

5. How to read troubleshooting

(1) Failure diagnosis in this manual describes Step 2 and Step 3 below :

(1) Question	"Step 1"	Hear from customers for conditions and environments of failures and check the fact.
(2) Pre-inspection (3) Reproduction method	"Step 2"	Perform diagnosis inspection, status inspection, function inspection and basic inspection. Check the failure status. If it is difficult to reproduce the problem with status inspection, use the reproduction method.
(4) Troubleshooting for each diagnosis code (5) Troubleshooting for each failure status	"Step 3"	Summarize inspection results obtained from Step 2. Perform inspection systematically according to troubleshooting procedures for each diagnosis code or failure status.
(6) Confirmation test	"Step 4"	Check if failure occurs again after repair. If it is difficult to reproduce a failure, perform the confirmation test under the conditions and environment of the failure.

(2) Pre-inspection

Pre-inspection	<ul style="list-style-type: none"> • Pre-inspection is performed in the following steps : Diagnosis inspection → Diagnosis deletion → Failure status check (Use the reproduction method if not reproduced.) → Diagnosis reconfirmation • Estimate the failure system before the reproduction test. Attach a tester and evaluate estimated failure together with failure status. Refer to the troubleshooting chart for estimated cause of a failure. • An error code is displayed if a failure occurs instantaneously. If any specific failure is not found, perform troubleshooting using the reproduction method. • Failure status check If failure is reproduced, perform Step 2 → Step 3 → Step 4. If failure is not reproduced, use the reproduction method (simulation of external conditions or check of each wire harness and connector, etc.)
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Tightening of engine bolts and nuts

1. Tightening torque of general standard bolts

(1) For bolts with seatings

Unit : N·m{kgf·cm}

Screw diameter x Pitch	7T	9T
M8 x 1.25 (Coarse thread)	28.5{290}	36{370}
M10 x 1.25 (Fine thread)	60{610}	74.5{760}
M10 x 1.5 (Coarse thread)	55{560}	68.5{700}
M12 x 1.25 (Fine thread)	108{1, 100}	136{1, 390}
M12 x 1.75 (Coarse thread)	97{990}	125{1, 280}
M14 x 1.5 (Fine thread)	171.5{1, 750}	216{2, 210}
M14 x 2 (Coarse thread)	154{1, 570}	199{2, 030}
Remark	Bolt with number "7" on the head	Bolt with number "9" on the head

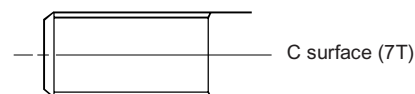
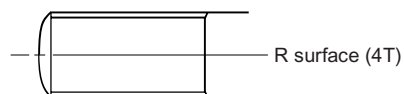
⚠ CAUTION • 8T bolt is in accordance with 7T bolt.

(2) For bolts with washers

Unit : N·m{kgf·cm}

Screw diameter x Pitch	4T	7T	9T
M6 x 1 (Coarse thread)	6{60}	10{100}	13{130}
M8 x 1.25 (Coarse thread)	14{140}	25{250}	31{320}
M10 x 1.25 (Fine thread)	29{300}	51{520}	64{650}
M10 x 1.5 (Coarse thread)	26{270}	47{480}	59{600}
M12 x 1.25 (Fine thread)	54{550}	93{950}	118{1, 200}
M12 x 1.75 (Coarse thread)	49{500}	83{850}	108{1, 100}
M14 x 1.5 (Fine thread)	83{850}	147{1, 500}	186{1, 900}
M14 x 2 (Coarse thread)	74{750}	132{1, 350}	172{1, 750}
Remark	Bolt with number "4" on the head Projection bolt Stud with R surface at free end	Bolt with number "7" on the head Stud with C surface at free end	Bolt with number "9" on the head

⚠ CAUTION • 8T bolt is in accordance with 7T bolt.



Hino P11C

STANDARD VALUE

Tightening torque

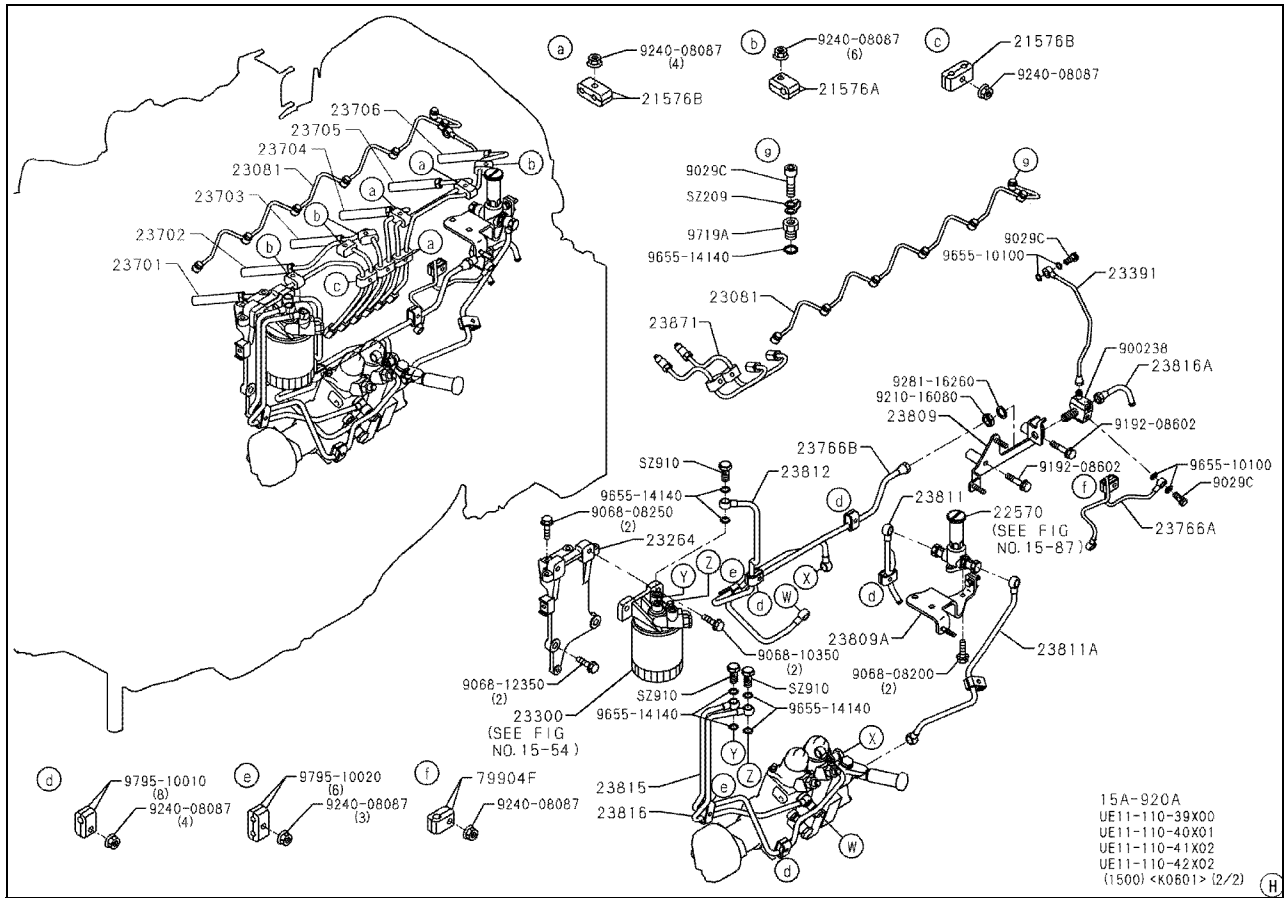
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Unit:N·m{kgf·cm,lbf·ft}

Tightening area	Tightening torque	Remark
Head cover mounting bolt (upper)	25{250, 18}	
Head cover mounting bolt (lower)	54{550, 40}	
Head bolt	118{1,200, 87}+90°+90°	Angle method
Additional head bolt	69{700, 51}	
Rocker support bolt	52{530, 38}	
Rocker arm adjusting screw lock nut (M10)	44{450, 32}	
Rocker arm adjusting screw lock nut (M12)	69{700, 51}	Exhaust side with engine retarder
Cross head adjusting screw lock nut (M10)	28{290, 20}	
Cross head adjusting screw lock nut (M12)	28{290, 20}	
Idle gear shaft mounting bolt	108{1,100, 80}	
Idle gear shaft mounting bolt (main idle)	44{450, 32}	
Supply pump drive gear mounting nut	245{2,500, 180}	
Supply pump drive bearing case retainer mounting bolt	25{250, 18}	
Flywheel mounting bolt	270{2,750, 200}	
Flywheel housing mounting bolt (M8)	25{250, 18}	
Flywheel housing mounting bolt (M14)	113{1,150, 83}	
Flywheel housing stay mounting bolt (M14)	113{1,150, 83}	
Flywheel housing stay mounting bolt (M16)	211{2,150, 156}	
Connecting rod mounting nut	69{700, 51}+90°+90°	Angle method
Cooling jet mounting bolt	23{230, 17}	
Main bearing cap mounting bolt	274{2,800, 200}	
Camshaft gear mounting bolt	137{1,400, 100}	Warm fitting
Crankshaft damper - crank pulley mounting bolt	108{1,100, 80}	
Crank pulley - crankshaft	245{2,500, 180}	
Timing gear case cover mounting bolt	44{450, 32}	
Engine mounting bracket mounting bolt	76{770, 56}	
Engine speed sensor (B)	49±4.9{500±50, 36±4}	At the unit side Engine speed sensor

Part layout (typical example)

Fuel pipe



SAPH301090500002

23081	Leakage pipe	23811	Feed pipe
23300	Fuel filter	23811A	Feed pipe
23391	Leakage pipe	23812	Feed pipe
23701	Injection pipe	23815	Feed pipe
23702	Injection pipe	23816	Overflow pipe
23703	Injection pipe	23816A	Through feed pipe
23704	Injection pipe	23871	Pressure feed pipe
23705	Injection pipe	9655-10100	Gasket*
23706	Injection pipe	9655-14140	Gasket*
23766A	Fuel pipe	SZ209	Gasket*
23766B	Overflow pipe		

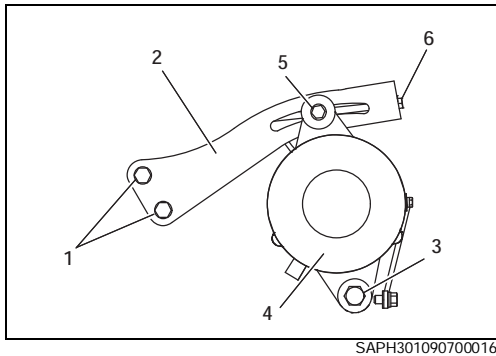
*Parts not to be reused.

Tightening torque

23081	20N·m{200kgf·cm,15 lbf·ft}	23705	44N·m{450kgf·cm,32 lbf·ft}
23701	44N·m{450kgf·cm,32 lbf·ft}	23706	44N·m{450kgf·cm,32 lbf·ft}
23702	44N·m{450kgf·cm,32 lbf·ft}	23871	Common rail side:54N·m{550kgf·cm,40 lbf·ft}
23703	44N·m{450kgf·cm,32 lbf·ft}	23871	Supply pump side:44N·m{450kgf·cm,32 lbf·ft}
23704	44N·m{450kgf·cm,32 lbf·ft}		

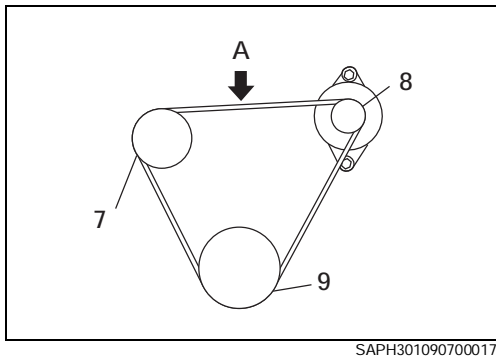
Installation of alternator

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1. Installation of alternator

- (1) Hand-tighten the brace mounting bolt (1) to temporarily secure the alternator brace (2).
- (2) Hand-tighten the through-bolt (3) to temporarily secure the alternator.
- (3) Hand-tighten the mounting bolt and nut on the brace side (5) to temporarily secure the alternator (4) and brace (2).
- (4) Thread the adjusting bolt (6) into the mounting bolt on the brace side (5).
- (5) Fully tighten the brace mounting bolt (1).
Tightening torque : 83 N·m {846 kgf·cm, 61 lbf·ft}
- (6) Tighten the belt by turning the adjusting bolt with a wrench.
- (7) Fully tighten the alternator through-bolt (3).
Tightening torque : 132 N·m {1,350 kgf·cm, 97 lbf·ft}
- (8) Fully tighten the mounting bolt and nut on the brace side (5).
Tightening torque : 47 N·m {480 kgf·cm, 35 lbf·ft}
- (9) Tighten the adjusting bolt (6) and make sure it is locked in place.
Tightening torque : 6 N·m {60 kgf·cm, 4.4 lbf·ft}



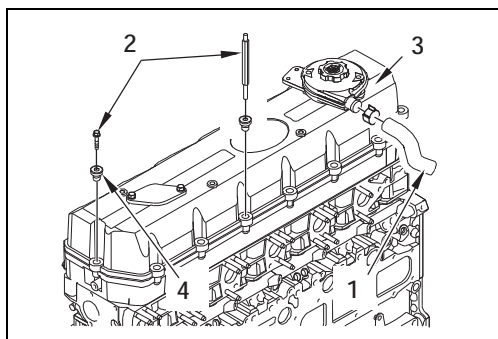
- 7 - Water pump pulley
8 - Alternator pulley
9 - Crankshaft pulley

2. V-belt tension adjustment

- (1) Loosen the fixing bolt and through bolt on the alternator brace side and adjust the tension of the V-belt (measurement position: A) using the adjusting bolt and the special tool.

Item	When installing a new belt	At the time of inspection
Deflection (mm{in.})	14 - 16 {0.5512 - 0.6299}	15 - 17 {0.5906 - 0.6693}
Tension (N{kgf,lbf})	640 - 690 {65 - 70, 144 - 155}	590 - 640 {60 - 65, 133- 144}

Special tool : 09444-1210 Compression gauge (used at the time of measuring the deflection amount) [Reference push force 98N {10kgf, 22lbf}]
95506-00090 (Denso part No.) Belt tension gauge (used at the time of measuring the tension force)



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12. Installation of head cover (upper)

- (1) Wipe dirt and oil on the joint surfaces of the head cover (upper) (3) and head cover (lower) and on the groove of the gasket and install the head cover (upper) (3) and gasket.

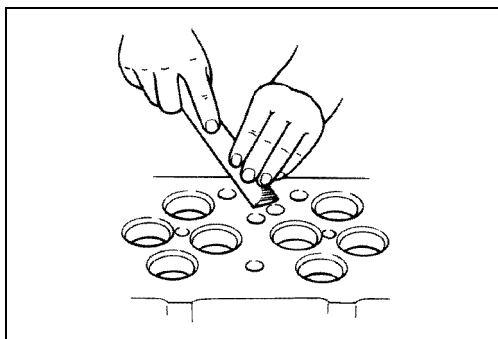
Tightening torque : 25 N·m {250 kgf·cm, 18 lbf·ft}

⚠ CAUTION • **Since the head covers are floating mount, do not overtighten the bolts (2).**

- (2) Connect the ventilator hose (1).

Overhaul

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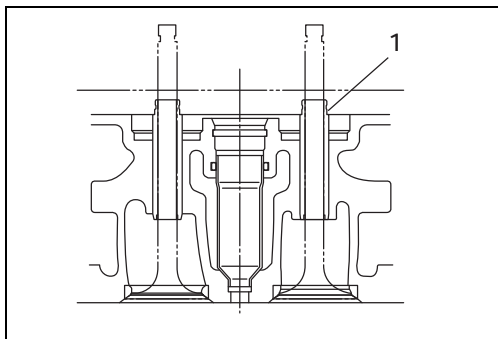


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1. Cleaning of cylinder head

- (1) Remove carbon or other deposit using a scraper.
- (2) Clean the cylinder head.

⚠ CAUTION • **To remove carbon or other deposit, do not damage the lower surface of the cylinder head.**



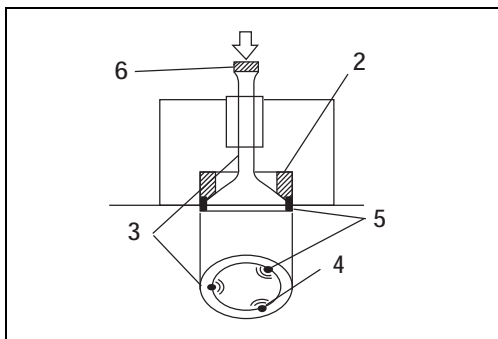
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2. Replacement of valve guide

- (1) Remove the valve stem seal.
- (2) Remove the valve guide (1) using a brass bar or press.
- (3) If a new valve guide (1) is assembled, press-fit carefully, being careful not to pry the end.

⚠ CAUTION • **In press fit, be careful not to damage the valve stem at the upper/lower ends of the guide.**

• **In press fit, be sure to apply engine oil to the circumference of the valve guide (1).**



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3. Replacement of valve seat

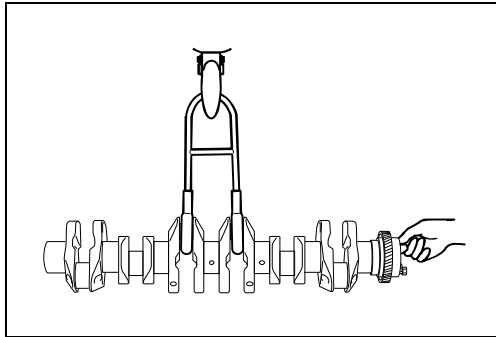
⚠ CAUTION • **The valve seat (2) replacement procedure below may damage the cylinder head depending on the case. It is recommended that a request for replacement be made to a machining vendor.**

- (1) If the valve seat (2) is replaced, use an out-of-use valve (3). After cutting three pieces (4) from the valve circumference, weld them (5) to the valve seat (2).

⚠ CAUTION • **Apply grease to protect the cylinder head lower surface from welding spatter before work.**

Replacement of crankshaft

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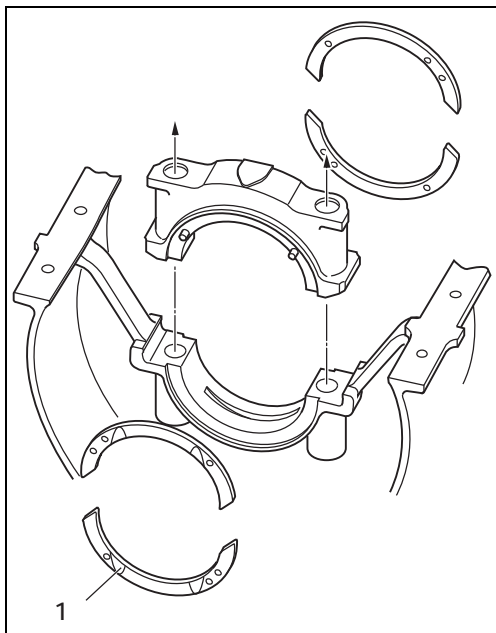


SAPH301090900083

1. Removal of crankshaft

- (1) Remove the main bearing cap and the crankshaft bearing. Remove the crankshaft using a hoist.

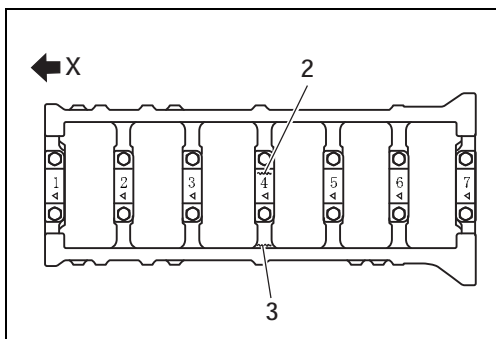
- CAUTION**
- Since the part is heavy, be careful for handling.
 - Store removed main bearing caps and crankshaft bearings for each cylinder number.



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2. Installation of crankshaft

- (1) Place the bearing with oil hole on the cylinder block and apply engine oil.
- (2) Place the crankshaft.
- (3) Align the bearing with no hole with the bearing cap and apply engine oil.
- (4) Insert the thrust bearing applied with engine oil between the crankshaft and the cylinder block so that the dented surface (1) faces outside.
- (5) Apply engine oil to the thrust bearing at the cap side in the same way and install the cap with the dented surface (1) facing outside.



SAPH301090900085

- (6) Install it so that the triangular mark on the main bearing cap faces the front of the engine (X).

- CAUTION**
- Check the stamp number (2) of each main bearing cap with the stamp number (3) of the cylinder block.

- (7) Apply engine oil to the bolt seating and the bolt thread of the main bearing cap bolt and tighten the bolts three times from the center to outside.

- CAUTION**
- Loosen the No. 4 cap bolt, tap the front/rear ends of the crankshaft with a plastic hammer for initial fit and tighten it while sometimes turning the crankshaft.

Tightening order : 4—3—5—2—6—1—7

Tightening torque : 274 N·m {2,800 kgf·cm, 200 lbf·ft}

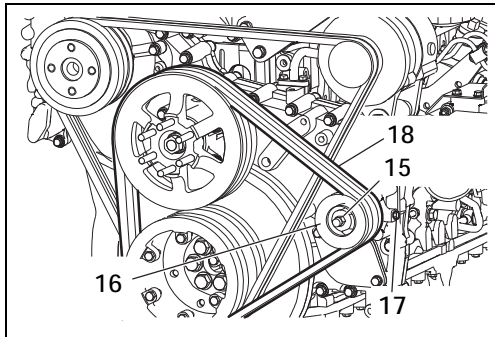
- (8) Make sure that the crankshaft turns smoothly.

Replacement of fan drive, tension pulley

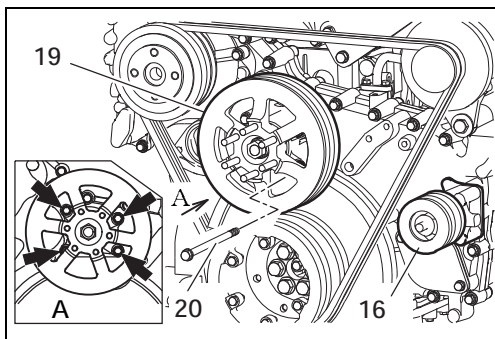
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1. Removal of fan drive, tension pulley

- (1) Remove the cooling fan.
- (2) The pulley fixing nut (15) of the tension pulley (16), loosen the adjusting bolt (17) and remove the V belt (18).



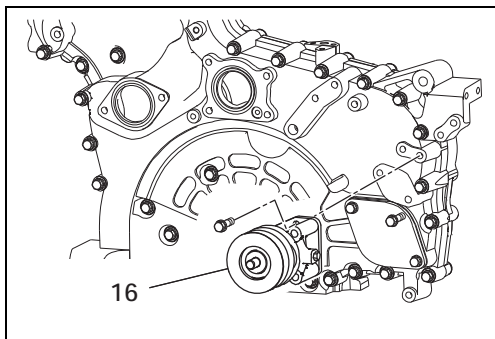
- (3) Loosen the four fan drive mounting bolts (20) and remove the fan drive (19) from the timing gear case cover.
- (4) Remove the tension pulley (16).



2. Installation of fan drive, tension pulley

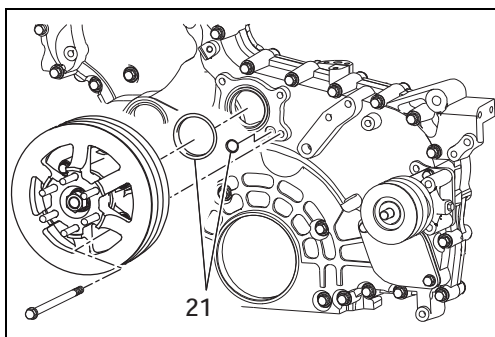
- (1) Install the tension pulley (16) assembly on the timing gear case cover with the tension pulley bracket. Install the pulley fixing nut temporarily.

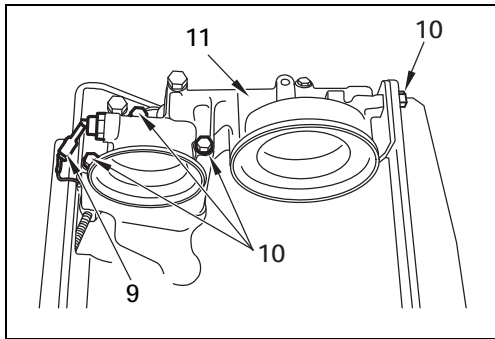
Tightening torque : 55 N·m {560 kgf·cm, 40 lbf·ft}



- (2) Install two new O-rings (21) on the O-ring groove at the timing case cover side and install the fan drive assembly on the timing gear case cover.

Tightening torque : 47 N·m {480 kgf·cm, 35 lbf·ft}





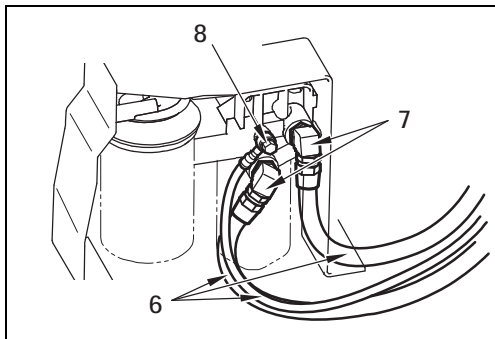
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7. Installation of the oil filter element cover (when it has been removed)

- (1) Replace the O-ring by a new one and install the oil filter element cover (11) with bolts (10) on the oil filter bracket (12).

Tightening torque : 47 N·m {480 kgf·cm, 35 lbf·ft}

- (2) Connect the oil filter warning (clogging alarm) connector (9).



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8. Connecting the oil hose

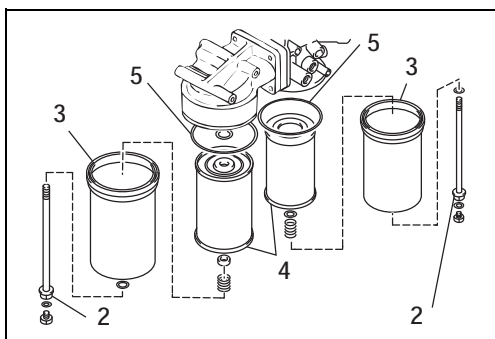
- (1) Secure the joint (7) securely with a hand vise or similar, tighten the nut of the oil hose (6), and connect the oil hose (6) to the oil filter assembly. (Inlet and outlet)

Tightening torque : 196 N·m {2,000 kgf·cm, 145 lbf·ft} (PF1)

- ⚠ CAUTION**
- When working with two spanners, use spanners with the same length for the moment arm to make spanner control easier.
 - If the joint part has been loosened, replace the O-ring by a new one.

- (2) Replace the gasket by a new one and connect the oil hose (6) (bypass) with a union bolt (8) to the oil filter assembly.

Tightening torque : 26.5 N·m {270 kgf·cm, 20 lbf·ft}



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9. Installation of oil filter element

- (1) Remove contamination or foreign matter on the mounting surface of the oil filter element cover (3).

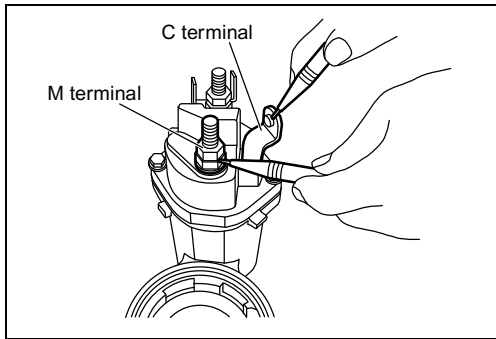
- (2) Apply engine oil thinly to the O-ring (5) (large-small) of a new oil filter element (4).

- (3) Install the oil filter element (4).

- (4) Tighten the center bolt (2).

Tightening torque:

44±4.9N·m{450±50kgf·cm,32±4lbf·ft}

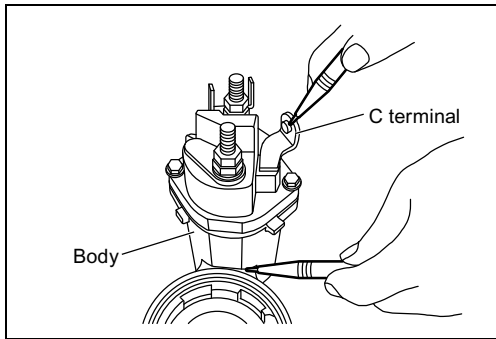


SAPH300021300041

7. Inspection of start magnet switch assembly (resistance of P coil)

- (1) Measure the P coil resistance between the C terminal and the M terminal using a circuit tester.

Standard value (Ω)	0.12 - 0.14
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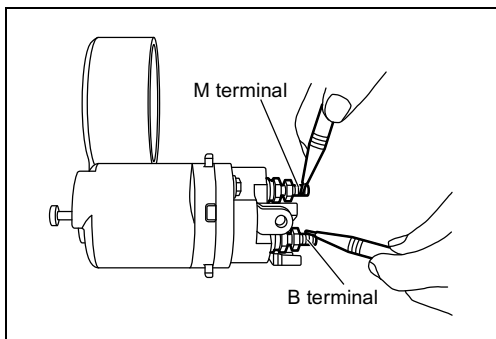


SAPH300021300042

8. Inspection of start magnet switch assembly (resistance of H coil)

- (1) Measure the H coil resistance between the C terminal and the body using a circuit tester.

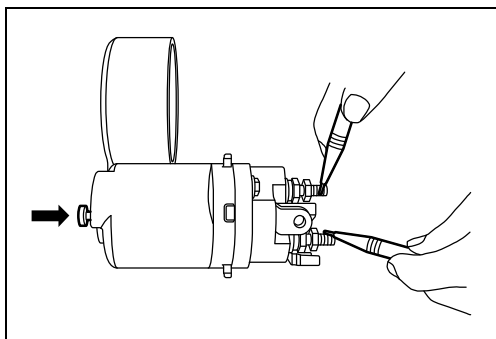
Standard value(Ω)	1.13 - 1.25
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SAPH300021300043

9. Inspection of start magnet switch assembly (electric continuity inspection)

- (1) Check electric continuity between the B terminal and the M terminal using a circuit tester, and make sure that there is no electric continuity.



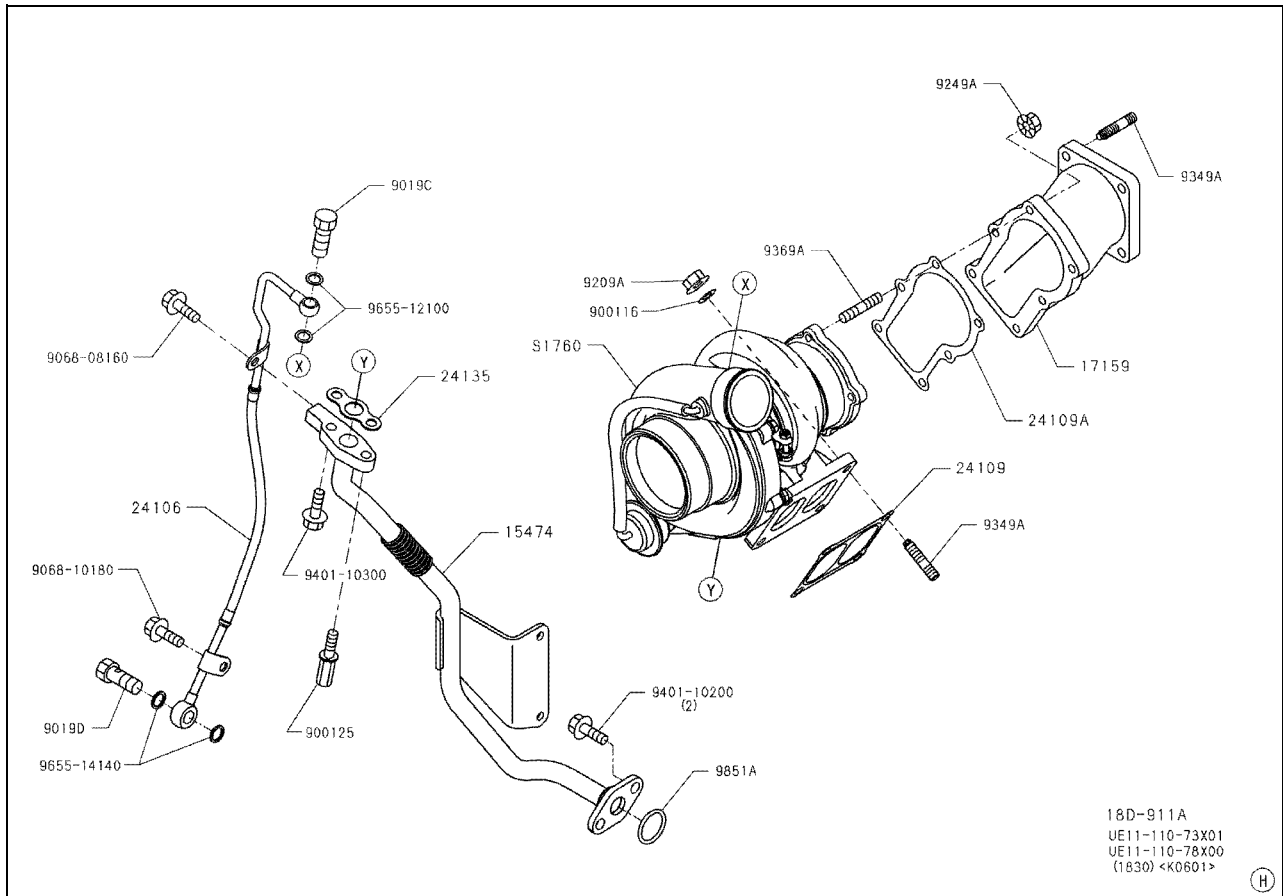
SAPH300021300044

- (2) Push the end of the start magnet switch assembly (close the internal contact) and make sure that there is electric continuity between the B terminal and the M terminal using a circuit tester.

Turbocharger Assembly

Assembly/disassembly layout

JP30109140402001



SAPH301091400001

15474	Oil outlet pipe	24135	Gasket*
17159	Exhaust manifold connector	9655-12100	Gasket*
24106	Oil inlet pipe	9655-14140	Gasket*
24109	Gasket*	9851A	O-ring*
24109A	Gasket*	S1760	Turbocharger assembly

*Parts not to be reused.

Tightening torque

9209A	59N·m{600kgf·cm,44lbf·ft}
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Turbocharger

JP03Z01020601005

Status	Cause	Action
Exhaust smoke is black (insufficient intake air).	Clogging of air cleaner element	Clean or replace air cleaner element.
	Air intake inlet is closed.	Recover normal status.
	Leak from connection of air intake system	Check and repair.
	Revolution of blower impeller and turbine shaft is heavy	Replacement
	Defective waste gate operation	Check and replace.
Exhaust smoke is black (Turbocharger is not operating).	Oil impurities are deposited at the sealing part of the turbine and revolution of the turbine shaft is heavy.	Replace engine oil and disassemble the turbocharger for cleaning.
	Seizure of bearing	Replace turbocharger.
	Seizure of bearing (insufficient lubrication or clogging of oil pipe)	Check the oil system of the engine and repair faulty areas. Also, replace engine oil.
	Seizure of bearing (Oil temperature is too high.)	Check the oil system of the engine and repair faulty areas. Also, replace engine oil.
	Seizure of bearing (Balance of revolving body is poor.)	Replace turbocharger.
	Seizure of bearing (insufficient warm-up or sudden stop from loaded operation: Unloaded operation)	Observe the precautions strictly in the operation manual.
	Contact of or damage to turbine shaft and blower impeller (excessive operation)	Check and repair engine parts.
	Contact of or damage to turbine shaft and blower impeller (excessive increase of exhaust gas temperature)	Check and repair engine parts.
	Contact of or damage to turbine shaft and blower impeller (entry of foreign matter)	Inspect the air cleaner and the engine parts and repair or replace the turbocharger.
	Contact of or damage to turbine shaft and blower impeller (wear of bearing)	Replace turbocharger.
	Contact of or damage to turbine shaft and blower impeller (faulty assembly)	Replacement

Computer pin arrangement

JP31Z01170201001

Computer pin arrangement

ECU terminal name

					+B 1	+B 2	+B 3
TACH							
ISDK		ACS 1	ACS 2	ASCS			
CASE							EGRT

	+BF 2				NESD		NE1 +	NE1 -
			SSWS		ST		STOP	
AGD 4	AGD 5		SWSS	AVC 4				
				AVC 5		NU SW		DG SW

HRV 1	HRV 2	CGD 1	CGD 2	MRL 1	MRL 2	+BF 1	
				CF/G			
						CA2 H	CA2 L

PGD 1	INJ 1		INJ 2	INJ 3	IJ1+	I1+S	
AGD 6	G3+	PCR 1			AVC 2	AVC 1	PIM
	GGND	PCR 2	GVCC			AGD 1	AGD 2

INJ 4	INJ 6	INJ 5	PGD 2	PGD 3	IJ2+	I2+S	
				PCV 2	PCV 2	PCV 1	PCV 1
	THH +			CA1 H	CA1 L		
THF +	EGRG						

ECU terminal number

A

1	2	3	4	5	6	7			
8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27
28	29			30	31	32	33	34	

B

1	2	3	4	5		6	7				
8	9	10	11	12	13	14	15	16	17	18	19
20	21			22	23			24	25	26	27
28	29			30	31			32	33	34	35

C

1	2	3	4	5	6	7			
8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27
28	29			30				31	32

D

1	2			3	4	5	6			
7	8	9	10	11	12	13	14	15	16	
17	18	19	20	21	22	23	24	25	26	27
28	29	30	31	32				33	34	35

E

1	2	3	4	5	6	7			
8	9	10	11	12	13	14	15	16	17
18	19			20	21	22	23	24	25
26	27			28	29			30	31

Signal check harness (Contact box)

A

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

B

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

C

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

D

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

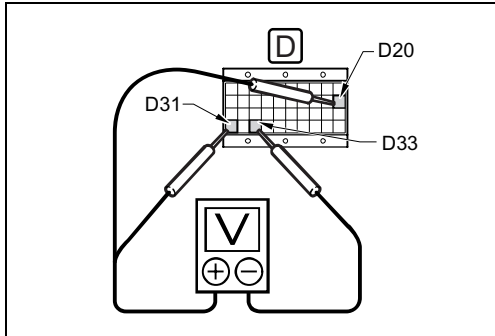
E

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

Excessive common rail pressure, supply pump excess forced feed (DTC code P0088)

JP31Z01170601016

1 Measurement of voltage between terminals



1. Set the starter key to "OFF" and connect the signal check harness.
2. Start and warm-up the engine until the coolant gauge moves (failure code P0088 or 76 is displayed).
3. Set the engine speed to idling. PFIN = Approx. 25 MPa (approx. 1.5 V)
4. Measure the voltage between terminal D20/D31 and terminal D33 of the signal check harness.

Standard value: 1.56 V or less

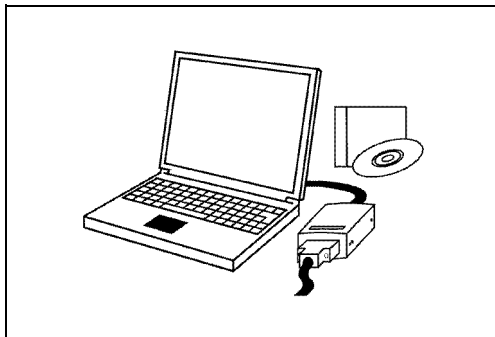
NG

Common rail pressure sensor failure or engine ECU failure

OK

2 Check of failure code

1. Make sure that other failure code is not output.
If other failure code is output, repair the failure code and make sure again that failure code P0088 or 76 is output. In particular, if a failure code of the main and sub-engine speed sensor systems is output, make necessary repairs to prevent output of the code.
2. Check the fuel injection timing of the supply pump. If the timing is not set 0° for the top dead center, set it correctly.
3. When there is no error after the check above, delete the past failure and operate the engine.
If the same code is output again, possible failures are the supply pump, common rail pressure sensor system and engine ECU. Perform more detailed diagnosis with HinoDX.

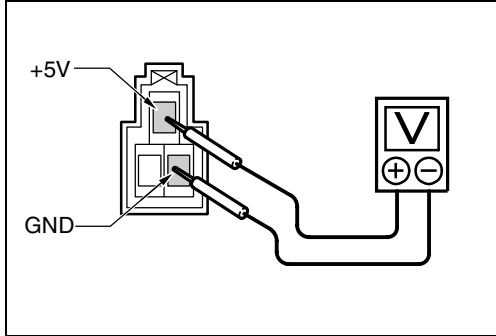


Emergency accelerator sensor malfunction

(DTC code P1133)

JP31Z01170601023

1 Power supply voltage measuring



1. With the ECU connector connected, disconnect the sensor connector and measure the voltage between the power terminal (+5 V) and the GND terminal.

⚠ CAUTION • The connector in the figure is seen from the fitting surface.

Standard value : 5.0 ± 0.5 V

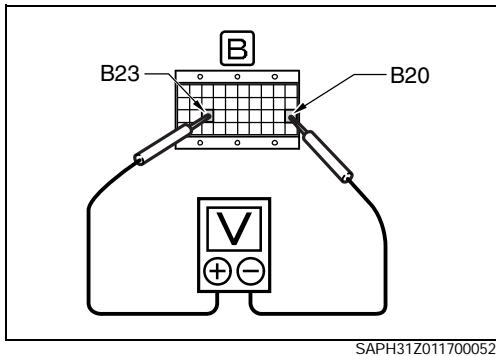
OK

NG

[2] Go to measurement of voltage between terminals.

[3] Go to measurement of voltage between terminals.

2 Measurement of voltage between terminals



1. Measure the voltage between terminals B20 and B23 of the signal check harness.

Standard value : 5.0 ± 0.5 V

OK

NG

Engine ECU, engine ECU connector failure

Harness failure