DETERMINING THE NEED FOR ENGINE OVERHAUL

Whether an engine needs overhauling or not is determined by considering various factors including reduction in output, difficulty in starting, deterioration in oil or fuel consumption, reduction in oil pressure, and the increased need for periodic maintenance.

DETERIORATION IN FUEL CONSUMPTION (FC)

Deterioration of FC is also attributable to the operating conditions of the vehicle (including road condition, load weight, driving habits) and poor maintenance of parts. Therefore, deterioration factors, and to thoroughly inspect the engine.

REDUCTION IN ENGINE OIL PRESSURE

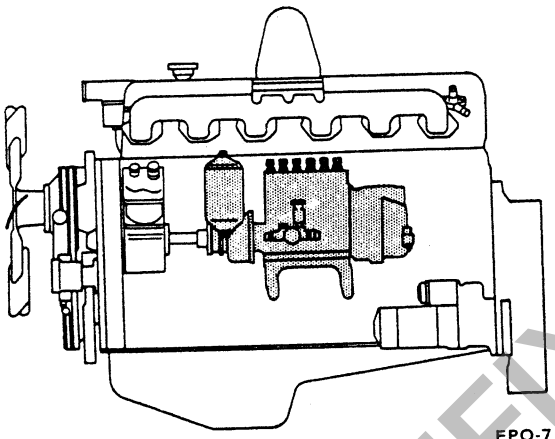
If the engine oil pressure drops to the repair limit, the engine including the

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8. FUEL SYSTEM



EPO-7

FUEL INJECTION PUMP 8– 1
- Separating each component 8– 1
- Boost compensator 8– 4
- Injection pump proper 8– 6
- Installing each component 8–12
- Fuel feed pump and priming pump 8–14
- Type RQ limit speed governor 8–17
- Type RFD mechanical governor 8–19
- Timer 8–22

NOZZLE AND NOZZLE HOLDER 8–24

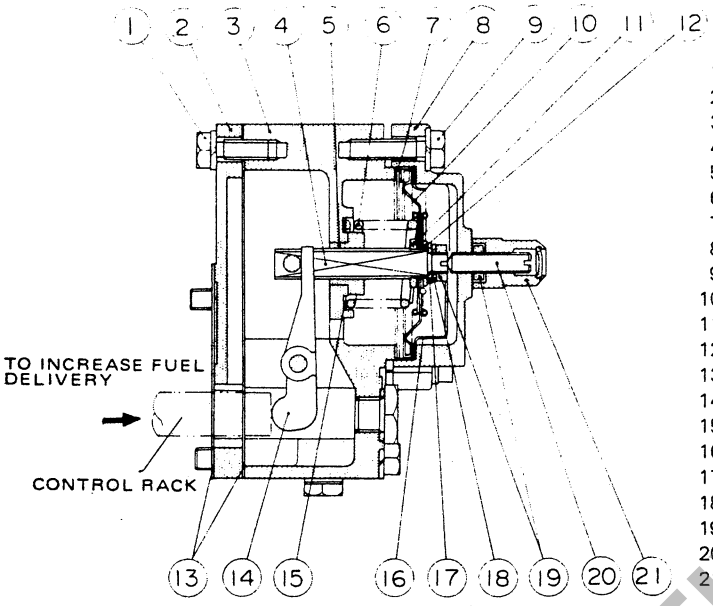
FUEL FILTER AND OVERFLOW VALVE 8–25

ADJUSTING AND TESTING INJECTION PUMP 8–26
- Initial injection timing (Injection pump only) 8–27
- Initial injection timing (With injection attached to engine) 8–28
- Adjustment of fuel injection 8–28
- Testing and adjusting governor (Type RQ governor) 8–32
- Adjusting governor (Type RFD governor) 8–34
- Testing timer 8–36

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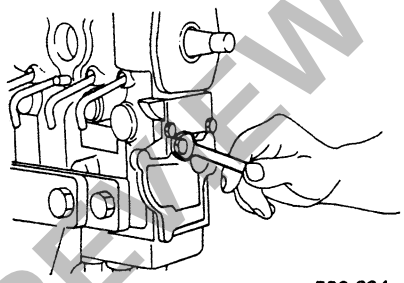
REASSEMBLY



EP9-245

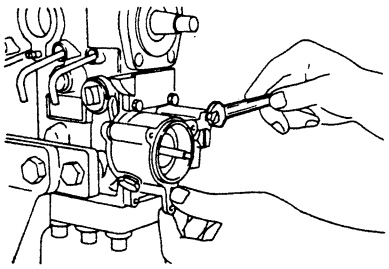
1 Bolt
2 Housing base
3 Housing
4 Push rod
5 Bushing
6 Spring
7 Shim
8 Cover
9 Bolt
10 Diaphragm
11 Shim
12 Shim
13 Gasket
14 Lever
15 Shim
16 Protector
17 Seal washer
18 Nut
19 Nut
20 Stopping screw
21 Cap

1) Install the housing base.



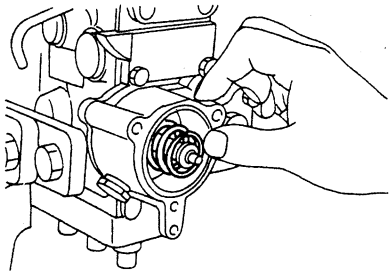
EP9-204

2) Install the diaphragm housing.



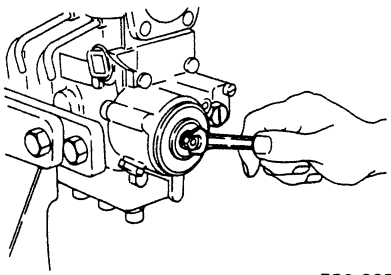
EP9-205

3) Install the spring.



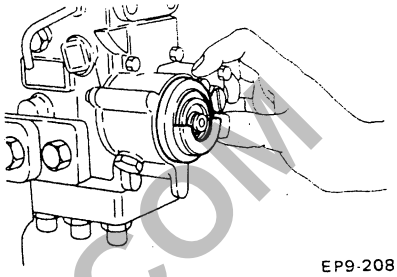
EP9-206

4) Install the diaphragm.



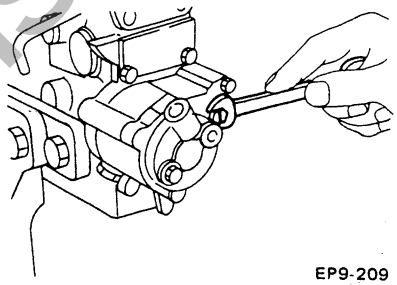
EP9-207

5) Install the protector.



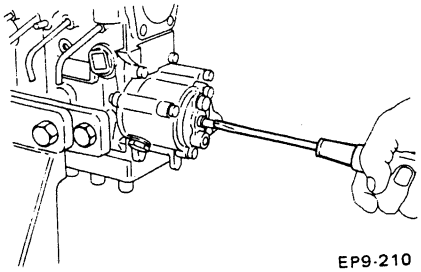
EP9-208

6) Install the cover.



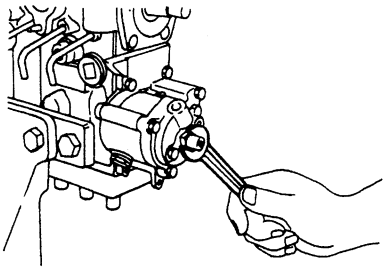
EP9-209

7) Install the stopper screw.



EP9-210

8) Install the cap.

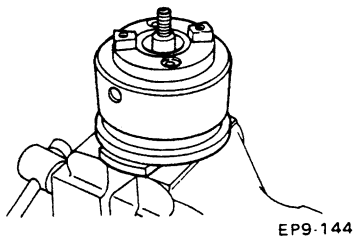


EP9-211

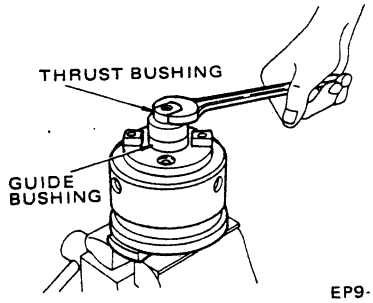
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3) Coat the oil seal threads of the flange with "thread lock". Place the flange over the timer flange pin.

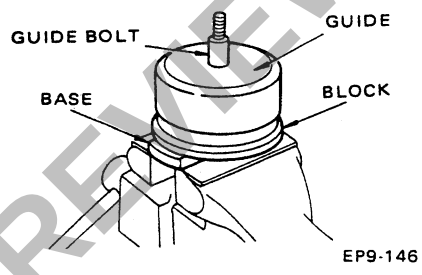

EP9-144

4) Fit the oil seal to the flange hole. With the guide bushing (157924-1200) intervening, thread in the thrust bushing (157924-1500) to force in the oil seal.



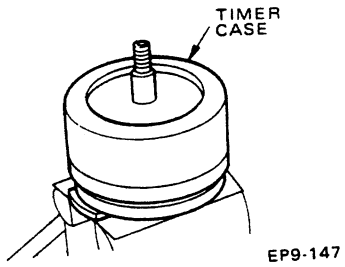
EP9-145

5) Clamp the base (157924-0110) in a vise and install the guide bolt (157924-1100).
6) Place the block (157924-0800) over the base and install the guide (157924-0900).



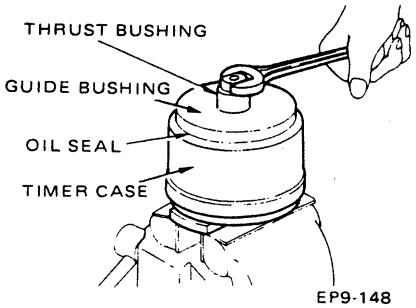
EP9-146

7) Coat the oil seal hole threads of the timer case with adhesive agent and position the timer case.



EP9-147

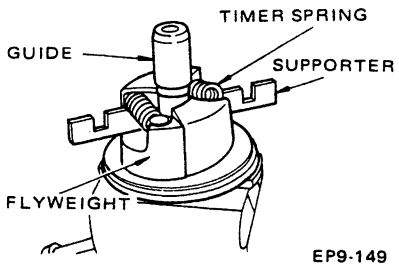
8) Insert the oil seal, fit the guide bushing (157924-1400), and thread in the thrust bushing (157924-1500), completing the job.



EP9-148

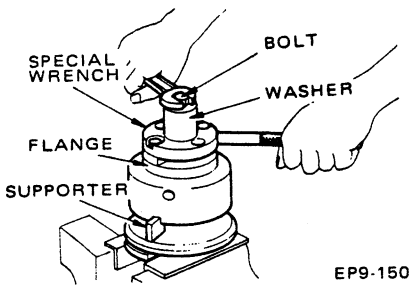
REASSEMBLY

1) Clamp the base (157924-0110) in a vise and install the guide bolt (157924-0200).
2) Place the flyweight holder over the pin of the base (157924-0110) and fit the rubber ring.
3) Coat the pin portion of the flyweight holder and the hole portion of the flyweight with grease. Install the flyweights.
4) Insert the adjusting washer and one end of the timer spring at the seat portion of the flyweight holder pin. Insert the supporter (157932-0300) beneath the spring, and thread the guide (157924-0400) over the guide bolt.



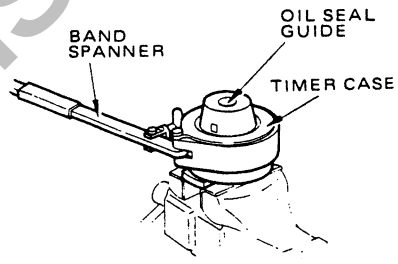
EP9-149

5) Mount the flange, apply a special wrench (157916-5320) to the flange claw, and fit the thrust bushing (157924-0500), washer (129301-2040), and bolt (129001-2220) to the flange.



EP9-150

6) Compress the timer spring with the special wrench, remove the supporter, tighten the bolt while the tension is released on the timer spring, and install the flange.
7) Insert the blade of a screwdriver in the flange hole. Position the timer spring so that one end falls at the flyweight holder pin seat and the other end at the flange pin seat.
8) Position the oil seal guide (157924-0700). Install the timer case and tighten it with the band spanner (157916-6120).



EP9-151

9) Remove one of the two locking screws on the side of the timer and connect a compressed air line in its place. Close off the other hole, immerse the timer in a container filled with light oil, and check for air leakage. Suitable air pressure is 0.5 kg/cm^2.
10) After completing the airtightness test, fill the timer with 150 grams of **"auto-timer grease"**. After completing the advance angle test, align the flyweight holder with the timer case groove and seal the flyweight holder.

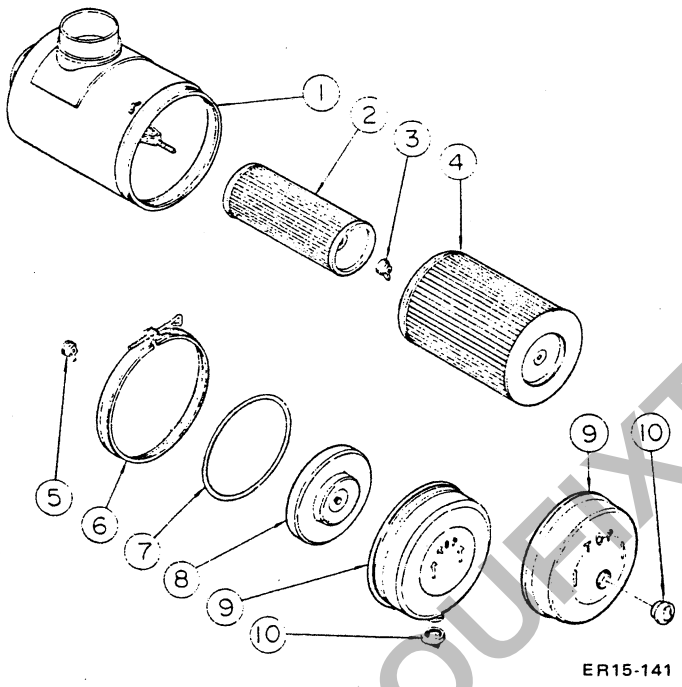
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AIR CLEANER

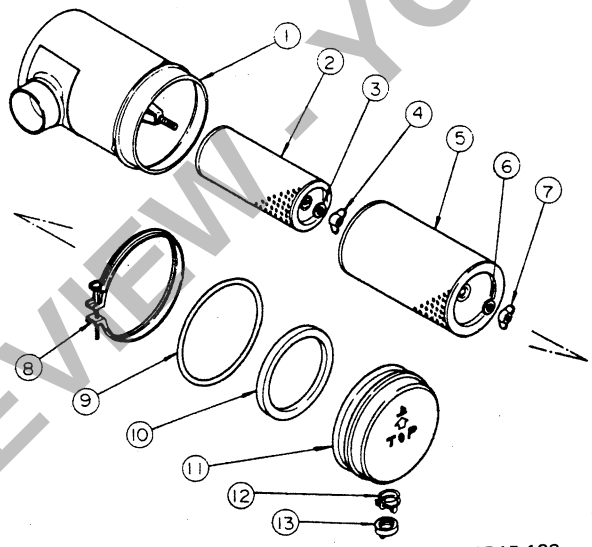
CYCLONE TYPE

DISASSEMBLY



ER15-141

1 Body assembly
2 Inner element assembly
3 Gasket nut assembly
4 Outer element assembly
5 Gasket nut assembly
6 Clamp assembly
7 O-ring
8 Baffle assembly
9 Cup assembly
10 Evacuator valve (equipped type only)



ER15-138

1 Body assembly
2 Inner element
3 Packing
4 Wing nut
5 Outer element
6 Packing
7 Wing nut
8 Clamp assembly
9 Packing
10 Packing
11 Dust pan assembly
12 Clamp
13 Evacuator valve (equipped type only)

1) Loosen the clamp bolt, and remove the dust cover.
2) Loosen the wing nut, and remove the outer element.
3) Loosen the wing nut, and remove the inner element.

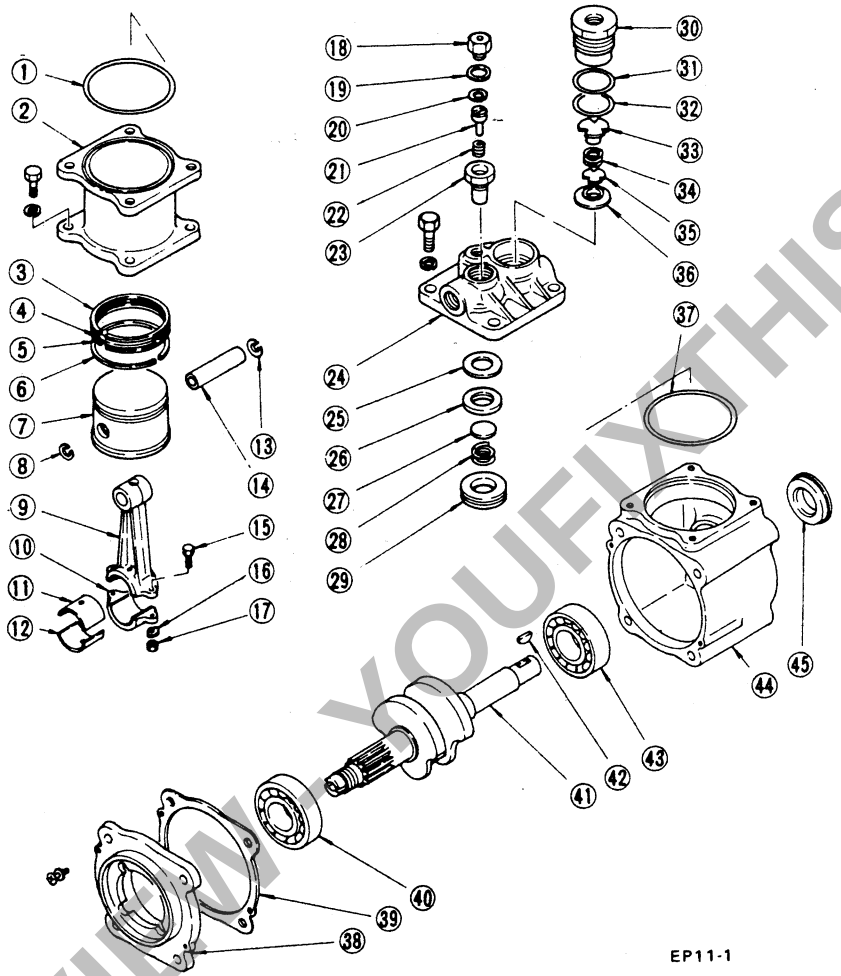
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AIR COMPRESSOR

MODEL M-17W

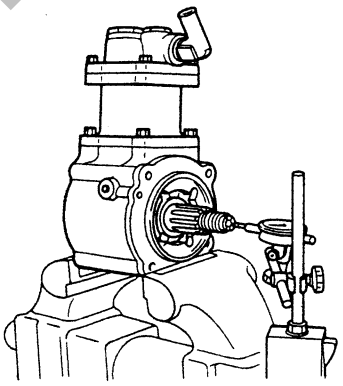
DISASSEMBLY



EP11-1

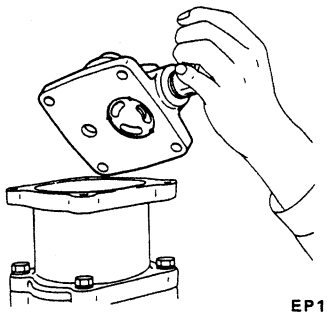
1 O-ring
2 Cylinder
3 Compression ring
4 Compression ring
5 Compression ring
6 Oil ring
7 Piston
8 Snap ring
9 Connecting rod
10 Connecting rod cap
11 Upper metal
12 Lower metal
13 Snap ring
14 Piston pin
15 Bolt
16 Washer
17 Nut
18 Connector
19 Packing
20 Snap ring
21 Unloader valve
22 Valve spring
23 Valve holder
24 Cylinder head
25 Packing
26 Valve seat
27 Suction valve
28 Valve spring
29 Valve holder
30 Delivery holder
31 O-ring
32 O-ring
33 Spring holder
34 Valve spring
35 Delivery valve
36 Valve seat
37 O-ring
38 Bearing holder
39 Packing
40 Ball bearing
41 Crankshaft
42 Key
43 Ball bearing
44 Crankcase
45 Oil seal

1) Before beginning the actual disassembly measure the end play of the crankshaft, and record the results.



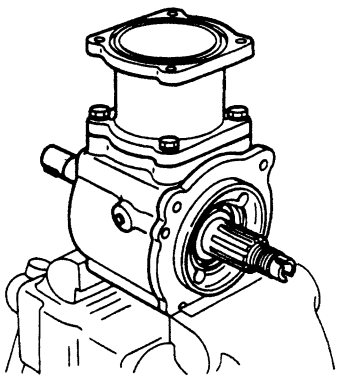
EP11-2

2) Remove the cylinder head.



EP11-3

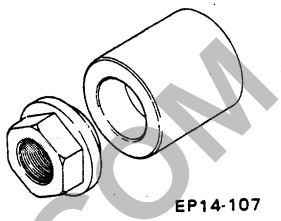
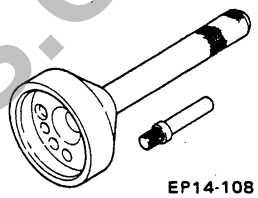
3) Remove the cylinder.



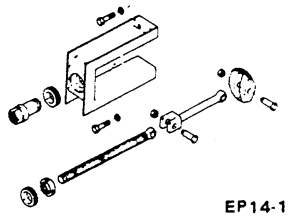
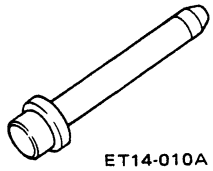
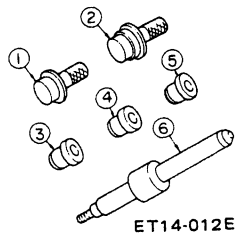
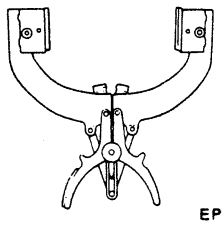
EP11-4

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Part No. and Part Name	Application	Shape
99718 96000 Collar replacer	For pressing front oil seal	 EP14-107
99691 97000 Sleeve replacer	For pressing rear oil seal	 EP14-108

ENGINE PROPER

Part No. and Part Name	Application	Shape
99600 96001 Cylinder liner tool	For removal and installation of cylinder liner	 EP14-109
99590 96002 Cam bush tool ass'y	For removal of cam bushing	 ET14-010A
99590 96003 Cam bush tool ass'y	For installation of cam bushing	 ET14-012E
99630 Z0001 Piston ring tool	For removal and installation of piston ring	 EP14-111

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MEASUREMENT OF BOOST PRESSURE

Should the turbocharger become inoperative, boost pressure should be measured to diagnose the intake and exhaust systems.

Boost pressure
Greater than 80 mmHg
[max. engine rpm under no load after warmup]

Examples of turbocharger failure

Turbocharger failure is evidenced by decreased engine output, excessive fuel consumption or black exhaust smoke. Abnormal boost pressure indicates the necessity of inspection and possible overhaul of the turbocharger intake and exhaust systems.

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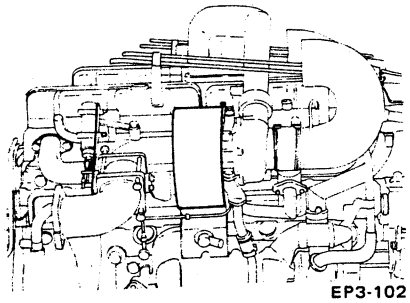
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DISASSEMBLING ENGINE

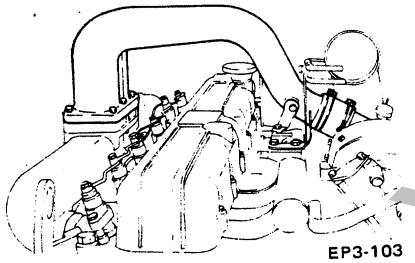
Before disassembring the engine, be sure to completely drain engine oil and cooling water.

TURBOCHARGER (for PE6T only)

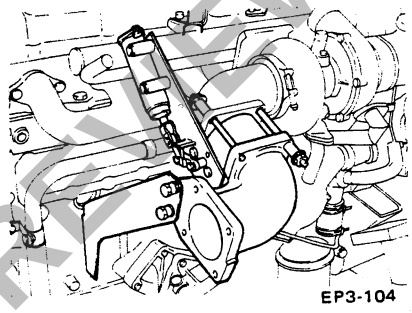
1) Remove the shield plate.


EP3-102

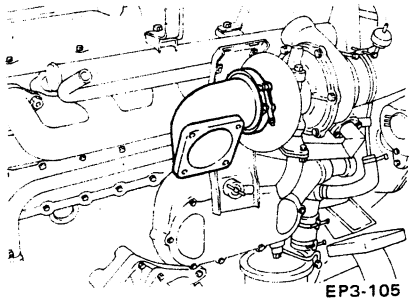
2) Remove the air intake duct.


EP3-103

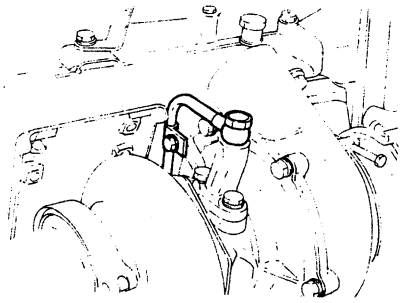
3) Remove the exhaust shutter and exhaust tube.


EP3-104

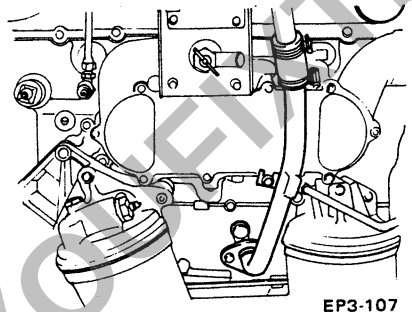
4) Loosen the V-band coupling and remove the exhaust tube connector.


EP3-105

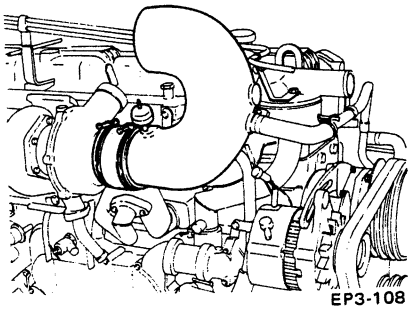
5) Remove the oil inlet tube.


EP3-106

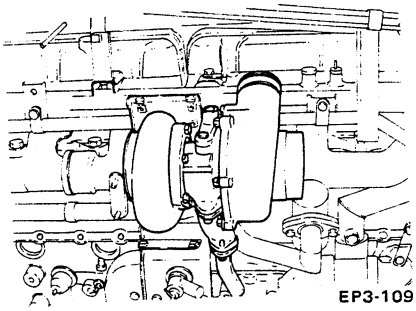
6) Remove the oil outlet pipe.


EP3-107

7) Remove the air intake hose and intake housing.

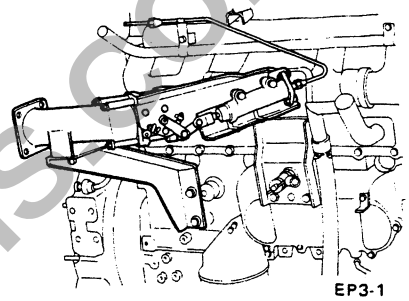

EP3-108

8) Remove the turbocharger.


EP3-109

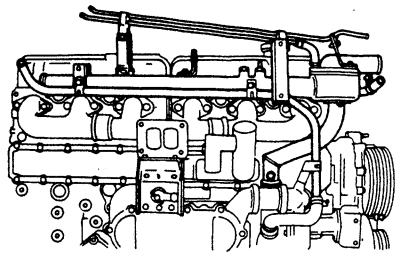
RIGHT SIDE OF ENGINE

1) Remove the air cylinder assembly, exhaust shutter assembly and exhaust manifold bracket (except crane).

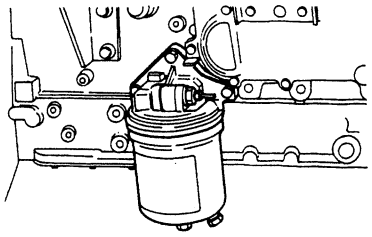

EP3-1

2) Remove the breather hose.

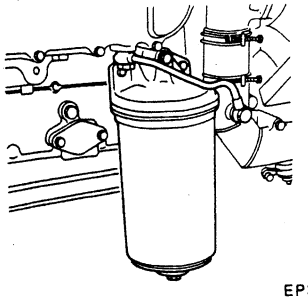
3) Remove the water manifold, water pipe hose and water tube.


EP3-2

4) Remove the full flow oil filter.


EP3-3

5) Remove the water drain tube and bypass oil filter.

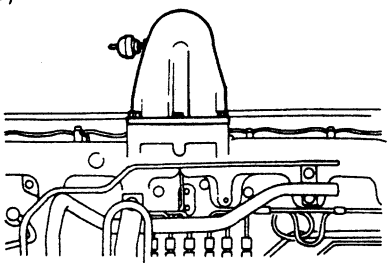

EP3-4

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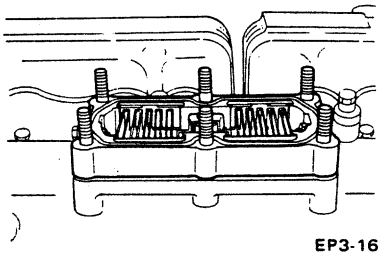
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LEFT SIDE OF ENGINE

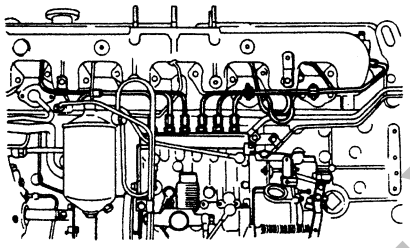
1) Remove the air intake duct.


EP3-15

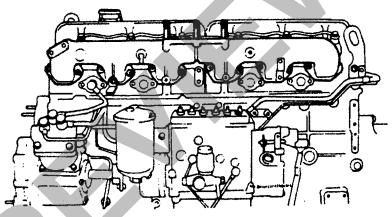
2) Remove the air heater assembly.


EP3-16

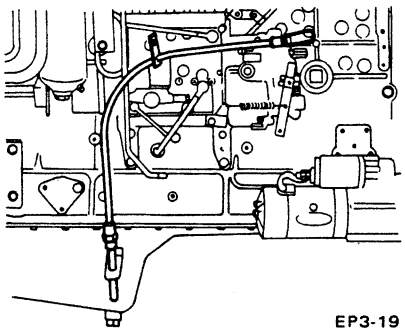
3) Remove the nozzle pipe, nozzle pipe support and fuel tube.


EP3-17

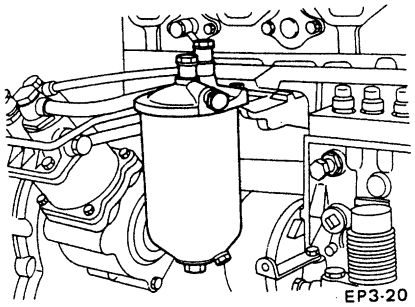
4) Remove the air intake manifold and hose.


EP3-18

5) Remove the oil level gauge and oil level gauge guide.

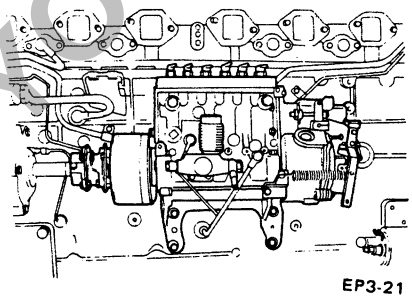

EP3-19

6) Remove the fuel filter.


EP3-20

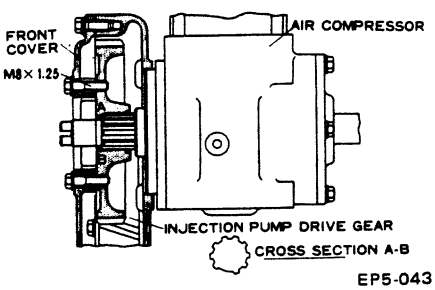
7) Remove nut which connects the coupling on the air compressor side with the joint on the timer side.
8) Remove the injection pump and oil tube.

Note
Do not remove the injection pump bracket unless it is abnormal.


EP3-21

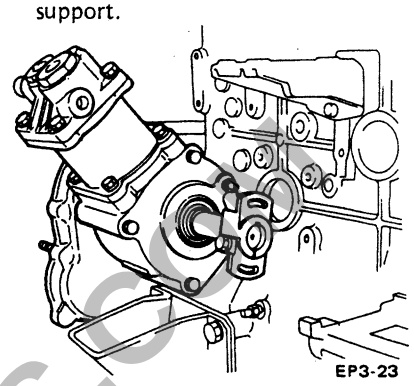
9) Remove the delivery tube, air inlet pipe and unloader tube.
10) Using a guide bolt (M8 x 1.25), attach the injection pump drive gear to the front cover, and remove the nut and plain washer.

Note
Be careful not to drop the plain washer into the gear train.

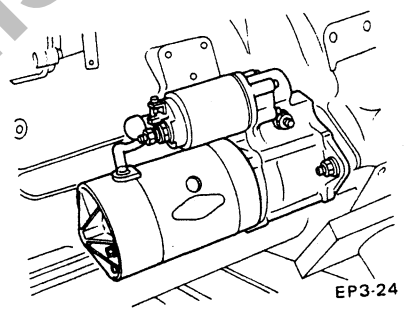


EP5-043

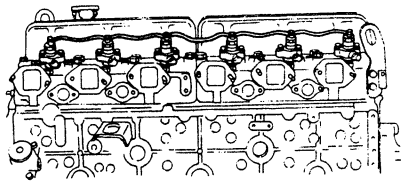
11) Remove the air compressor and support.


EP3-23

12) Remove the starting motor.


EP3-24

13) Remove the fuel spill tube and nozzle holder assembly.

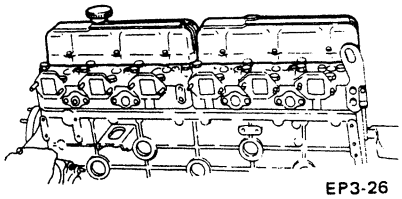

EP3-25

REAR SIDE OF ENGINE

Remove the tachometer driver kit (crane only).

CYLINDER HEAD

1) Remove the rocker cover.

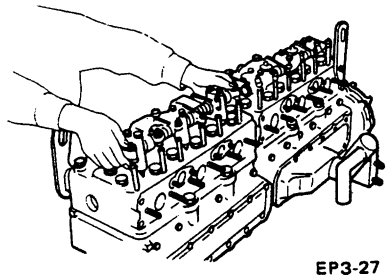

EP3-26

2) Remove the rocker shaft assembly and push rods.

Note
Be sure to loosen the rocker shaft bracket mounting bolts, proceeding from the outer one to the inner one.

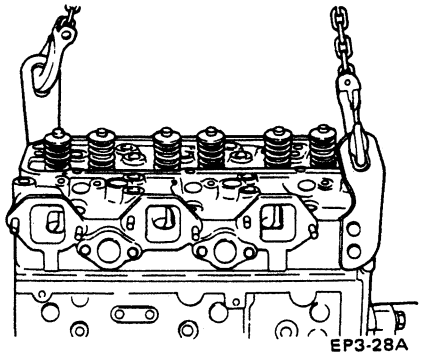
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EP3-27

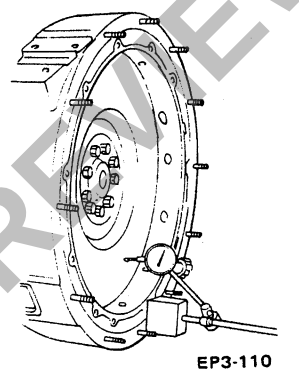
3) Remove the cylinder head and gasket.

Note
Be sure to loosen the cylinder head mounting bolts, diagonal proceeding from the outer one to the inner one.

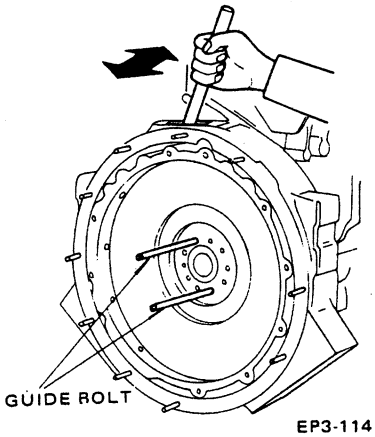

EP3-28A

ENGINE PROPER

1) Measure the lateral runout of the clutch disc contacting surface of the flywheel, and record the results.

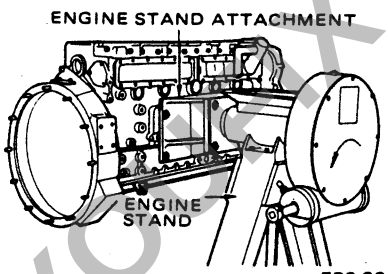

EP3-110

2) Using guide bolt (99687 95000), remove the flywheel.



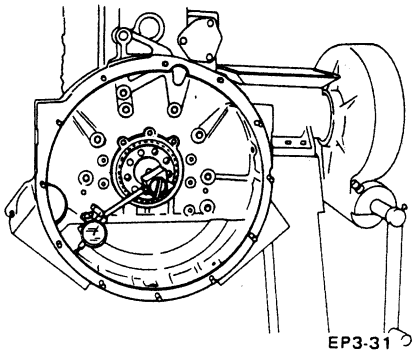
EP3-114

3) Attach the engine stand attachment (99554 97001) to the engine.
4) Lift up the engine with a hoist, and mount it on the engine stand (99550 96001).

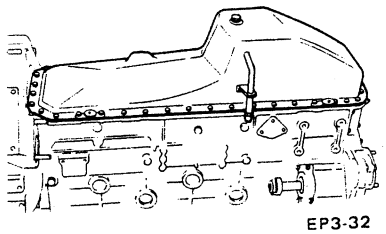


EP3-30

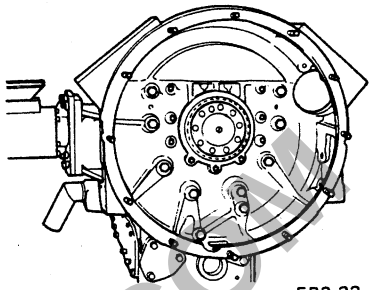
5) Measure the amount of misalignment between the crankshaft and flywheel housing, and record the results.


EP3-31

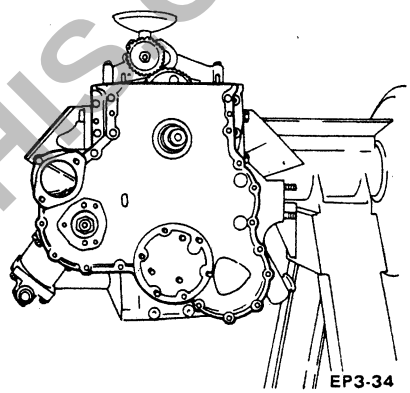
6) Remove the oil pan shield assembly (crane only) and oil pan.


EP3-32

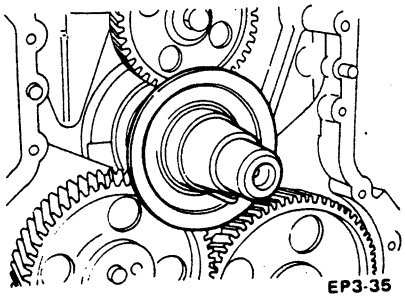
7) Remove the flywheel housing, end plate and rear oil slinger.


EP3-33

8) Remove the front cover.

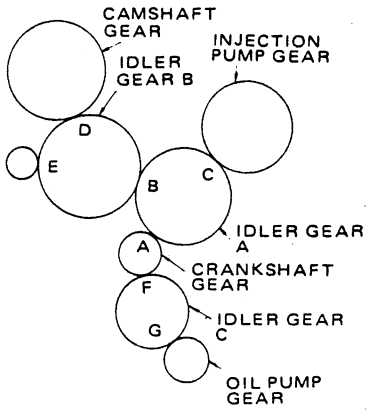

EP3-34

9) Remove the front oil slinger.


EP3-35

10) Measure the backlash of the gear train, and record the results.

Note
Always temporarily install the water pump when taking measurements.



EP3-36

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ENGINE SPECIFICATIONS

Model	PE6	PE6T
Type	Diesel	
Cooling system	Water cooled	
Number of cylinders and cylinder configuration	6, in-line	
Number of circles	4	

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