



SERVICE MANUAL INFORMATION

**SB-19-017 XL SERIES EXHAUST VALVE
INSPECTION WORKSHOP MANUAL
CORRECTION**

**GROUP: SERVICE MANUAL UPDATE
BULLETIN NO: SB-19-017
DATE: 5-17-2019**

SUBJECT VEHICLES: 20MY XL Series Trucks equipped with an A09 engine.

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

OVERVIEW:

Change of exhaust valve inspection method.

Workshop manual correction of Diagnostic Trouble Code DTC P0027, P0421, P2458, P24A2.



DTC: P0027

P0027: Exhaust Control Valve Performance INFORMATION

1. Technical description

<Description of malfunction>

- The engine ECU detected sticking of the exhaust control valve.

2. DTC set condition

(1) DTC detection condition

- DPR regeneration is in process.
- The vehicle speed is 0 km/h {0 mph}.
- The time of 60 seconds has elapsed after the exhaust control valve was actuated.

(2) Judgment criteria

- The difference between the fuel injection quantity while the exhaust brake is working and the fuel injection quantity when the exhaust control valve is not actuated is 5 mm³/st or less. And also, the difference between the air flow while the exhaust control valve is working and the air flow when the exhaust control valve is not actuated is -50 mg/cyl or more.

3. Reset condition

- Immediately after normal status is resumed

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

- MIL: ON
- SVS light: 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>

- The exhaust control valve does not work.
- DPR regeneration is not terminated successfully.

6. Pre-inspection work

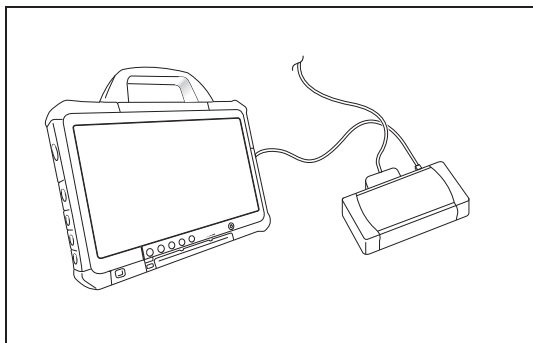
- Check that the battery voltage is in the normal range.

7. After-inspection work

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

8. Estimated failure factors

- Abnormality in characteristics of air flow sensor
- Diesel throttle sticking
- Bend, clogging, and crack of piping and hose
- Improper adjustment of exhaust control valve
- Malfunction of exhaust control valve

INSPECTION PROCEDURE: P0027**1 Check the DTC detected 1 [HINO DX II]**

SAPH16F090300072

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to HINO DX II .
3. Set the starter switch to the "ON" position.
4. Select [Engine], and check if any DTC listed below other than P0027 has been detected.
P0101, P04D5, P2101

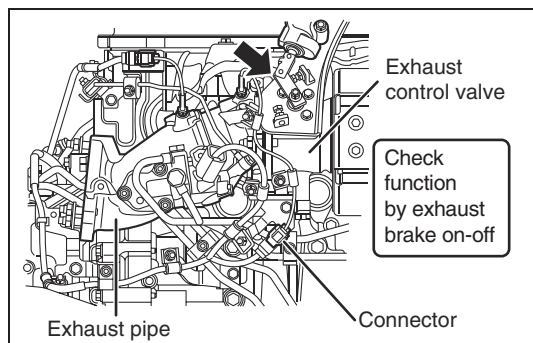
Has a DTC other than P0027 been detected?**YES****NO****Go to diagnosis procedure of a related DTC.****Go to step 2.****2 Inspect the exhaust brake valve piping and hose**

1. Check the piping and hose, connected to the exhaust control valve, for bend, clogging, and crack.

Was any failure found?**YES****NO****Connect securely, repair if needed.****Go to step 3.**

3 Inspect the exhaust brake valve

1. Check the exhaust brake valve for unease and sticking.



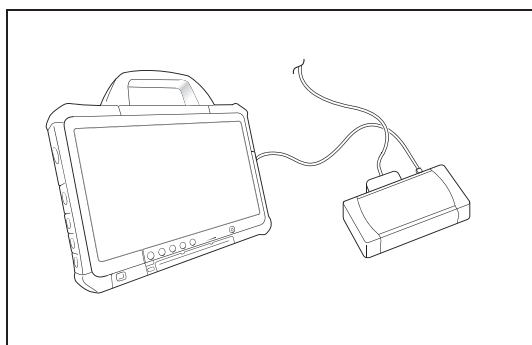
SAPH16F090300073

Was any failure found?**YES**

Clean the exhaust control valve. Replace if needed. After clearing or replacement, go to step 4.

NO

Go to step 5.

4 Check the DTC detected 2 [HINO DX II]

SAPH16F090300074

1. Perform a DPR forced regeneration.
2. After completion of regeneration, reload the DTC and check if the DTC P0027 has been detected.

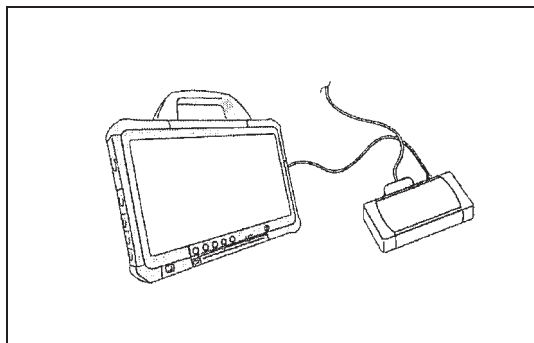
Has DTC P0027 been detected?**YES**

Go to step 5.

NO

Procedure completed.

CHANGE

5 Inspect the exhaust brake valve [HINO DX II]

SAPH16F090300075

1. Warm up the engine. (Coolant temperature: 60 °C {140 °F} or more)

2. Turn OFF the devices that place load on the engine, such as the air conditioner.

<Inspection procedure>

(1) Turn the starter key to the "ON" position.

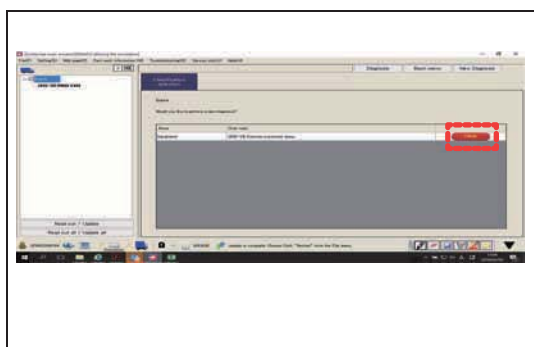
(2) Start HINO DX II .

(3) On the HINO DX II window, click [Customization].

Select the vehicle model and region, and check [Engine].

Select either Upload INF file and then [Road out] to read out.

(4) Select [Engine], and press the click button.

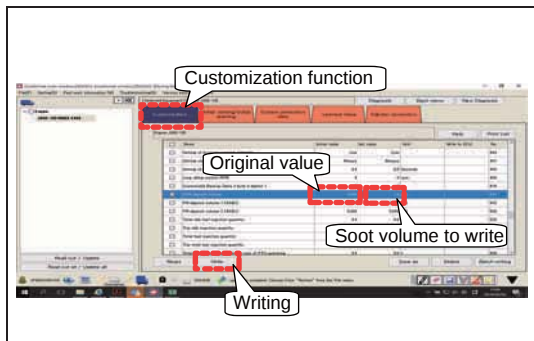


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(5) Writing soot volume

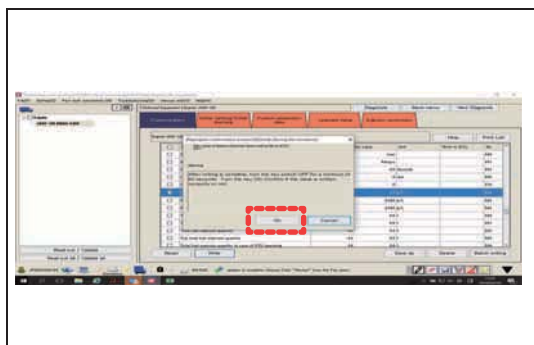
HINT

- As in the window on the left, write a soot volume [2.5] using the customization function. Record the original value not to forget. The example in the window is [0.674].
- If the soot volume is indicated between 2.5 to 5.0 from the beginning, do not change. In such a case, do not stop regeneration halfway.



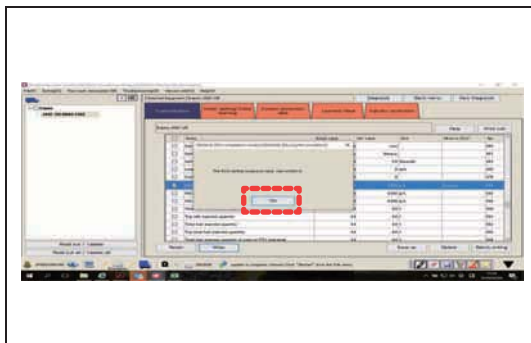
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(6) Turn the starter key "OFF" and then "ON" according to the instruction.
Then, click [OK].



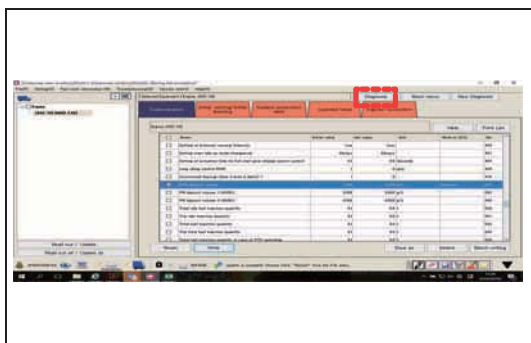
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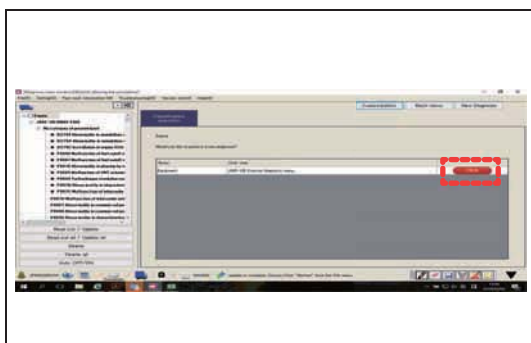
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(7) Check that ECU writing has been completed. Click [OK]. Refer to the window on the left.



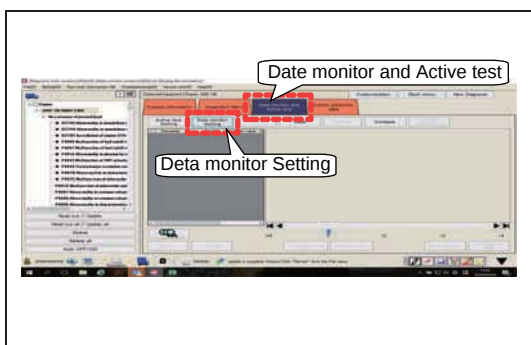
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(8) Click [Diagnosis].



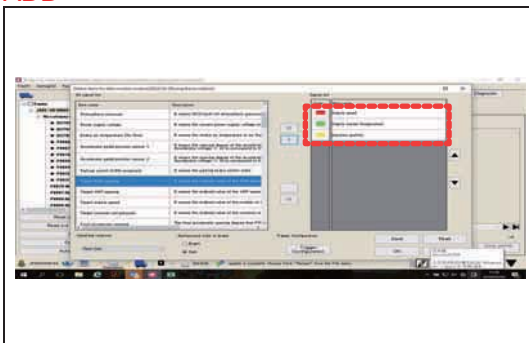
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(9) Select [Engine], and press the click button.



SAPH16F090300082

(10) Select [Data monitor and Active test]. Select [Data monitor Setting]. Refer to the window on the left.

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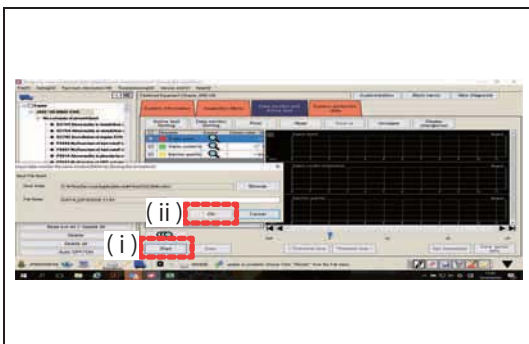
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(11) From the selection window on the left, select the following 3 items. Click OK.

- Engine speed
- Engine Coolant temperature
- Injection quantity

(12) (i) Click [Start] to display the window to check the data storage destination.

(ii) Click [OK] to start data monitoring.

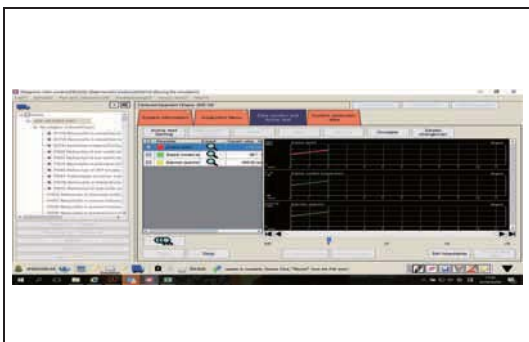


SAPH16F090300084

(13) Start the engine.

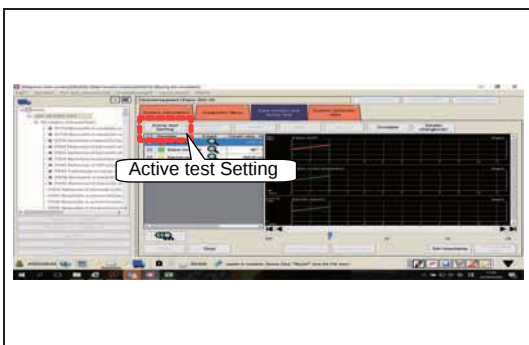
(14) Press the DPR manual regeneration switch of the vehicle. Start regeneration.click [OK].

(15) Check the injection quantity after 1 minute. This injection quantity is A(exhaust brake ON condition). Record the this value not to forget.



SAPH16F090300085

(16) Select [Active test Setting].



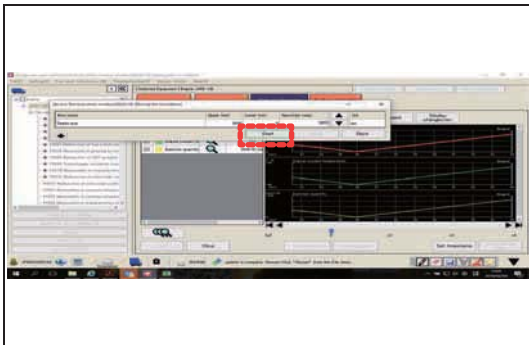
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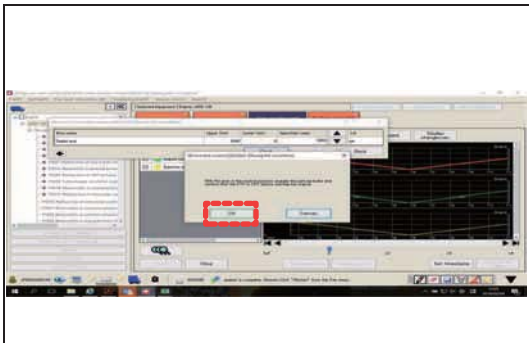
SAPH16F090300087

- (17) Select [Target rpm].
- (18) Set to 900 r/min.
- (19) Press Select.



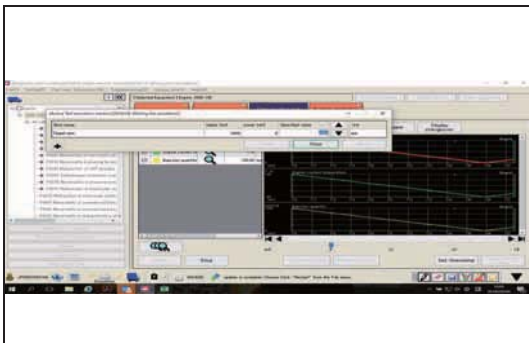
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- (20) Press Start.



SAPH16F090300089

- (21) With the gear in the neutral position, apply the parking brake confirm that the PTO is off then press OK.



SAPH16F090300090

- (22) Check the injection quantity after 1 minute. This injection quantity is B(exhaust brake OFF condition). Record the this value not to forget.

CHANGE

(23) Press stop.

HINT

- If the original soot amount is less than 2.5 g / L, stop playback by pressing the manual regeneration switch.

(24) If the amount of soot is 2.5 or less, rewrite the original amount of soot with the customization function of (5) Writing soot volume.

(25) Make a judgment by the difference of A(exhaust brake ON condition) from B(exhaust brake OFF condition).

Standard values
18– 24 mm ³ /st

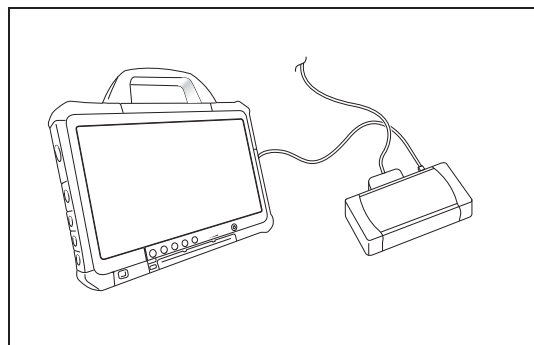
Do the measurements meet the standard value? (There shall be a change in the injection quantity between while the exhaust brake is working and when it is not actuated.)

YES

Go to step 6.

NO

Adjust the butterfly opening of the exhaust brake.

6 Check the DTC detected [HINO DX II]

SAPH16F090300092

1. Perform a DPR forced regeneration.
2. After regeneration, select [Engine] and check if DTC P0027 has been detected.

Has DTC P0027 been detected?

YES

Replace the engine ECU.

NO

Procedure completed.

DTC: P0421

EN01H16F09030F03001082

**P0421: Determination of ATC deterioration
INFORMATION****1. Technical description****<Description of malfunction>**

- If post injection is performed normally but the ATC (oxidation catalyst) is not generating heat, the engine ECU detects abnormality as ATC functional deterioration.

2. DTC set condition

- (1) DTC detection condition
During DPR active regeneration.
Conditions below continue for 35 sec.
 - Engine speed: 700 r/min or higher, 1,000 r/min or lower.
 - Fuel injection quantity: 40 mm³/st. or lower
 - Engine speed fluctuation: 156 r/min/sec or lower
 - Fuel injection quantity fluctuation: 39 mm³/st./sec or less
 - Post-injection quantity: 17.5 mm³/st. or more
 - ATC inlet temperature: 300°C {572°F} or higher
 - Post injection has no malfunction.
 - Exhaust gas mass flow ≤ 210kg/h
- (2) Judgment criteria
Both of the following conditions must be met.
 - ATC outlet temperature – ATC inlet temperature is below the specified value.

3. Reset condition

- Immediately after normal status is resumed

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

- MIL: ON
- SVS light: 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 DTC.
- After starting the DPR automatic regeneration, form the DTC detection condition.
- Check that no DTC is detected after test drive.

8. Estimated failure factors

- ATC deterioration caused by use of low-grade fuel
- Improper adjustment of exhaust brake valve.
- Leak of exhaust gas from the pipe.
- ATC inlet exhaust gas temperature sensor malfunction.
- ATC outlet exhaust gas temperature sensor malfunction.

INSPECTION PROCEDURE: P0421**1 Check the engine ECU**

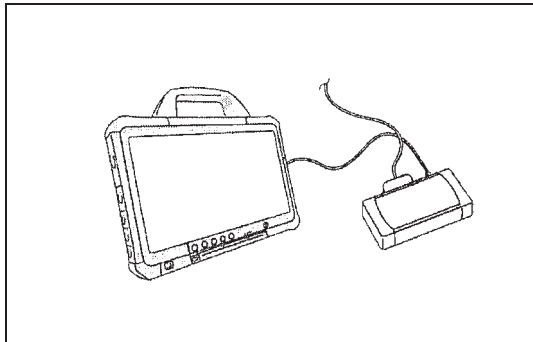
1. Set the starter switch to the "LOCK" position.
2. Check the engine ECU software part number (ECU part number) by HINO DX II .
Confirm the latest part number with Hino national service manager.

Does the engine ECU have the latest software number?**YES****Go to step 2.****NO****Reprogram the engine ECU by using HINO DX II and then go to step 2.****2 Inspect the exhaust leaks from the exhaust pipe between exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 3 (DOC inlet)**

1. Check that the exhaust pipe has no looseness of flange or pipe breakage.

Was any failure found?**YES****Repair or replace the faulty part.
Perform "After-inspection work" of INFORMATION section.****NO****Go to step 3.**

CHANGE

3 Inspect the exhaust brake valve [HINO DX II]

SAPH16F090300582

1. Warm up the engine. (Coolant temperature: 60 °C {140 °F} or more)

2. Turn OFF the devices that place load on the engine, such as the air conditioner.

<Inspection procedure>

(1) Turn the starter key to the "ON" position.

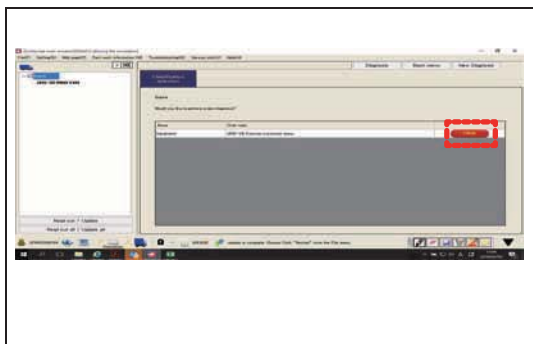
(2) Start HINO DX II.

(3) On the HINO DX II window, click [Customization].

Select the vehicle model and region, and check [Engine].

Select either Upload INF file and then [Road out] to read out.

(4) Select [Engine], and press the click button.



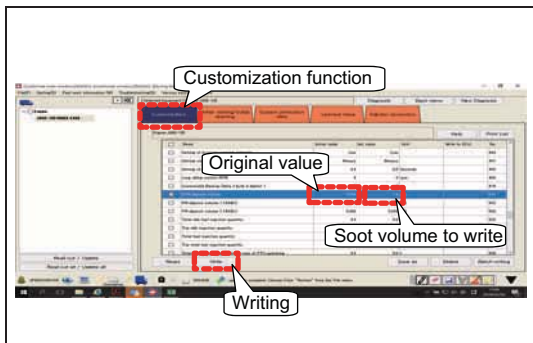
SAPH16F090300583

(5) Writing soot volume

HINT

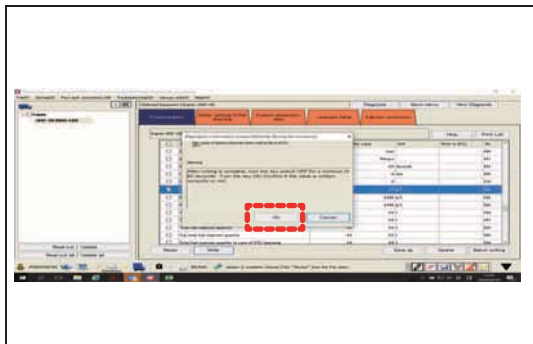
- As in the window on the left, write a soot volume [2.5] using the customization function. Record the original value not to forget. The example in the window is [0.674].

- If the soot volume is indicated between 2.5 to 5.0 from the beginning, do not change. In such a case, do not stop regeneration halfway.



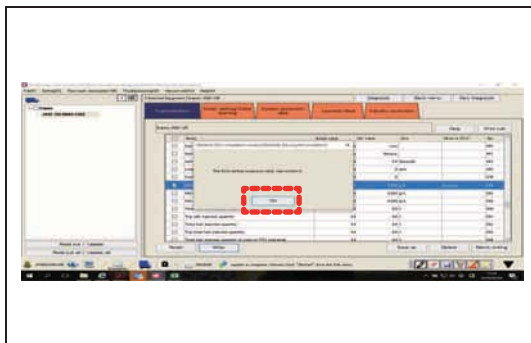
SAPH16F090300584

(6) Turn the starter key "OFF" and then "ON" according to the instruction. Then, click [OK].



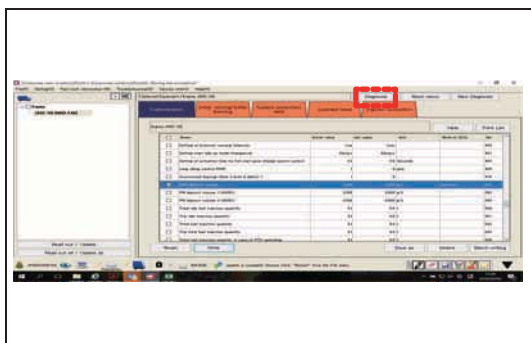
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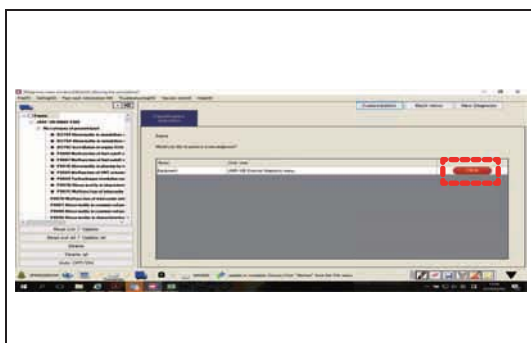
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(7) Check that ECU writing has been completed. Click [OK].
Refer to the window on the left.



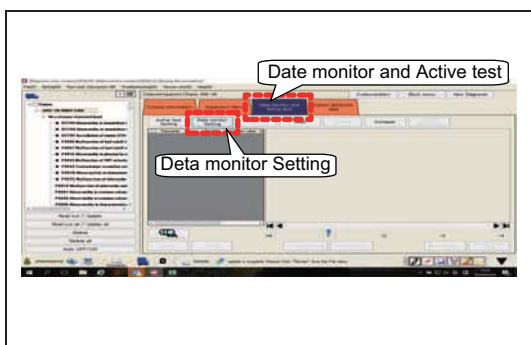
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(8) Click [Diagnosis].



SAPH16F090300588

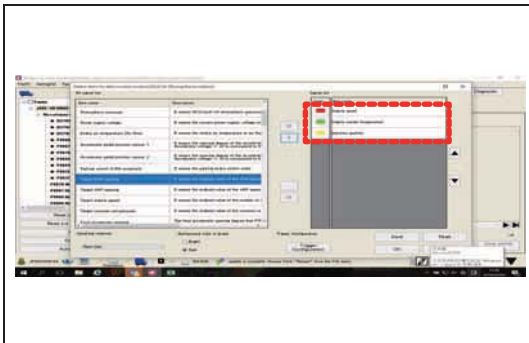
(9) Select [Engine], and press the click button.



SAPH16F090300589

(10) Select [Data monitor and Active test].
Select [Data monitor Setting].
Refer to the window on the left.

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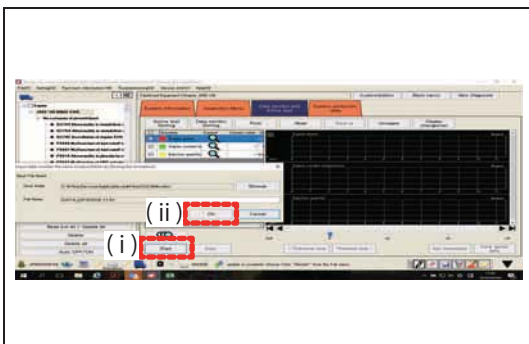
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(11) From the selection window on the left, select the following 3 items. Click OK.

- Engine speed
- Engine Coolant temperature
- Injection quantity

(12) (i) Click [Start] to display the window to check the data storage destination.

(ii) Click [OK] to start data monitoring.

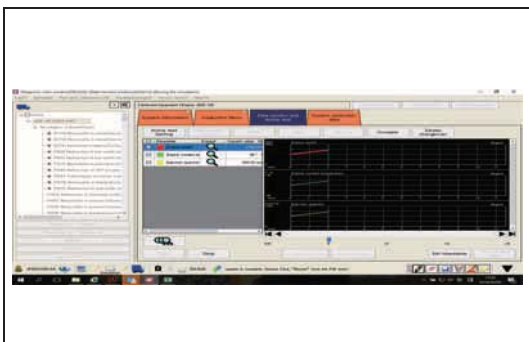


SAPH16F090300591

(13) Start the engine.

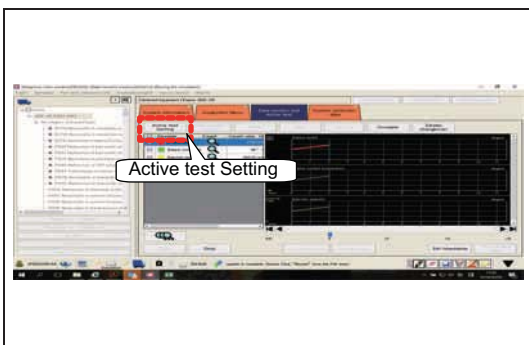
(14) Press the DPR manual regeneration switch of the vehicle. Start regeneration.click [OK].

(15) Check the injection quantity after 1 minute. This injection quantity is A(exhaust brake ON condition). Record the this value not to forget.



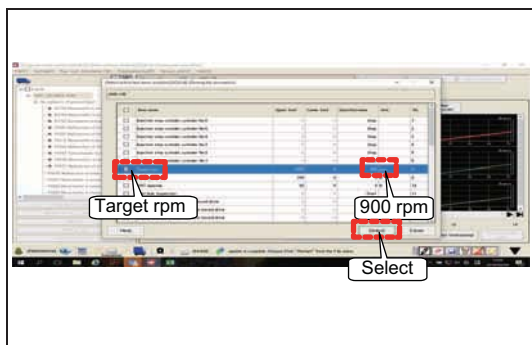
SAPH16F090300592

(16) Select [Active test Setting].



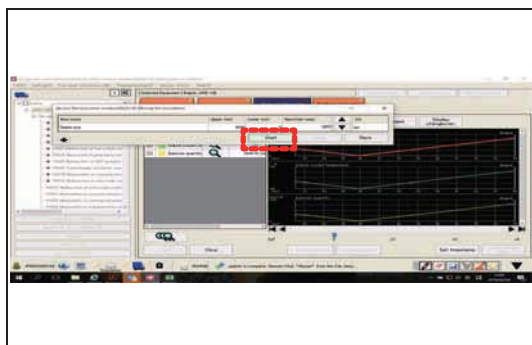
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ADD



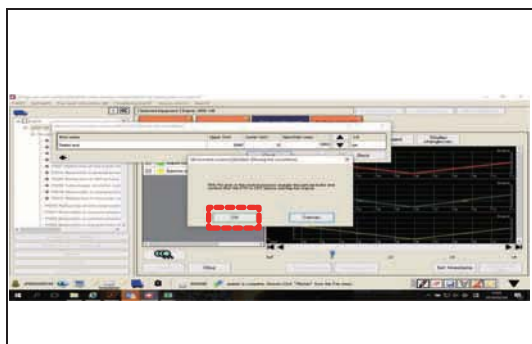
SAPH16F090300594

- (17) Select [Target rpm].
- (18) Set to 900 r/min.
- (19) Press Select.



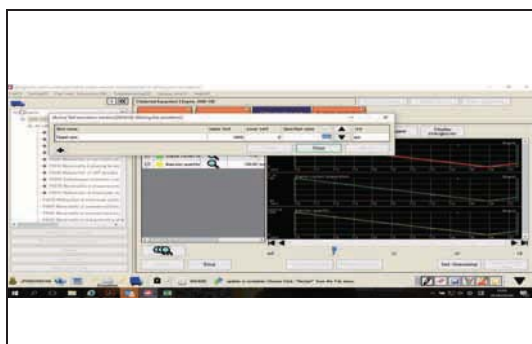
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- (20) Press Start.



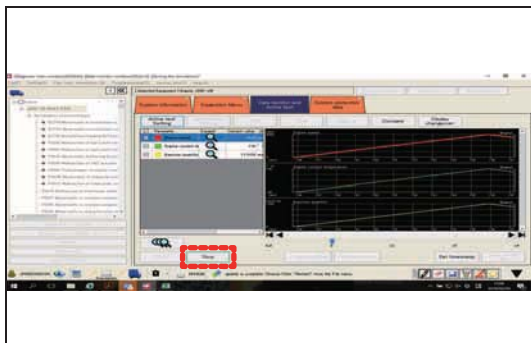
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- (21) With the gear in the neutral position, apply the parking brake confirm that the PTO is off then press OK.



SAPH16F090300597

- (22) Check the injection quantity after 1 minute. This injection quantity is B(exhaust brake OFF condition). Record the this value not to forget.

CHANGE

SAPH16F090300598

(23) Press stop.

HINT

- If the original soot amount is less than 2.5 g / L, stop playback by pressing the manual regeneration switch.

(24) If the amount of soot is 2.5 or less, rewrite the original amount of soot with the customization function of (5) Writing soot volume.

(25) Make a judgment by the difference of A(exhaust brake ON condition) from B(exhaust brake OFF condition).

Standard values
18 – 24 mm ³ /st

Do the measurements meet the standard value? (There shall be a change in the injection quantity between while the exhaust brake is working and when it is not actuated.)

YES

Go to step 4.

NO

Adjust the butterfly opening of the exhaust brake.
Perform "After-inspection work" of INFORMATION section.

4**Inspect fuel**

1. Open the fuel cap and check fuel for abnormality (in color is yellow or green).

Was any failure found?

YES

Replace the fuel with good quality fuel.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 5.

5**Inspect the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet) connector**

1. Check the connection of the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet) connector (looseness and poor contact).

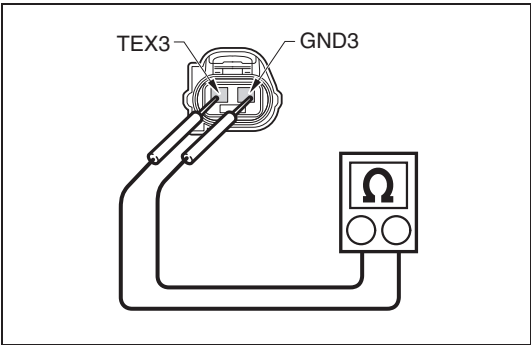
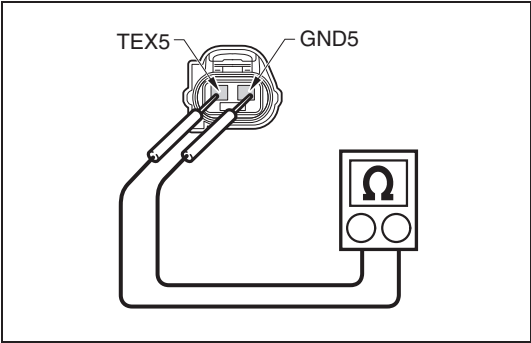
Was any failure found?**YES****Connect securely, repair if needed.
Go to step 6.****NO****Go to step 6.****6****Inspect the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet)**

1. Check the installation of the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet).
2. Make sure there is no dirt, damage or clogging in the sensing unit of the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet).

Was any failure found?**YES****Clean the sensing unit and install it properly.
If damaged, replace the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet).
Go to step 7.****NO****Go to step 7.**

7

Inspect the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet) unit



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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor 1 (ATC inlet)	20 °C {68 °F}: 13.7 – 29.8 kΩ
	TEX5 – GND5	50 °C {122 °F}: 7.13 – 13.7 kΩ
	Exhaust gas temperature sensor 2 (ATC outlet)	80 °C {176 °F}: 4.1 – 7.13 kΩ
	TEX3 – GND3	

Do the measurements meet the standard value?

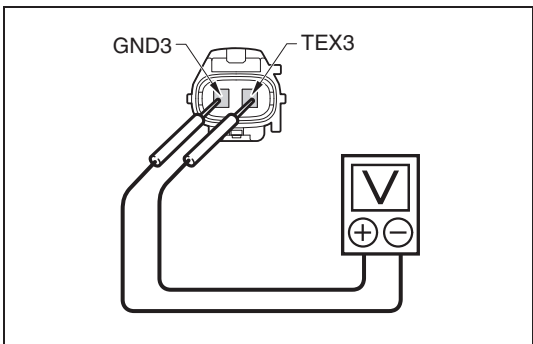
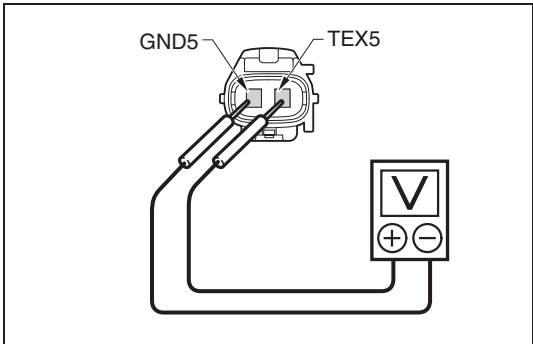
YES

Go to step 8.

NO

Replace the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet).
Go to step 8.

8 Inspect the sensor power supply



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

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Exhaust gas temperature sensor 1 (ATC inlet) vehicle-side connector TEX5 – GND5 Exhaust gas temperature sensor 2 (ATC outlet) vehicle-side connector TEX3 – GND3	4.5 – 5.5 V

Do the measurements meet the standard value?

YES

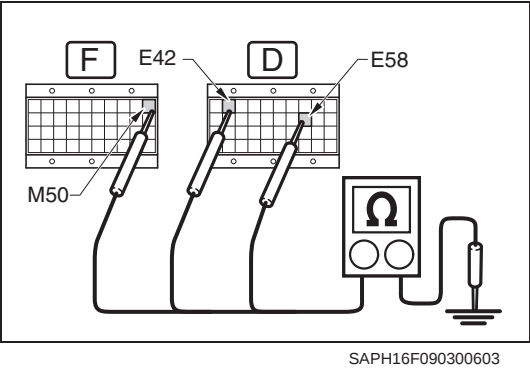
Go to step 11.
If any failure was found at the step 5 - 7, perform "After-inspection work" of INFORMATION section.

NO

Go to step 9.

9

Inspect for short-circuit of the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet) harness



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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (signal check harness) EXT+ (E42) – Ground AG5 (E58) – Ground ET+ (M50) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

YES

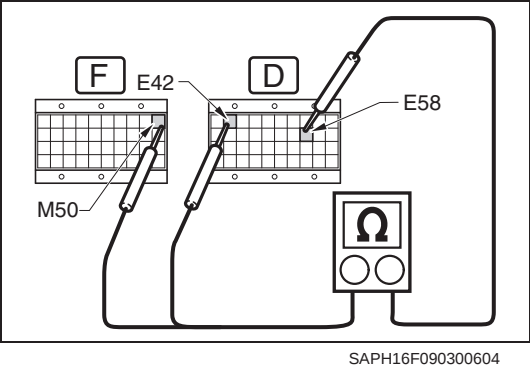
NO

Go to step 10.

Repair or replace the harness.
Go to step 10.

10

Inspect disconnection of the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet) harness



- Connect the exhaust gas temperature sensor 1 (ATC inlet) and the exhaust gas temperature sensor 2 (ATC outlet) connector.
- 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) EXT+ (E42) – AG5 (E58) ET+ (M50) – AG5 (E58)	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.
If any failure was found at the step 5 - 9, perform "After-inspection work" of INFORMATION section.

NO

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

11 Inspect the exhaust gas temperature sensor 3 (DOC inlet) connector

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

Was any failure found?**YES**

Connect securely, repair if needed.
Go to step 12.

NO

Go to step 12.

12 Inspect the exhaust gas temperature sensor 3 (DOC inlet)

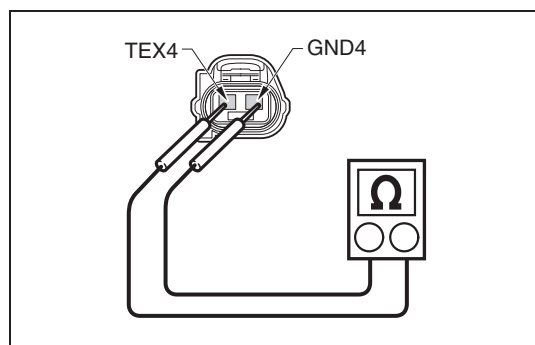
1. Check the installation of the exhaust gas temperature sensor 3 (DOC inlet).
2. Make sure there is no dirt, damage or clogging in the sensing unit of the exhaust gas temperature sensor 3 (DOC inlet).

Was any failure found?**YES**

Clean the sensing unit and install it properly.
If damaged, replace the exhaust gas temperature sensor 3 (DOC inlet).
Go to step 13.

NO

Go to step 13.

13 Inspect the exhaust gas temperature sensor 3 (DOC inlet) unit

SAPH16F090300605

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor 3 (DOC inlet) TEX4 – GND4	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

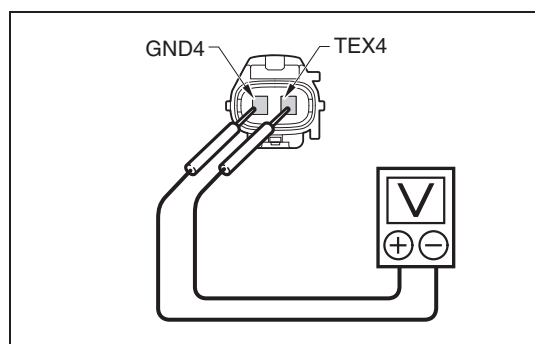
Do the measurements meet the standard value?

YES

Go to step 14.

NO

Replace the exhaust gas temperature sensor 3 (DOC inlet).
Go to step 14.

14 Inspect the sensor power supply

SAPH16F090300606

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

Measurement conditions	Tester connections	Standard values
Starter switch: ON	Exhaust gas temperature sensor 3 (DOC inlet) vehicle-side connector TEX4 – GND4	4.5 – 5.5 V

Do the measurements meet the standard value?

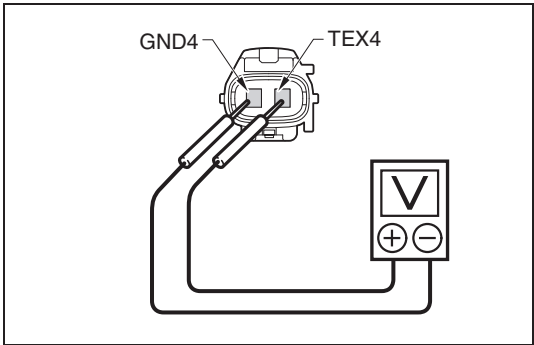
YES

Go to step 17.
If any failure was found at the step 11 - 13,
perform "After-inspection work" of INFOR-
MATION section.

NO

Go to step 15.

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



1. Set the starter switch to the "LOC " 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 and ground.

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (sig- nal check harness) ET2+ (V49) – Ground AGD3 (V46) – Ground	$\infty \Omega$

Do the measurements meet the standard value?

YES

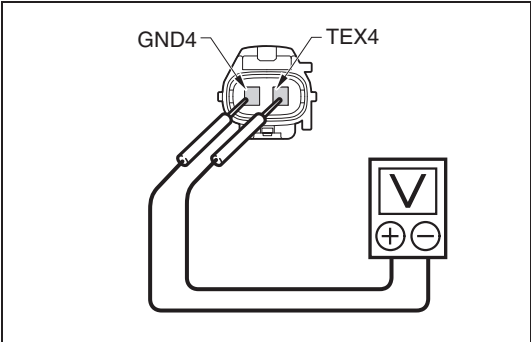
Go to step 16.

NO

Repair or replace the harness.
Go to step 16.

16

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



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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Engine ECU (sig-nal check harness) ET2+ (V49) – AGD3 (V46)	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 17.
If any failure was found at the step 11 - 15, perform "After-inspection work" of INFOR-MATION section.

NO

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

17	Test drive
-----------	-------------------

1. Set the starter switch to the "ON" position.
2. Change the PR soot amount using the HINO II .
3. Set the starter switch to the "LOC " position.
4. Monitor the PR mode set.
5. Start the test drive.
6. Once the PR mode reads an of "6 7 15 23 24 27 or 2 " bring vehicle speed to "0" and keep idling for 60 seconds.

Measurement conditions	Standard values
During the DPR automatic regeneration	Vehicle interdiction → Vehicle start

Was DTC P0420 recorded on the combination meter?
--

YES

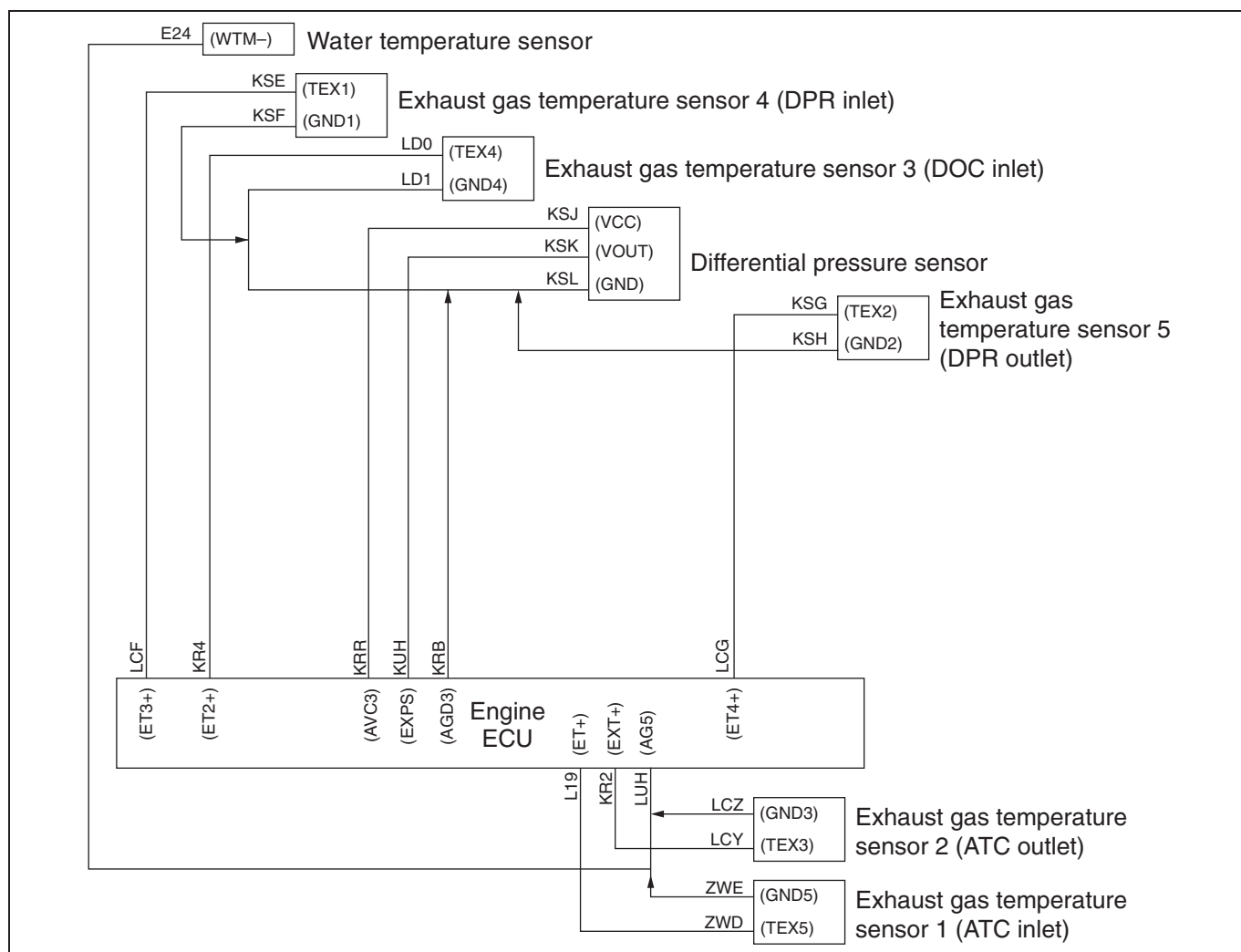
Replace the ATC.

NO

Procedure completed. (Temporary loose connection.)
--

DTC: P2458

EN01H16F09030F03001199

P2458: Fault in manual regeneration
INFORMATION

SAPH16F090301522

1. Technical description

- The DPR performs PM regeneration by increasing DOC temperature using the engine warm up control.
- During a manual regeneration, warm up control is carried out by idle up, exhaust brake closing, VNT control, after injection, post injection and dosing valve injection.

<Description of malfunction>

- In a manual regeneration, the DOC and ATC temperatures do not increase to the post injection-enabled region even after the specified time.

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

- Battery voltage is in the range of 10 V to 16 V.
- The engine speed remains at 500 r/min or more.
- DPR manual regenerating.
- Do not detect the exhaust gas temperature sensor 4 (DPR inlet) of failure.

(2) Judgment criteria

- After a manual DPR regeneration is started, the DOC temperature is still below 200 °C {392 °F} and the ATC temperature is still below 230 °C {446 °F} even after 30 minutes.

3. Reset condition

- DPR memory is reset by the diagnostic tool (HINO DX II).

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

- MIL: OFF
- SVS light: ON
- 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>

- Do not DPR 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**Drop in injection quantity of fuel injection system****Failure of VNT system****Exhaust gas temperature sensor 4 (DPR inlet):**

- Loose/disconnected sensor or failure in sensing area (contamination, clogging or damaged)
- Abnormal resistance of sensor
- Failure in engine ECU sensor power supply

Exhaust gas temperature sensor 1 (ATC inlet)

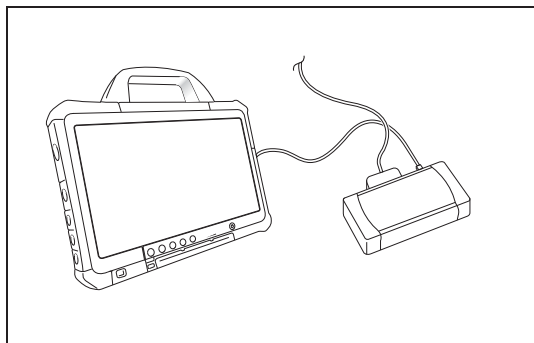
- Loose/disconnected sensor or failure in sensing area (contamination, clogging or damaged)
- Abnormal resistance of sensor
- Failure in engine ECU sensor power supply

Exhaust brake

- Malfunction of exhaust brake
- Improper adjustment of exhaust brake (The difference between the injection quantities in active and inactive conditions is out of the standard)

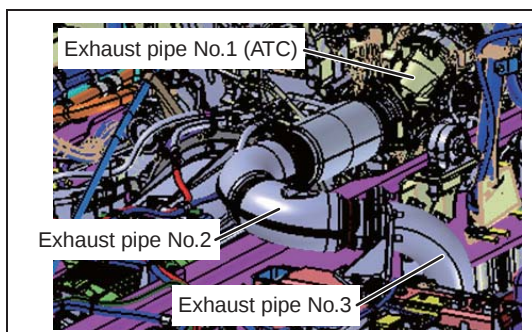
Gas leaks in the middle of the exhaust system

Failure of coolant temperature sensor (low temperature stuck)

INSPECTION PROCEDURE: P2458**1 Check the DTC detected¹ [HINO DX II]**

SAPH16F090301523

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to HINO DX II .
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any DTC other than P2458 has been detected.

Have DTCs other than P2458 been detected?**YES****Go to diagnosis procedure of a related DTC.****NO****Go to step 2.****2 Inspect the exhaust pipe**

SAPH16F090301524

1. Check for exhaust pipe crack (between the turbocharger and DPR), exhaust gas leak (soot contamination) and improper coupling flange tightening.

Was any failure found?**YES****Repair of exhaust pipe (replace gasket, retighten), replace if needed.****NO****Go to step 3.**

3**Inspect the aftertreatment fuel injector holder is clogging with soot.**

1. Remove the aftertreatment fuel injector.

HINT

Refer to the section "AFTERTREATMENT FUEL INJECTOR, OVERHAUL, REMOVING THE AFTERTREATMENT FUEL INJECTOR" in the chapter "EXHAUST SYSTEM (A09C)".

2. Cleaning the aftertreatment fuel injector.

HINT

Refer to the section "AFTERTREATMENT FUEL INJECTOR, OVERHAUL, CLEANING CARBON" in the chapter "EXHAUST SYSTEM (A09C)".

3. Mounting the aftertreatment fuel injector.

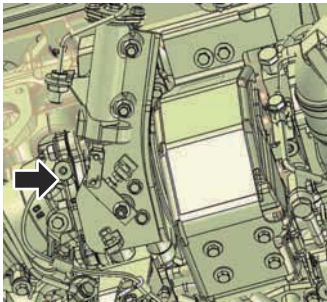
HINT

Refer to the section "AFTERTREATMENT FUEL INJECTOR, OVERHAUL, MOUNTING THE AFTERTREATMENT FUEL INJECTOR" in the chapter "EXHAUST SYSTEM (A09C)".

Was any failure found?**YES****Go to step 4.****NO****Go to step 4.****4****Inspect the exhaust control valve**

1. Check the exhaust brake valve for unease and sticking.

Check function
by exhaust control
brake on-off



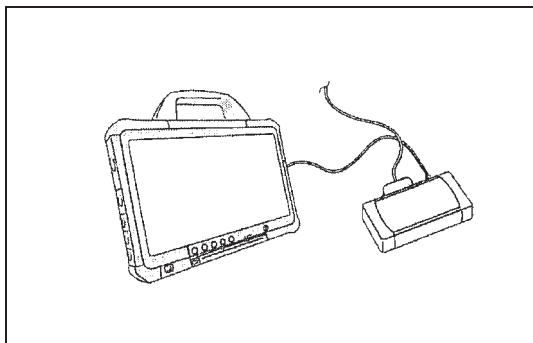
SAPH16F090301525

Was any failure found?**YES**

**Clean the exhaust brake valve.
Replace if necessary.
After cleaning or replacement, go to step 5.**

NO**Go to step 5.**

CHANGE

5 Inspect the exhaust brake valve [HINO DX II]

SAPH16F090301526

1. Warm up the engine. (Coolant temperature: 60 °C {140 °F} or more)

2. Turn OFF the devices that place load on the engine, such as the air conditioner.

<Inspection procedure>

(1) Turn the starter key to the "ON" position.

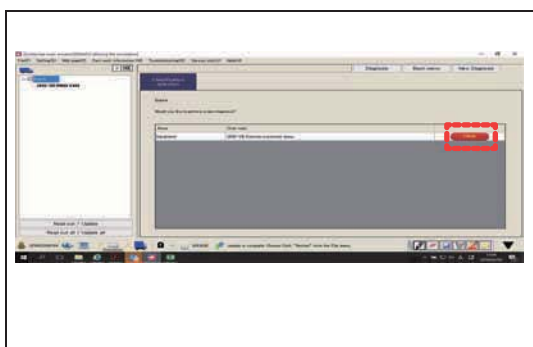
(2) Start HINO DX II.

(3) On the HINO DX II window, click [Customization].

Select the vehicle model and region, and check [Engine].

Select either Upload INF file and then [Road out] to read out.

(4) Select [Engine], and press the click button.

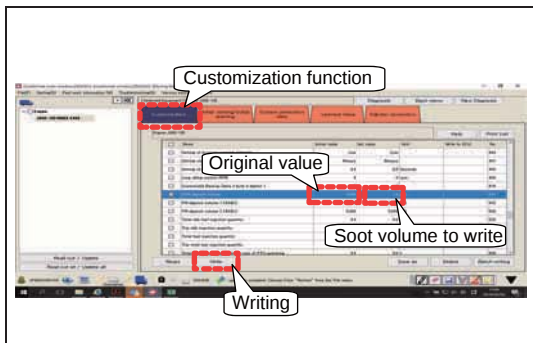


SAPH16F090301527

(5) Writing soot volume

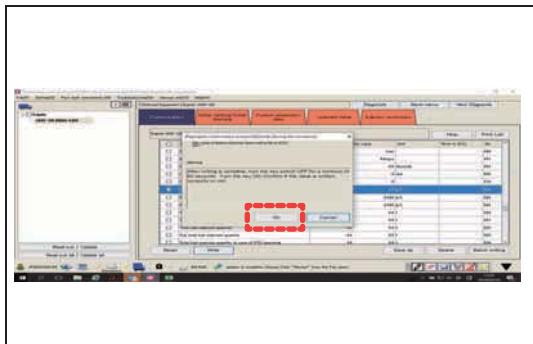
HINT

- As in the window on the left, write a soot volume [2.5] using the customization function. Record the original value not to forget. The example in the window is [0.674].
- If the soot volume is indicated between 2.5 to 5.0 from the beginning, do not change. In such a case, do not stop regeneration halfway.



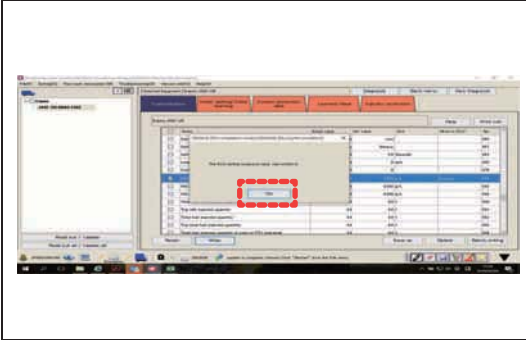
SAPH16F090301528

(6) Turn the starter key "OFF" and then "ON" according to the instruction. Then, click [OK].



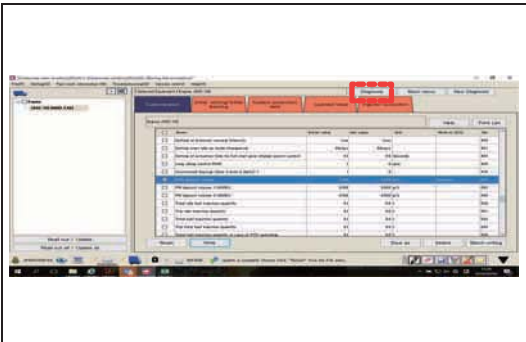
SAPH16F090301529

ADD



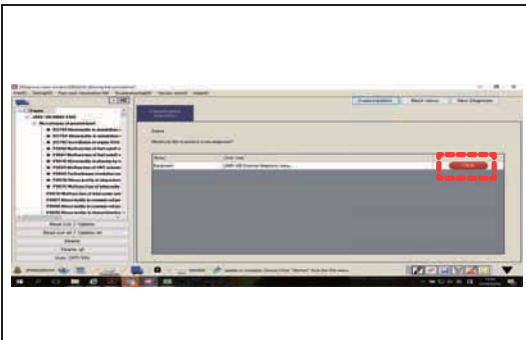
SAPH16F090301530

(7) Check that ECU writing has been completed. Click [OK].
Refer to the window on the left.



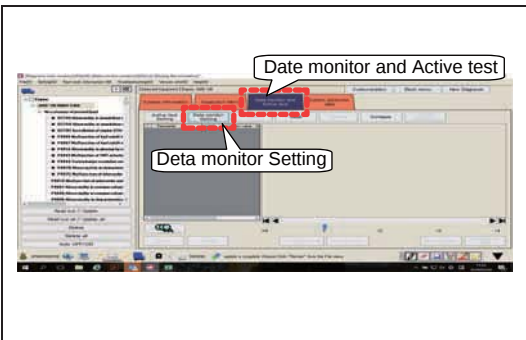
SAPH16F090301531

(8) Click [Diagnosis].



SAPH16F090301532

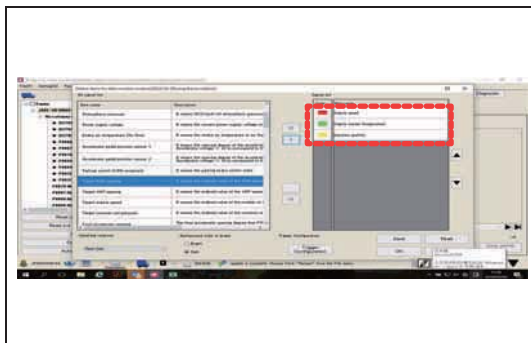
(9) Select [Engine], and press the click button.



SAPH16F090301533

(10) Select [Data monitor and Active test].
Select [Data monitor Setting].
Refer to the window on the left.

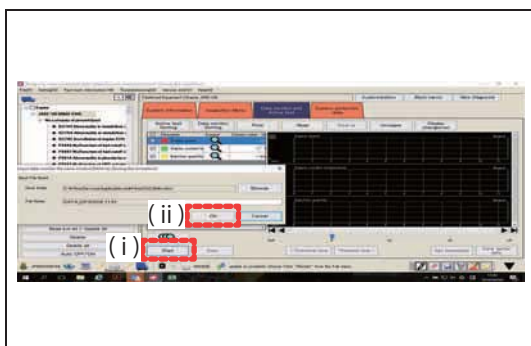
ADD



SAPH16F090301534

(11) From the selection window on the left, select the following 3 items. Click OK.

- Engine speed
- Engine Coolant temperature
- Injection quantity



SAPH16F090301535

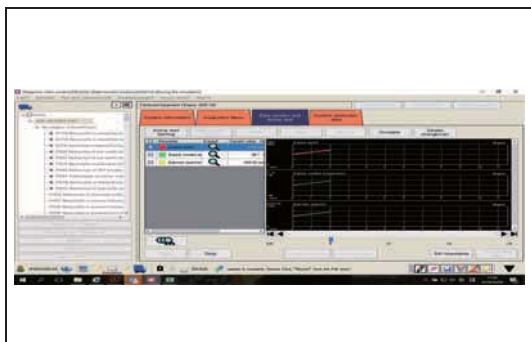
(12) (i) Click [Start] to display the window to check the data storage destination.

(ii) Click [OK] to start data monitoring.

(13) Start the engine.

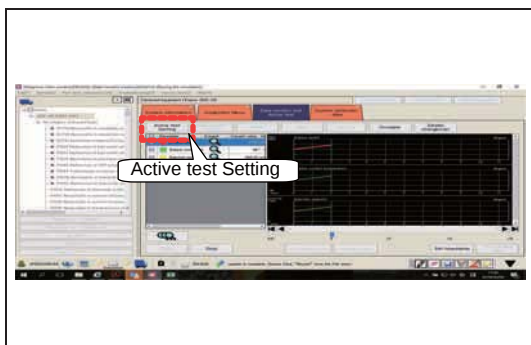
(14) Press the DPR manual regeneration switch of the vehicle. Start regeneration.click [OK].

(15) Check the injection quantity after 1 minute. This injection quantity is A(exhaust brake ON condition). Record the this value not to forget.



SAPH16F090301536

(16) Select [Active test Setting].

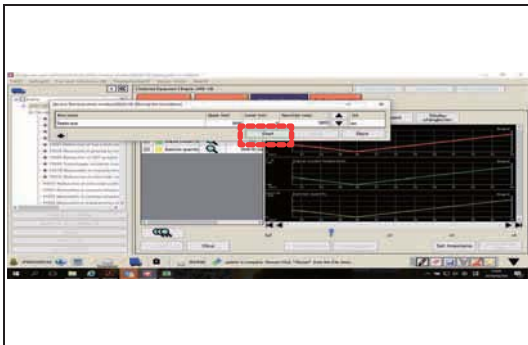


SAPH16F090301537

ADD

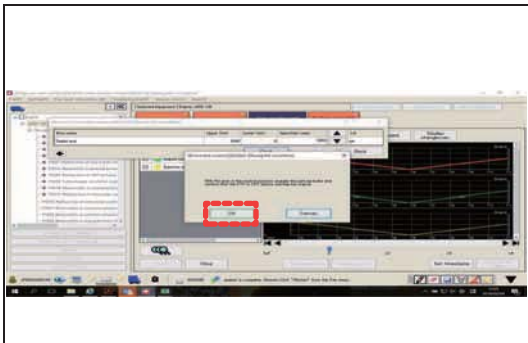
SAPH16F090301538

- (17) Select [Target rpm].
- (18) Set to 900 r/min.
- (19) Press Select.



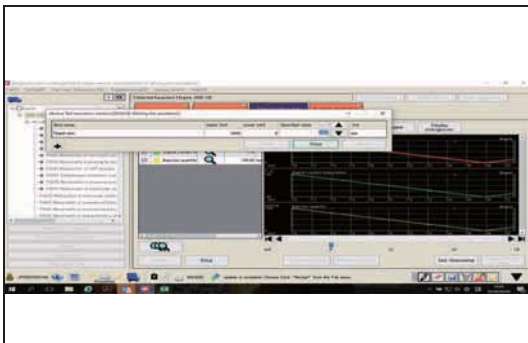
SAPH16F090301539

- (20) Press Start.



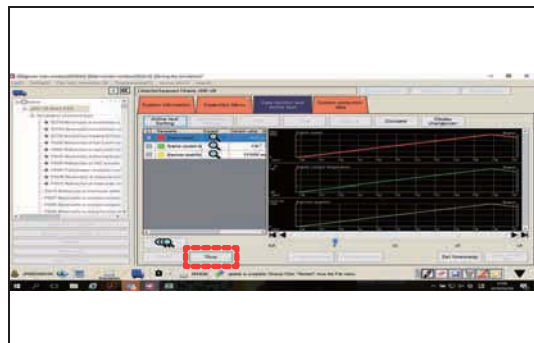
SAPH16F090301540

- (21) With the gear in the neutral position, apply the parking brake confirm that the PTO is off then press OK.



SAPH16F090301541

- (22) Check the injection quantity after 1 minute. This injection quantity is B(exhaust brake OFF condition). Record the this value not to forget.

CHANGE

SAPH16F090301542

(23) Press stop.

HINT

- If the original soot amount is less than 2.5 g / L, stop playback by pressing the manual regeneration switch.

(24) If the amount of soot is 2.5 or less, rewrite the original amount of soot with the customization function of (5) Writing soot volume.

(25) Make a judgment by the difference of A(exhaust brake ON condition) from B(exhaust brake OFF condition).

Standard values
18 – 24 mm ³ /st

Do the measurements meet the standard value? (There shall be a change in the injection quantity between while the exhaust brake is working and when it is not actuated.)

YES

Go to step 6.

NO

Adjust the butterfly opening of the exhaust brake.

6 Inspect the exhaust gas temperature sensor 4 (DPR inlet)

1. Inspect the exhaust gas temperature sensor 4 (DPR inlet) for improper installation.
2. Check the sensing area of the exhaust gas temperature sensor 4 (DPR inlet) for dirt, clogging, and damage.

Was any failure found?

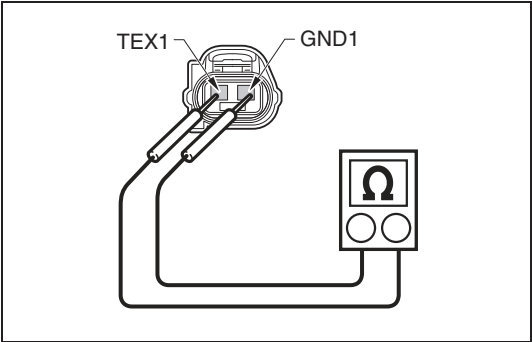
YES

Clean the sensing area and install the sensor properly.
If damage is found, replace the sensor.

NO

Go to step 7.

7 Inspect the exhaust gas temperature sensor 4 (DPR inlet) unit



SAPH16F090301543

1. Disconnect the exhaust gas temperature sensor 4 (DPR inlet) connector.
2. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor 4 (DPR inlet).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor 4 (DPR inlet) 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 8.

NO

Replace the exhaust gas temperature sensor 4 (DPR inlet).
Perform "After-inspection work" of INFORMATION section.

8 Inspect the exhaust gas temperature sensor 1 (ATC inlet)

1. Inspect the exhaust gas temperature sensor 1 (ATC inlet) for improper installation.
2. Check the sensing area of the exhaust gas temperature sensor 1 (ATC inlet) for dirt, clogging, and damage.

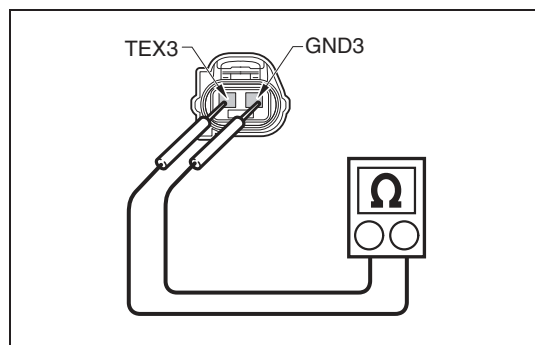
Was any failure found?

YES

Clean the sensing area and install the sensor properly.
If damage is found, replace the sensor.

NO

Go to step 9.

9 Inspect the exhaust gas temperature sensor 1 (ATC inlet) unit

SAPH16F090301544

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

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor 1 (ATC 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

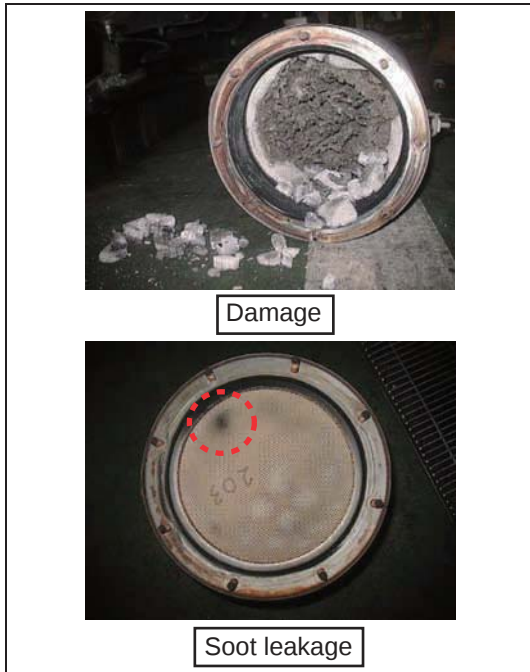
Go to step 10.

NO

Replace the exhaust gas temperature sensor 1 (ATC inlet).
Perform "After-inspection work" of INFORMATION section.

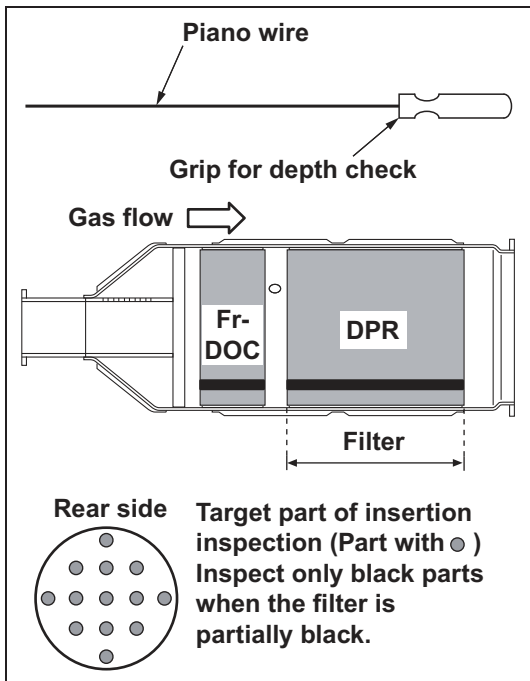
10 Inspect the DPR filter

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.



SAPH16F090301545

2. Insert the check probe from the rear surface to inspect the inside.
3. Check probe inserting depth.



SAPH16F090301546

Standard values
295 - 304 mm {11.61 - 11.97 in.}
Was any failure found?

YES

Replace the DPR filter and the PM sensor.
After replace, perform DPR manual regeneration.

NO

Go to step 11.

11 Inspect the coolant temperature sensor

- 1. Inspect the coolant temperature sensor for improper installation.
- 2. Check the sensing area of the coolant temperature sensor for dirt, clogging, and damage.

Was any failure found?

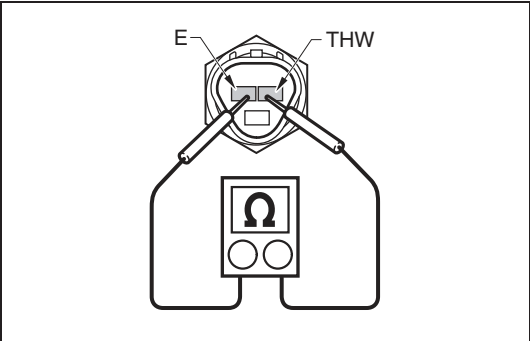
YES

Clean the sensing area and install the sensor properly.
If damage is found, replace the sensor.

NO

Go to step 12.

12 Inspect the coolant temperature sensor unit



SAPH16F090301547

- 1. Set the starter switch to the "LOCK" position.
- 2. Disconnect the engine coolant temperature sensor connector.
- 3. 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 THW – E	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 coolant temperature sensor.

13 Perform a basic engine check

1. Perform a basic engine check using the ENGINE BASIC INSPECTION SHEET. (Check the fuel injection amount, check the VNT activate.)

Was any failure found?**YES**

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

NO

Go to step 14.

14 DPR manual regeneration

1. Perform DPR manual regeneration, and check succeeded.

Was DPR regeneration succeeded?**YES**

Procedure completed.

NO

Replace the DPR filter and the PM sensor.
After replace, perform DPR manual regeneration.

DTC: P24A2

EN01H16F09030F03001208

P24A2: Excessive fuel dosing quantity INFORMATION

1. Technical description

<Description of malfunction>

- The engine ECU monitors accumulate post fuel injection quantity at DPR regeneration.

2. DTC set condition

- (1) DTC detection condition
 - While the engine is in operation
- (2) Judgment criteria
 - Accumulate post fuel injection quantity exceeds 2,000 cc.

3. Reset condition

- Immediately after normal status is resumed.

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

- MIL: ON
- SVS light: 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)>

- DPR regeneration prohibited.
- Engine output is insufficient.

<Symptoms on the vehicle due to malfunction>

- –

6. Pre-inspection work

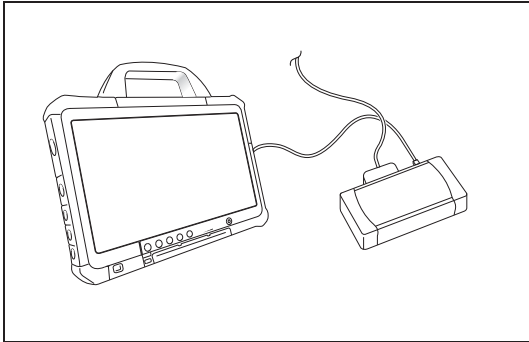
- Check that the battery voltage is in the normal range.

7. After-inspection work

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

8. Estimated failure factors

- Exhaust gas leakage
- DPR filter damage
- Abnormality in fuel injection quantity
- Improper adjustment of exhaust brake valve
- Malfunction of EGR valve
- Malfunction of VNT actuator
- Failure of exhaust gas temperature sensor 4 (DPR inlet)

INSPECTION PROCEDURE: P24A2**1 Check the DTC detected [HINO DX II]**

SAPH16F090301588

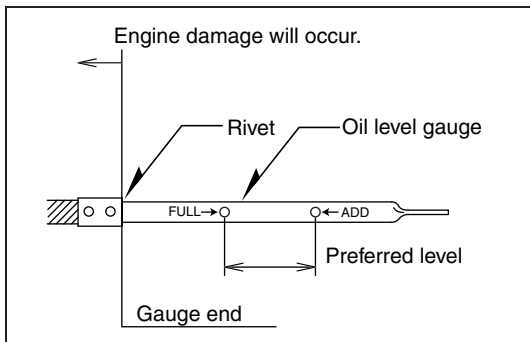
1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to HINO DX II .
3. Set the starter switch to the "ON" position.
4. Select [Engine] and check if any below DTC other than P24A2 has been detected.
 - P0005, P0006, P0007, P20D8, P20CE

Has DTC other than P24A2 been detected?**YES**

Go to diagnosis procedure of a related DTC.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 2.

2 Inspect the engine oil level

SAPH16F090301589

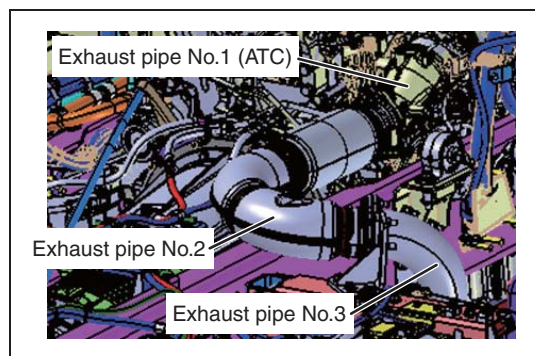
1. Check the oil level gauge and make sure the engine oil quantity is within the stipulated value.
2. Check the engine oil condition (dirt, viscosity).

Was any failure found?**YES**

Adjust the engine oil quantity according so that it is within the stipulated value.
Change the oil if it is dirty.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 3.

3 Inspect the exhaust pipe

SAPH16F090301590

1. Check for exhaust pipe crack, exhaust gas leak (soot contamination) and improper coupling flange tightening.

Was any failure found?**YES**

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

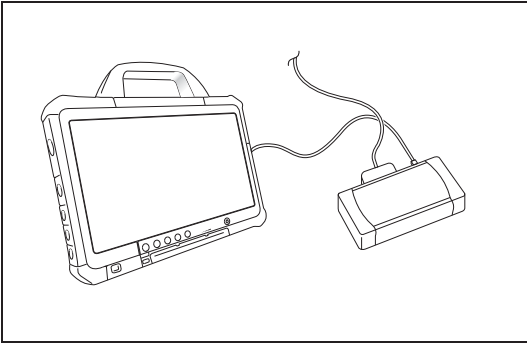
NO

Go to step 4.

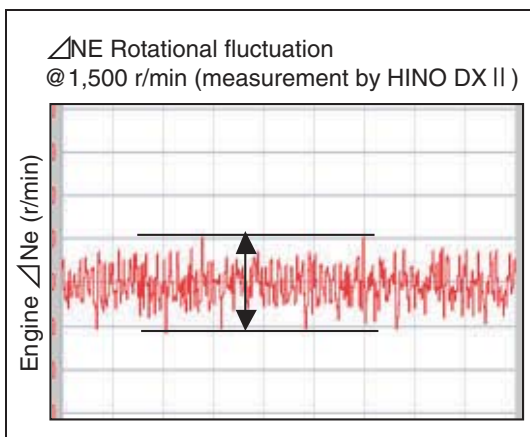
4 Inspect the injector [HINO DX II]

Check the injection quantity and the rotational fluctuation.

1. Start the engine
2. Select [Injection quantity] from the [Data monitor Setting] menu, and measure the amount of fuel injection.
3. Select [Engine speed] from the [Data monitor Setting] menu, and measure the rotational fluctuation.



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SAPH16F090301592

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)	△Ne (r/min)
MT	5.0q ≤	≤ 26
Allison® 3000RDS	6.0q ≤	
Allison® 3000HS		
Allison® 3500RDS		

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

YES

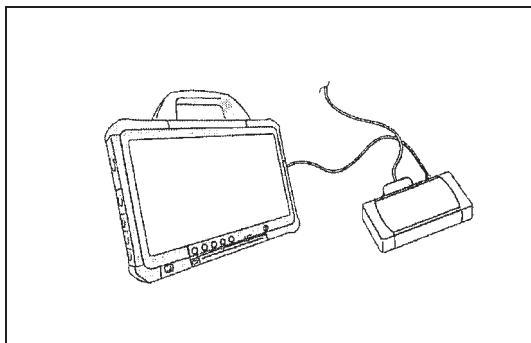
Go to step 5.

NO

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

CHANGE

5 Inspect the exhaust brake valve [HINO DX II]



SAPH16F090301594

1. Warm up the engine. (Coolant temperature: 60 °C {140 °F} or more)

2. Turn OFF the devices that place load on the engine, such as the air conditioner.

<Inspection procedure>

(1) Turn the starter key to the "ON" position.

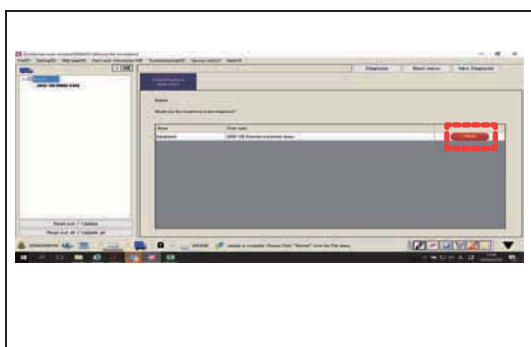
(2) Start HINO DX II.

(3) On the HINO DX II window, click [Customization].

Select the vehicle model and region, and check [Engine].

Select either Upload INF file and then [Road out] to read out.

(4) Select [Engine], and press the click button.

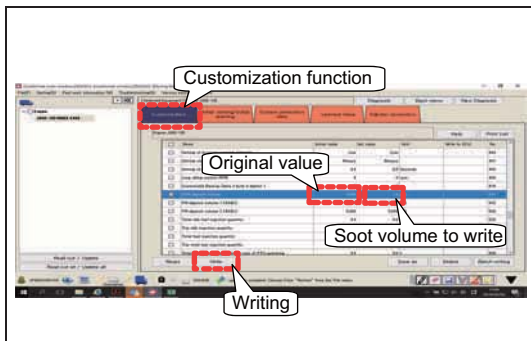


SAPH16F090301595

(5) Writing soot volume

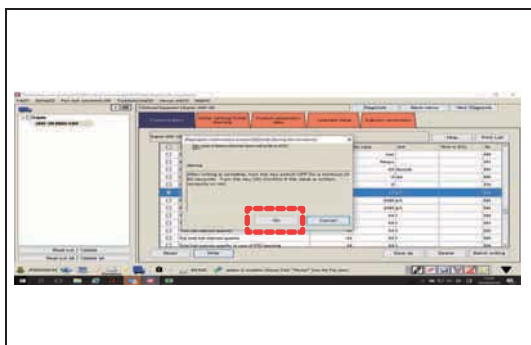
HINT

- As in the window on the left, write a soot volume [2.5] using the customization function. Record the original value not to forget. The example in the window is [0.674].
- If the soot volume is indicated between 2.5 to 5.0 from the beginning, do not change. In such a case, do not stop regeneration halfway.



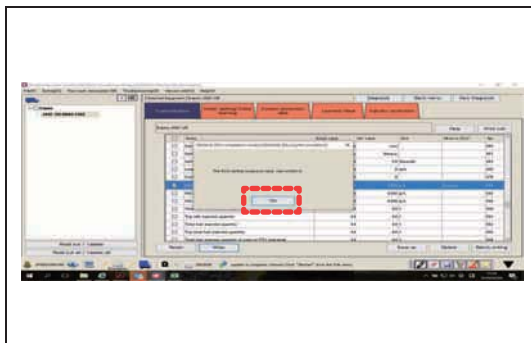
SAPH16F090301596

(6) Turn the starter key "OFF" and then "ON" according to the instruction. Then, click [OK].



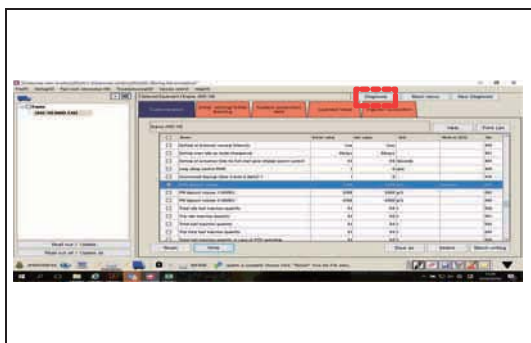
SAPH16F090301597

ADD



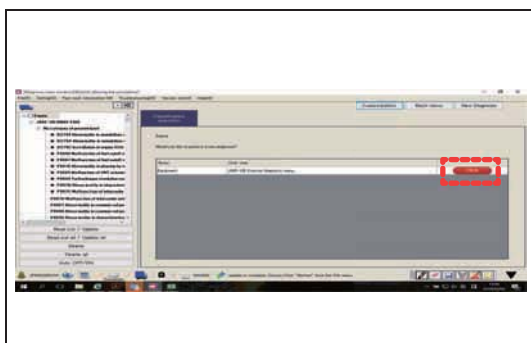
SAPH16F090301598

(7) Check that ECU writing has been completed. Click [OK].
Refer to the window on the left.



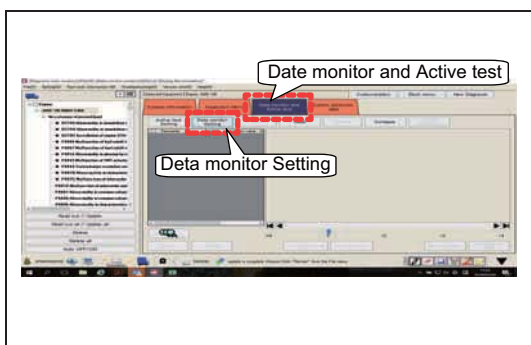
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(8) Click [Diagnosis].



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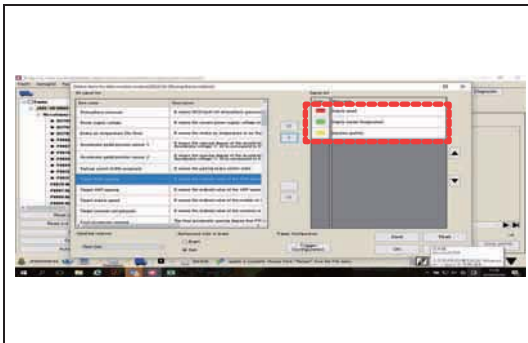
(9) Select [Engine], and press the click button.



SAPH16F090301601

(10) Select [Data monitor and Active test].
Select [Data monitor Setting].
Refer to the window on the left.

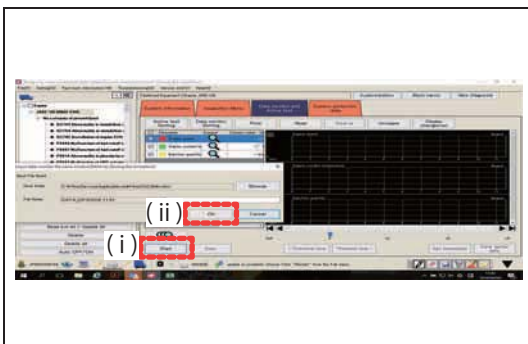
ADD



SAPH16F090301602

(11) From the selection window on the left, select the following 3 items. Click OK.

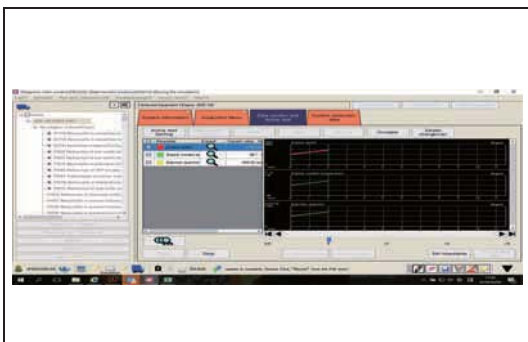
- Engine speed
- Engine Coolant temperature
- Injection quantity



SAPH16F090301603

(12) (i) Click [Start] to display the window to check the data storage destination.

(ii) Click [OK] to start data monitoring.

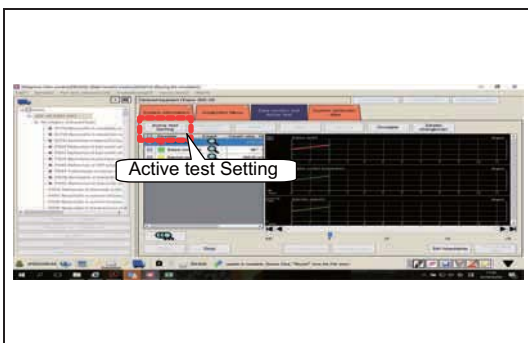


SAPH16F090301604

(13) Start the engine.

(14) Press the DPR manual regeneration switch of the vehicle. Start regeneration.click [OK].

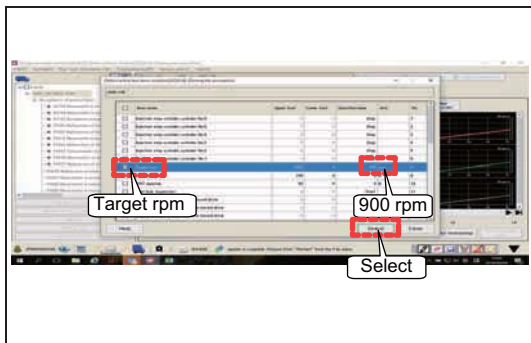
(15) Check the injection quantity after 1 minute. This injection quantity is A(exhaust brake ON condition). Record the this value not to forget.



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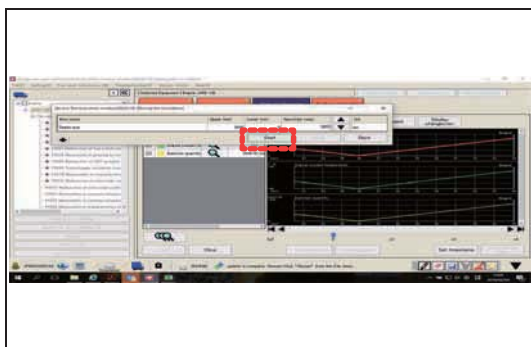
(16) Select [Active test Setting].

ADD



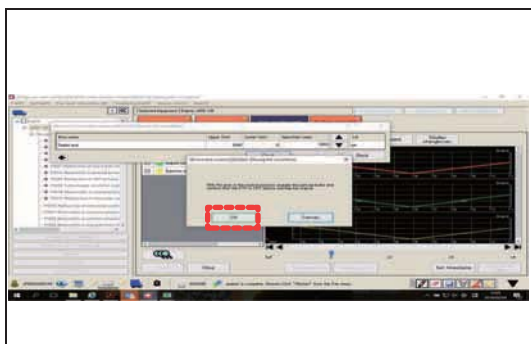
SAPH16F090301606

- (17) Select [Target rpm].
- (18) Set to 900 r/min.
- (19) Press Select.



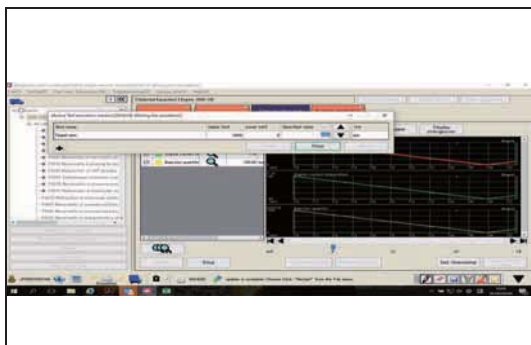
SAPH16F090301607

- (20) Press Start.



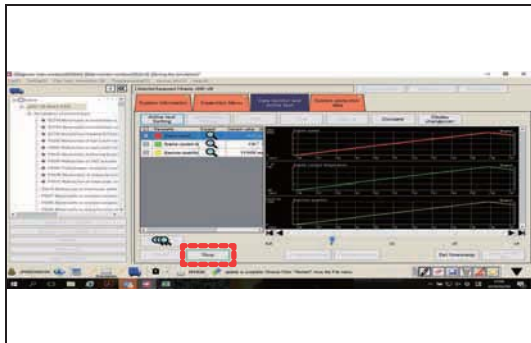
SAPH16F090301608

- (21) With the gear in the neutral position, apply the parking brake confirm that the PTO is off then press OK.



SAPH16F090301609

- (22) Check the injection quantity after 1 minute. This injection quantity is B(exhaust brake OFF condition). Record the this value not to forget.

CHANGE

SAPH16F090301610

(23) Press stop.

HINT

- If the original soot amount is less than 2.5 g / L, stop playback by pressing the manual regeneration switch.

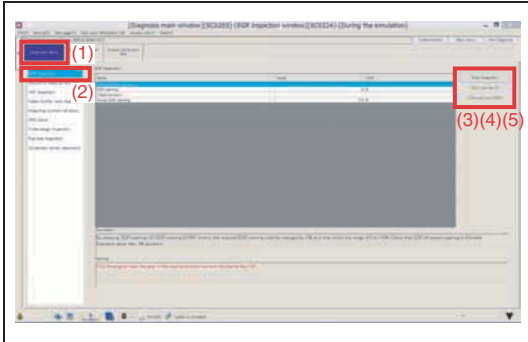
(24) If the amount of soot is 2.5 or less, rewrite the original amount of soot with the customization function of (5) Writing soot volume.

(25) Make a judgment by the difference of A(exhaust brake ON condition) from B(exhaust brake OFF condition).

Standard values
18 – 24 mm ³ /st

Do the measurements meet the standard value? (There shall be a change in the injection quantity between while the exhaust brake is working and when it is not actuated.)

YES**Go to step 6.****NO****Adjust the butterfly opening of the exhaust brake.**

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

SAPH16F090301611

1. Set the starter switch to the "LOCK" position.
2. Connect the vehicle to HINO DX II .
3. Set the starter switch to the "ON" position.
4. Select [Inspection Menu] and then [EGR inspection] 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 [Inspection Menu].
 - (2) Select [EGR inspection].
 - (3) Click [Start inspection].
 - (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 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

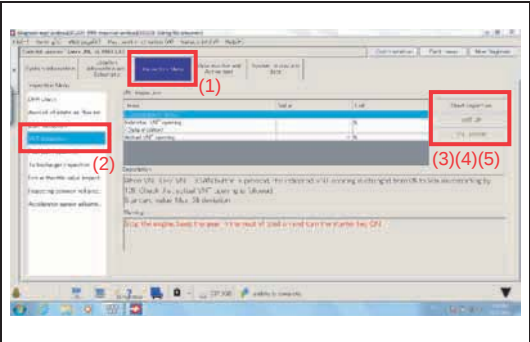
Go to step 7.

NO

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

7

Check the response delay of the VNT controller [HINO DX II]



SAPH16F090301612

1. Select [Inspection Menu] from the menu, then inspect the response delay at the Target NT position and Actual NT position.

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

<Inspection procedure>

- (1) Select [Inspection Menu].
- (2) Select [NT inspection].
- (3) Click [Start inspection].
- (4) Select [NT P].
- Inspect the response delay at each step of the Target NT position and Actual NT position from 0 to 90 .
- (5) Select [NT DO N].
- Inspect the response delay at each step of the Target NT position and Actual NT 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

Go to step 8.

NO

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

8**Inspect the exhaust gas temperature sensor 4 (DPR inlet)**

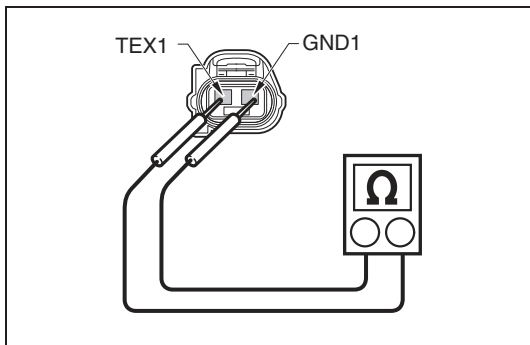
1. Inspect the exhaust gas temperature sensor 4 (DPR inlet) for improper installation.
2. Check the sensing area of the exhaust gas temperature sensor 4 (DPR inlet) for dirt, clogging, and damage.

Was any failure found?**YES**

**Clean the sensing unit and install it properly.
If damaged, replace the sensor.**

NO

Go to step 9.

9**Inspect the exhaust gas temperature sensor 4 (DPR inlet) unit**

SAPH16F090301613

1. Disconnect the exhaust gas temperature sensor 4 (DPR inlet) connector.
2. Use the electrical tester to measure the resistance between the terminals of the exhaust gas temperature sensor 4 (DPR inlet).

Measurement conditions	Tester connections	Standard values
Starter switch: LOCK	Exhaust gas temperature sensor 4 (DPR inlet) 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 10.

NO

**Replace the exhaust gas temperature sensor 4 (DPR inlet).
Perform "After-inspection work" of INFORMATION section.**

10 Inspect the DPR filter

1. Remove the DPR filter and check if there is no soot, damages or other abnormalities at its end.



Damage

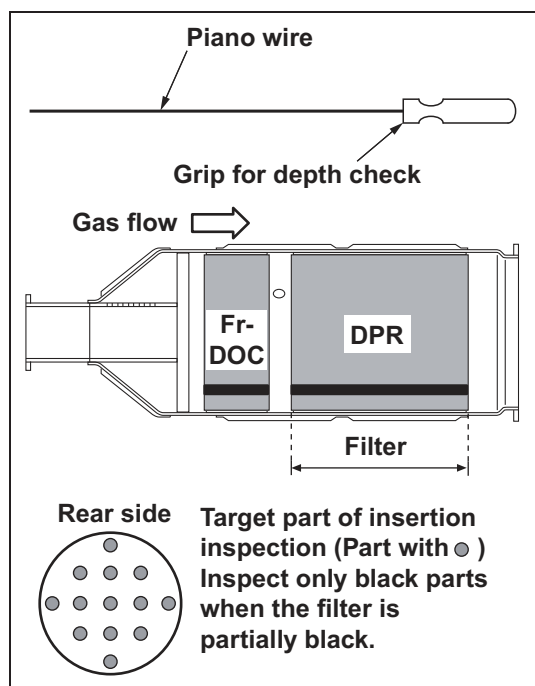


Soot leakage

SAPH16F090301614

2. Insert the check probe from the rear surface to inspect the inside.
3. Check probe inserting depth.

Standard values
295 - 304 mm {11.61 - 11.97 in.}



SAPH16F090301615

Was any failure found?

YES

Replace the DPR filter and the PM sensor.
After replace, perform DPR manual regeneration.
Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

11 DPR manual regeneration

1. Perform DPR manual regeneration, and check succeeded.

Was DPR regeneration succeeded.

YES

Procedure completed.

NO

Replace the DPR filter and the PM sensor.