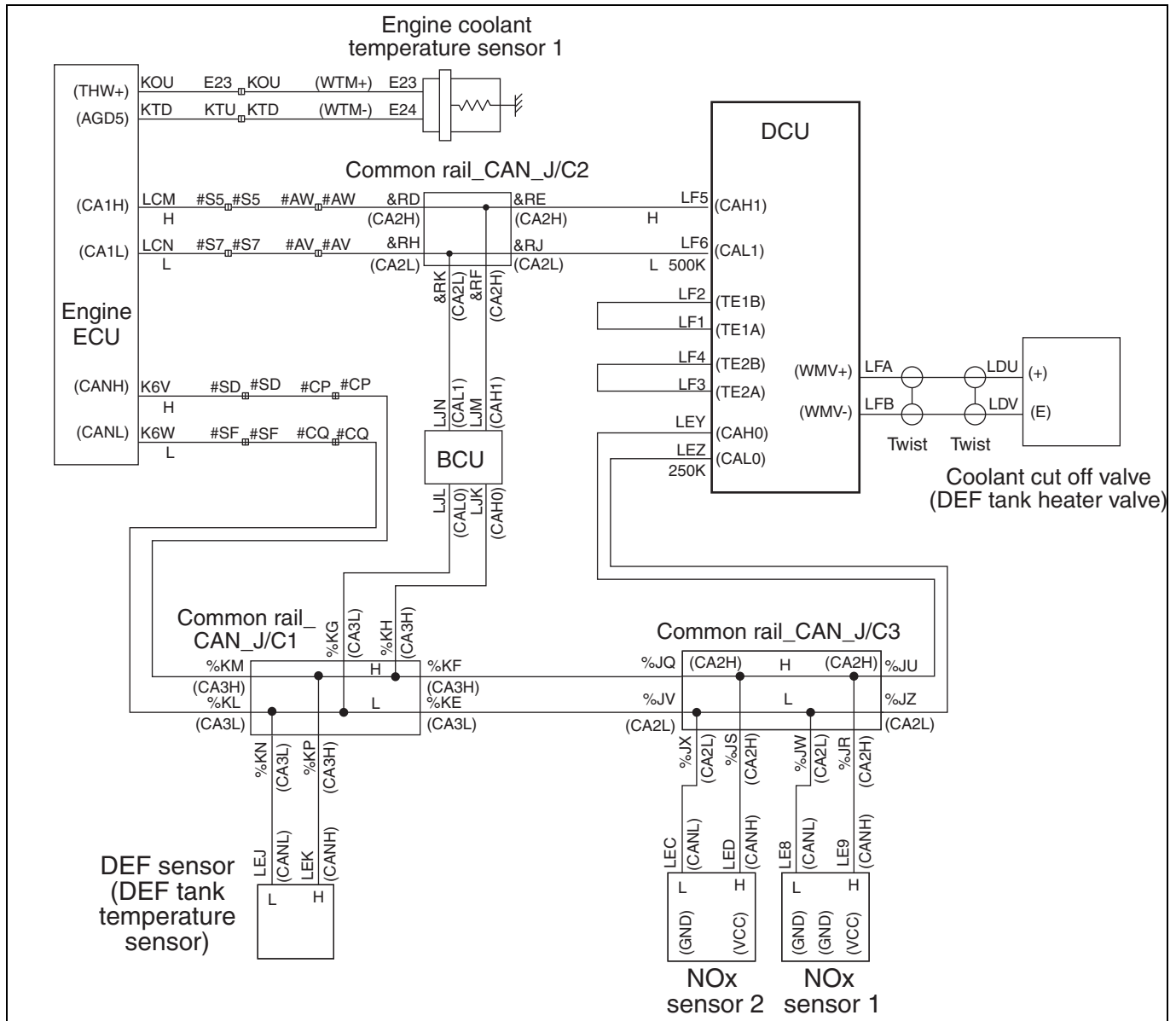
CHECKLIST: P20B1

DTC: P20B1		DEF tank heater valve - circuit (Open load)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the coolant cut off valve (DEF tank heater valve) connector	Check the connection of the coolant cut off valve (DEF tank heater valve) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the coolant cut off valve (DEF tank heater valve) unit	Measure the resistance between the terminals of the coolant cut off valve (DEF tank heater valve). <Tester connections> Coolant cut off valve (DEF tank heater valve) connector LDU – LDV <Standard values> 20 °C {68 °F}: 9.04 – 9.52 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the coolant cut off valve (DEF tank heater valve). Perform "After-inspection work" of INFORMATION section.
3	Check for short-circuit in the coolant cut off valve (DEF tank heater valve) wire harness	Disconnect the DCU 86P connector. Connect the signal check harness to measure the resistance between the terminals of the DCU 86 vehicle-side connector and the ground. <Tester connections> WMV+ – Ground WMV- – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Check for disconnection in the coolant cut off valve (DEF tank heater valve) wire harness	Measure the resistance of the wire harness and coolant cut off valve (DEF tank heater valve) between the DCU 86P vehicle-side connector and the coolant cut off valve (DEF tank heater valve). 1. Connect the coolant cut off valve (DEF tank heater valve) connector. 2. Connect the signal check harness to DCU 86P vehicle-side connector and measure the resistance between the terminals of the DCU 86P vehicle-side connector. <Tester connections> DCU 86P vehicle-side connector WMV+ – WMV- <Standard values> 20 °C {68 °F}: 9.04 – 9.52 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P20B1		DEF tank heater valve - circuit (Open load)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the DTC detected. [DCU] [Hino-DX]	Check if P20B1 has been detected in [DCU].	DTC P20B1 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU.(After replacing the DCU, perform a DPR forced regeneration.) Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P20B2

EN01H16F02040F03001048

DTC: P20B2 DEF tank heater valve stuck
INFORMATION

SAPH16F020400154

1. Technical description

- Coolant cut off valve (DEF tank heater valve) malfunction is judged by using the value of DEF tank temperature sensor.
 - There are 2 types of coolant cut off valve (DEF tank heater valve) malfunction.: "stuck open" and "stuck closed".
- <Description of malfunction>**
- Malfunction of coolant cut off valve (DEF tank heater valve) is detected.

2. DTC set condition

(1) DTC detection condition

When stuck in open position

1. Starter switch ON.

When stuck in closed position

2. Coolant cut off valve (DEF tank heater valve) open (DEF defrosts)

Coolant temperature is more than 40 °C {104 °F}.

(2) Judgement criteria

When stuck in open position

1. DEF tank temperature is more than 75 °C {167 °F} for 10 seconds (Judged by whether the DEF tank is abnormally heated.)

When stuck in closed position

2. Rise in the DEF tank temperature after 1,000 to 1,200 seconds in condition 2. above: Within 1 °C {33.8 °F} (Judged by the fact that the temperature does not rise even when the DEF tank is heated.)

3. Reset condition

- When stuck in open position
After having restored to the normal conditions.
- When stuck in closed position
Temperature rises at least 1°C {33.8 °F} 1,000 to 1,200 seconds after valve opens (defrosts).

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

- MIL: ON
- 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

- If DTC P20B1 is detected simultaneously, start DTC P20B1 inspection first.
- Check if the battery voltage is in the normal range.

7. After-inspection work

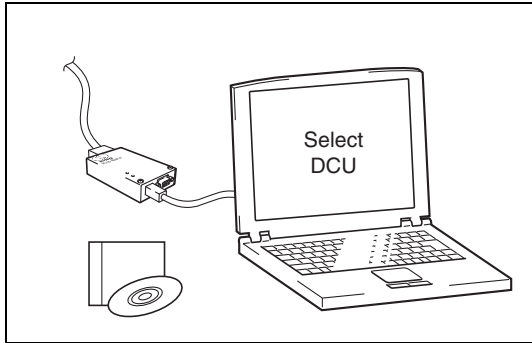
- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Coolant cut off valve (DEF tank heater valve) closed stuck or open stuck
- Blockage or leakage of coolant pipes
- Harness disconnection or short-circuit
- Looseness or unsteady contact of connector
- DEF tank temperature sensor malfunction
- Engine coolant temperature sensor malfunction

NOTICE

1. If the heat source is brought close to the DEF tank or the heated DEF is supplied, P20B2 may be detected.
2. "Stuck closed" will be detected only at low temperatures where defrosting of DEF is necessary.

INSPECTION PROCEDURE: P20B2**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400155

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if any DTC other than P20B2 (for example, P20B1, U02A2) has been detected in [Fault Information].

Has a DTC other than P20B2 been detected?**YES****NO****Go to diagnosis procedure of a related DTC.****Go to step 2.****2 Inspect the DEF tank temperature sensor connector**

1. Check if the connection of the DEF tank temperature sensor connector (Looseness or poor contact).

Was any failure found?**YES****NO**

**Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.**

Go to step 3.

3 Inspect the engine coolant system (pipes or hoses)

1. Check for leakage of the engine coolant system (pipes or hoses).
2. Check for uncoupled, clogged, broken, or cracked parts in the engine cooling system (pipes and hoses).

Was any failure found?

YES

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

NO

Go to step 4.

4 Inspect the engine coolant temperature sensor connector

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

Was any failure found?

YES

Connect securely. Repair if needed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5 Inspect the engine coolant temperature sensor

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

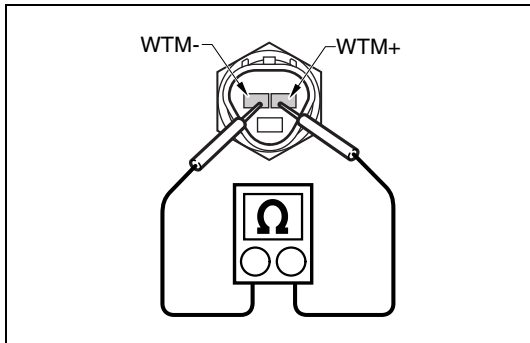
Was any failure found?

YES

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the engine coolant temperature sensor unit

SAPH16F020400156

1. Disconnect the engine coolant temperature sensor connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine coolant temperature sensor 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 7.

NO

Replace the engine coolant temperature sensor.
Perform "After-inspection work" of INFORMATION section.

7 Inspect the coolant cut off valve (DEF tank heater valve) connector

1. Check the connection of the coolant cut off valve (DEF tank heater valve) connector.

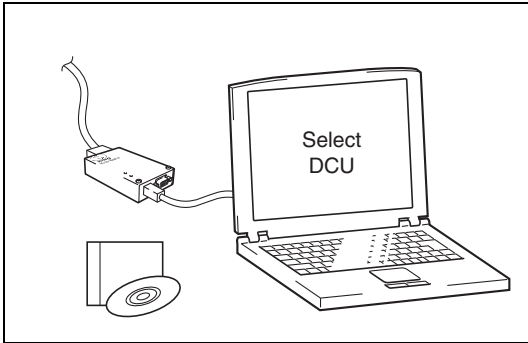
Was any failure found?

YES

Connect securely. Repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 8.

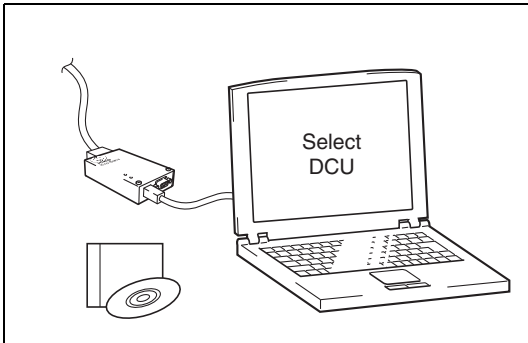
8 Coolant cut off valve (DEF tank heater valve) actuation test [Hino-DX]

SAPH16F020400157

1. Set the starter switch to the "ON" position.
2. Select [DCU] from the menu.
3. Select [Coolant shutoff valve] from the [Activation Test] menu and check the coolant cut off valve (DEF tank heater valve) operating noise.

Operating noise is heard?**YES****Go to step 9.****NO**

**Replace the coolant cut off valve (DEF tank heater valve).
Perform "After-inspection work" of INFORMATION section.**

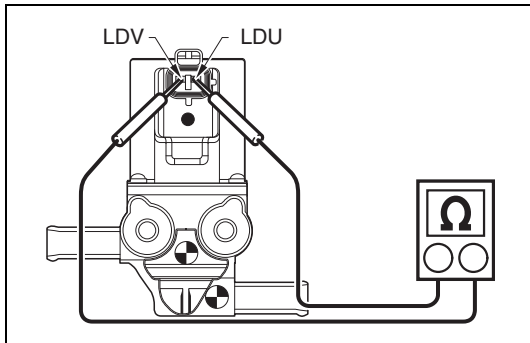
9 Inspect the engine coolant temperature [Hino-DX]

SAPH16F020400158

1. Select [DEF tank temperature] and [Engine coolant temperature] from [Data Monitor].
2. Start the engine.
3. Check if the DEF tank temperature rises when the coolant temperature is 40 °C {104 °F} or higher.

Did DEF tank temperature rise?**YES****Go to step 10.****NO**

**Replace the coolant cut off valve (DEF tank heater valve).
Perform "After-inspection work" of INFORMATION section.**

10 Inspect the coolant cut off valve (DEF tank heater valve) unit

SAPH16F020400159

1. Set the starter switch to the "LOCK" position.
2. Disconnect the coolant cut off valve (DEF tank heater valve) connector.
3. Use the electrical tester to measure the resistance of the terminals of the coolant cut off valve (DEF tank heater valve).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Coolant cut off valve (DEF tank heater valve) connector LDU – LDV	20 °C {68 °F}: 9.04 – 9.52 Ω

Do the measurements meet the standard value?

YES

Go to step 11.

NO

Replace the coolant cut off valve (DEF tank heater valve).
Perform "After-inspection work" of INFORMATION section.

11 Inspect the coolant cut off valve (DEF tank heater valve)

1. Twenty seconds after the engine has started, grasp the pipe downstream of the coolant cut off valve (DEF tank heater valve) and check if the pressure drops.

Did the pressure drop?

YES

Go to step 12.

NO

Replace the coolant cut off valve (DEF tank heater valve).
Perform "After-inspection work" of INFORMATION section.

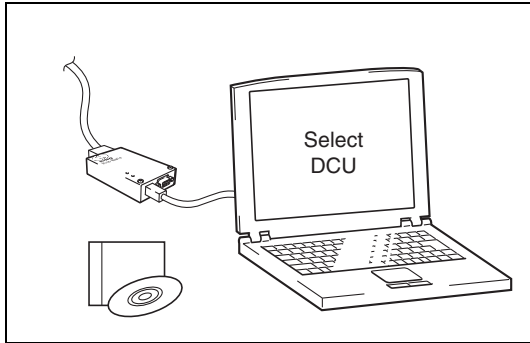
12 Inspect the DEF sensor

1. Remove the coolant hose (upstream, downstream) from DEF sensor.
2. Blow air from one side and make sure it comes out from the other side.

Was any failure found?**YES****Replace the DEF sensor.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 13.****13 Inspect the DEF pump**

1. Remove the coolant hose (upstream, downstream) from DEF pump.
2. Blow air from one side and make sure it comes out from the other side.

Was any failure found?**YES****Replace the DEF pump.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 14.**

14 Replace the DEF tank temperature sensor


SAPH16F020400160

1. Replace the DEF tank temperature sensor.
2. Warm up the engine. (engine coolant temperature: 60 °C {140 °F} or more)
3. Stop the engine.
4. Set the starter switch to the "ON" position.
5. Select [DCU] and check if P20B2 has been detected in [Fault Information].

Has the DTC P20B2 been detected?
YES

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

NO

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

CHECKLIST: P20B2

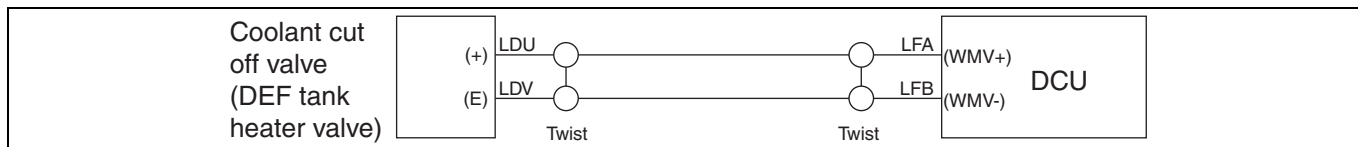
DTC: P20B2		DEF tank heater valve stuck		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if any DTC other than P20B2 (for example, P20B1, U02A2) have been detected in [DCU].	DTC other than P20B2 (for example, P20B1) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the DEF tank temperature sensor connector	Check the connection of the DEF tank temperature sensor connector (Looseness or poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 3.
3	Inspect the engine coolant system (pipes or hoses)	1. Check for leakage of the engine coolant system (pipes or hoses). 2. Check for uncoupled, clogged, broken, or cracked parts in the engine cooling system (pipes and hoses).	Failure found: Go to YES. No failure found: Go to NO.		Repair or replace the faulty part. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Inspect the coolant temperature sensor connector	Check the connection of the coolant temperature sensor connector (Looseness or poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect coolant temperature sensor	1. Check the installation of the coolant temperature sensor. 2. Make sure there is no dirt or damage to the coolant temperature sensor.	Failure found: Go to YES. No failure found: Go to NO.		Clean the coolant temperature sensor and install it properly. If damaged, replace the coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 6.

DTC: P20B2		DEF tank heater valve stuck		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
6	Inspect the coolant temperature sensor unit	Measure the resistance between the terminals of the engine coolant temperature sensor. <Tester connections> Engine coolant temperature sensor WTM + – WTM- <Standard values> 20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 7.	Replace the coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.
7	Inspect the coolant cut off valve (DEF tank heater valve) connector	Check the connection of the coolant cut off valve (DEF tank heater valve) connector (Looseness or poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 8.
8	Coolant cut off valve (DEF tank heater valve) actuation test [Hino-DX]	Check the coolant cut off valve (DEF tank heater valve) operating noise using [Activation Test] on Hino-DX. 1. Set the starter switch to the "ON" position. 2. Select [DCU] from the menu. 3. Select [Coolant shutoff valve] from the [Activation Test] menu and check the coolant cut off valve (DEF tank heater valve) operating noise.	Operation sound was able to be heard: Go to YES. It was not audible: Go to NO.		Go to step 9.	Replace the coolant cut off valve (DEF tank heater valve). Perform "After-inspection work" of INFORMATION section.
9	Inspect the engine coolant temperature [Hino-DX]	1. Select [DEF tank temperature] and [Engine coolant temperature] from [Data Monitor] 2. Start the engine. 3. Check if the DEF tank temperature rises when the coolant temperature is 40 °C {104 °F} or higher.	DEF tank temperature rose: Go to YES. DEF tank temperature did not rise: Go to NO.		Go to step 10.	Replace the coolant cut off valve (DEF tank heater valve). Perform "After-inspection work" of INFORMATION section.

DTC: P20B2		DEF tank heater valve stuck		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
10	Inspect the coolant cut off valve (DEF tank heater valve) unit	Measure the resistance between the terminals of the coolant cut off valve (DEF tank heater valve). <Tester connections> Coolant cut off valve (DEF tank heater valve) connector LDU – LDV <Standard values> 20 °C {68 °F}; 9.04 – 9.52 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 11.	Replace the coolant cut off valve (DEF tank heater valve). Perform "After-inspection work" of INFORMATION section.
11	Inspect the coolant cut off valve (DEF tank heater valve)	Twenty seconds after the engine has started, grasp the pipe downstream of the coolant cut off valve (DEF tank heater valve) and check if the pressure drops.	There is fault (The pressure does not fall out): Go to YES. There is no fault (The pressure drops): Go to NO.		Go to step 12.	Replace the coolant cut off valve (DEF tank heater valve). Perform "After-inspection work" of INFORMATION section.
12	Inspect the DEF sensor	1. Remove the coolant hose (upstream, downstream) from DEF sensor. 2. Blow air from one side and make sure it comes out from the other side.	Failure found: Go to YES. No failure found: Go to NO.		Replace the DEF sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 13.
13	Inspect the DEF pump	1. Remove the coolant hose (upstream, downstream) from DEF pump. 2. Blow air from one side and make sure it comes out from the other side.	Failure found: Go to YES. No failure found: Go to NO.		Replace the DEF pump Perform "After-inspection work" of INFORMATION section.	Go to step 14.
14	Replace the DEF tank temperature sensor	Replace the DEF tank temperature sensor. Warm up the engine (water temp: 60 °C {140 °F}: or more) and check if P20B2 has been detected in [DCU].	DTC P20B2 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P20B3

EN01H16F02040F03001049

DTC: P20B3 DEF tank heater valve - circuit (Circuit low)**INFORMATION**

SAPH16F020400161

1. Technical description

- DCU detects malfunctions based on the coolant cut off valve (DEF tank heater valve) circuit voltage.

<Description of malfunction>

- Malfunction of coolant cut off valve is detected.

2. DTC set condition

- (1) DTC detection condition
 - Starter switch ON.
 - Coolant cut off valve duty > 0%
- (2) Judgement criteria
 - Coolant cut off valve voltage < 0.66 V for 0.05 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<Symptoms on the vehicle due to malfunction>

- Control will not work properly if the DEF freezes.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or unsteady contact of connector
- Coolant cut off valve malfunction

INSPECTION PROCEDURE: P20B3

1 Inspect the coolant cut off valve connector

1. Check the connection of the coolant cut off valve connector (Looseness and poor contact).

Was any failure found?

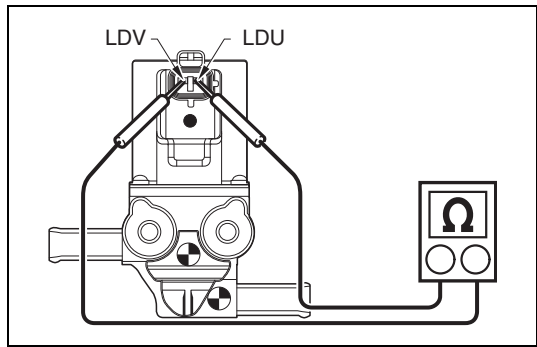
YES

NO

Connect securely, repair if needed.

Go to step 2.

2 Inspect the coolant cut off valve unit



SAPH16F020400162

1. Set the starter switch to the "LOCK" position.
2. Remove the connector of the coolant cut off valve.
3. Use the electrical tester to measure the resistance between the terminals of the coolant cut off valve.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Coolant cut off valve connector LDU – LDV	20 °C {68 °F}: 9.04 – 9.52 Ω

Do the measurements meet the standard value?

YES

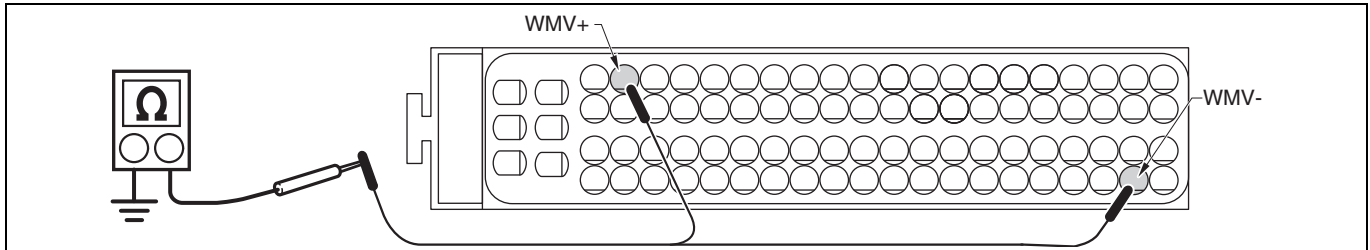
NO

Go to step 3.

Replace the coolant cut off valve. Perform "After-inspection work" of INFORMATION section.

3 Check for short-circuit in the coolant cut off valve wire 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.



SAPH16F020400163

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

Do the measurements meet the standard value?

YES

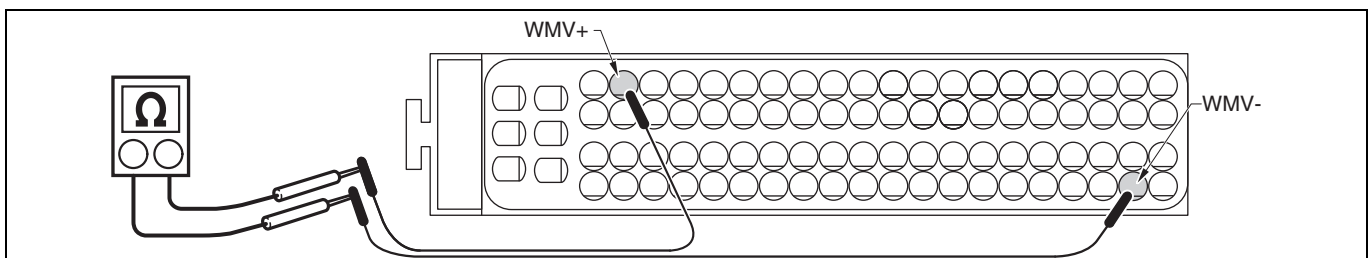
Go to step 4.

NO

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

4 Check for disconnection in the coolant cut off valve wire harness

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



SAPH16F020400164

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector WMV+ – WMV-	20 °C {68 °F}: 9.04 – 9.52 Ω

Do the measurements meet the standard value?

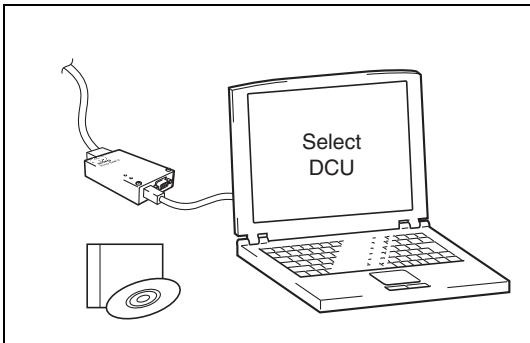
YES

NO

Go to step 5.

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

5 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400165

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P20B3 has been detected in [Fault Information].

Has DTC P20B3 been detected?

YES

NO

Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.

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

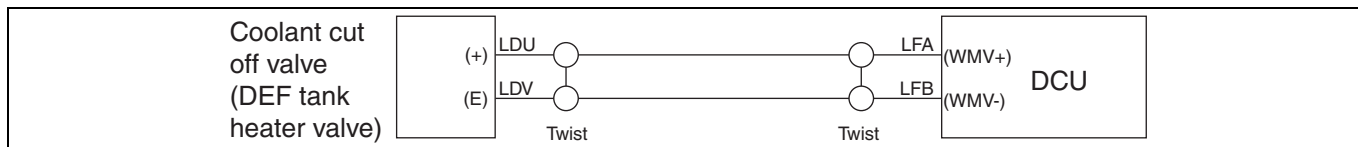
CHECKLIST: P20B3

DTC: P20B3		DEF tank heater valve - circuit (Circuit low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the coolant cut off valve connector	Check the connection of the coolant cut off valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the coolant cut off valve unit	Measure the resistance between the terminals of the coolant cut off valve. <Tester connections> Coolant cut off valve connector LDU – LDV <Standard values> 20 °C {68 °F}: 9.04 – 9.52 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the coolant cut off valve. Perform "After-inspection work" of INFORMATION section.
3	Check for short-circuit in the coolant cut off valve wire harness	Disconnect the DCU 86P connector. Connect the signal check harness to measure the resistance between the terminals of the DCU 86 vehicle-side connector and the ground. <Tester connections> WMV+ – Ground WMV- – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Check for disconnection in the coolant cut off valve wire harness	Measure the resistance of the wire harness and coolant cut off valve between the DCU 86P vehicle-side connector and the coolant cut off valve. 1. Connect the coolant cut off valve connector. 2. Connect the signal check harness to DCU 86P vehicle-side connector and measure the resistance of the DCU 86P vehicle-side connector terminals. <Tester connections> DCU 86P vehicle-side connector WMV+ – WMV- <Standard values> 20 °C {68 °F}: 9.04 – 9.52 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P20B3		DEF tank heater valve - circuit (Circuit low)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the DTC detected (DCU) [Hino-DX]	Check if P20B3 has been detected in [DCU].	<p>DTC P20B3 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	<p>Procedure completed.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>

DTC: P20B4

EN01H16F02040F03001050

DTC: P20B4 DEF tank heater valve - circuit (Circuit high)
INFORMATION

SAPH16F020400166

1. Technical description

- DCU detects malfunctions based on the coolant cut off valve circuit voltage.

<Description of malfunction>

- Malfunction of coolant cut off valve is detected.

2. DTC set condition

- (1) DTC detection condition
 - Starter switch ON.
 - Coolant cut off valve duty > 0%
- (2) Judgement criteria
 - Coolant cut off valve voltage = 2.7 V for 0.1 sec.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON

5. Symptoms on the vehicle when the DTC is set**<Symptoms on the vehicle due to backup control (fail safe function)>**

- -

<Symptoms on the vehicle due to malfunction>

- Control will not work properly if the DEF freezes.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- Looseness or unsteady contact of connector
- Coolant cut off valve malfunction

INSPECTION PROCEDURE: P20B4

1 Inspect the coolant cut off valve connector

1. Check the connection of the coolant cut off valve connector (Looseness and poor contact).

Was any failure found?

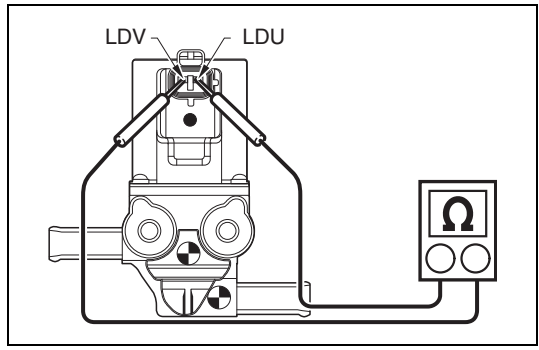
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Check the coolant cut off valve unit



1. Set the starter switch to the "LOCK" position.
2. Remove the connector of the coolant cut off valve.
3. Use the electrical tester to measure the resistance between the terminals of the coolant cut off valve.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Coolant cut off valve connector LDU – LDV	20 °C {68 °F}: 9.04 – 9.52 Ω

Do the measurements meet the standard value?

YES

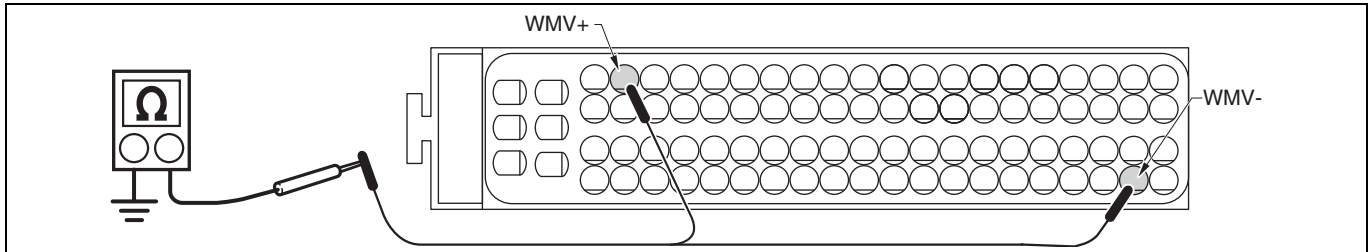
NO

Go to step 3.

Replace the coolant cut off valve. Perform "After-inspection work" of INFORMATION section.

3 Check for short-circuit in the coolant cut off valve wire 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.



SAPH16F020400168

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

Do the measurements meet the standard value?

YES

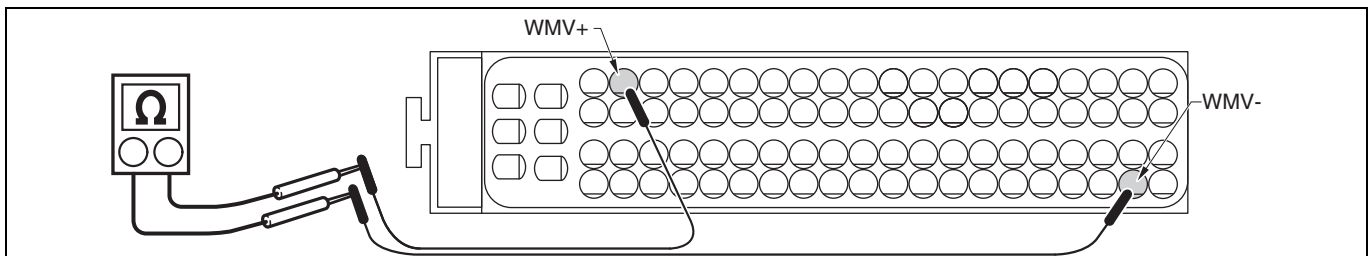
Go to step 4.

NO

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

4 Check for disconnection in the coolant cut off valve wire harness

1. Connect the coolant cut off valve 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.



SAPH16F020400169

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	DCU 86P vehicle-side connector WMV+ – WMV-	20 °C {68 °F}: 9.04 – 9.52 Ω

Do the measurements meet the standard value?

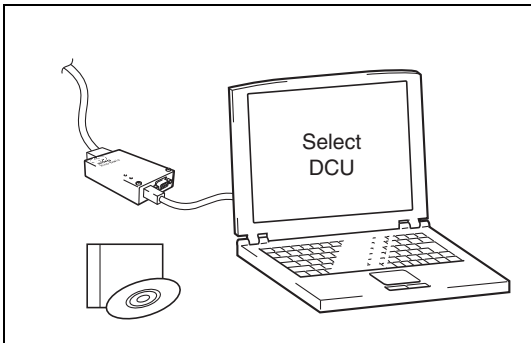
YES

NO

Go to step 5.

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

5 Check the DTC detected (DCU)



SAPH16F020400170

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P20B4 has been detected in [Fault Information].

Has DTC P20B4 been detected?

YES

NO

**Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

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

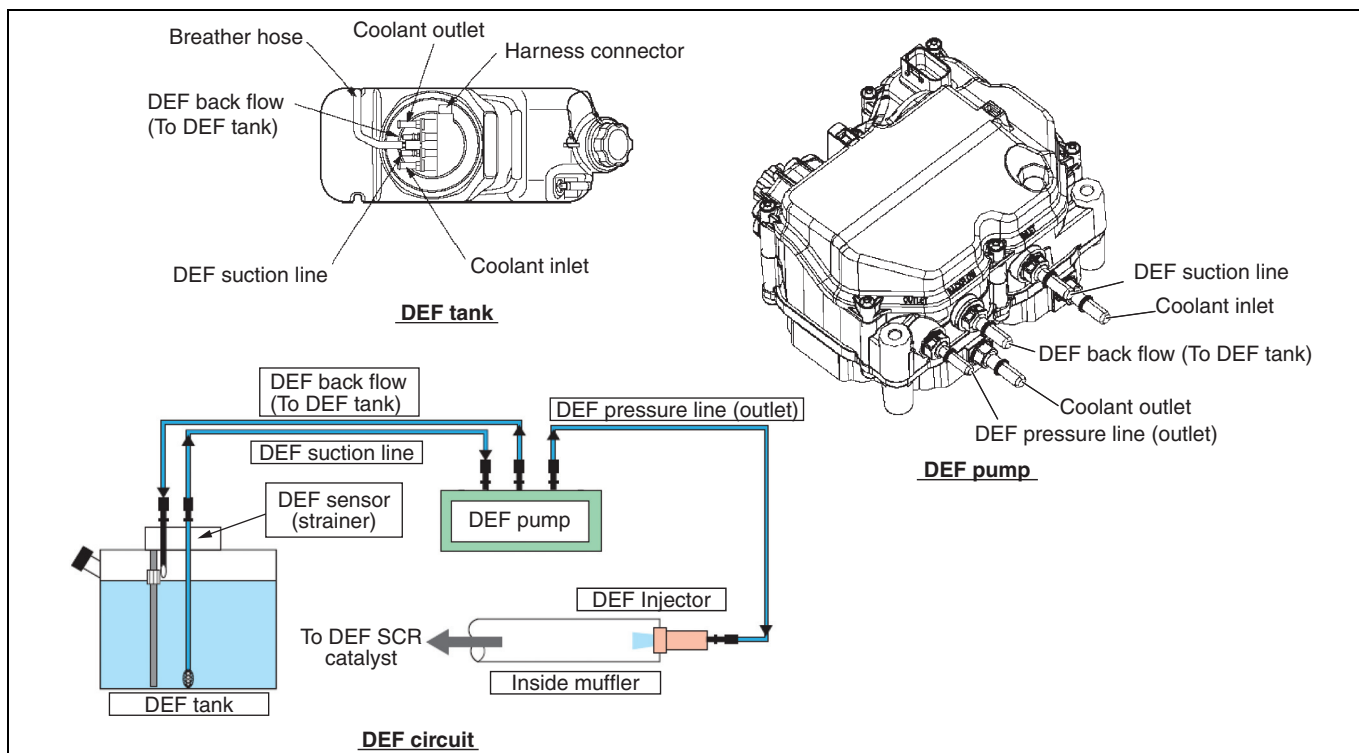
CHECKLIST: P20B4

DTC: P20B4		DEF tank heater valve - circuit (Circuit high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the coolant cut off valve connector	Check the connection of the coolant cut off valve connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Check the coolant cut off valve unit	Measure the resistance between the terminals of the coolant cut off valve. <Tester connections> Coolant cut off valve connector LDU – LDV <Standard values> 20 °C {68 °F}: 9.04 – 9.52 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Replace the coolant cut off valve. Perform "After-inspection work" of INFORMATION section.
3	Check for short-circuit in the coolant cut off valve wire harness	Disconnect the DCU 86P connector. Connect the signal check harness to measure the resistance between the terminals of the DCU 86P vehicle-side connector and the ground. <Tester connections> WMV+ – Ground WMV- – Ground <Standard values> ∞ Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Check for disconnection in the coolant cut off valve wire harness	Measure the resistance of the wire harness and coolant cut off valve between the DCU 86P vehicle-side connector and the coolant cut off valve. 1. Connect the coolant cut off valve connector. 2. Connect the signal check harness to DCU 86P vehicle-side connector and measure the resistance of the DCU 86P vehicle-side connector terminals. <Tester connections> DCU 86P vehicle-side connector WMV+ – WMV- <Standard values> 20 °C {68 °F}: 9.04 – 9.52 Ω	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.

DTC: P20B4		DEF tank heater valve - circuit (Circuit high)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Check the DTC detected (DCU)	Check if P20B4 has been detected in [DCU].	<p>DTC P20B4 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		<p>Replace the DCU. (After replacing the DCU, perform a DPR forced regeneration.)</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	<p>Procedure completed.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>

DTC: P20E8

EN01H16F02040F03001051

DTC: P20E8 Suction line pressure build up check
INFORMATION

SAPH16F020400171

1. Technical description

- DEF line pressure depends on ejection of the DEF pump.
- DEF pump ejection is determined by value of DEF pressure sensor which is built in DEF pump.

<Description of malfunction>

- Abnormal pressure in the DEF pipe is detected.

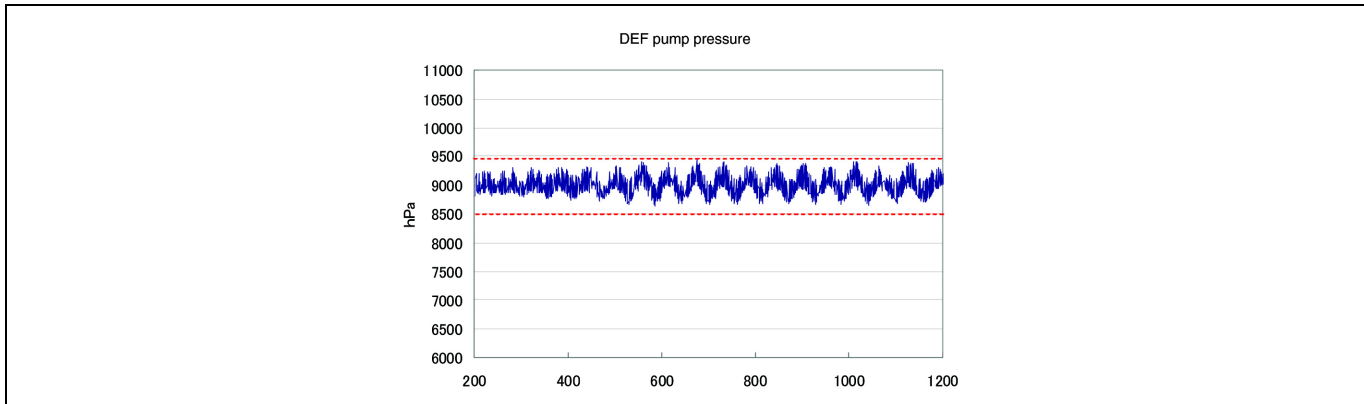
2. DTC set condition**(1) DTC detection condition**

Exhaust gas temperature (SCR inlet) > 150 °C {302 °F}
DEF defrosting is done.

(2) Judgement criteria

After the DEF pump starts to build up pressure, DEF line pressure does not increase more than 8,000 hPa (116 psi) for 50 sec., three times in a row.

Normal pressure behavior



SAPH16F020400172

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR System failure lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- If malfunction does not improve within 500 miles: engine output is restricted.
- If malfunction does not improve within 2,000 miles: vehicle speed is restricted.

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.
- Engine output is insufficient (when malfunction does not improve within 500 miles).
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles).

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- DEF in the DEF tank is empty.
- Strainer in the DEF sensor is clogged.
- Air is entering into DEF suction line.
- DEF suction line is clogged, and DEF is leaking from DEF suction line.
- DEF pump filter is clogged.
- Leak from DEF pump.
- DEF pump malfunction.

INSPECTION PROCEDURE: P20E8**1 Inspect the DEF quantity**

1. Make sure that the DEF level in the combination meter reaches at least 3 scale marks.

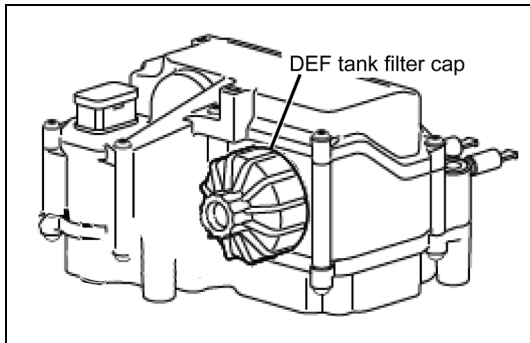
Are there at least 3 scale marks of DEF?

YES

Go to step 2.

NO

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

2 Inspect the DEF tank filter cap

SAPH16F020400173

1. Check for the DEF leakage or crystallization from the DEF tank filter cap.

Was any failure found?

YES

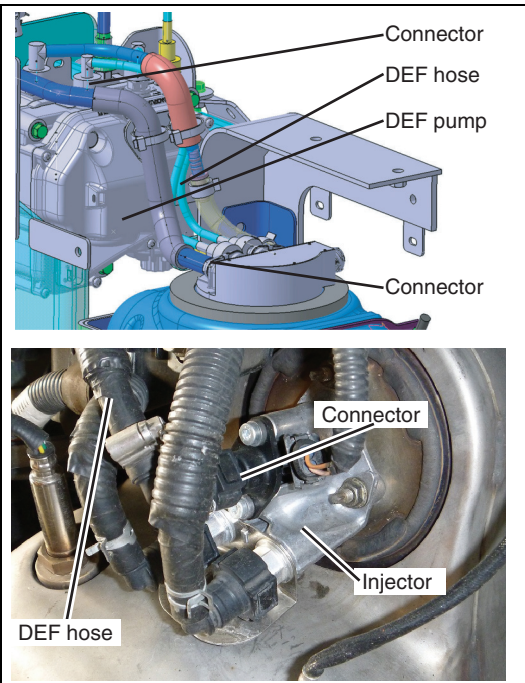
Check the contents described below. If there is no failure, replace the DEF tank filter.

- Cracks of the filter cap.
 - Tightening torque of the filter cap.
- Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the DEF pipe



SAPH16F020400174

1. Check all connectors and DEF hoses and check if they are free of leaks and DEF crystals.
2. Gently pull on connectors and make sure they are securely connected.
 - DEF hose connector (injector side)
 - DEF hose connector (DEF pump side)
 - DEF hose (suction side)

HINT

- **If DEF leaks, deposits of DEF crystals will form around the muffler.**

Was any failure found?

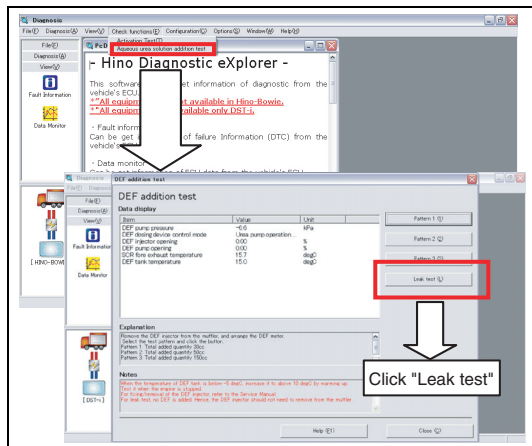
YES

Clean connectors and the area around connectors and make sure connectors are securely connected. After repair work is completed, go to step 4.

NO

Go to step 5.

4 Leak test of the DEF pipe [Hino-DX]



SAPH16F020400175

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU].
5. Perform [Leak test] from the [DEF addition test] in [Check functions] menu on Hino-DX.

Standard values

The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.

Do the measurements meet the standard value?

YES

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

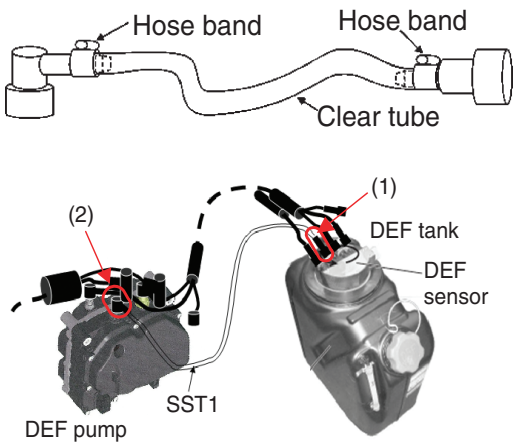
NO

Go to step 5.

5 Inspect the DEF pressure 1 (Inspection of the DEF hose) [Hino-DX]

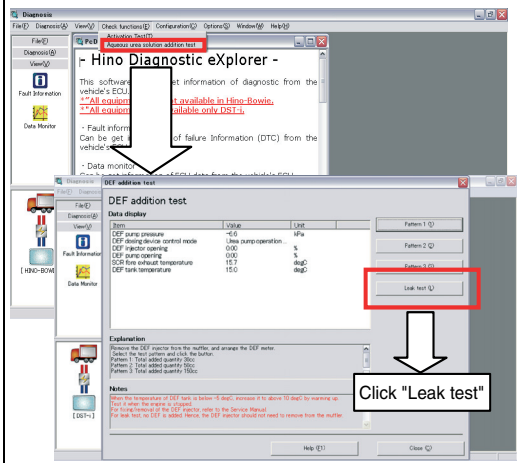
Preparation for making SST1

- Straight Connector :
SAE J2044 8x6-3/8
- Elbow Connector :
SAE J2044 8x6-3/8
- Clear Tube (1m):
8x6 (Outer Dia.: 8mm, Inner Dia.: 6mm)
- Hose Band (2)
(After overhauling 87209-E006*, it can be used for Straight Connector and Elbow Connector.)



1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF hose (suction side) between the DEF tank (1) and the DEF pump (2) and connect the SST1.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Select [DCU].
6. Perform [Leak test] from the [DEF addition test].

Measurement conditions	Standard values
Starter switch: ON	The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.



SAPH16F020400176

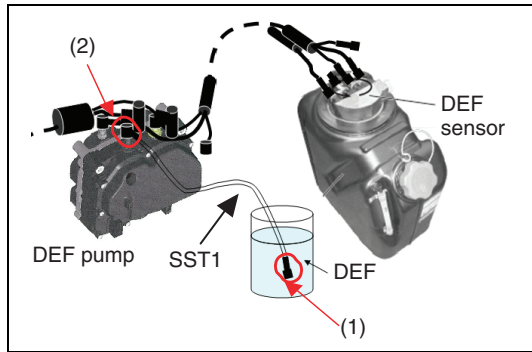
Do the measurements meet the standard value?

YES

NO

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

Go to step 6.

6 Inspection of the DEF pressure 2 (Inspection of the DEF tank/sensor) [Hino-DX]

SAPH16F020400177

1. Set the starter switch to the "LOCK" position.
2. Fill a clean small container with clean DEF.
3. Disconnect the SST1 DEF tank-side connector (1) and put the connector into the container containing the DEF.
4. Set the starter switch to the "ON" position.
5. Perform the [Leak test].

Measurement conditions	Standard values
Starter switch: ON	The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.

Do the measurements meet the standard value?

YES

Go to step 7.

NO

Go to step 8.

7 Inspect the DEF tank

1. Remove the DEF tank from the vehicle.
2. Remove the DEF pick-up assembly (DEF sensor) from the DEF tank.
3. Discharge the DEF from the DEF tank and check the foreign objects in the DEF tank.

Was any failure found?

YES

Remove the foreign objects and clean the DEF tank.

⚠ CAUTION

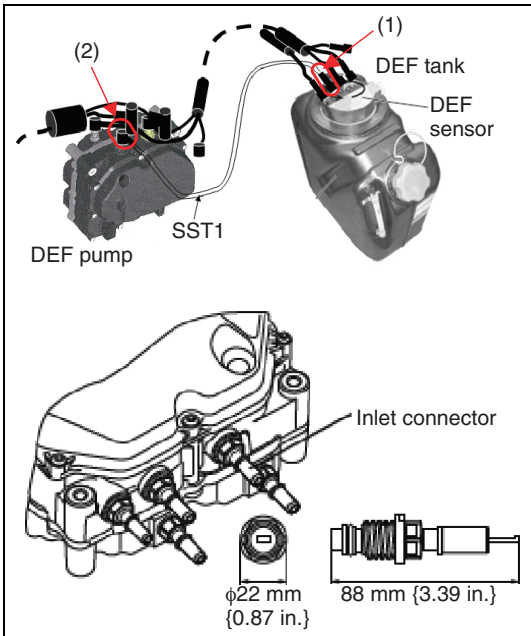
The DEF tank must be cleaned with fresh water or diluted DEF.

Perform "After-inspection work" of INFORMATION section.

NO

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

8 Inspection of the DEF pressure 3 (Inspection of the DEF pump) [Hino-DX]



SAPH16F020400178

1. Set the starter switch to the "LOCK" position.
2. Replace with a new inlet valve of the DEF pump.
3. Connect SST1 again between the DEF tank (1) and the DEF pump (2).
4. Set the starter switch to the "ON" position.
5. Perform the [Leak test].

Measurement conditions	Standard values
Starter switch: ON	The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.

Do the measurements meet the standard value?

YES

NO

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

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

CHECKLIST: P20E8

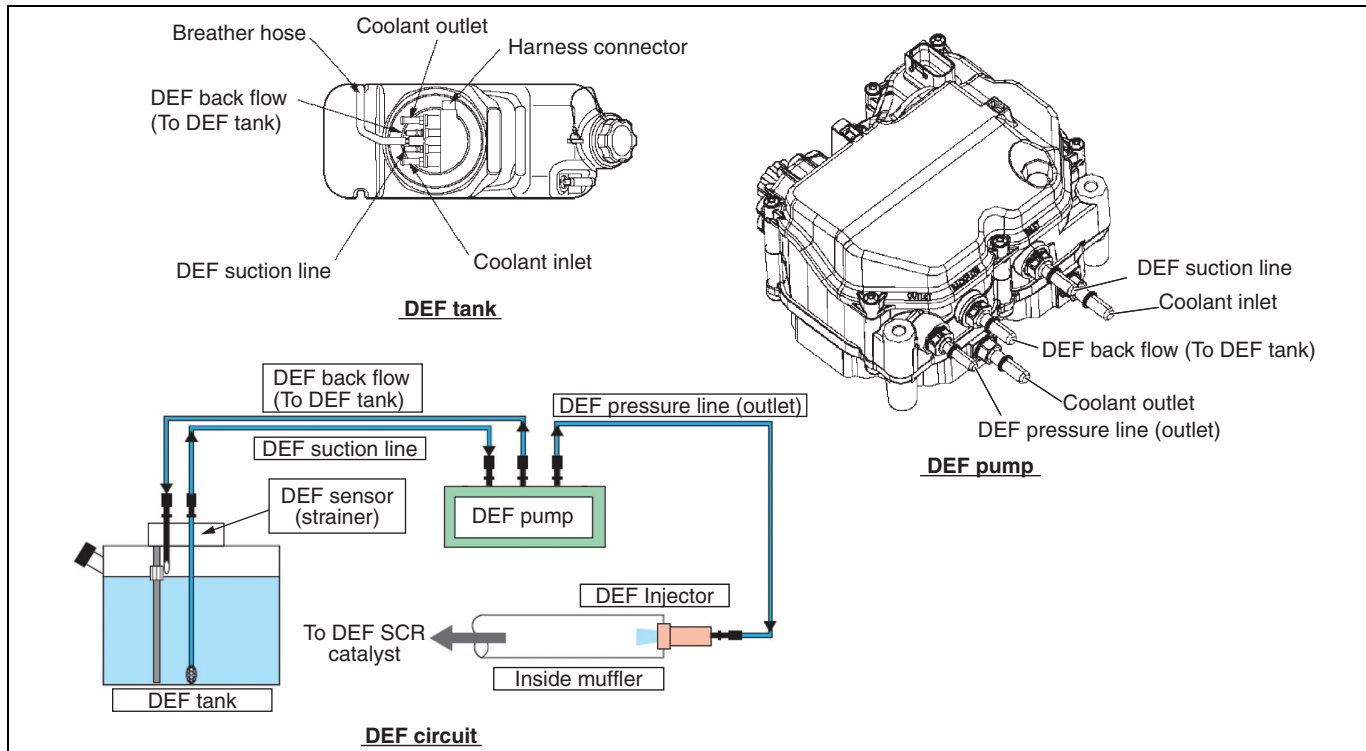
DTC: P20E8		Suction line pressure build up check		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF quantity	Make sure that the DEF level in the combination meter reaches at least 3 scale marks.	<p>The DEF level reaches at least 3 scale marks: Go to Yes</p> <p>The DEF level does not reach 3 scale marks: Go to No</p>		Go to step 2.	Refill the DEF. Perform "After-inspection work" of INFORMATION section.
2	Inspect the DEF tank filter cap	Check for DEF leakage or crystallization from the DEF tank filter cap.	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO</p>		<p>Check the contents described below. If there is no failure, replace the DEF tank filter.</p> <ul style="list-style-type: none"> Cracks of the filter cap. Tightening torque of the filter cap. <p>Perform "After-inspection work" of INFORMATION section.</p>	Go to step 3.
3	Inspect the DEF pipe	<ol style="list-style-type: none"> Check all connectors and DEF hoses and check if they are free of leaks and DEF crystals. Gently pull on connectors and make sure they are securely connected. <ul style="list-style-type: none"> DEF hose connector (injector side) DEF hose connector (DEF pump side) DEF hose (suction side) <p>HINT If DEF leaks, deposits of DEF crystals will form around the muffler.</p>	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean connectors and the area around connectors and make sure connectors are securely connected. After repair work is completed, go to step 4.	Go to step 5.

DTC: P20E8		Suction line pressure build up check		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Leak test of the DEF pipe [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Connect the vehicle to Hino-DX. 3. Set the starter switch to the "ON" position. 4. Select [DCU]. 5. Perform [Leak test] from the [DEF addition test] in [Check functions] menu on Hino-DX. <p><Standard values> DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the DEF pressure 1 (Inspection of the DEF hose) [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Disconnect the DEF hose (suction side) between the DEF tank (1) and the DEF pump (2) and connect the SST1. 3. Connect the vehicle to Hino-DX. 4. Set the starter switch to the "ON" position. 5. Select [DCU] and perform [Leak Test] from [DEF addition test] of Hino-DX. <p><Standard values> DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Replace the DEF suction line. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspection of the DEF pressure 2 (Inspection of the DEF tank/sensor) [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Fill a clean small container with clean DEF. 3. Disconnect the SST1 DEF tank-side connector (1) and put the connector into the container containing the DEF. 4. Set the starter switch to the "ON" position. 5. Use Hino-DX and perform [Leak test]. <p><Standard values> The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 sec.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 7.	Go to step 8.

DTC: P20E8		Suction line pressure build up check		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
7	Inspect the DEF tank	DEF discharged from the DEF tank, check for foreign material in the tank.	<p>There are foreign objects: Go to YES.</p> <p>There are no foreign objects: Go to NO.</p>		<p>Remove the foreign objects and clean the DEF tank.</p> <p>NOTICE The DEF tank must be cleaned with fresh water or diluted DEF.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	<p>Replace the DEF pick-up assembly (DEF sensor). Perform "After-inspection work" of INFORMATION section.</p>
8	Inspection of the DEF pressure 3 (Inspection of the DEF pump) [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Replace with a new inlet valve of the DEF pump. 3. Connect SST1 again between the DEF tank(1) and the DEF pump(2). 4. Set the starter switch to the "ON" position. 5. Use Hino-DX and perform [Leak test]. <p><Standard values> The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		<p>Procedure completed. Perform "After-inspection work" of INFORMATION section.</p>	<p>Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.</p>

DTC: P20E9

EN01H16F02040F03001052

DTC: P20E9 Back flow line check
INFORMATION

SAPH16F020400179

1. Technical description

- DEF line pressure depends on flow rate of DEF pump.
- DEF pump flow rate is determined by the value supplied from the DEF pressure sensor which is integrated with the DEF pump.

<Description of malfunction>

- Abnormal pressure in the DEF pipe is detected.

2. DTC set condition

- (1) DTC detection condition
Exhaust gas temperature (SCR inlet) > 150 °C {302 °F}
Defrosting DEF is done.
- (2) Judgement criteria

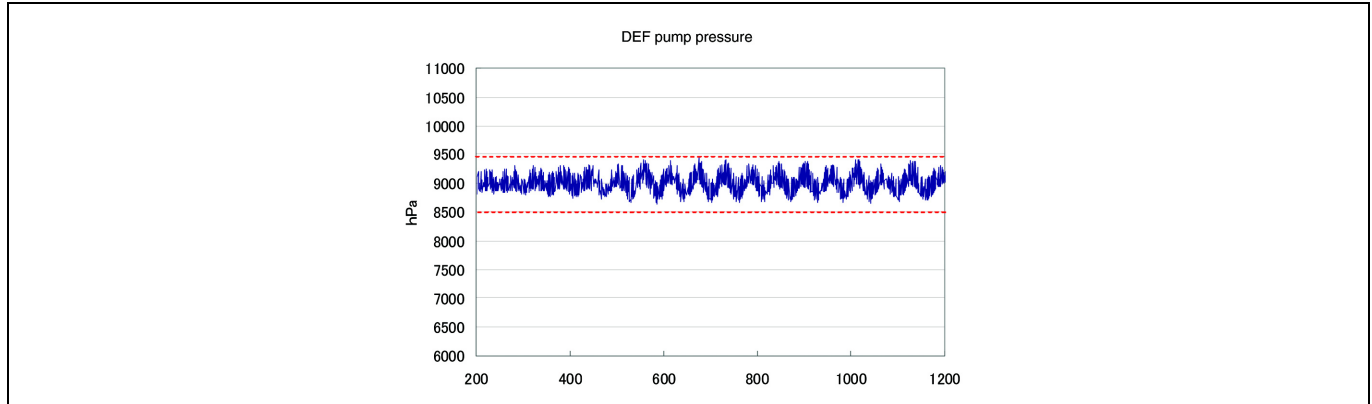
Immediately after DEF pressure rise

- DEF line pressure does not decrease or is stable at more than 10,000 hPa for 2 sec. at DEF pump duty cycle 7%.
- When the DEF pressure was not stable for 8 sec. from 8,500 hPa to 9,500 hPa (123.3 psi to 137.8 psi) during a period of 300 sec.

While Normal monitoring

- DEF line pressure is more than 12,500 hPa (181.3 psi) for 5 sec.

Normal pressure characteristics



SAPH16F020400180

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- SCR System failure lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- If malfunction does not improve within 500 miles: engine output is restricted.
- If malfunction does not improve within 2,000 miles: vehicle speed is restricted.

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.
- Engine output is insufficient (when malfunction does not improve within 500 miles)
- Vehicle does not speed up (when malfunction does not improve within 2,000 miles)

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

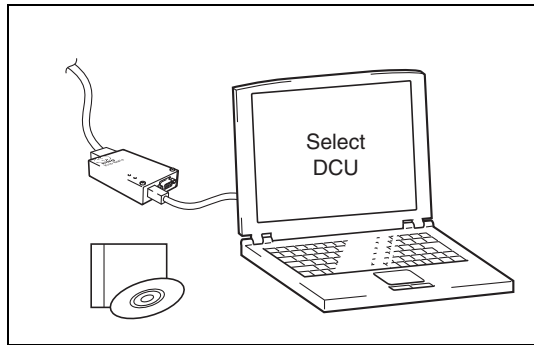
- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- The back flow line of the DEF is clogged.
- The back flow side of the DEF sensor (strainer) is clogged.
- The back flow connector of the DEF pump is clogged.
- DEF pump malfunction

INSPECTION PROCEDURE: P20E9

1 Check the DTC detected (DCU) [Hino-DX]



SAPH16F020400181

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if P20E8 has been detected in [Fault Information].

Has DTC P20E8 been detected?

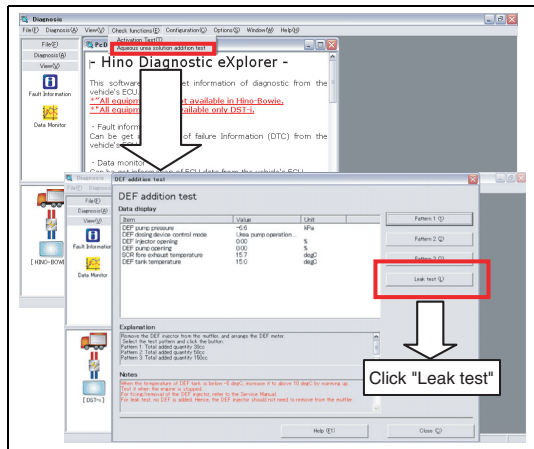
YES

NO

Proceed to DTC P20E8 diagnosis procedure.

Go to step 2.

2 Inspect the leak of the DEF pipe [Hino-DX]



SAPH16F020400182

1. Perform the [Leak test] from the [DEF addition test] in [Check functions] menu on Hino-DX.
2. Sixty seconds after the start of the [Leak test] (after pressure has stabilized), monitor the pressure fluctuation for 60 seconds.

Standard values	
•	DEF pressure must not exceed 8,500 hPa {123.3 psi}.
•	DEF pressure temporarily exceeded 8,500 hPa {123.3 psi} but dropped below that value thereafter.

Do the measurements meet the standard value?

YES

NO

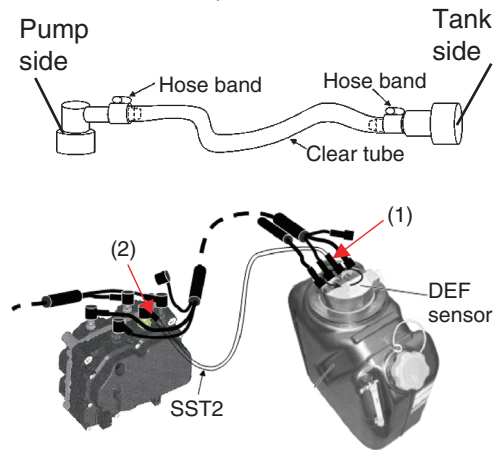
Proceed to DTC P20E8 diagnosis procedure.

Go to step 3.

3 Inspect the DEF pressure 1 (Inspection of the DEF hose) [Hino-DX]

Items to be prepared for SST2 creation

- Straight Connector* : SAE J2044 8x6-5/16"
- Elbow Connector* : SAE J2044 8x6-3/8"
- Clear Tube (1m): 8x6 (Outer Dia.: 8mm, Inner Dia.: 6mm)
- Hose band (2 pcs.)
(*Straight Connector and Elbow Connector are reused from disassembly of 87209-E006*.)



SAPH16F020400183

1. Set the starter switch to the "LOCK" position.
2. Disconnect the DEF hose (back flow side) between the DEF tank (1) and the DEF pump (2) and connect the SST2.
3. Set the starter switch to the "ON" position.
4. Perform the [Leak test] from the [DEF addition test] on [Check functions] menu on Hino-DX.

Measurement conditions	Standard values
Starter switch: ON	The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.

Do the measurements meet the standard value?

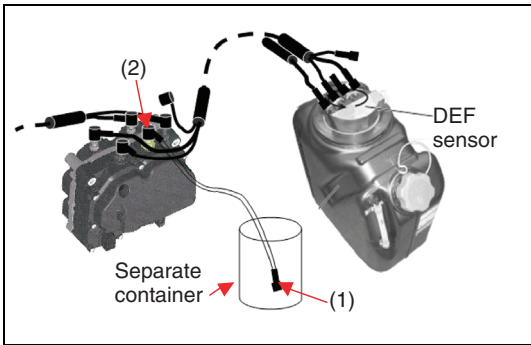
YES

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

NO

Go to step 4.

4 Inspect the DEF pressure 2 (Inspection of the DEF sensor) [Hino-DX]



SAPH16F020400184

1. Set the starter switch to the "LOCK" position.
2. Disconnect the SST2 DEF tank side connector (1) and fill a clean small container with clean DEF.
3. Set the starter switch to the "ON" position.
4. Perform the [Leak test] as same as step 2.

HINT

- The DEF is discharged from the connector in the container.

Measurement condition	Standard values
Starter switch: ON	The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.

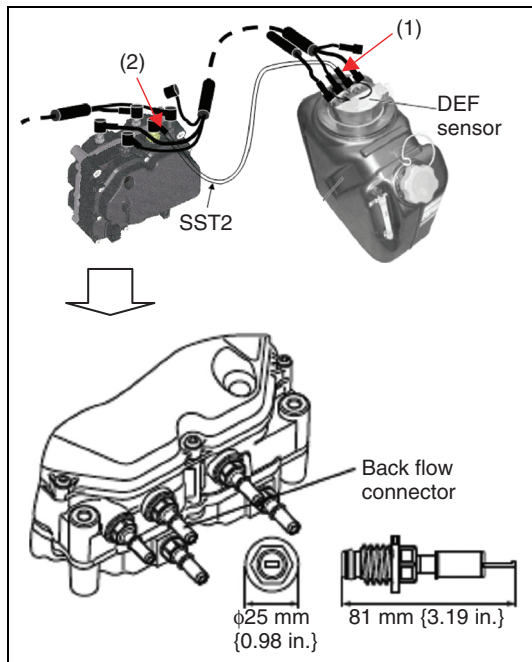
Do the measurements meet the standard value?

YES

NO

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

Go to step 5.

5 Inspect the DEF pressure 2 (Inspection of the DEF pump) [Hino-DX]


SAPH16F020400185

1. Set the starter switch to the "LOCK" position.
2. Replace with a new back flow valve of the DEF pump.
3. Connect the SST2 again between the DEF tank (1) and the DEF pump (2).
4. Set the starter switch to the "ON" position.
5. Perform the [Leak test] as same as step 2.

Measurement conditions	Standard values
Starter switch: ON	The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.

Do the measurements meet the standard value?
YES
**Procedure completed.
Perform "After-inspection work" of INFORMATION section.**
NO
**Replace the DEF pump.
Perform "After-inspection work" of INFORMATION section.**

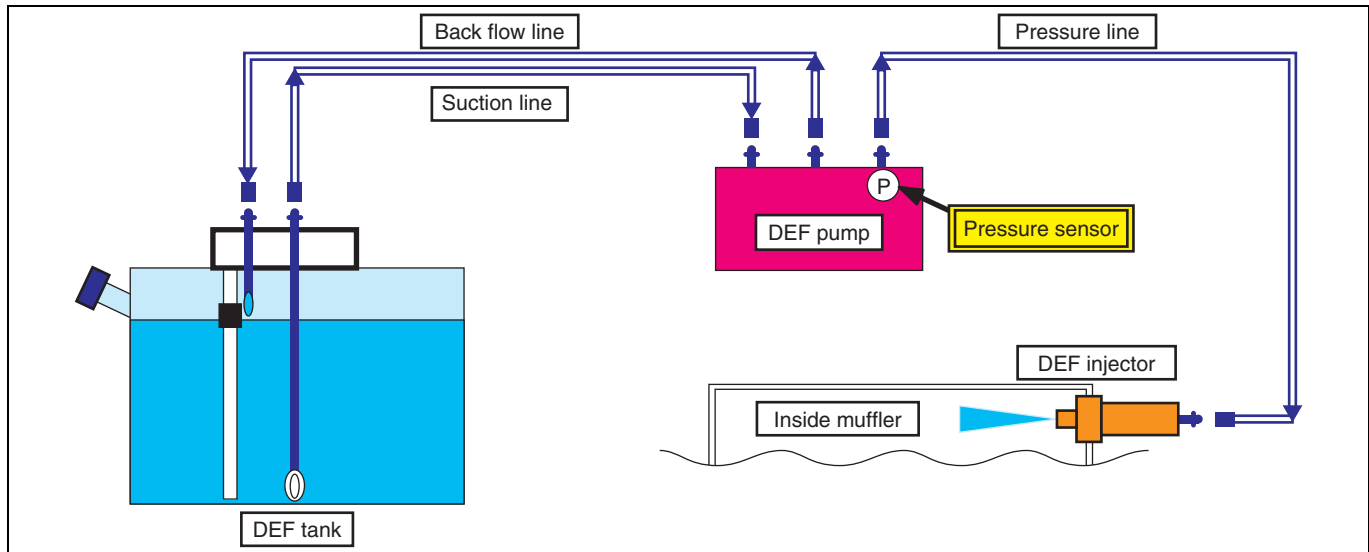
CHECKLIST: P20E9

DTC: P20E9		Back flow line check		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if P20E8 has been detected in [DCU].	DTC P20E8 has been detected: Go to YES. No DTC has been detected: Go to NO.		Proceed to DTC P20E8 diagnosis procedure.	Go to step 2.
2	Inspect the leak of the DEF pipe [Hino-DX]	Use Hino-DX active test function to test the DEF leak 1. Select [DEF addition test] in [DCU] from the [Check functions] menu after the starter switch is "ON", and run the [Leak test]. 2. Monitor for 60 seconds the pressure fluctuations (after pressure stabilization) occurred after 60 seconds from the start of the [Leak test]. <Standard values> DEF pressure must not exceed 8,500 hPa {123.3 psi}. DEF pressure temporarily exceeded 8,500 hPa {123.3 psi} but dropped below that value thereafter.	The measurement corresponds to a standard value: Go to YES. The measurement does not correspond to a standard value: Go to NO.		Proceed to DTC P20E8 diagnosis procedure.	Go to step 3.
3	Inspect the DEF pressure 1 (Inspection of the DEF hose) [Hino-DX]	1. Set the starter switch to the "LOCK" position. 2. Disconnect the DEF hose (back flow side) between the DEF tank (1) and the DEF pump (2) and connect the SST2. 3. Set the starter switch to the "ON" position. 4. Perform [Leak test] from [DEF addition test] of Hino-DX. <Standard values> The DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Replace the DEF suction line. Perform "After-inspection work" of INFORMATION section.	Go to step 4.

DTC: P20E9		Back flow line check		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Inspect the DEF pressure 2 (Inspection of the DEF sensor) [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Disconnect the SST2 DEF tank side connector (1) and put the connector into clean container. 3. Set the starter switch to the "ON" position. 4. Perform the [Leak test] of Hino-DX <p>HINT The DEF is discharged from the connector in the container.</p> <p><Standard values> DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Replace the DEF sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 5.
5	Inspect the DEF pressure 2 (Inspection of the DEF pump) (Hino-DX)	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Replace with a new back flow valve of the DEF pump. 3. Connect the SST2 again between the DEF tank (1) and the DEF pump (2). 4. Set the starter switch to the "ON" position. 5. Perform the [Leak test] of Hino-DX <p><Standard values> DEF pressure is stable in the 8,500 to 9,500 hPa (123.3 to 137.8 psi) range for 60 seconds.</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Procedure completed. Perform "After-inspection work" of INFORMATION section.	Replace the DEF pump. Perform "After-inspection work" of INFORMATION section.

DTC: P20F4

EN01H16F02040F03001053

DTC: P20F4 DEF consumption failure
INFORMATION

SAPH16F020400186

1. Technical description

- The amount of added DEF is diagnosed as abnormal.
- The amount of added DEF is controlled by the DEF pressure and the opening of the DEF injector.

<Description of malfunction>

- Failure of DEF injector during system operation is detected.

2. DTC set condition**(1) DTC detection condition**

<During system operation>
DEF injector duty is > 15%

Accumulated DEF injector duty is > 25,000

Ratio (= Accumulated DEF pump duty/ Accumulated DEF injector duty) is < 0.12

(2) Judgement criteria

<At system running>

Pressure line check start: DEF pump speed: keep and DEF injector: full open

If DEF pressure is > 750 kPa {109 psi} after 4 sec. from DEF injector open.

DTC is detected.

3. Reset condition.

- After having restored to the normal conditions.

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

- MIL: ON
- SCR System failure lamp: ON
- DEF injection is stopped.
- NOx purification function is stopped.
- Output restricted instantaneously.
- If malfunction does not improve within 50 min.: vehicle speed is restricted.

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 is declined.
- Engine output is insufficient.
- Vehicle does not speed up (when malfunction does not improve within 50 min.).

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Clogging of the DEF injector
- Clogging of the DEF pipe

INSPECTION PROCEDURE: P20F4

1 Inspect the DEF pipe (pump ↔ injector)

1. Check the DEF pipe (pressure line) and check if there are no disconnections, clogging, corrosion, or cracks.

Was any failure found?

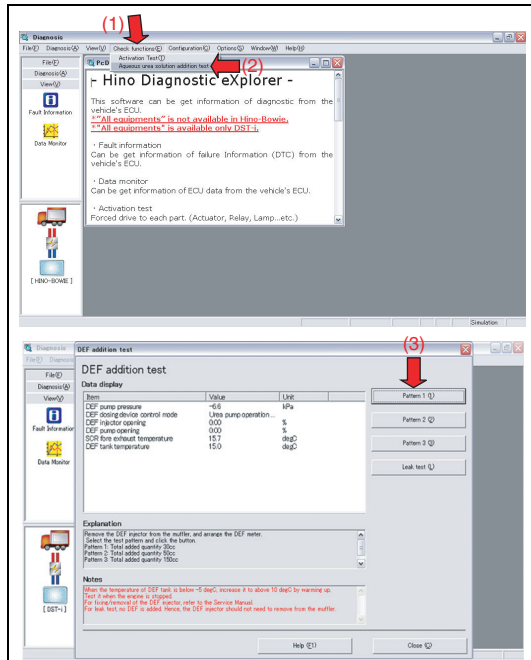
YES

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

NO

Go to step 2.

2 Inspect DEF injector 1 [Hino-DX]



SAPH16F020400187

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 the muffler.

HINT

Refer to the workshop manual "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.

3. Set the starter switch to the "ON" position.
 4. Select [DCU].
 5. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector.
- <Inspection procedure>
(1) Select [Check functions].
(2) Select [DEF addition test].
(3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)

NOTICE

When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.

HINT

Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.

Is operation normal?

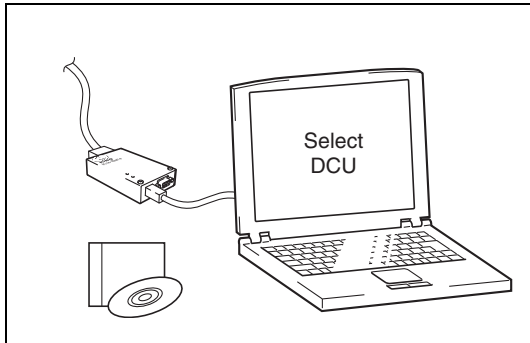
YES

Procedure completed. DEF crystal clogging is considered resolved. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the DEF injector 2 [Hino-DX]



SAPH16F020400188

1. Set the starter switch to the "LOCK" position.
2. Replace DEF injector with a new one. (Do not install it on the muffler.)
3. Set the starter switch to the "ON" position.
4. Perform DEF addition test as same as step 2.

Is operation normal?

YES

New injector installed in the muffler. Procedure completed. After installing the injector, idle the engine (for about 10 min.) and from the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.

NO

Re-install the DEF injector and replace the DEF pipe (pressure line). After replacing the pipe, idle the engine (for about 10 min.) and from the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}. Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P20F4

DTC: P20F4		DEF consumption failure		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the DEF pipe (pump ↔ injector)	Check the DEF pipe (pressure line) and check if there are no disconnections, clogging, corrosion, or cracks.	Failure found: Go to YES. No failure found: Go to NO.		Replace the DEF pipe (pressure line). Perform "After-inspection work" of INFORMATION section.	Go to step 2.

DTC: P20F4		DEF consumption failure		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
2	Inspect the DEF injector 1 [Hino-DX]	<p>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.)</p> <ol style="list-style-type: none"> Set the starter switch to the "LOCK" position. Remove the DEF injector from the muffler. <p>HINT Refer to the workshop manual "SELECTIVE CATALYTIC REDUCTION (SCR)" in the chapter "EMISSION CONTROL (J08E)" (S5-CJ08E10* or S5-UJ08E10*) for removal and installation of the DEF injector.</p> <ol style="list-style-type: none"> Set the starter switch to the "ON" position. Select [DCU]. Select [Check functions] on Hino-DX menu and check the operation of the DEF injector. <p><Inspection procedure> (1) Select [Check functions]. (2) Select [DEF addition test]. (3) Perform addition test as instructed on the Hino-DX screen. (Perform all three patterns)</p> <p>NOTICE When the DEF tank temperature is -5 °C (23 °F) or lower, perform warm-up to raise it to 10 °C (50 °F) or higher.</p> <p>HINT Refer to the section "System individual function" in the chapter "HINO Diagnostic eXplorer" for detail of DEF addition test.</p>	<p>Operation is normal: Go to YES.</p> <p>Operation is abnormal: Go to NO.</p>		<p>Procedure completed. DEF crystal clogging is considered resolved. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 3.

DTC: P20F4		DEF consumption failure		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
3	Inspect the DEF injector 2 [Hino-DX]	<ol style="list-style-type: none"> 1. Set the starter switch to the "LOCK" position. 2. Replace DEF injector with a new one. (Do not install it on the muffler.) 3. Set the starter switch to the "ON" position. 4. Perform DEF addition test as same as step 2. 	<p>Operation is normal: Go to YES.</p> <p>Operation is abnormal: Go to NO.</p>		<p>New injector installed in the muffler. Procedure completed.</p> <p>After installing the injector, idle the engine (for about 10 min.) and from the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>	<p>Re-install the DEF injector and replace the DEF pipe (pressure line).</p> <p>After replacing the pipe, idle the engine (for about 10 min.) and from the menu [Data Monitor] check if the DEF is stable between 800 kPa {116 psi} and 1,051 kPa {152 psi}.</p> <p>Perform "After-inspection work" of INFORMATION section.</p>

2. DTC set condition

(1) DTC detection condition

NOx sensor is activated

Engine is running and at least 300 sec. has elapsed since it was started.

DPR Mode = 0

Time elapsed since Burner deactivated \geq 500 sec.

Catalyst located downstream of PM filter (P0420) Completed

Engine coolant temperature (from ECM) $>$ 60 °C {140 °F}

Barometric pressure \geq 75 kPa {11 psi}

Δ | Calculated NOx (SCR upstream., from ECM)/Calculated NOx (SCR upstream., from ECM) $|\leq$ 0.5

(2) Judgement criteria

Compare actual NOx (from NOx sensor (SCR upstream.))

with calculated NOx (SCR upstream., from ECM)

Difference ratio

$$= \frac{\text{Actual NOx sensor (from NOx sensor (SCR upstr.))} - \text{Calculated NOx (SCR upstr., from ECM)}}{\text{Calculated NOx (SCR upstr., from ECM)}}$$

SAPH16F020400190

Average difference ratio: $<$ -0.6 or $>$ 3

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

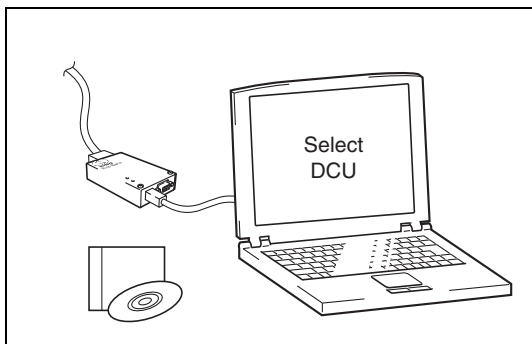
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

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

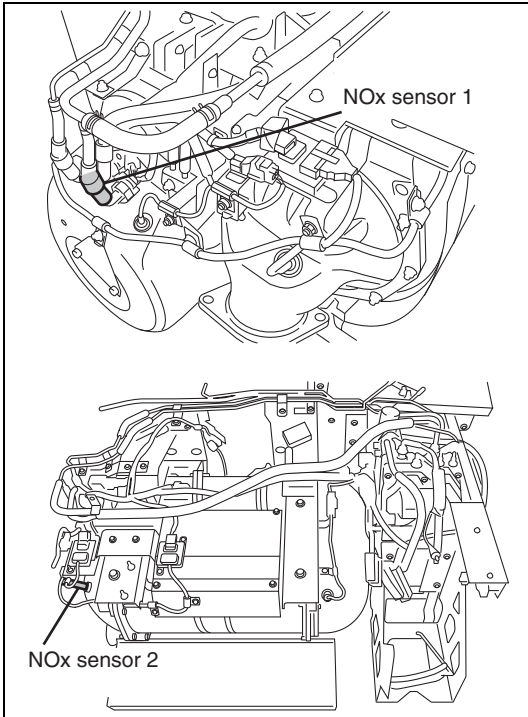
INSPECTION PROCEDURE: P2201**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400191

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if any DTC other than P2201 (for example P2202, P2209, U029D) has been detected in [Fault Information].

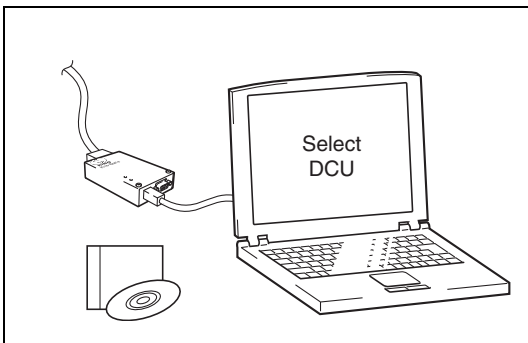
Has a DTC other than P2201 been detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Go to step 2.**

2 Inspect the NOx sensor 1 (SCR upstream)



SAPH16F020400192

1. Set the starter switch to the "LOCK" position.
2. Remove the NOx sensor 1 (SCR upstream) and NOx sensor 2 (SCR downstream).
3. Install NOx sensors 1 and 2 in the vehicle, in their opposite location.



SAPH16F020400193

4. Set the starter switch to the "ON" position.
5. Erase the malfunction history using Hino-DX.
6. Perform a DPR forced regeneration.
7. Select [DCU] and check if P2201 has been detected in [Fault Information].

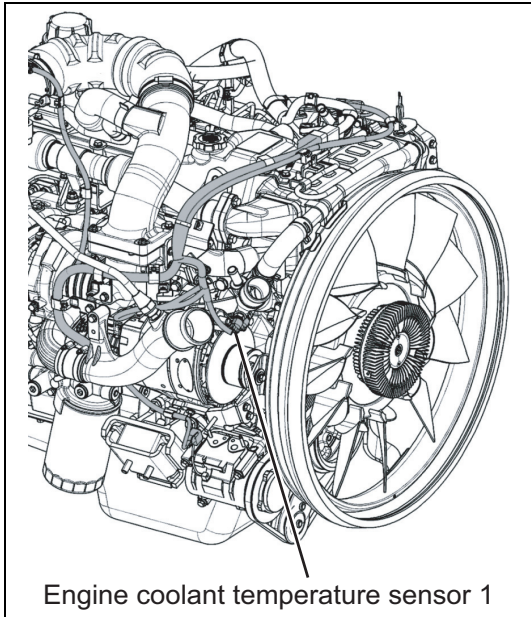
Has DTC P2201 detected?

YES

Go to step 3.

NO

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

3 Inspect the engine coolant temperature sensor

SAPH16F020400194

1. Check the installation of the engine coolant temperature sensor (Looseness and poor contact).
2. Make sure there is no dirt or damage to the engine coolant temperature sensor.

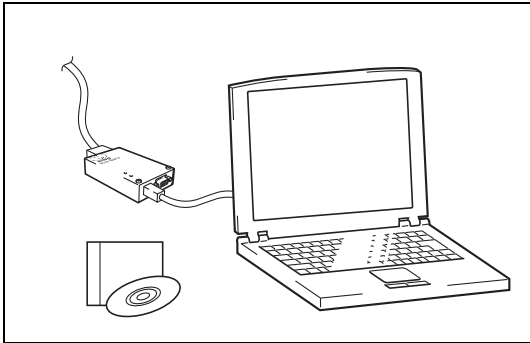
Was any failure found?**YES**

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Check the coolant temperature sensor output signal [Hino-DX]



SAPH16F020400195

1. Set the starter switch to the "ON" position.
2. Select [Engine coolant temperature] from [Data Monitor] on the menu.
3. When the engine coolant temperature (actual measured value) is 50 °C {122 °F}, check if the temperature output by the engine coolant temperature sensor is 50°C {122 °F}.

Standard values

**Engine coolant temperature sensor output value:
50 °C {122 °F}**

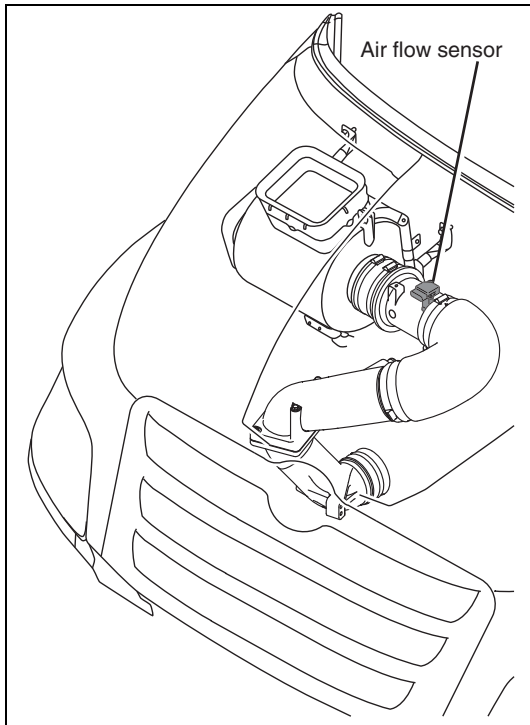
Do the measurements meet the standard value?

YES

Go to step 5.

NO

**Replace the engine coolant temperature sensor.
Perform "After-inspection work" of INFORMATION section.**

5 Inspect the air flow sensor

SAPH16F020400196

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

Was any failure found?**YES**

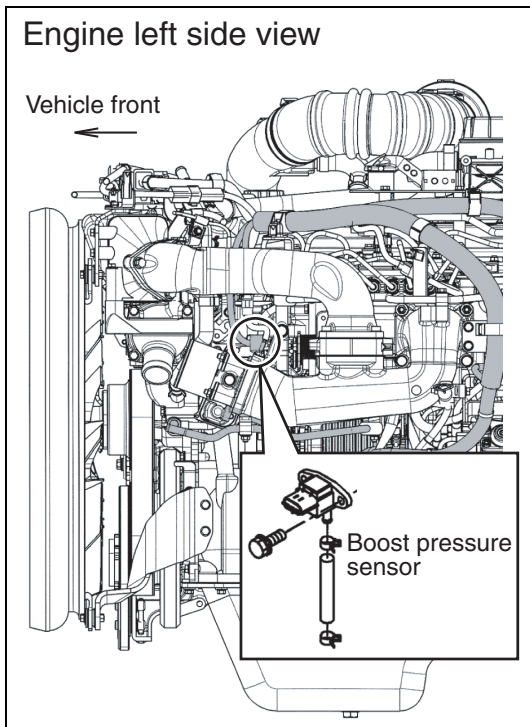
If dirt, clogging or damage in the sensing unit was found, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the boost pressure sensor

1. Check the installation of the boost pressure sensor.
2. Make sure there is no dirt, damage or restriction to the boost pressure sensor.

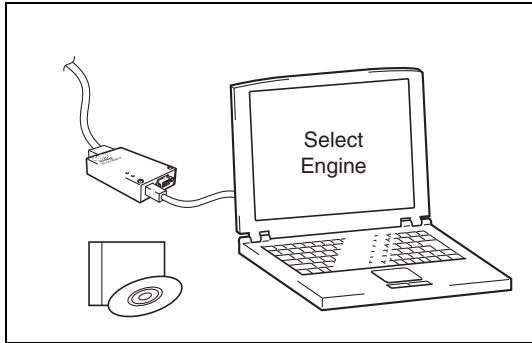


SAPH16F020400197

Was any failure found?**YES**

If dirt, clogging or damage in the sensing unit was found, replace the boost pressure sensor.
Perform "After-inspection work" of INFORMATION section.

NO**Go to step 7.**

7 Check the boost pressure sensor output signal [Hino-DX]

SAPH16F020400198

1. Start the engine.
2. Select [Engine] on the Hino-DX.
3. Select [Actual boost pressure] from [Data Monitor] on the menu.
4. Race the engine from idle to No-Load Maximum and check if the boost pressure output signal varies.

Standard values

Boost pressure sensor output value: There is no abnormal change in the sensor output signal. (The pressure sensor signal changes according to the engine speed)

Do the measurements meet the standard value?

YES

Go to step 8.

NO

Replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.

8 Inspect the intake manifold temperature sensor

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

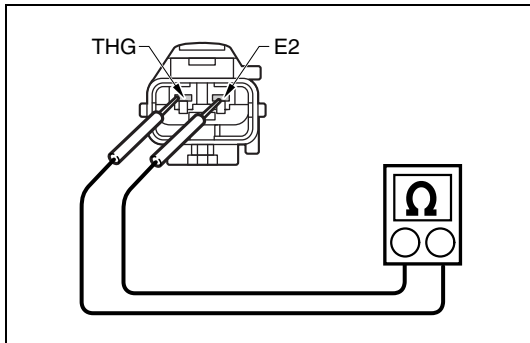
Was any failure found?

YES

Clean the intake manifold temperature sensor and install it properly. If damaged, replace the intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect the intake manifold temperature sensor unit

SAPH16F020400199

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Intake manifold temperature sensor THG – E2	20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ

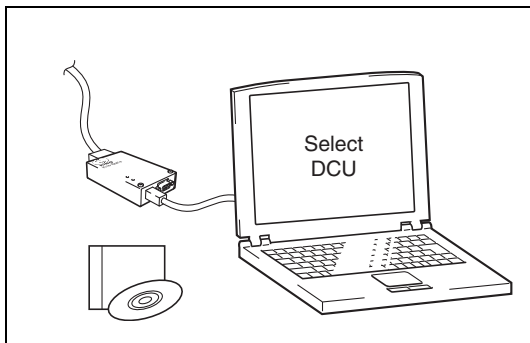
Do the measurements meet the standard value?

YES

Go to step 10.

NO

Replace the intake manifold temperature sensor.
Perform "After-inspection work" of INFORMATION section.

10 Inspect the NOx sensor 1 [Hino-DX]

SAPH16F020400200

1. Replace NOx sensor 1 with a new sensor.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P2201 has been detected in [Fault Information].

Has DTC P2201 been detected?

YES

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

NO

NOx sensor 1 failure. (Install the new NOx sensor 1.)
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P2201

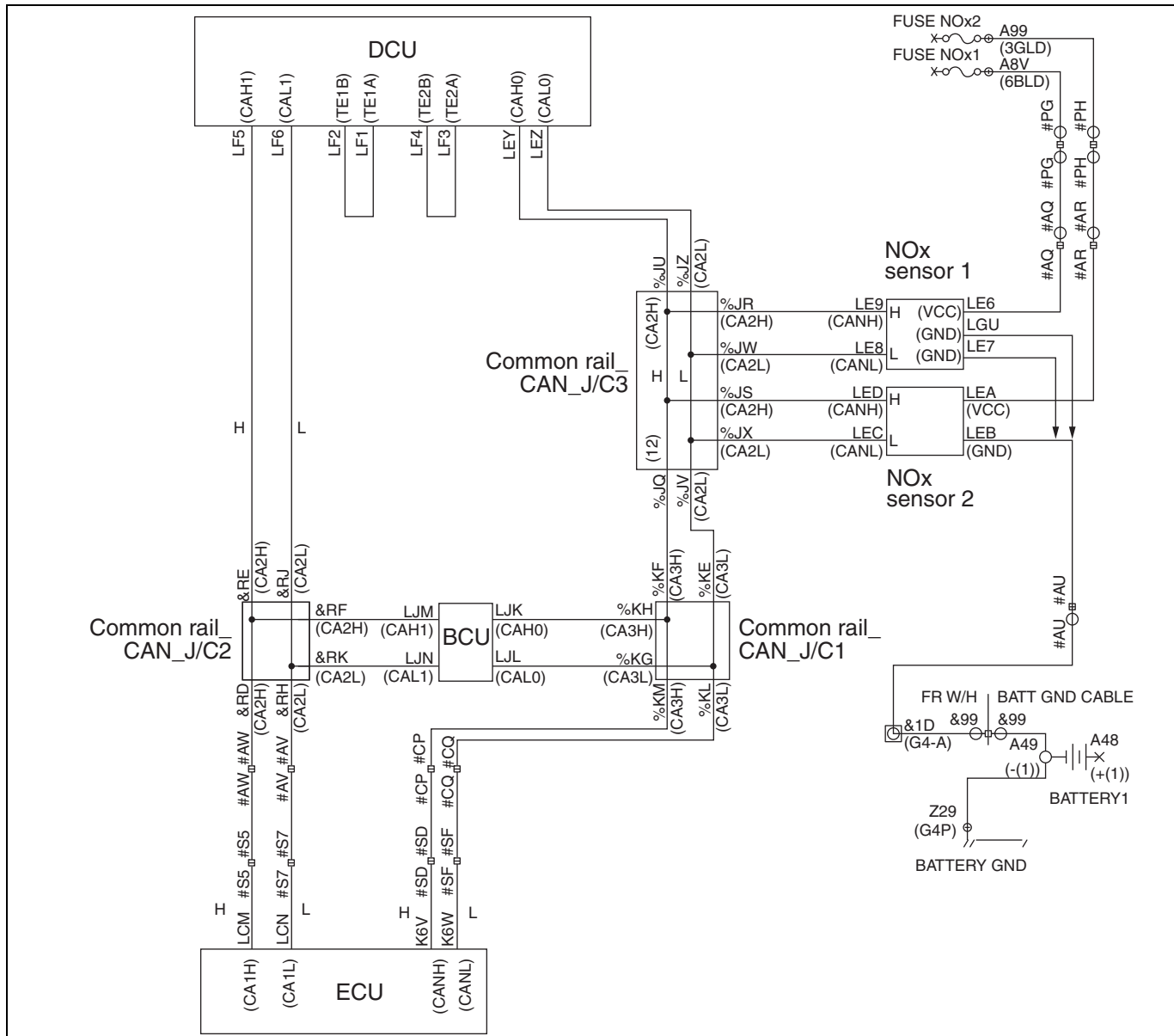
DTC: P2201		NOx sensor (SCR upstream) - Performance and Monitoring capability		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if any DTC other than P2201 (for example P2202, P2209, U029D) has been detected in [Engine].	DTC other than P2201 (for example P2202, P2209, U029D) has been detected: Go to YES. No DTC has not been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the NOx sensor 1 (SCR upstream)	<ol style="list-style-type: none"> Swap the position of the NOx sensor 1 and 2, and attach them to the vehicle. Erase the malfunction history using Hino-DX. After a DPR forced regeneration, check if P2201 is detected in the [DCU]. 	DTC P2201 has been detected: Go to YES. No DTC has not been detected: Go to NO.		Go to step 3.	Replace the NOx sensor 1. Perform "After-inspection work" of INFORMATION section.
3	Inspect the engine coolant temperature sensor	<ol style="list-style-type: none"> Check the installation of the engine coolant temperature sensor (Looseness and poor contact). Make sure there is no dirt or damage to the engine coolant temperature sensor. 	Failure found: Go to YES. No failure found: Go to NO.		Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.
4	Check the engine coolant temperature sensor output signal [Hino-DX]	Select [Engine coolant temperature] from [Data Monitor] on the menu. When the coolant temperature (actual measured value) is 50 °C {122 °F}, check if the temperature output by the engine coolant temperature sensor is 50 °C {122 °F} <Standard values> The output value and the measured value match	The output value and the measured value match: Go to YES. The output value and the measured value do not match: Go to NO.		Go to step 5.	Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2201		NOx sensor (SCR upstream) - Performance and Monitoring capability		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the air flow sensor	<ol style="list-style-type: none"> 1. Check the installation of the air flow sensor. 2. Make sure there is no dirt or damage to the air flow sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		If dirt, clogging or damage in the sensing unit was found, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the boost pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the boost pressure sensor. 2. Make sure there is no dirt, damage or restriction to the boost pressure sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		If dirt, clogging or damage in the sensing unit was found, replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Check the boost pressure sensor output signal [Hino-DX]	<p>From the Hino-DX [Data Monitor] menu, select [Actual boost pressure] to race the engine from idling after the engine is started up from No-Load Maximum, and check if there is no abnormality in the boost pressure sensor output signal.</p> <p><Standard values> There is no abnormal change in the sensor output signal. (The pressure sensor signal changes according to the engine speed)</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 8.	Replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2201		NOx sensor (SCR upstream) - Performance and Monitoring capability		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the intake manifold temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the intake manifold temperature sensor. 2. Make sure there is no dirt or damage to the intake manifold temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the intake manifold temperature sensor and install it properly. If damaged, replace the intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 9.
9	Inspect the intake manifold temperature sensor unit	<p>Measure the resistance between the terminals of the intake manifold temperature sensor.</p> <p><Tester connections> Intake manifold temperature sensor THG – E2</p> <p><Standard values> 20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 10.	Replace the intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.
10	Inspect the NOx sensor 1 [Hino-DX]	Replace the NOx sensor 1 with a new one, and check again if DTCP2201 is detected in the [DCU] after the starter switch is ON.	<p>DTC P2201 has been detected: Go to YES.</p> <p>No DTC has not been detected: Go to NO.</p>		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	NOx sensor 1 failure. Install the new NOx sensor 1. Perform "After-inspection work" of INFORMATION section.

DTC: P2202

EN01H16F02040F03001055

DTC: P2202 NOx sensor (SCR upstream) and Heater - Circuit (Circuit open)
INFORMATION

SAPH16F020400201

1. Technical description

- NOx sensor 1 (SCR upstream) is controlled by the NOx sensor controller.
- The NOx sensor controller is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of circuit inside NOx sensor 1 (SCR upstream) is received from CAN data.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
Failure of NOx sensor 1 (SCR upstream) internal circuit (Low failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

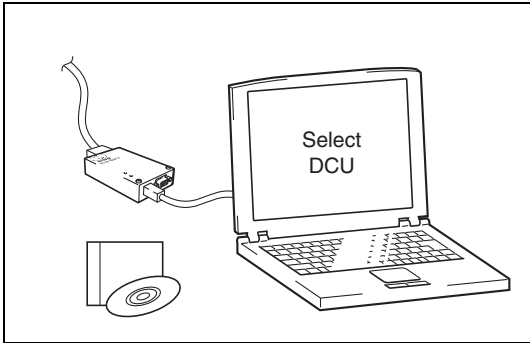
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Failure of NOx sensor 1 (SCR upstream)
 - Failure of circuit inside sensor
 - Failure of NOx sensor controller

INSPECTION PROCEDURE: P2202**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400202

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if a CAN communication system malfunction (U029D) has been detected in [Fault Information].

Has DTC U029D been detected?**YES**

Go to the diagnostic procedure of a related DTC.

NO

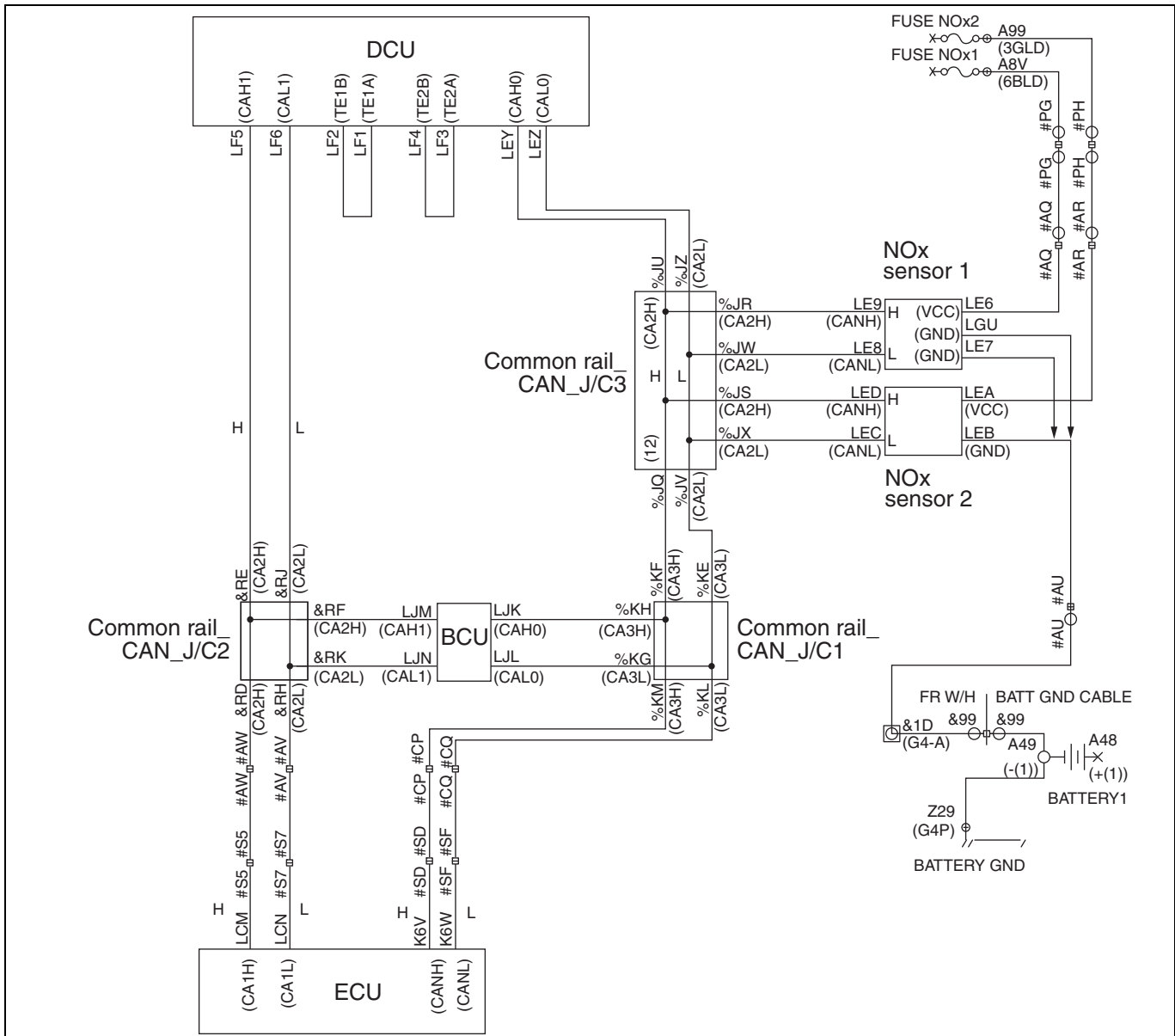
**Replace the NOx sensor 1 (SCR upstream).
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P2202

DTC: P2202		NOx sensor (SCR upstream) and Heater - Circuit (Circuit open)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if a CAN communication system malfunction (U029D) has been detected in [Fault Information].	DTC U029D has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the NOx sensor 1 (SCR upstream). Perform "After-inspection work" of INFORMATION section.

DTC: P2203

EN01H16F02040F03001056

DTC: P2203 NOx sensor (SCR upstream) and Heater - Circuit (Circuit short)
INFORMATION

SAPH16F020400203

1. Technical description

- NOx sensor 1 (SCR upstream) is controlled by the NOx sensor controller.
- The NOx sensor controller is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of NOx sensor 1 (SCR upstream) is received from CAN data.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
Failure of NOx sensor 1 (SCR upstream) internal circuit (High failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

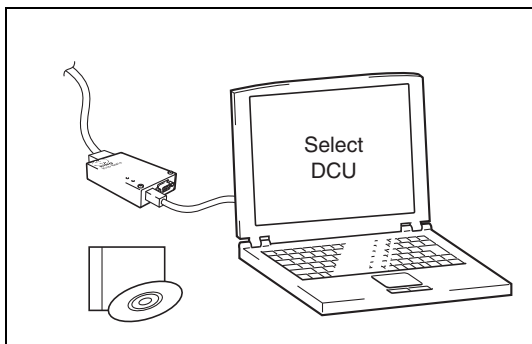
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Failure of NOx sensor 1 (SCR upstream)
 - Failure of circuit inside sensor
 - Failure of NOx sensor controller

INSPECTION PROCEDURE: P2203**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400204

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if a CAN communication system malfunction (U029D) has been detected in [Fault Information].

Has DTC U029D been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Replace the NOx sensor 1 (SCR upstream).
Perform "After-inspection work" of INFORMATION section.**

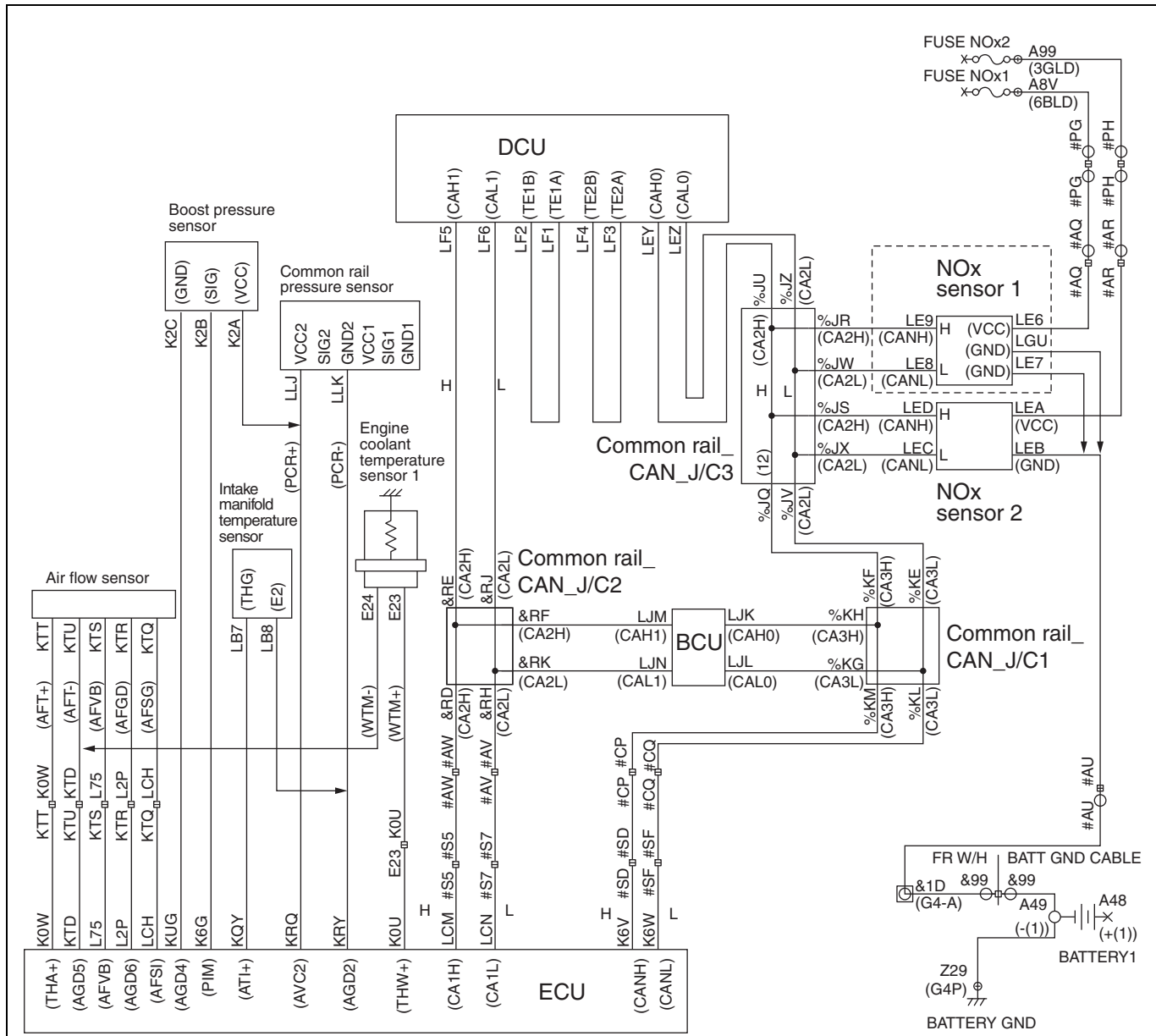
CHECKLIST: P2203

DTC: P2203		NOx sensor (SCR upstream) and Heater - Circuit (Circuit short)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if a CAN communication system malfunction (U029D) has been detected in [DCU].	DTC P029D has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace the NOx sensor 1 (SCR upstream). Perform "After-inspection work" of INFORMATION section.

DTC: P2204

EN01H16F02040F03001057

DTC: P2204 NOx sensor (SCR upstream) - Feedback INFORMATION



SAPH16F020400205

1. Technical description

- NOx sensor 1 (SCR upstream) is controlled by the NOx sensor controller.
- The NOx sensor controller is connected via the DCU and a harness, and it sends and receives data.

<Description of malfunction>

- Failure of NOx sensor 1 (SCR upstream) is detected.

2. DTC set condition

(1) DTC detection condition

Starter switch ON.

NOx sensor 1 (SCR upstream) is operating (after heat-up is completed).

Variation of fuel injection rate (Engine) < 40 mg/cylinder.

(2) Judgement criteria

The NOx sensor status signal sent from the NOx sensor is invalid for at least 90 sec. in a 180 sec. interval.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

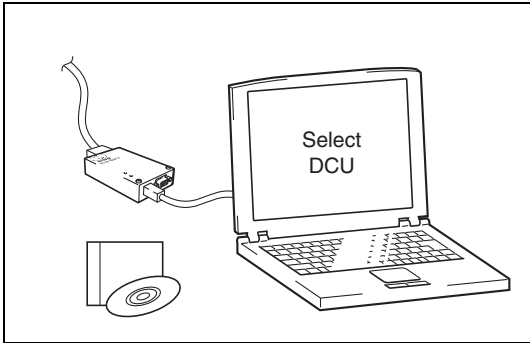
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

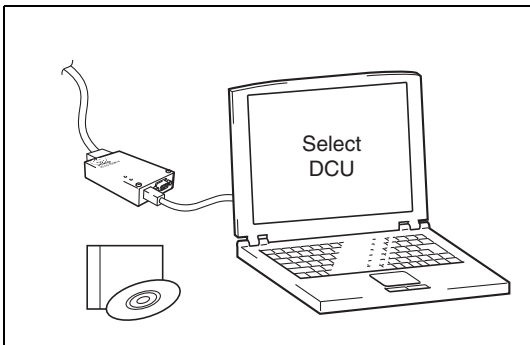
8. Estimated failure factors

- Harness disconnection or short-circuit
- NOx sensor 1 (SCR upstream) malfunction

INSPECTION PROCEDURE: P2204**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400206

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if any DTC other than P2204 (for example, P2202, P2203, P2209, U029D) has been detected in [Fault Information].

Has a DTC other than P2204 been detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Go to step 2.****2 Inspect the NOx sensor 1 (SCR upstream) [Hino-DX]**

SAPH16F020400207

1. Set the starter switch to the "LOCK" position.
2. Disconnect the NOx sensor 1 (SCR upstream) and NOx sensor 2 (SCR downstream).
3. Install NOx sensors 1 and 2 in the vehicle, in their opposite location.
4. Set the starter switch to the "ON" position.
5. Erase the malfunction history using Hino-DX.
6. Perform the DPR forced regeneration.
7. Select [DCU] and check if P2204 has been detected in [Fault Information].

Has DTC P2204 been detected?**YES****Go to step 3.****NO****Replace the NOx sensor 1 (SCR upstream).
Perform "After-inspection work" of INFORMATION section.**

3 Inspect the engine coolant temperature sensor

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

Was any failure found?

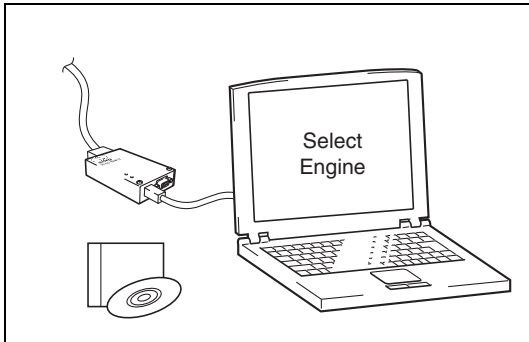
YES

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Check the engine coolant temperature sensor output signal [Hino-DX]



SAPH16F020400208

1. Set the starter switch to the "ON" position.
2. Select [Engine].
3. Select [Engine coolant temperature] from [Data Monitor] on the menu.
4. When the engine coolant temperature (actual measured value) is 50 °C {122 °F}, check if the temperature output by the engine coolant temperature sensor is 50 °C {122 °F}.

Standard values

Coolant temperature sensor output value: 50 °C {122 °F}

Do the measurements meet the standard value?

YES

Go to step 5.

NO

Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

5 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.

Was any failure found?**YES**

If dirt, clogging or damage in the sensing unit was found, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 Inspect the boost pressure sensor

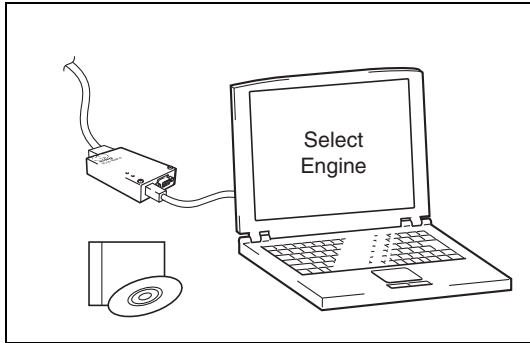
1. Check the installation of the boost pressure sensor.
2. Make sure there is no dirt or damage to the boost pressure sensor.

Was any failure found?**YES**

If dirt, clogging or damage in the sensing unit was found, replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 7.

7 Inspect the boost pressure sensor output signal [Hino-DX]

SAPH16F020400209

1. Start the engine.
2. Select [Engine] on the Hino-DX.
3. Select [Actual boost pressure] from [Data Monitor] on the menu.
4. Race the engine from idle to No-Load Maximum and check if the boost pressure output signal varies.

Standard values

Boost pressure sensor output value: There is no abnormal change in the sensor output signal. (The pressure sensor signal changes according to the engine speed)

Do the measurements meet the standard value?

YES

Go to step 8.

NO

Replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.

8 Inspect the Intake manifold temperature sensor

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

Was any failure found?

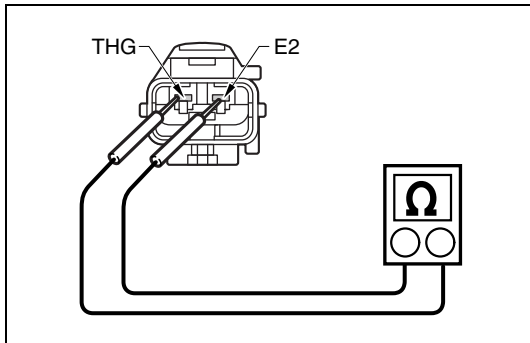
YES

Clean the Intake manifold temperature sensor and install it properly. If damaged, replace the Intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect the Intake manifold temperature sensor unit



SAPH16F020400210

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Intake manifold temperature sensor THG – E2	20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ

Do the measurements meet the standard value?

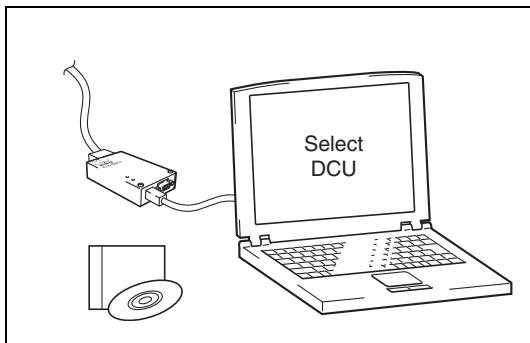
YES

Go to step 10.

NO

Replace the intake manifold temperature sensor.
Perform "After-inspection work" of INFORMATION section.

10 Inspection of the NOx sensor 1 [Hino-DX]



SAPH16F020400211

1. Replace NOx sensor 1 with a new sensor.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P2204 has been detected in [Fault Information].

Has DTC P2204 been detected?

YES

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

NO

NOx sensor 1 failure. Install a new NOx sensor 1.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P2204

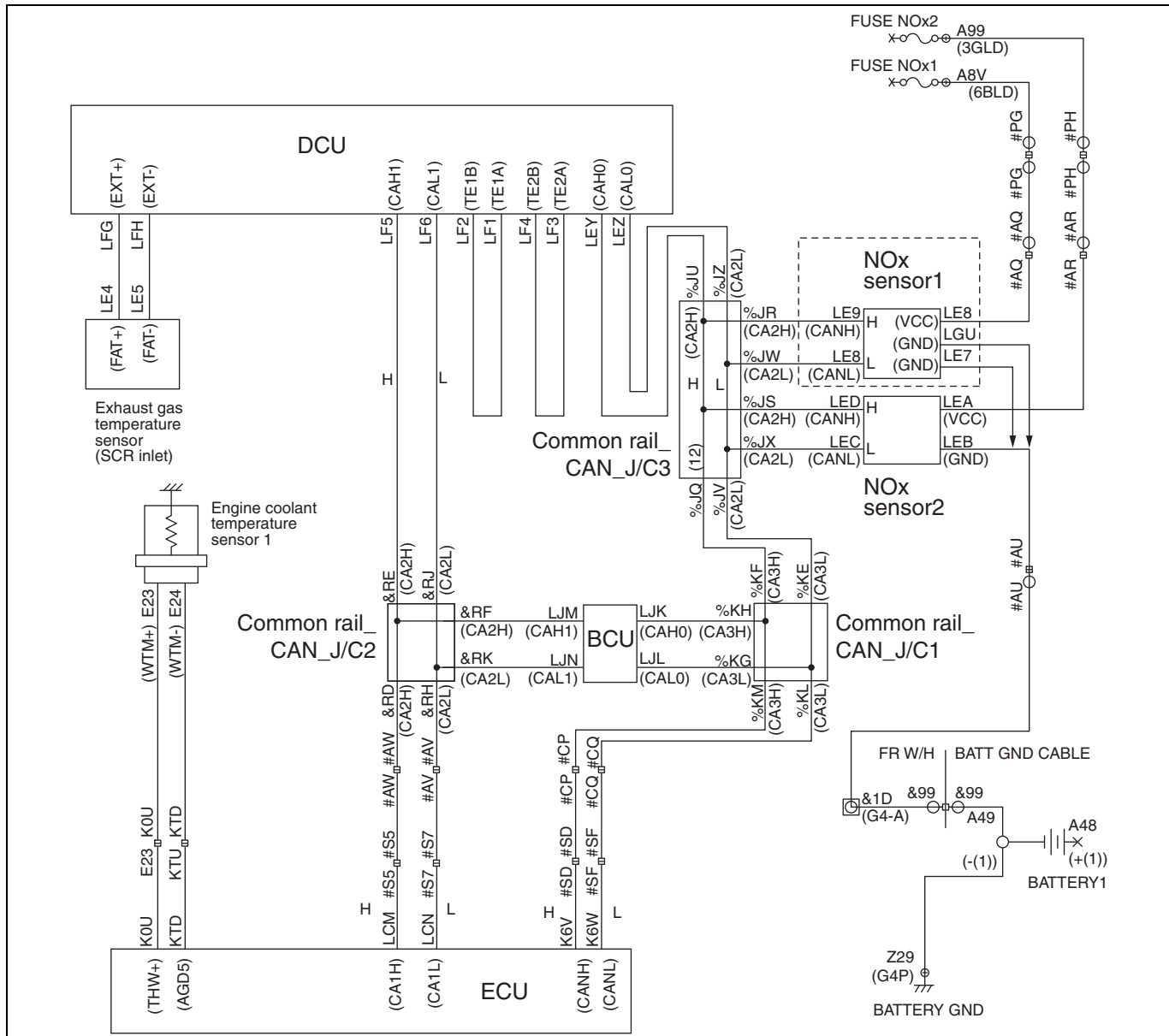
DTC: P2204		NOx sensor (SCR upstream) - Feedback		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if any DTC other than P2204 (for example, P2202, P2203, P2209, U029D) has been detected in [DCU].	DTC other than P2204 (for example, P2202, P2203, P2209, U029D) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the NOx sensor 1 (SCR upstream) [Hino-DX]	Swap the NOx sensor 1 (SCR upstream) and NOx sensor 2 (SCR downstream), connect them and check if DTC P2204 has been detected. 1. Install NOx sensors 1 and 2 in the vehicle, in their opposite location. 2. Erase the malfunction history using Hino-DX. 3. Perform the DPR forced regeneration. Check if P2204 has been detected in [DCU].	DTC P2204 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Replace the NOx sensor 1 Perform "After-inspection work" of INFORMATION section.
3	Inspect the engine coolant temperature sensor	1. Check the installation of the engine coolant temperature sensor. 2. Make sure there is no dirt or damage to the engine coolant temperature sensor.	Failure found: Go to YES. No failure found: Go to NO.		Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 4.

DTC: P2204		NOx sensor (SCR upstream) - Feedback		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
4	Check the engine coolant temperature sensor output signal [Hino-DX]	Select [Engine coolant temperature] from [Data Monitor] on the menu. When the engine coolant temperature (actual measured value) is 50 °C {122 °F}, check if the temperature output by the engine coolant temperature sensor is 50 °C {122 °F}. <Standard values > The output value and the measured value match	The output value and the measured value match: Go to YES. The output value and the measured value do not match: Go to NO.		Go to step 5.	Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.
5	Inspect the air flow sensor	<ol style="list-style-type: none"> 1. Check the installation of the air flow sensor. 2. Make sure there is no dirt or damage to the air flow sensor. 	Failure found: Go to YES. No failure found: Go to NO.		If dirt, clogging or damage in the sensing unit was found, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the boost pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the boost pressure sensor. 2. Make sure there is no dirt, clogging or damage in the sensing unit of the boost pressure sensor. 	Failure found: Go to YES. No failure found: Go to NO.		If dirt, clogging or damage in the sensing unit was found, replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Inspect the boost pressure sensor output signal [Hino-DX]	Select [Actual boost pressure] from [Data Monitor] on the menu. Race the engine from idle to No-Load Maximum and check if the boost pressure output signal varies. <Standard values> There is no abnormality in the sensor output signal. (The pressure sensor signal changes according to the engine speed)	There is no abnormality in the sensor output signal: Go to YES. There is abnormality in the sensor output signal: Go to NO.		Go to step 8.	Replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2204		NOx sensor (SCR upstream) - Feedback		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
8	Inspect the Intake manifold temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the intake manifold temperature sensor. 2. Make sure there is no dirt or damage to the intake manifold temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the Intake manifold temperature sensor and install it properly. If damaged, replace the Intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 9.
9	Inspect the Intake manifold temperature sensor unit	<p>Measure the resistance between the terminals of the intake manifold temperature sensor.</p> <p><Tester connections> Intake manifold temperature sensor THG – E2</p> <p><Standard values> 20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 10.	Replace the intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.
10	Inspection of the NOx sensor 1 [Hino-DX]	Replace the NOx sensor 1 with a new one, and check again if P2204 is detected in the [DCU] after the starter switch is ON.	<p>DTC P2204 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	NOx sensor 1 failure. Install a new NOx sensor 1. Perform "After-inspection work" of INFORMATION section.

DTC: P2209

EN01H16F02040F03001058

DTC: P2209 NOx sensor (SCR upstream) - Heater performance
INFORMATION

SAPH16F020400212

1. Technical description

- The NOx sensors are controlled by the NOx sensor controller.
- The NOx sensor controller is connected to the DCU via the harness for reception and transmission of information.

<Description of malfunction>

- Failure of NOx sensor 1 (SCR upstream) is detected.

2. DTC set condition**(1) DTC detection condition**

Starter switch ON.

SCR catalyst downstream temperature (from exhaust gas temperature sensor (SCR inlet)) $\geq 100\text{ }^{\circ}\text{C}$ {212 $^{\circ}\text{F}$ }Engine coolant temperature $\geq 65\text{ }^{\circ}\text{C}$ {149 $^{\circ}\text{F}$ }**(2) Judgement criteria**

A valid NOx reading cannot be taken by the NOx sensor when 180 sec. elapses after start of NOx sensor heater activation.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Disconnection or short-circuit in sensor harness
- Malfunction of NOx sensor 1 (SCR upstream)
 - Malfunction of circuit in the sensor
 - Malfunction of NOx sensor controller

INSPECTION PROCEDURE: P2209

1 Inspect the NOx sensor 1 (SCR upstream) connector

1. Check the connection of the NOx sensor (SCR upstream) connector (Looseness and poor contact).

Was any failure found?

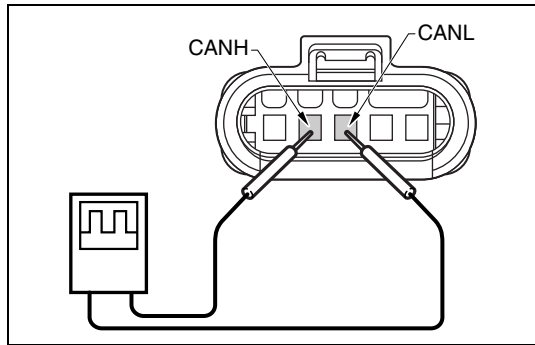
YES

NO

Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.

Go to step 2.

2 Inspect the NOx sensor 1 harness (CAN communication line)



SAPH16F020400213

1. Set the starter switch to the "LOCK" position.
2. Disconnect the NOx sensor 1 connector.
3. Set the starter switch to the "ON" position.
4. Use the oscilloscope to measure the voltage between the terminals of the NOx sensor 1 vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	NOx sensor 1 vehicle-side connector CANH – CANL	0 ↔ 5 V pulse waveform

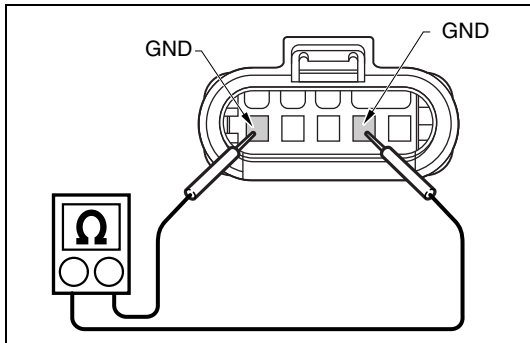
Do the measurements meet the standard value?

YES

NO

Go to step 3.

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

3 Inspect the NOx sensor 1 harness (GND line)

SAPH16F020400214

1. Use the electrical tester to measure the resistance between the terminals of the NOx sensor 1 vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	NOx sensor 1 vehicle-side connector GND – GND	Continuity

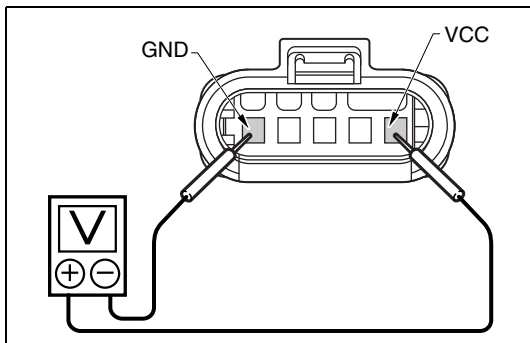
Do the measurements meet the standard value?

YES

Go to step 4.

NO

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

4 Inspect the NOx sensor 1 harness (power supply line)

SAPH16F020400215

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

Measurement conditions	Tester connections	Standard values
Starter switch: ON	NOx sensor 1 vehicle-side connector VCC – GND	9 V to 16 V

Do the measurements meet the standard value?

YES

Go to step 5.

NO

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

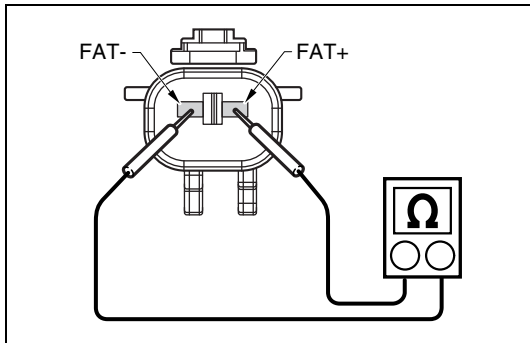
5 Inspect the exhaust gas temperature sensor (SCR inlet) connector

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.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 6.****6 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).
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 7.**

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

SAPH16F020400216

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 8.

NO

Replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

8 Inspect the engine coolant temperature sensor connector

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect the engine coolant temperature sensor

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

Was any failure found?

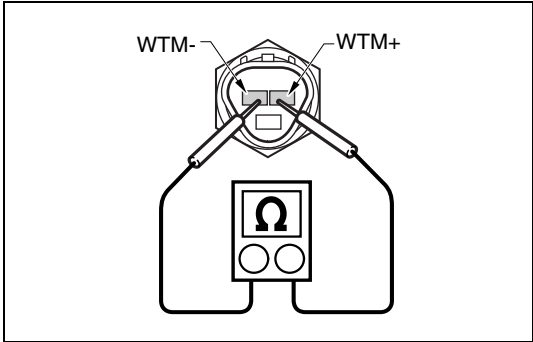
YES

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect the engine coolant temperature sensor unit



SAPH16F020400217

1. Disconnect the engine coolant temperature sensor connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor.

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

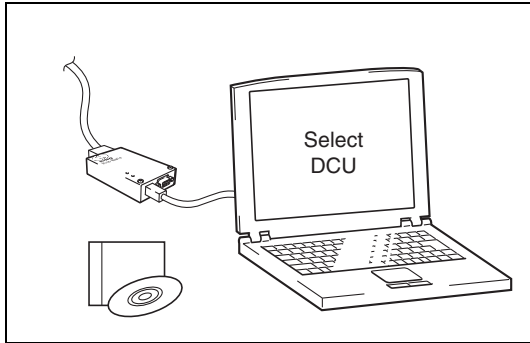
Do the measurements meet the standard value?

YES

Go to step 11.

NO

Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

11 Inspect the NOx sensor 1 [Hino-DX]

SAPH16F020400218

1. Set the starter switch to the "LOCK" position.
2. Replace a new NOx sensor 1.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Erase the malfunction history and perform a DPR forced regeneration.
6. Select [DCU] and check if P2209 has been detected in [Fault Information].

Has DTC other than P2209 been detected?**YES**

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

NO

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

CHECKLIST: P2209

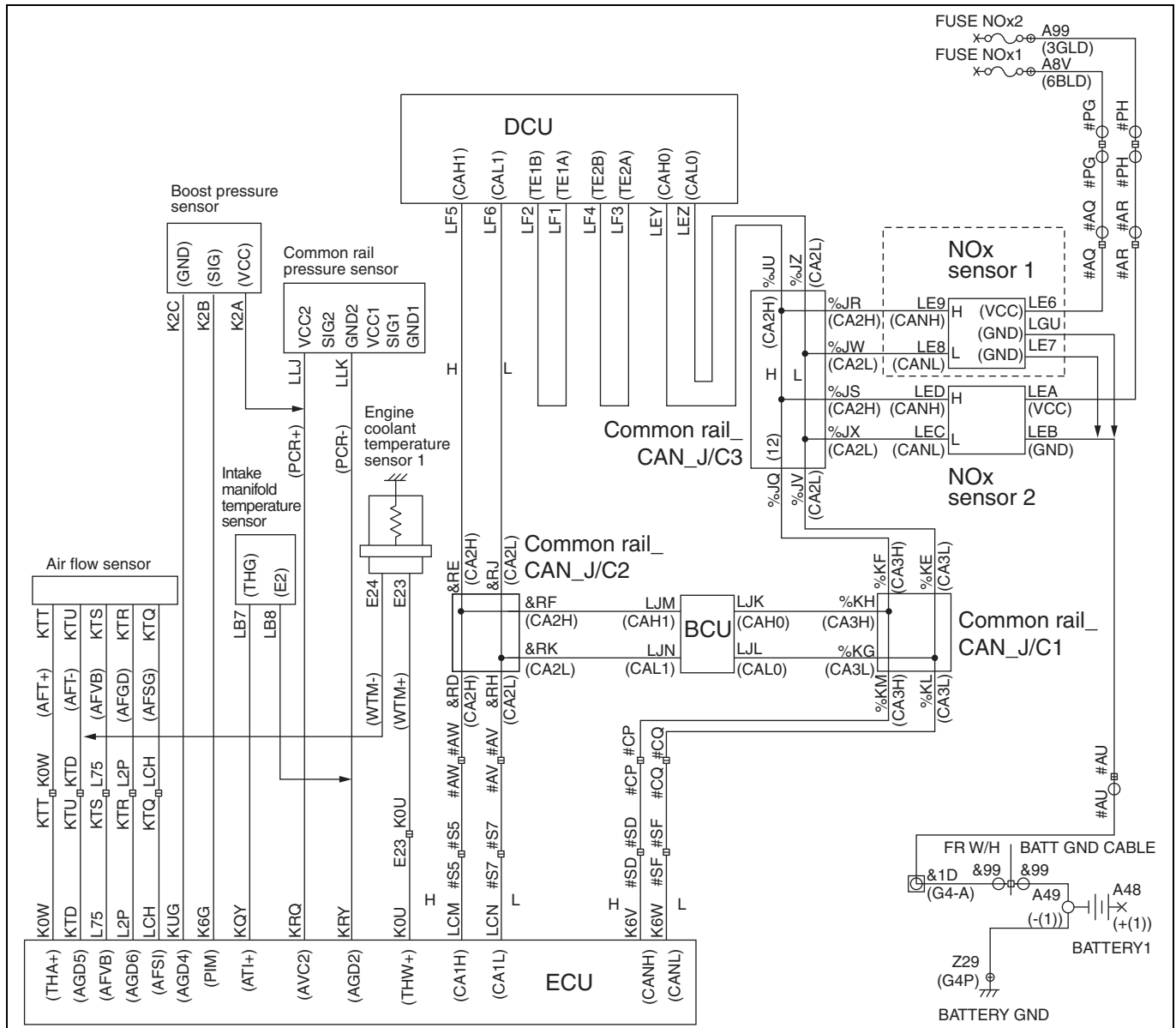
DTC: P2209		NOx sensor (SCR upstream) - Heater performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the NOx sensor 1 (SCR upstream) connector	Check the connection of the NOx sensor (SCR upstream) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the NOx sensor 1 harness (CAN communication line)	Disconnect the NOx sensor 1 connector, use the oscilloscope to measure the voltage between the terminals of the NOx sensor 1 vehicle-side connector. <Tester connections> NOx sensor 1 vehicle-side connector CANH – CANL <Standard values> 0 – 5 V pulse waveform	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
3	Inspect the NOx sensor 1 harness (GND line)	Measure the resistance between the terminals of the NOx sensor 1 vehicle-side connector. <Tester connections> NOx sensor 1 vehicle-side connector GND – GND <Standard values> Continuity	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect the NOx sensor 1 harness (power supply line)	Measure the voltage between the terminals of the NOx sensor 1 vehicle-side connector. <Tester connections> NOx sensor 1 vehicle-side connector VCC – GND <Standard values> 9 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
5	Inspect the exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 6.

DTC: P2209		NOx sensor (SCR upstream) - Heater performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
6	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 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). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Inspect the exhaust gas temperature sensor (SCR inlet) unit	<p>Measure the resistance between the terminals of the exhaust gas temperature sensor (SCR inlet). <Tester connections> Exhaust gas temperature sensor (SCR inlet) FAT+ – FAT- <Standard values> 20 °C {68 °F}: 220 Ω</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 8.	Replace the exhaust gas temperature sensor (SCR inlet) unit. Perform "After-inspection work" of INFORMATION section.
8	Inspect the engine coolant temperature sensor connector	Check the connection of engine coolant temperature sensor connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 9.

DTC: P2209		NOx sensor (SCR upstream) - Heater performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Inspect the engine coolant temperature sensor	<ol style="list-style-type: none"> 1. Check the condition of the engine coolant temperature sensor (Looseness and poor contact). 2. Make sure there is no dirt or damage to the coolant temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 10.
10	Inspect the engine coolant temperature sensor unit	<p>Measure the resistance between the terminals of the engine coolant temperature sensor.</p> <p><Tester connections> Engine coolant temperature sensor WTM+ – WTM- <Standard values> 20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176 °F}: 0.326 – 0.310 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 11.	Replace the engine coolant temperature sensor unit. Perform "After-inspection work" of INFORMATION section.
11	Inspect the NOx sensor 1 [Hino-DX]	<ol style="list-style-type: none"> 1. Replace a new NOx sensor 1. 2. Erase the malfunction history and perform a DPR forced regeneration. 3. Check if P2209 has been detected in [DCU]. 	<p>DTC P2209 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

DTC: P2212

EN01H16F02040F03001059

DTC: P2212 NOx sensor (SCR downstream) - Feedback INFORMATION

SAPH16F020400219

1. Technical description

- NOx is detected by a NOx sensor status signal sent from NOx sensor 2 (SCR downstream).

<Description of malfunction>

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

2. DTC set condition

- (1) DTC detection condition

NOx sensor is activated

$|\Delta\text{Fuel injection quantity (from ECM)}| < 40 \text{ mg/cyl/sec.}$

- (2) Judgement criteria

The NOx sensor status signal sent from NOx sensor 2 is invalid for at least 90 sec. in a 180 sec. interval.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

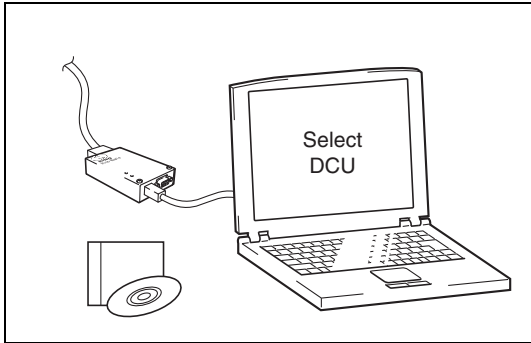
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

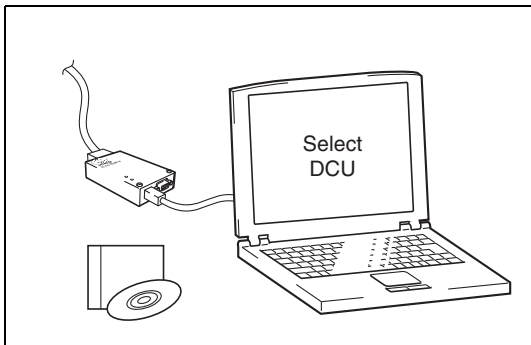
8. Estimated failure factors

- Harness disconnection or short-circuit
- NOx sensor 2 (SCR downstream) malfunction

INSPECTION PROCEDURE: P2212**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400220

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to Hino-DX.
3. Set the starter switch to the "ON" position.
4. Select [DCU] and check if any DTC other than P2212 (for example, P2215, P2216, P2222, U029E) has been detected in [Fault Information].

Has a DTC other than P2212 been detected?**YES****NO****Go to diagnosis procedure of a related DTC.****Go to step 2.****2 Inspect the NOx sensor 2 (SCR downstream) [Hino-DX]**

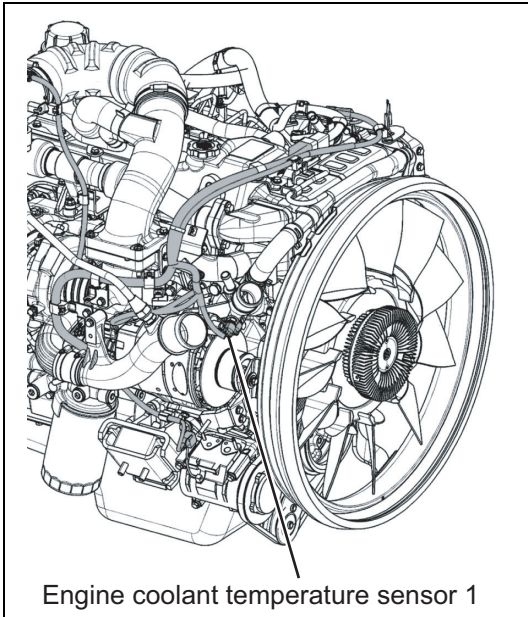
SAPH16F020400221

1. Set the starter switch to the "LOCK" position.
2. Disconnect the NOx sensor 1 (SCR upstream) and NOx sensor 2 (SCR downstream).
3. Install NOx sensors 1 and 2 in the vehicle, in their opposite location.
4. Set the starter switch to the "ON" position.
5. Erase the malfunction history using Hino-DX.
6. Perform a DPR forced regeneration.
7. Select [DCU] and check if P2212 has been detected in [Fault Information].

Has DTC P2212 been detected?**YES****NO****Go to step 3.**

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

3 Inspect the engine coolant temperature sensor



SAPH16F020400222

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

Was any failure found?

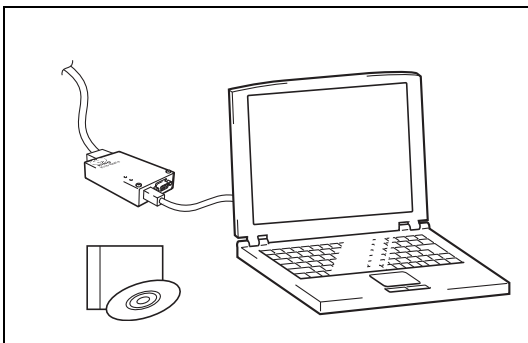
YES

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Check the engine coolant temperature sensor output signal [Hino-DX]



SAPH16F020400223

1. Set the starter switch to the "ON" position.
2. Select [Engine].
3. Select [Engine coolant temperature] from [Data Monitor] on the menu.
4. When the engine coolant temperature (actual measured value) is 50 °C {122 °F}, check if the temperature output by the coolant temperature sensor is 50 °C {122 °F}.

Standard values

Engine coolant temperature sensor output value:
50 °C {122 °F}

Do the measurements meet the standard value?

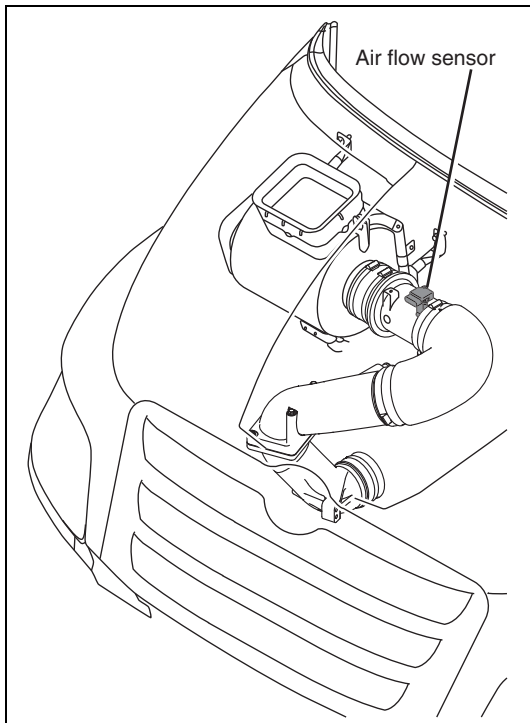
YES

Go to step 5.

NO

Replace the engine coolant temperature sensor.
Perform "After-inspection work" of INFORMATION section.

5 Inspect the air flow sensor



SAPH16F020400224

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

Was any failure found?

YES

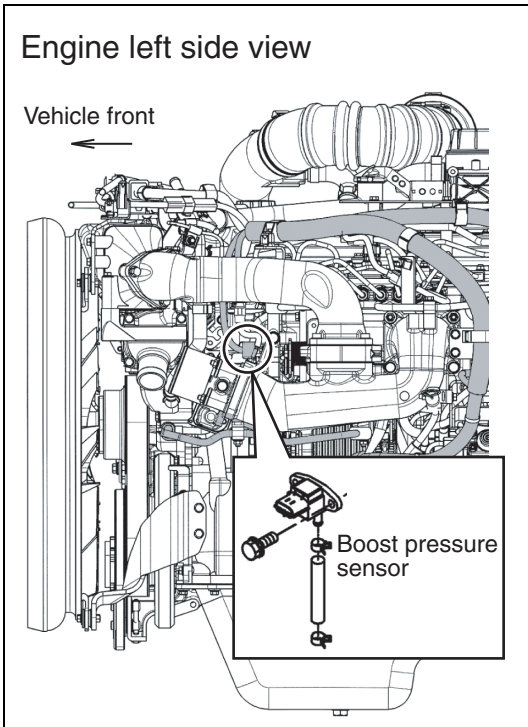
If dirt, clogging or damage in the sensing unit was found, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

6 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.



SAPH16F020400225

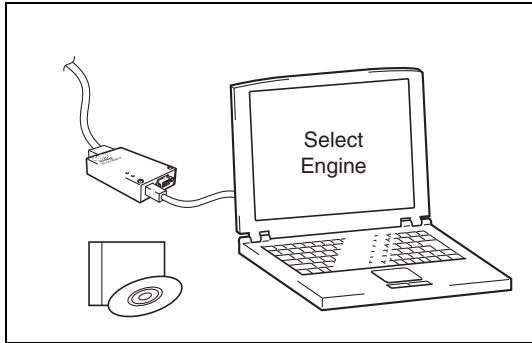
Was any failure found?

YES

If dirt, clogging or damage in the sensing unit was found, replace the boost pressure sensor.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 7.

7 Check the boost pressure sensor output signal [Hino-DX]

SAPH16F020400226

1. Start the engine.
2. Select [Engine] on the Hino-DX.
3. Select [Actual boost pressure] from [Data Monitor] on the menu.
4. Race the engine from idle to No-Load Maximum and check if the boost pressure output signal varies.

Standard values

Boost pressure sensor output value: There is no abnormal change in the sensor output signal. (The pressure sensor signal changes according to the engine speed)

Do the measurements meet the standard value?

YES

Go to step 8.

NO

Replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.

8 Inspect the intake manifold temperature sensor

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

Was any failure found?

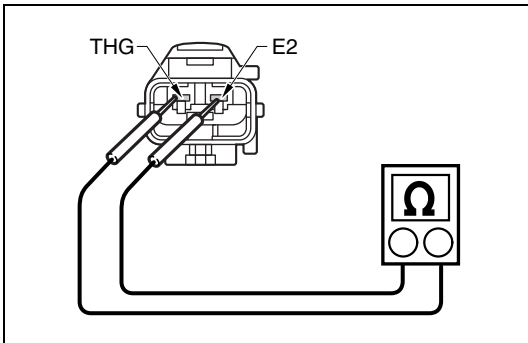
YES

Clean the intake manifold temperature sensor and install it properly. If damaged, replace the intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect the Intake manifold temperature sensor unit



SAPH16F020400227

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Intake manifold temperature sensor THG – E2	20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ

Do the measurements meet the standard value?

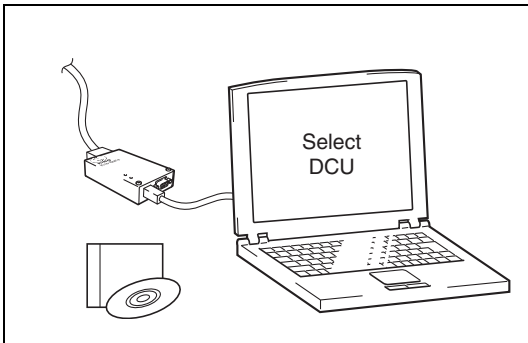
YES

Go to step 10.

NO

Replace the Intake manifold temperature sensor.
Perform "After-inspection work" of INFORMATION section.

10 Inspection of the NOx sensor 2 [Hino-DX]



SAPH16F020400228

1. Replace NOx sensor 2 with a new sensor.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if P2212 has been detected in [Fault Information].

Has DTC P2212 been detected?

YES

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

NO

NOx sensor 2 is faulty. Install a new NOx sensor 2.
Perform "After-inspection work" of INFORMATION section.

CHECKLIST: P2212

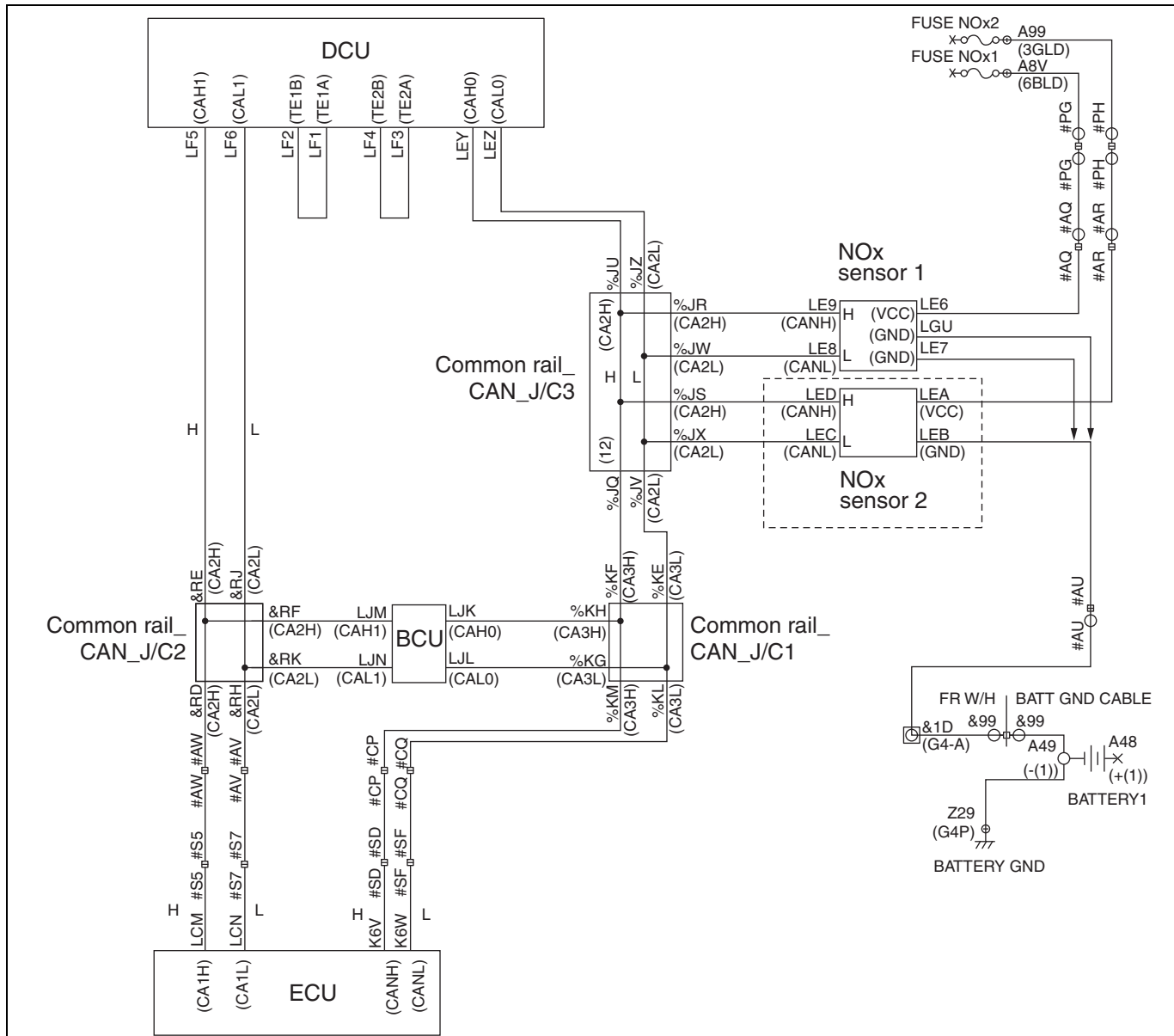
DTC: P2212		NOx sensor (SCR downstream) - Feedback		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if any DTC other than P2212 (for example, P2215, P2216, P2222, U029E) has been detected in [DCU].	DTC other than P2212 (for example, P2215, P2216, P2222, U029E) has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to diagnosis procedure of a related DTC.	Go to step 2.
2	Inspect the NOx sensor 2 (SCR downstream)	Swap the NOx sensor 1(SCR upstream) and NOx sensor 2 (SCR downstream), connect them and check if DTC P2212 has been detected. 1. Swap the positions of the NOx sensor 1 and 2, and attach them to the vehicle. 2. Erase the malfunction history using Hino-DX. 3. After DPR forced regeneration, check if P2212 is detected in the [DCU].	DTC P2212 has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to step 3.	Replace the NOx sensor 2. Perform "After-inspection work" of INFORMATION section.
3	Inspect the engine coolant temperature sensor	1. Check the installation of the engine coolant temperature sensor. 2. Make sure there is no dirt or damage to the engine coolant temperature sensor.	The output value and the measured value match: Go to YES. The output value and the measured value do not match: Go to NO.		Clean the engine coolant temperature sensor and connect securely. Repair the sensor if needed.	Go to step 4.
4	Check the engine coolant temperature sensor output signal [Hino-DX]	Select [Engine coolant temperature] from [Data Monitor] on the menu. When the engine coolant temperature (actual measured value) is 50 °C {122 °F}, check if the temperature output by the engine coolant temperature sensor is 50 °C {122 °F}. <Standard values> The output value and the measured value match.	The output value and the measured value match: Go to YES. The output value and the measured value do not match: Go to NO.		Go to step 5.	Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

DTC: P2212		NOx sensor (SCR downstream) - Feedback		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
5	Inspect the air flow sensor	<ol style="list-style-type: none"> 1. Check the installation of the air flow sensor. 2. Make sure there is no dirt or damage to the air flow sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		If dirt, clogging or damage in the sensing unit was found, replace the air flow sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 6.
6	Inspect the boost pressure sensor	<ol style="list-style-type: none"> 1. Check the installation of the boost pressure sensor. 2. Make sure there is no dirt or damage to the boost pressure sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		If dirt, clogging or damage in the sensing unit was found, replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 7.
7	Check the boost pressure sensor output signal [Hino-DX]	<p>From the Hino-DX [Data Monitor] menu, select [Actual boost pressure] to race the engine from idling after the engine is started up from No-Load Maximum, and check if there is no abnormality in the boost pressure sensor output signal.</p> <p><Standard values> There is no abnormal change in the sensor output signal. (The pressure sensor signal changes according to the engine speed)</p>	<p>There is no abnormal change in the sensor output signal: Go to YES.</p> <p>There is abnormal change in the sensor output signal: Go to NO.</p>		Go to step 8.	Replace the boost pressure sensor. Perform "After-inspection work" of INFORMATION section.
8	Inspect the intake manifold temperature sensor.	<ol style="list-style-type: none"> 1. Check the installation of the intake manifold temperature sensor. 2. Make sure there is no dirt or damage to the intake manifold temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the intake manifold temperature sensor and connect securely. Replace the intake manifold temperature sensor if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 9.

DTC: P2212		NOx sensor (SCR downstream) - Feedback		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Inspect the intake manifold temperature sensor unit.	Measure the resistance between the terminals of the intake manifold temperature sensor. <Tester connections> Intake manifold temperature sensor THG – E2 <Standard values> 20 °C {68 °F}: 7.336 – 5.794 kΩ 50 °C {122 °F}: 2.435 – 2.41 kΩ	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 10.	Replace the intake manifold temperature sensor. Perform "After-inspection work" of INFORMATION section.
10	Inspect the NOx sensor 2 [Hino-DX]	Replace the NOx sensor 2 with a new one, and check again if DTC P2212 is detected in the [DCU] after the switch is ON.	DTC P2212 has been detected: Go to YES. No DTC has been detected: Go to NO.		Replace the DCU. Perform "After-inspection work" of INFORMATION section.	NOx sensor 2 is faulty. Install a new NOx sensor 2. Perform "After-inspection work" of INFORMATION section.

DTC: P2215

EN01H16F02040F03001060

DTC: P2215 NOx sensor (SCR downstream) and Heater - Circuit (Circuit open)
INFORMATION

SAPH16F020400229

1. Technical description

- The NOx sensor 2 (SCR downstream) is controlled by the NOx sensor controller.
- The NOx sensor controller is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of NOx sensor 2 (SCR downstream) is received from CAN data.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
Failure of NOx sensor 2 (SCR downstream) internal circuit (Low failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

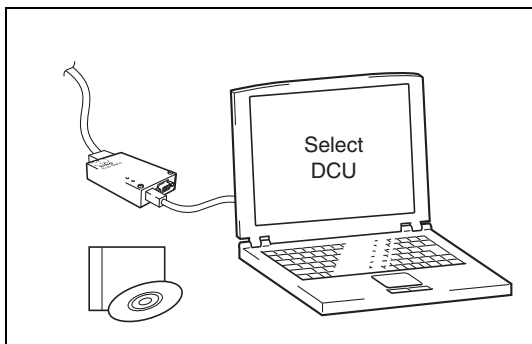
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Failure of NOx sensor 2 (SCR downstream)
 - Failure of circuit inside sensor
 - Failure of NOx sensor controller

INSPECTION PROCEDURE: P2215**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400230

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if a CAN communication system malfunction (U029E) has been detected in [Fault Information].

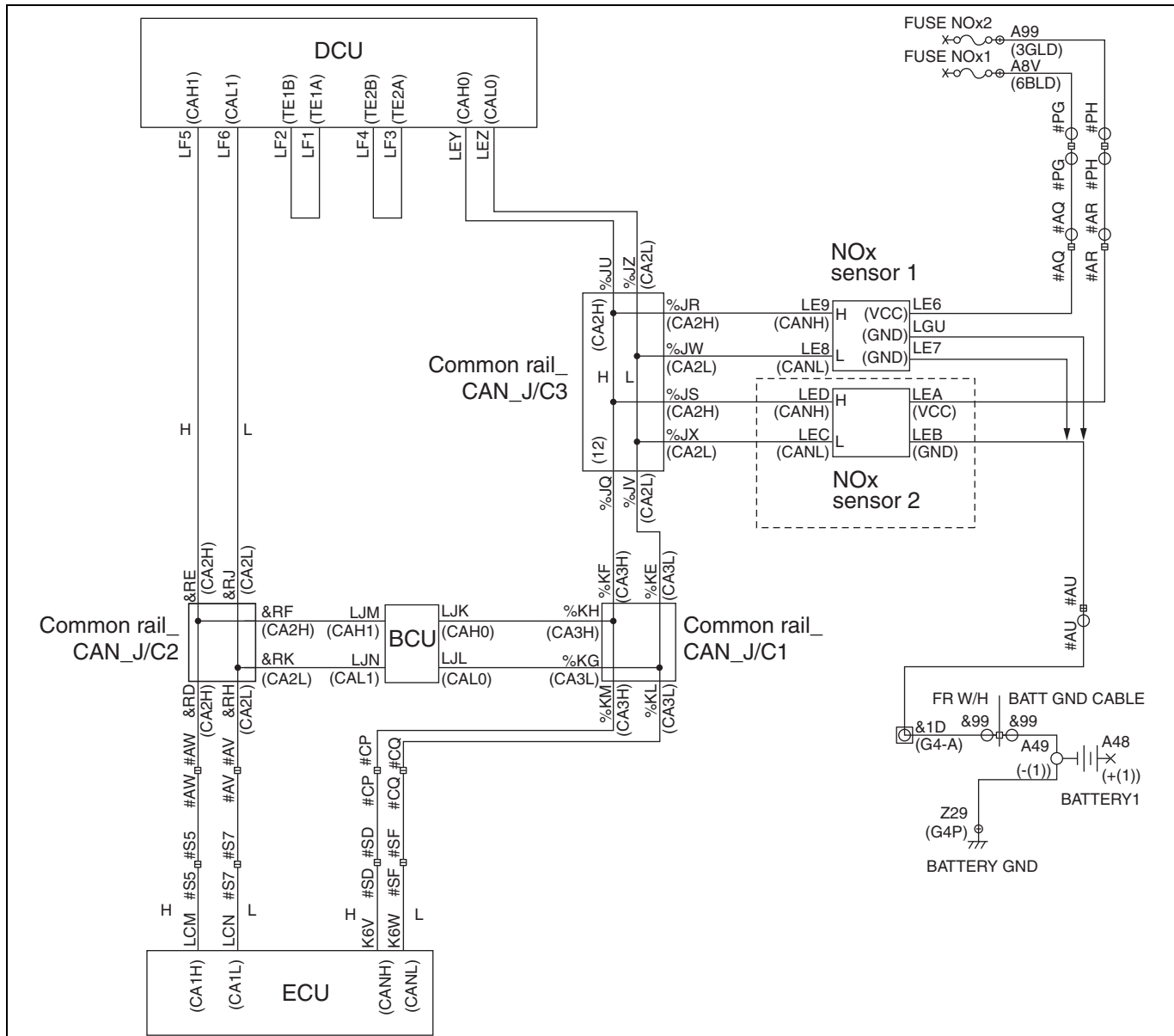
Has DTC U029E been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Replace the NOx sensor 2 (SCR downstream).
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P2215

DTC: P2215		NOx sensor (SCR downstream) and Heater - Circuit (Circuit open)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if a CAN communication system malfunction (U029E) has been detected in [DCU].	DTC U029E has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace NOx sensor 2 (SCR downstream). Perform "After-inspection work" of INFORMATION section.

DTC: P2216

EN01H16F02040F03001061

DTC: P2216 NOx sensor (SCR downstream) and Heater - Circuit (Circuit short)
INFORMATION

SAPH16F020400231

1. Technical description

- The NOx sensor 2 (SCR downstream) is controlled by the NOx sensor controller.
- The NOx sensor controller is connected via the engine ECU and DCU through CAN communication, and it sends and receives data.

<Description of malfunction>

- Failure of NOx sensor 2 (SCR downstream) is received from CAN data.

2. DTC set condition

- (1) DTC detection condition
Starter switch ON.
- (2) Judgement criteria
Failure of NOx sensor 2 (SCR downstream) (High failure flag) is received from CAN data.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

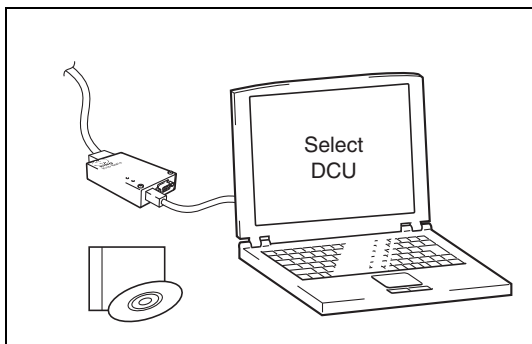
- Check if the battery voltage is in the normal range.

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Failure of NOx sensor 2 (SCR downstream)
 - Failure of circuit inside sensor
 - Failure of NOx sensor controller

INSPECTION PROCEDURE: P2216**1 Check the DTC detected (DCU) [Hino-DX]**

SAPH16F020400232

1. Connect the vehicle to Hino-DX.
2. Set the starter switch to the "ON" position.
3. Select [DCU] and check if a CAN communication system malfunction (U029E) has been detected in [Fault Information].

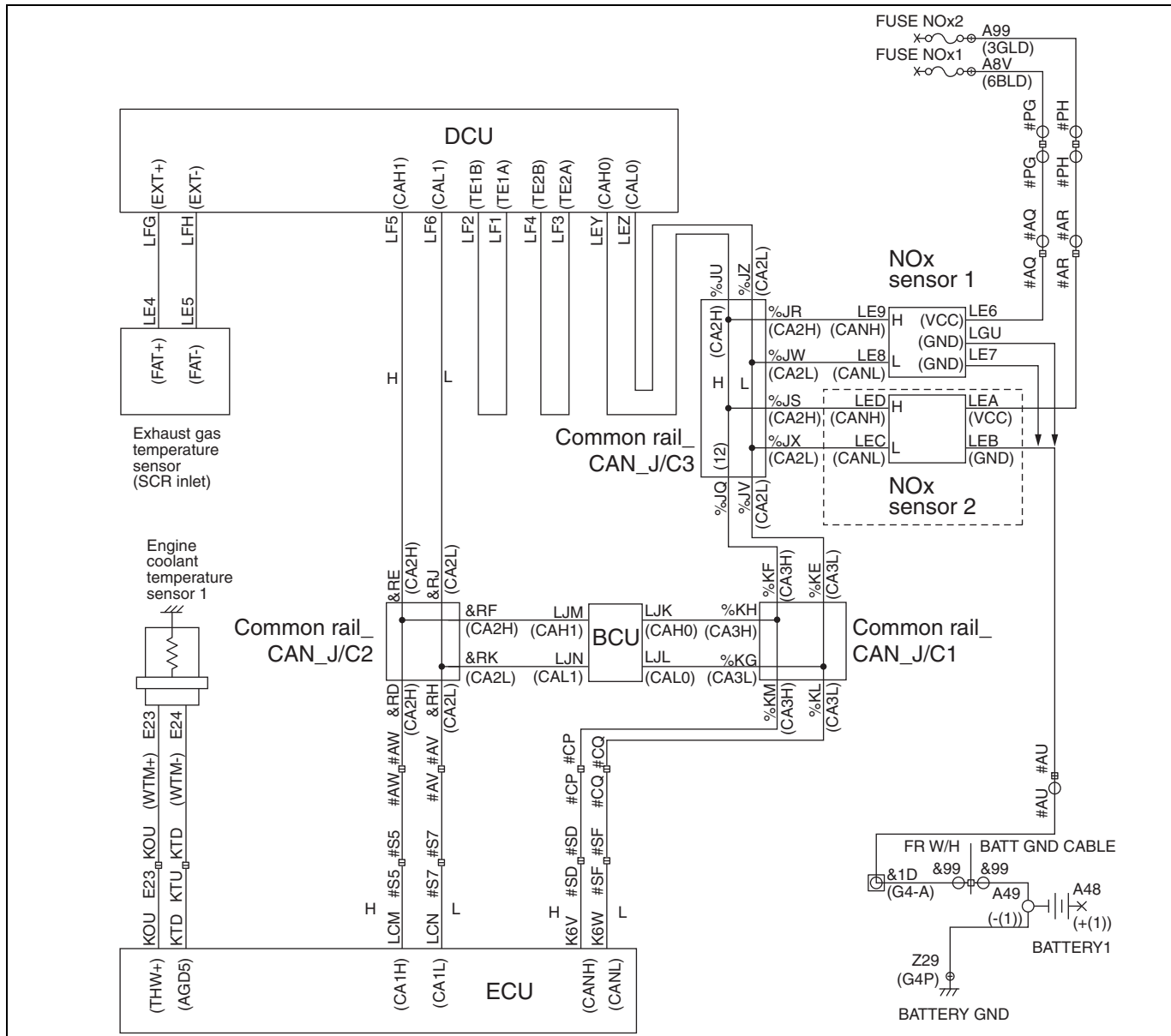
Has DTC U029E been detected?**YES****Go to the diagnostic procedure of a related DTC.****NO****Replace the NOx sensor 2 (SCR downstream).
Perform "After-inspection work" of INFORMATION section.**

CHECKLIST: P2216

DTC: P2216		NOx sensor (SCR downstream) and Heater - Circuit (Circuit short)		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Check the DTC detected (DCU) [Hino-DX]	Check if a CAN communication system malfunction (U029E) has been detected in [DCU].	DTC U029E has been detected: Go to YES. No DTC has been detected: Go to NO.		Go to the diagnostic procedure of a related DTC.	Replace NOx sensor 2 (SCR downstream). Perform "After-inspection work" of INFORMATION section.

DTC: P2222

EN01H16F02040F03001062

DTC: P2222 NOx sensor (SCR downstream) - Heater performance INFORMATION

SAPH16F020400233

1. Technical description

- The NOx sensors (SCR downstream) are controlled by the NOx sensor controller.
- The NOx sensor controller is connected to the DCU via the harness for reception and transmission of information.

<Description of malfunction>

- NOx sensor 2 (SCR downstream) heater malfunction is detected.

2. DTC set condition**(1) DTC detection condition**

Starter switch ON.

SCR catalyst upstream temperature (exhaust gas temperature sensor (SCR upstream)) $\geq 100\text{ }^{\circ}\text{C}$ {212 °F}Engine coolant temperature $\geq 65\text{ }^{\circ}\text{C}$ {149 °F}**(2) Judgement criteria**

NOx sensor 2 does not detect appropriate NOx value even after 180 sec. after the NOx sensor 2 (SCR outlet) heater has started to operate.

3. Reset condition

- After having restored to the normal conditions.

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

- MIL: ON
- 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 is declined.

<Symptoms on the vehicle due to malfunction>

- -

6. Pre-inspection work

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

7. After-inspection work

- Clear all past DTCs.
- Check if no DTC is stored after test drive.

8. Estimated failure factors

- Harness disconnection or short-circuit
- NOx sensor 2 (SCR downstream) malfunction
 - Sensor internal circuit malfunction
 - NOx sensor controller malfunction

INSPECTION PROCEDURE: P2222**1 Inspect the NOx sensor 2 (SCR downstream) connector**

1. Check the connection of the NOx sensor 2 (SCR downstream) connector (Looseness and poor contact).

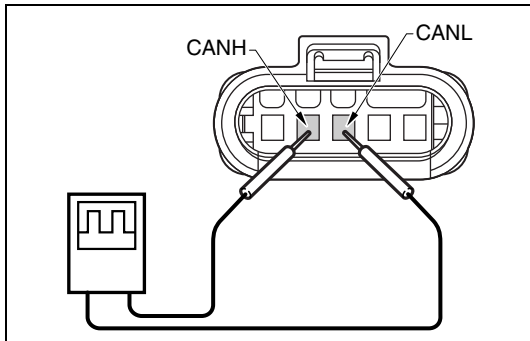
Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the NOx sensor 2 harness (CAN communication line)

SAPH16F020400234

1. Set the starter switch to the "LOCK" position.
2. Disconnect the NOx sensor 2 connector.
3. Set the starter switch to the "ON" position.
4. Use the oscilloscope to measure the voltage between the terminals of the NOx sensor 2 vehicle-side connector.

Measurement conditions	Tester connections	Standard values
Starter switch: ON	NOx sensor 2 vehicle-side connector CANH – CANL	Pulse waves in the range of 0 V to 5 V.

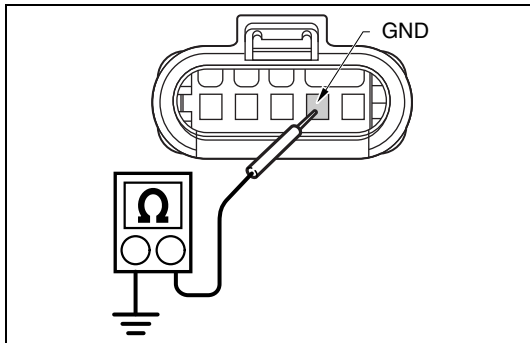
Do the measurements meet the standard value?

YES

Go to step 3.

NO

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

3 Inspect the NOx sensor 2 harness (GND line)

SAPH16F020400235

1. Set the starter switch to the "LOCK" position.
2. Use the electrical tester to measure the resistance between the GND terminal in the NOx sensor 2 vehicle-side connector and the ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	NOx sensor 2 vehicle-side connector GND – Ground	1 Ω or less

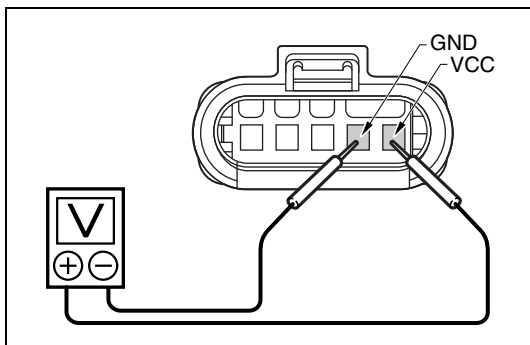
Do the measurements meet the standard value?

YES

Go to step 4.

NO

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

4 Inspect the NOx sensor 2 harness (Power supply line)

SAPH16F020400236

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	NOx sensor 2 vehicle-side connector VCC – GND	9 – 16 V

Do the measurements meet the standard value?

YES

Go to step 5.

NO

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

5 Inspect 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.
Perform "After-inspection work" of INFORMATION section.**

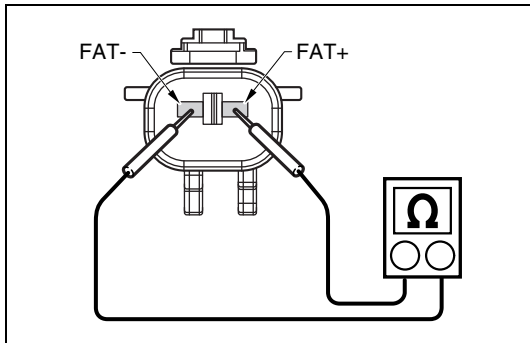
NO**Go to step 6.****6 Inspect the exhaust gas temperature sensor (SCR inlet)**

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).
Perform "After-inspection work" of INFORMATION section.**

NO**Go to step 7.**

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

SAPH16F020400237

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 upstream) FAT+ – FAT-	20 °C {68 °F}: 220 Ω

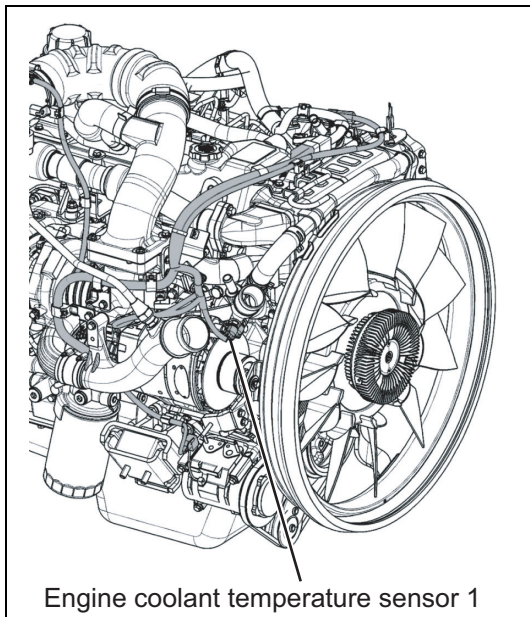
Do the measurements meet the standard value?

YES

Go to step 8.

NO

Replace the exhaust gas temperature sensor (SCR inlet).
Perform "After-inspection work" of INFORMATION section.

8 Inspect the engine coolant temperature sensor connector

SAPH16F020400238

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

Was any failure found?

YES

Connect securely, repair if needed.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9 Inspect the engine coolant temperature sensor

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

Was any failure found?

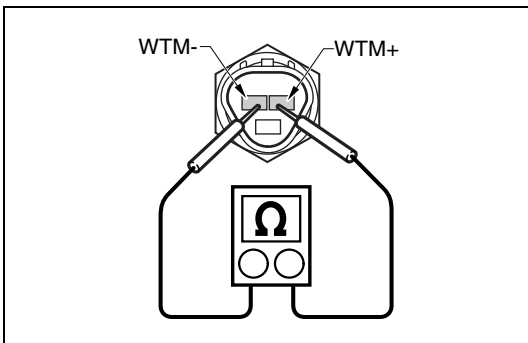
YES

Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 10.

10 Inspect the engine coolant temperature sensor unit



SAPH16F020400239

1. Disconnect the engine coolant temperature sensor connector.
2. Use the electrical tester to measure the resistance between the terminals of the engine coolant temperature sensor.

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

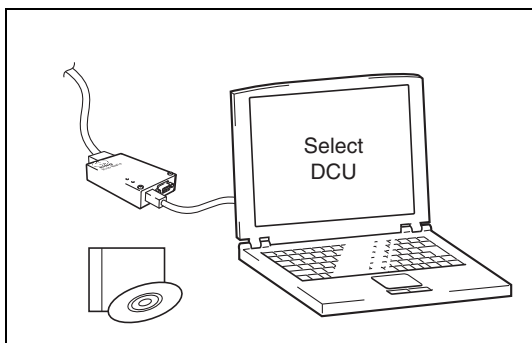
Do the measurements meet the standard value?

YES

Go to step 11.

NO

Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.

11 Check the NOx sensor 2 [Hino-DX]

SAPH16F020400240

1. Set the starter switch to the "LOCK" position.
2. Replace with a new NOx sensor 2.
3. Connect the vehicle to Hino-DX.
4. Set the starter switch to the "ON" position.
5. Erase the malfunction history and perform a DPR forced regeneration.
6. Select [DCU] and check if P2222 has been detected in [Fault Information].

Has DTC P2222 been detected?**YES**

**Replace the DCU. (After replacing, operate DPR forced regeneration.)
Perform "After-inspection work" of INFORMATION section.**

NO

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

CHECKLIST: P2222

DTC: P2222		NOx sensor (SCR downstream) - Heater performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
1	Inspect the NOx sensor 2 (SCR downstream) connector	Check the connection of the NOx sensor 2 (SCR downstream) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 2.
2	Inspect the NOx sensor 2 harness (CAN communication line)	Disconnect the NOx sensor 2 and use the oscilloscope to measure the voltage between the terminals of the NOx sensor 2 vehicle-side connector. <Tester connections> NOx sensor 2 vehicle-side connector CAN H – CAN L <Standard values> Pulse waveform of 0 ↔ 5 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 3.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
3	Inspect the NOx sensor 2 harness (GND line)	Measure the resistance between the GND terminal in the NOx sensor 2 vehicle-side connector and the ground. <Tester connections> NOx sensor 2 vehicle-side connector GND – Ground <Standard values> 1 Ω or less	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 4.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
4	Inspect the NOx sensor 2 harness (Power supply line)	Measure the voltage between the terminals of the NOx sensor 2 vehicle-side connector. <Tester connections> NOx sensor 2 vehicle-side connector VCC – GND <Standard values> 9 – 16 V	The measurements meet the standard value: Go to YES. The measurements do not meet the standard value: Go to NO.		Go to step 5.	Repair or replace the harness. Perform "After-inspection work" of INFORMATION section.
5	Inspect exhaust gas temperature sensor (SCR inlet) connector	Check the connection of the exhaust gas temperature sensor (SCR inlet) connector (Looseness and poor contact).	Failure found: Go to YES. No failure found: Go to NO.		Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.	Go to step 6.

DTC: P2222		NOx sensor (SCR downstream) - Heater performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
6	Inspect the exhaust gas temperature sensor (SCR inlet)	<ol style="list-style-type: none"> 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). 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Clean the Exhaust gas temperature sensor (SCR inlet) and install it properly. If damaged, replace the Exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.</p>	Go to step 7.
7	Inspect the exhaust gas temperature sensor (SCR inlet) unit	<p>Measure the resistance between the terminals of the exhaust gas temperature sensor (SCR inlet). <Tester connections> Exhaust gas temperature sensor (SCR inlet) FAT+ – FAT- <Standard values> 20 °C {68 °F} 220 Ω</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 8.	<p>Replace the exhaust gas temperature sensor (SCR inlet). Perform "After-inspection work" of INFORMATION section.</p>
8	Inspect the engine coolant temperature sensor connector	Check the connection of the engine coolant temperature sensor connector (Looseness and poor contact).	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		<p>Connect securely, repair if needed. Perform "After-inspection work" of INFORMATION section.</p>	Go to step 9.

DTC: P2222		NOx sensor (SCR downstream) - Heater performance		Inspection Procedure		
Step	Action	Description	Judgement	Check (Yes/No)	Yes	No
9	Inspect the engine coolant temperature sensor	<ol style="list-style-type: none"> 1. Check the installation of the engine coolant temperature sensor. 2. Make sure there is no dirt or damage to the engine coolant temperature sensor. 	<p>Failure found: Go to YES.</p> <p>No failure found: Go to NO.</p>		Clean the engine coolant temperature sensor and install it properly. If damaged, replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.	Go to step 10.
10	Inspect the engine coolant temperature sensor unit	<p>Measure the resistance between the terminals of the engine coolant temperature sensor.</p> <p><Tester connections> Engine coolant temperature sensor WTM+ – WTM- <Standard values> 20 °C {68 °F}: 2.59 – 2.32 kΩ 80 °C {176°F}: 0.326 – 0.310 kΩ</p>	<p>The measurements meet the standard value: Go to YES.</p> <p>The measurements do not meet the standard value: Go to NO.</p>		Go to step 11.	Replace the engine coolant temperature sensor. Perform "After-inspection work" of INFORMATION section.
11	Check the NOx sensor 2 [Hino-DX}	<ol style="list-style-type: none"> 1. Replace the NOx sensor 2 with a new and erase the malfunction history in Hino-DX. 2. After DPR forced regeneration, check if P2222 is detected in the [DCU]. 	<p>DTC P2222 has been detected: Go to YES.</p> <p>No DTC has been detected: Go to NO.</p>		Replace the DCU. (After replacing, operate DPR forced regeneration) Perform "After-inspection work" of INFORMATION section.	Procedure completed. Perform "After-inspection work" of INFORMATION section.

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