



SERVICE MANUAL INFORMATION

**SB-18-036 COE DTC P24FE WORKSHOP
MANUAL CORRECTION**

**GROUP: SERVICE MANUAL UPDATE
BULLETIN NO: SB-18-036
DATE: 12-18-2018
REF: SB-A-11-094**

SUBJECT VEHICLES: 2017MY-2020MY Cab Over Engine (COE)
Trucks equipped with an J05E.

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.

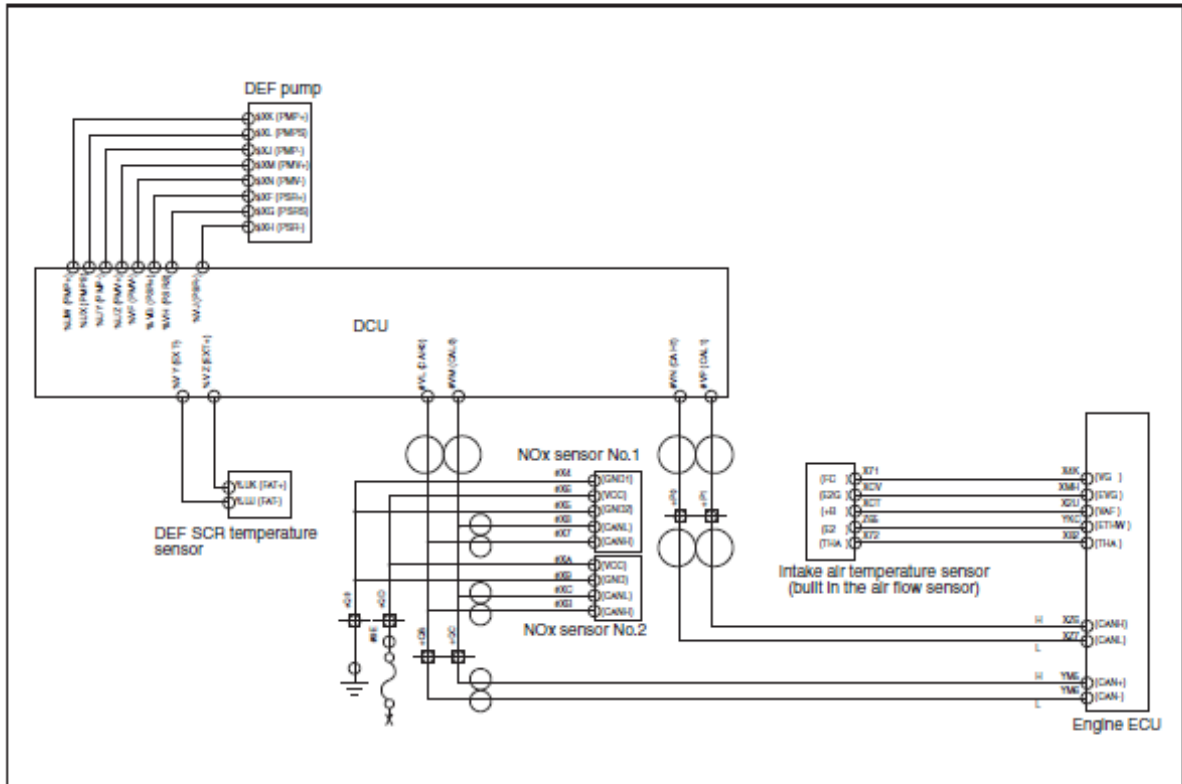
OVERVIEW:

Workshop manual correction of DTC P24FE procedure.



DTC: P24FE

EN01H02127030602016211

**DTC: P24FE Remove the SCR catalyst
INFORMATION**

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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, a deviation in NH_3 absorption to the sensing unit.

<Description of malfunction>

- Deterioration of DEF SCR catalyst is detected.

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2. DTC set condition**(1) DTC detection condition****Conditions below continue for 10sec**

- 1000 rpm ≤ Engine speed ≤ 2500 rpm.
- Engine speed ≥ 300 rpm for 3 seconds.
- 30 mm³/st.cyl ≤ Fuel quantity ≤ 150 mm³/st.cyl.
- 150 kg/h ≤ Exhaust gas mass flow < 1,000 kg/h.
- 210 °C (410 °F) ≤ SCR catalyst temp ≤ 340 °C (644 °F).
- DOC temp ≥ 200 °C (392 °F).
- Intake air temperature ≥ -20 °C (-4°F).
- 60% ≤ Ratio of actual NH₃ load ≤ 120%.
- Calculated HC load ≤ 1.0 g.
- NOx sensor No.1 (SCR upstream) and NOx sensor No.2 (SCR downstream) are valid for 121 seconds.
- DPR active regeneration not in process.
- DEF injection volume ≥ 50mg/s.
- DEF quality sensor is valid, and 35% ≥ DEF quality concentration ≥ 25%.
- 50 ppm ≤ NOx (SCR upstream) < 1000 ppm.
(NOx sensor No.1 (SCR upstream) stable and NOx sensor No.2 (SCR downstream) stable)

(2) Judgment criteria

- Calculate Average NOx conversion efficiency from NOx sensor No.1 (SCR upstream) and NOx sensor No.2 (SCR downstream).
Average NOx conversion efficiency ≤ 0.03.

3. Reset condition

- Immediately after returning to normal or after clearing the DTC and resetting the SCR related memory.

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

- MIL: OFF
- SVS light: 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>

- Output is limited, and vehicle speed is limited (SCR inducement).

6. Pre-inspection work

- Check that the battery voltage is in the normal range.
- Check that no abnormality is found by the diagnostic system check.

7. After-inspection work

- Clear all past DTCs and perform SCR related memory reset.
- Check if no DTC is stored after test drive.

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8. Estimated failure factors

- Remove the SCR catalyst.
- NOx sensor malfunction.
- Air flow sensor malfunction.
- DEF SCR Temperature sensor malfunction.
- After treatment fuel injector malfunction.
- SCR catalyst: miscalculation of adsorption amount or HC poisoning.

INSPECTION PROCEDURE: P24FE

1 Check the DEF solution

1. Check the DEF solution concentration.

Standard values
30 – 35%

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 key 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 II]

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.

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3 Inspect the air flow meter

1. Check the installation of the air flow meter.
2. Make sure there is no dirt, damage or clogging in the sensing unit of the air flow meter.

Was any failure found?

YES

Clean the sensing unit and install it properly. If damaged, replace the air flow meter. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 4.

4 Inspect the DEF SCR Temperature sensor (SCR inlet) connector

1. Check the connection of the DEF SCR 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 DEF SCR Temperature sensor (SCR inlet)

1. Check the installation of the DEF SCR Temperature sensor (SCR inlet).
2. Make sure there is no dirt, damage or clogging in the sensing unit of DEF SCR Temperature sensor (SCR inlet).

Was any failure found?

YES

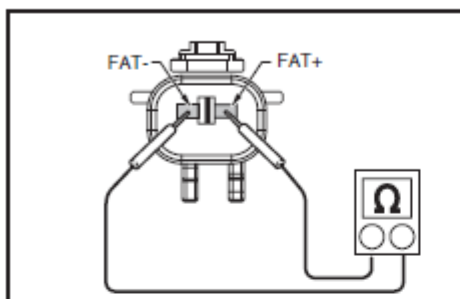
Clean the sensing unit and install it properly. If damaged, replace the sensor. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 6.

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6 Inspect the DEF SCR Temperature sensor (SCR inlet) unit

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1. Set the starter key to the "LOCK" position.
2. Disconnect the DEF SCR Temperature sensor (SCR inlet) connector.
3. Use the electrical tester to measure the resistance between the terminals of the DEF SCR Temperature sensor (SCR inlet).

Measurement conditions	Tester connections	Standard values
Starter key: LOCK	DEF SCR 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 DEF SCR 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.

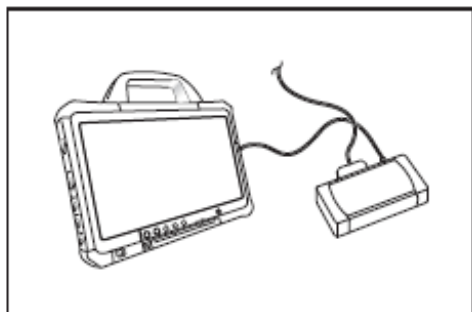
NO

Go to step 8.

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8 Inspect the DEF injector 1 [HINO DX II]

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1. Turn the starter key to the "LOCK" position.
2. Remove the DEF injector from the muffler.
3. Remove the DEF injector from the DEF piping (pressure line).
4. Using the dropper, add the DEF solution into the DEF injector inlet until the DEF injector is filled with the DEF solution and leave the DEF injector for approximately 1 minute. And then, install the DEF injector to the DEF piping (pressure line).
5. Connect the diagnostic tester (HINO DX II) to the vehicle.
6. Turn the starter key to the "ON" position.
7. Select [DCU].
8. Select [Inspection Menu] on HINO DX II and check the operation of the DEF injector.

<Inspection procedure>

- (1) Select [Inspection Menu].
- (2) Select [Start inspection].
- (3) Select [Leak test] and make sure that the pressure of the DEF solution pump is stable at 850 to 950 kPa for 1 minute.
- (4) Select [Exit] and make sure that the pressure of the DEF solution pump returns to the original level.
- (5) Repeat (3) and (4) for 3 times.
- (6) Make sure that the amount of DEF injected is as specified as patterns 1 to 3 of [Inspection Menu].

HINT

The DEF crystal is soluble in the DEF solution. Clogging maybe eliminated by repeating injection several times. For this reason, even if there are the DEF deposits on the tip of the DEF injector, it is not an abnormality as long as the above injection is possible.

Is operation normal?

YES

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

NO

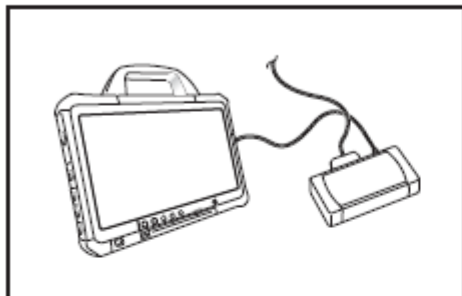
Go to step 9.

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9 Inspect the DEF injector 2 [HINO DX II]



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1. Set the starter key to the "LOCK" position.
2. Replace the DEF injector with a new one. (Do not install it on the muffler.)
3. Set the starter key to the "ON" position.
4. Select [Inspection Menu] on HINO DX II and check the operation of the DEF injector again.

<Inspection procedure>

- (1) Select [Inspection Menu].
 - (2) Select [DEF solution addition test].
 - (3) Select [Start inspection]
- Check that aqueous DEF solution is sprayed from the aqueous DEF solution injector.
 - (4) Select [Pattern 1]
 - (5) Select [Pattern 2]
 - (6) Select [Pattern 3]

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 II (Data monitor and Active test) verify that the DEF solution is stable between 800 kPa and 1,051 kPa.

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 II (Data monitor and Active test) verify that the DEF solution is stable between 800 kPa and 1,051 kPa. Perform "After-inspection work" of INFORMATION section.

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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 and the PM sensor. After replacing the filter, execute a DPR manual regeneration and check if no DTC (P24FE) is detected.
- Perform the fuel injector test to check the fuel injector if DPR manual regeneration has failed. Perform "After-inspection work" of INFORMATION section.

NO

Go to step 11.

11 Check the DEF crystallization

1. Remove the SCR catalyst.

HINT

- Refer to the workshop manual "DPR (DIESEL PARTICULATE ACTIVE REDUCTION SYSTEM)" in the chapter "EXHAUST SYSTEM (J05E)" (S5-LJ05E19* or S5-LJ05E20*) for removal and installation of the SCR catalyst.

2. Remove the outlet chamber sub assembly.
3. Remove the monolithic converter assembly.
4. Confirm the presence of DEF crystallized substance inside the outlet chamber sub assembly and monolithic converter assembly.
5. Check for crystallized substance in NOx sensor No.2 (SCR downstream).

Is there DEF crystallized substance?

YES

Remove the DEF crystallized substance. Perform "After-inspection work" of INFORMATION section.

NO

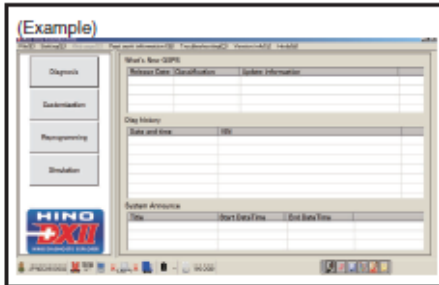
Go to step 12.

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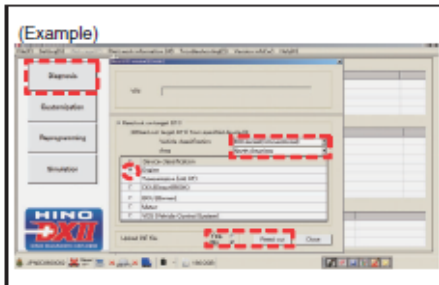
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12 Inspect the NOx sensor No.1 (SCR upstream) [HINO DX II]



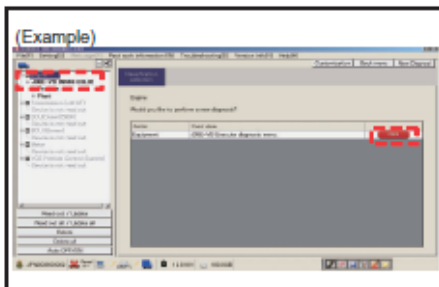
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1. Turn the starter key to the "ON" position.
2. Start DX II .



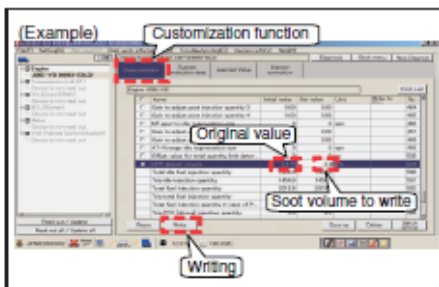
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3. On the DX II window, click [Diagnosis].
Select the vehicle model and region, and check [Engine].
Select either Upload INF file and then [Read out] to read out.



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

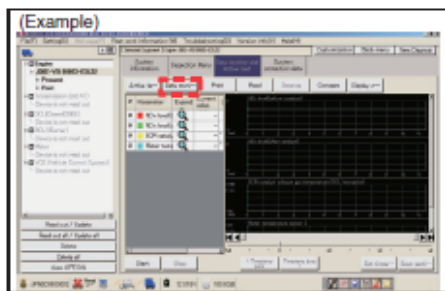


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5. Writing soot volume

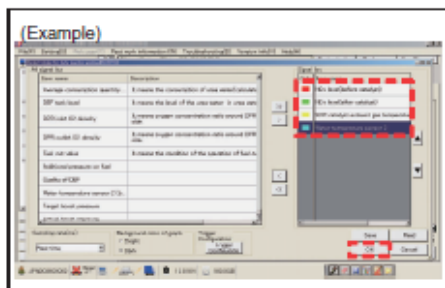
HINT

- As in the window on the left, write a soot volume [2.2] 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 2.2 to 5.0 from the beginning, press the DPR regeneration button in this state without rewriting the soot volume. In such a case, do not stop regeneration halfway.



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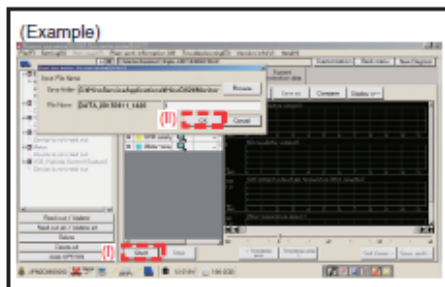
10. Select [Data monitor Setting].
Refer to the window on the left.



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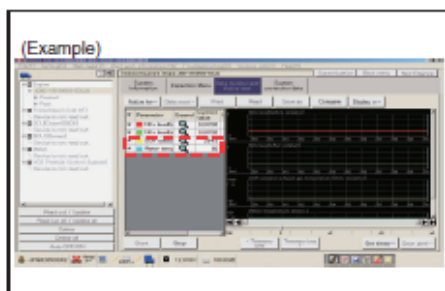
11. From the selection window on the left, select the following 4 items.
Click OK.

- NOx level (before catalyst)
- NOx level (after catalyst)
- SCR catalyst exhaust gas temperature (DCU reception)
- Water temperature sensor 2



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



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13. Start the engine.
14. Press the DPR manual regeneration switch of the vehicle.
Start regeneration.

HINT

- Since NOx sensor waveform is not detected until the exhaust gas temperature and coolant temperature reach the specified values or more, perform DPR regeneration to increase the exhaust gas temperature and coolant temperature.
 - Specified values
 - SCR catalyst temperature : over 250 °C {482 °F}
 - Coolant temperature : over 70 °C {158 °F}
15. On the DX II data monitor, monitor the SCR catalyst temperature, coolant temperature and NOx levels before and after.

16. Following the determination manual, determine the quality of the sensor according to the NOx sensor waveform data on the monitor.

HINT

- **NOx sensor reference value (During DPR manual regeneration)**
 - NOx sensor No.1 (SCR upstream) : 0.168 or more

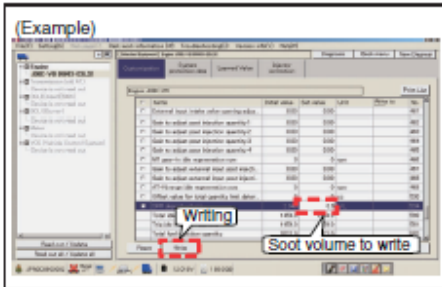
This is the end of the trouble shooting.

17. After completing the trouble shooting, press the DPR switch (button) to stop the regeneration.

18. Turn the starter key OFF once to stop the engine. Turn it ON again.
19. Rewrite the soot volume to the recorded original value.

Refer to the window on the left.

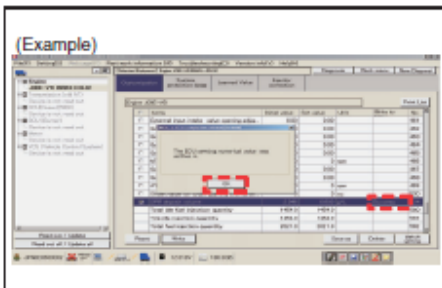
For the case of this window, the soot volume to write is [0.6].



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20. Check that the original soot volume has been written, and click [OK].

Refer to the window on the left.

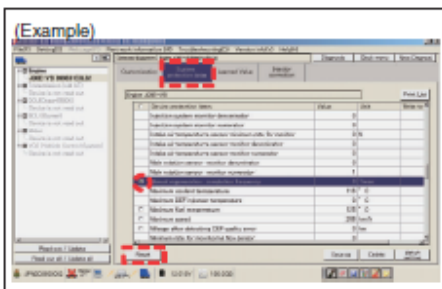


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21. Select [System protection data] to check [Manual regeneration completion frequency]. Click [Reset]. Refer to the window on the left.

NOTICE

Unless this memory reset is performed, the DTC of abnormal regeneration frequency would turn on.

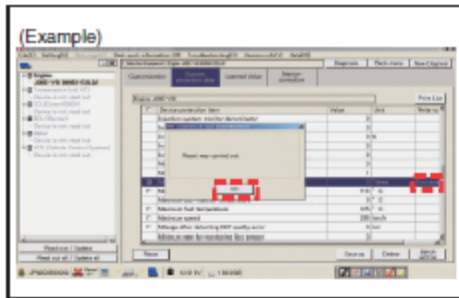


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22. Check that the memory reset has been completed. Click [OK]. Refer to the window on the left.

Does the NOx controller operate properly?

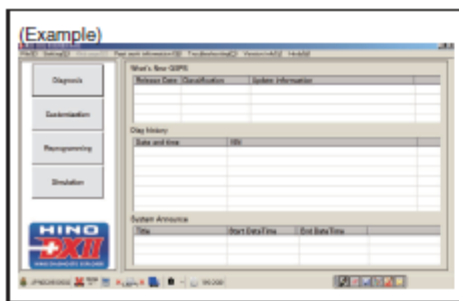
YES

Go to step 13.

NO

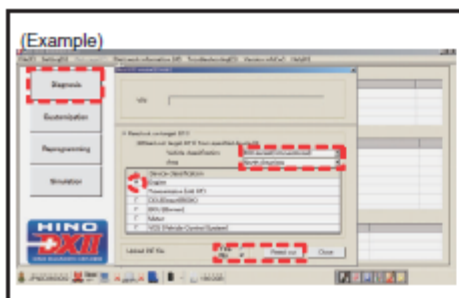
Replace NOx sensor No.1 (SCR upstream) that does not operate properly.

13 Inspect the NOx sensor No.2 (SCR downstream) [HINO DX II]



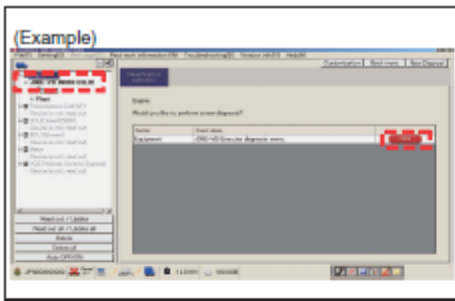
SH-TS021270301370

1. Turn the starter key to the "ON" position.
2. Start DX II .



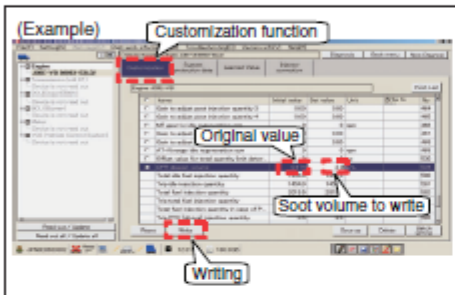
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3. On the DX II window, click [Diagnosis]. Select the vehicle model and region, and check [Engine]. Select either Upload INF file and then [Read out] to read out.



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

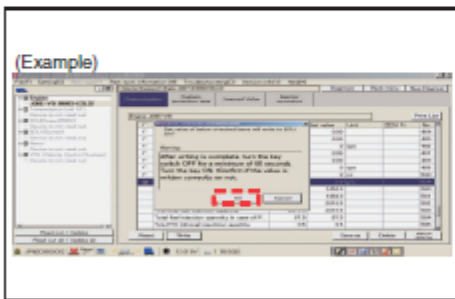


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5. Writing soot volume

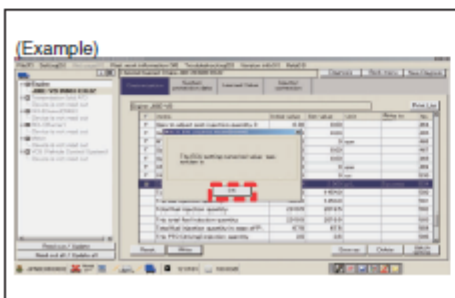
HINT

- As in the window on the left, write a soot volume [2.2] 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 2.2 to 5.0 from the beginning, press the DPR regeneration button in this state without rewriting the soot volume. In such case, do not stop regeneration halfway.



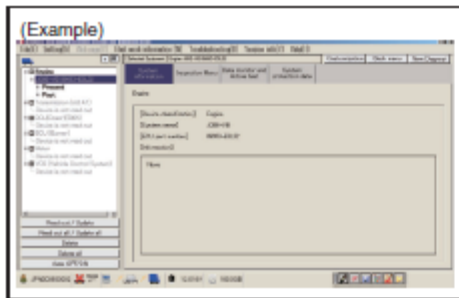
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6. Turn the starter key "OFF" and then "ON" according to the instruction. Then, click [OK].



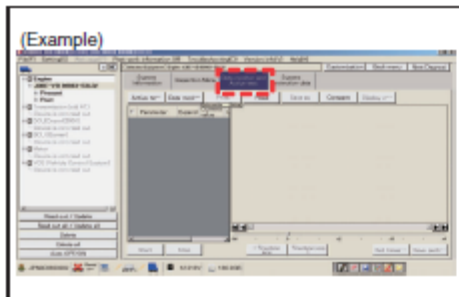
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7. Check that ECU writing has been completed. Click [OK]. Refer to the window on the left.



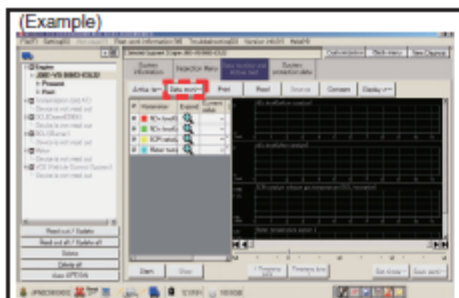
SH-TS021270301376

8. Start monitoring using the data monitoring function of DX II .
Check the output waveform of the NOx sensor on the monitor.



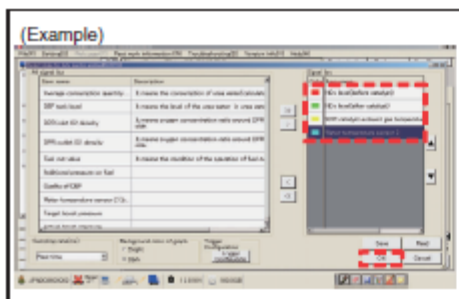
SH-TS021270301377

9. Select [Data monitor and Active test].



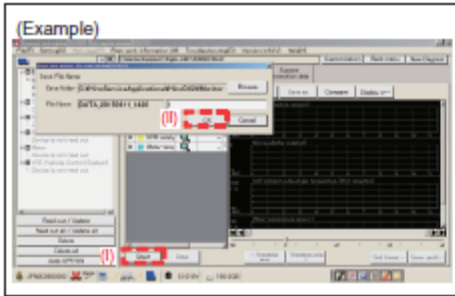
SH-TS021270301378

10. Select [Data monitor Setting].
Refer to the window on the left.

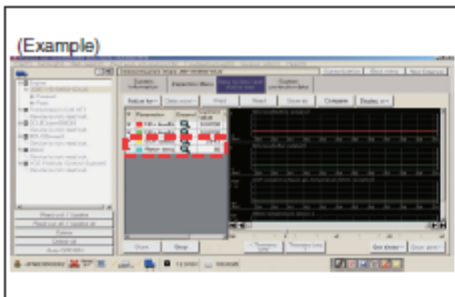


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11. From the selection window on the left, select the following 4 items.
Click OK.
- NOx level (before catalyst)
 - NOx level (after catalyst)
 - SCR catalyst exhaust gas temperature (DCU reception)
 - Water temperature sensor 2



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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.

HINT

- Since NOx sensor waveform is not detected until the exhaust gas temperature and coolant temperature reach the specified values or more, perform DPR regeneration to increase the exhaust gas temperature and coolant temperature.
- Specified values
 - SCR catalyst temperature : over 250 °C {482 °F}
 - Coolant temperature : over 70 °C {158 °F}

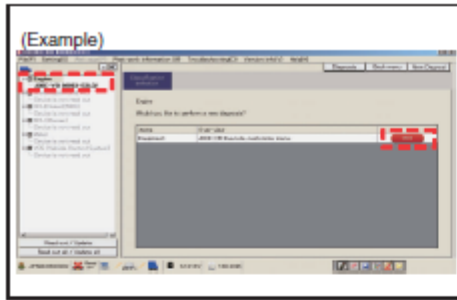
15. On the DX II data monitor, monitor the SCR catalyst temperature, coolant temperature and NOx levels before and after.
16. After completing the DPR manual regeneration, following the determination manual, determine the quality of the sensor according to the NOx sensor waveform data on the monitor.

HINT

- NOx sensor reference value (After DPR manual regeneration)
- NOx sensor No.2 (SCR downstream) : -0.064 or less
- Diagnosis timing: Within 5 minutes after completion of manual regeneration of DPR.
- If the value of NOx sensor No.2 (SCR downstream) is -0.064 or more, perform the above items 14 through 16 again. If the value of NOx sensor No.2 (SCR downstream) is -0.064 or more for two consecutive times, the NOx sensor No.2 (SCR downstream) is malfunctioning.

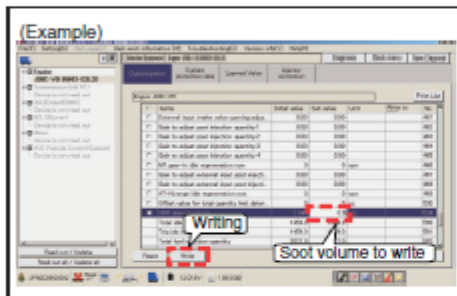
This is the end of the trouble shooting.

17. Turn the starter key OFF once to stop the engine. Turn it ON again.



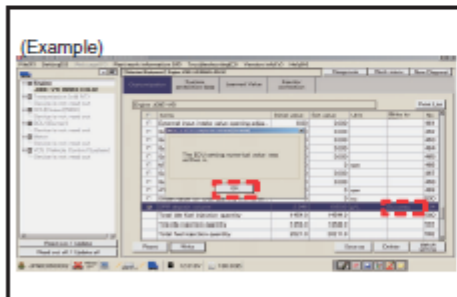
SH-TS021270301382

18. After completing the trouble shooting, rewrite the soot volume to the original value.
Select [Engine] as in the window on the left. Click the [Click] button.



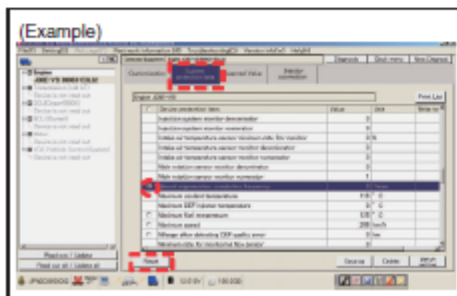
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19. Rewrite the soot volume to the recorded original value.
Refer to the window on the left.
For the case of this window, the soot volume to write is [0.6].



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20. Check that the original soot volume has been written, and click [OK].
Refer to the window on the left.



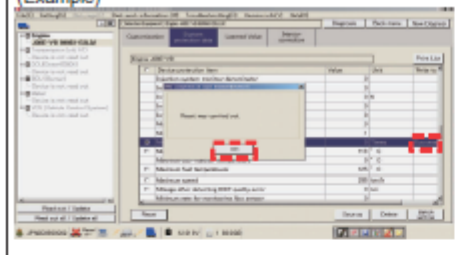
SH-TS021270301385

21. Select [System protection data] to check [Manual regeneration completion frequency]. Click [Reset]. Refer to the window on the left.

NOTICE

Unless this memory reset is performed, the DTC of abnormal regeneration frequency would turn on.

(Example)



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22. Check that the memory reset has been completed. Click [OK]. Refer to the window on the left.

Does the NOx controller operate properly?

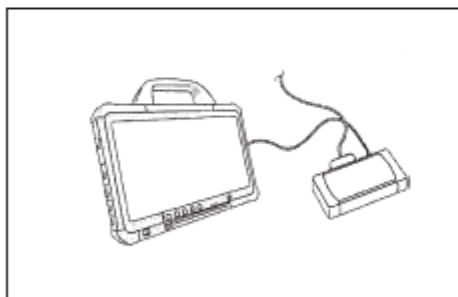
YES

Go to step 14.

NO

Replace NOx sensor No.2 (SCR downstream) that does not operate properly.

14 Inspect the SCR catalyst [HINO DX II]



SHTS021270301387

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. Perform SCR related memory reset.
6. Form the DTC detection condition.
7. Select [Engine] and check if P24FE has been detected.

Has DTC P24FE 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.

HINO

TRUCKS

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