F5AE9484
F5AE9454
F5CE9484
F5CE9454
F5CE5454
Engines

Service Manual

87693890

CASE CONSTRUCTION

MidWestTech | Case F5AE9484, F5AE9454, F5CE9484, F5CE9454, F5CE5454 Engine Service Manual | Publication 87693890

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FOREWORD

UNITS OF MEASURE

In this manual, the units of measure of the IS (International System) are used.

The units of measure of the MKSA system are listed in parenthesis after the units of the International system.

Example: 24.5 Mpa (250 kgf/cm^2).

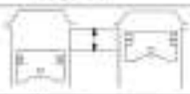
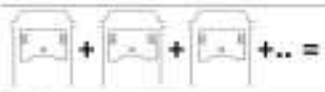
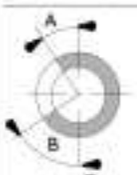
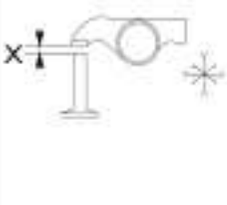
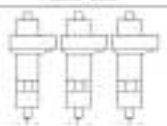
Here below, a conversion table of the units of the IS and some units of measure of other systems is listed. as a reference.

Quantity	To convert from (SI)	into (Others)	Multiply by
Length	mm	in	0.03937
	mm	ft	0.003281
Volume	L	US gal	0.2642
	L	US qt	1.057
	m^3	yd^3	1.308
Mass	kg	lb	2.205
Force	N	kgf	0.10197
	N	lbf	0.2248
Torque	N.m	kgf.m	0.10197
	N.m	lbf.ft	0.7375

Quantity	To convert from (SI)	into (Others)	Multiply by
Pressure	MPa	kgf/cm^2	10.197
	MPa	psi	145.0
Power	kW	PS	1.360
	kW	HP	1.341
Temperature	°C	°F	°C x 1.8 + 32
Velocity	km/h	mph	0.6214
	min^{-1}	rpm	1.0
Flow	L/min	US gpm	0.2642
	mL/rev	cc/rev	1.0

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GENERAL SPECIFICATIONS

	Type		4 CYLINDERS
	Cycle		Diesel 4 strokes
	Power		See the specifications reported in Section 3
	Injection		Direct
	Number of cylinders		4
	Bore	mm	99
	Stroke	mm	104
	Total displacement	cm^3	3200
	**TIMING**		
	start before T.D.C. end after B.D.C.	A B	19° ± 30' 37° ± 30'
	start before B.D.C. end after T.D.C.	D C	61° ± 30' 21° ± 30'
	Checking timing X Checking operation X	mm mm mm mm	0.25 ± 0.05 0.50 ± 0.05 0.20 to 0.40 0.45 to 0.65
	FUEL FEED		
	Injection Type:	 Bosch	 VE 4/12F
	Nozzle type		BOSCH DSLA138PV 33
	Injection sequence		1 - 3 - 4 - 2

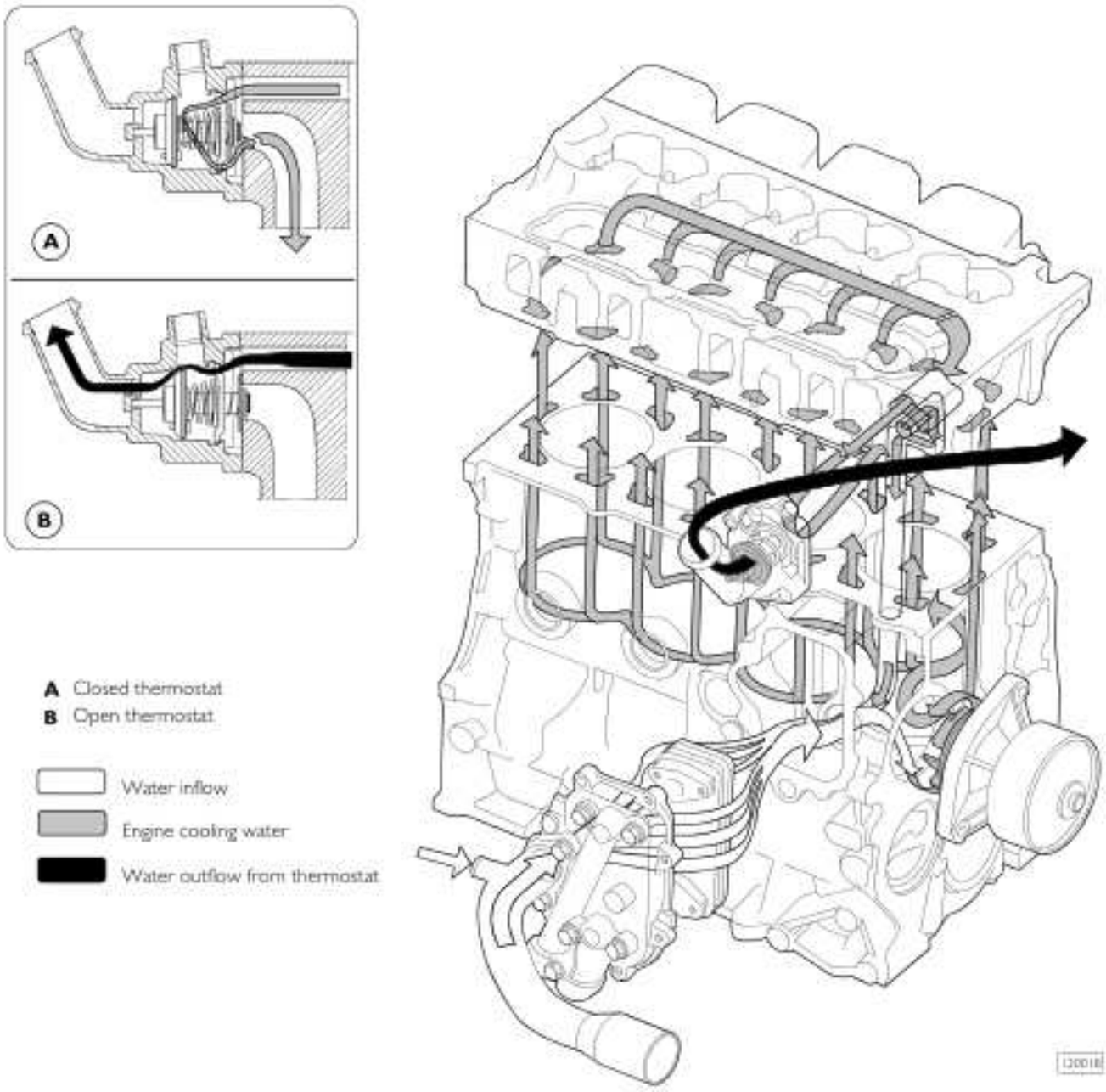
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COOLING SYSTEM

The closed circuit forced circulation engine cooling system is composed of the following parts:

- ❑ expansion tank: position, form and dimensions may vary depending on the engine fitting.
- ❑ radiator dissipating the heat absorbed by the engine cooling liquid. This component's position and dimensions may vary depending on the outfit.
- ❑ fan increasing the radiator's cooling power. This component may vary depending on the specific engine fitting.
- ❑ heat exchanger cooling the lubricant oil. This component may vary depending on the specific engine fitting.
- ❑ centrifugal water pump positioned in the front part of the engine basement;
- ❑ thermostat controlling cooling liquid circulation.

Figure 11



COOLING SYSTEM LAYOUT

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FAILURE	POSSIBLE ROOT CAUSE (*) = if applicable to the appliance	RECOMMENDED TESTS OR REMEDY	NOTES
Anomalous engine fumes. Black or dark grey fumes.	Ignition pump spark lead is excessive.	Correct the adjustment.	
	The nozzles (or some of them) are partially or totally obstructed.	Replace the injectors with a series or new injectors or, as an alternative, clean and recondition the original ones using the specific equipment.	
	Clogged or deteriorated air filter.	Clean or replace the air filter.	
	Loss of compression within the engine due to: worn or stuck snap rings; worn cylinder barrel; deteriorated or incorrectly calibrated valves.	Overhaul the engine or limit the inspection to the parts of interest.	
	Unsuitable injectors' type, different type of injectors or incorrectly calibrated injectors.	Replace the injectors.	
	Incorrect ignition pipe internal diameter, dented pipe ends due to repeated locking.	Check the conditions of the pipe ends or pipe fittings and eventually replace the pipes.	
Blue, blue-grey and whitish grey fumes.	Excessive spark lead.	Adjust the pump setting.	Apply to CNH Technical Service.
	K.S.B. automatic cold spark lead device is not malfunctioning.	Calibrate the ignition pipe or replace the K.S.B. unit.	Apply to CNH Technical Service.
	Defective injectors.	Replace the injectors. Remplacer les injecteurs.	
	Oil leakage from the piston rings caused by worn or stuck rings or barrels worn inside.	Overhaul the engine.	
	Engine oil leaking through the intake valve guides, due to worn guides or valve stems.	Recondition the cylinder head.	
	Engine is too cold (thermostat is not working or defective)	Replace the thermostat.	

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540110 ENGINE DISASSEMBLY ON BENCH

NOTE Engine disassembly operations to remove the engine from the vehicle are described in the specific section. Engine disassembly operations, as well as engine overhaul, must be executed by qualified engineers only, duly provided with the specific tools required.

NOTE Depending on the appliance, some units may have different position on the engine.

NOTE Before fitting the engine on the rotary stand 380000978, disassemble the parts which may interfere with the bracket assembly. Depending on the appliance, it may be necessary to remove the starter and the oil filter.

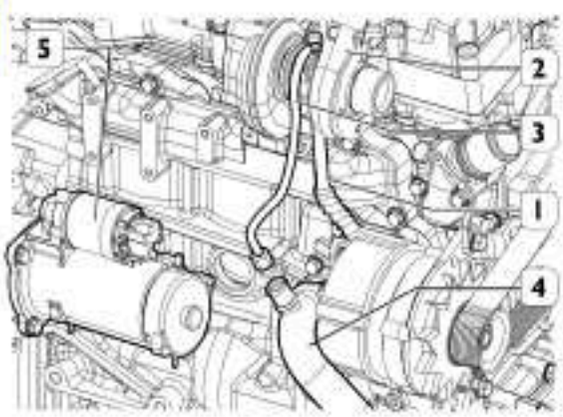
- ❑ Drain the engine oil from the oil pan collecting it in a suitable container.

Warning! Avoid skin contact with the engine oil: in case of contact wash your skin with running water.

The engine oil is highly polluting: waste disposal must be executed complying with the laws and regulations in force.

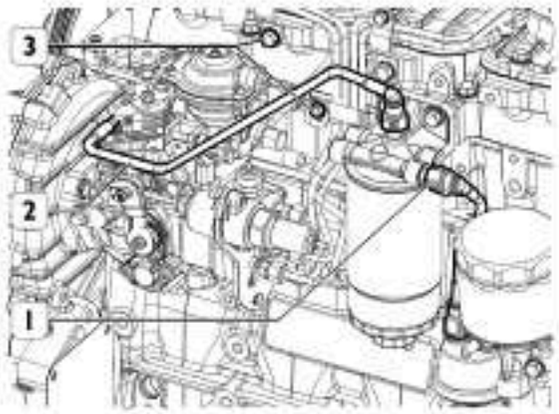
- ❑ Remove the electric wiring from the injection pump.

Figure 1



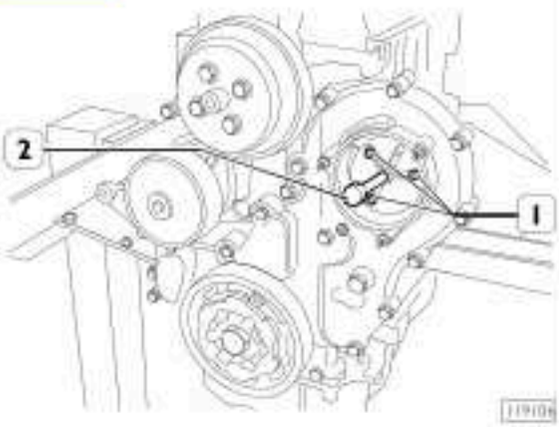
- ❑ Remove oil delivery pipe connected to the turbocharger (3) and t the oil return pipe (1).
- ❑ Remove the turbocharger unit (2).
- ❑ Duly hold the starter (5), unscrew the fastening screws and remove the starter.
- ❑ Remove the water hose (4).

Figure 2



- ❑ Remove the L.D.A. pipe. Remove the fast clutch fuel pipes from the priming pump to the filter (1) and from the filter to the ignition pump (2), then fit the specially provided caps to the pipes, the pumps and the filter. Unscrew the screws (3), fastening the fuel ignition pipes and remove them.

Figure 3



- ❑ Unscrew the pump fastening screws on the rear part of the gear cover. To disassemble the pump, fit tool 99340025 to the pump wheel and fix it with the three screws (1).
  Using the specially provided wrench, slowly tighten the screw (2) holding the rear part of the pump removing the pump completely.

NOTE Before removing the pump verify if, for the model used, a shaft block system exists. In that case, block the engine by means of the specific tool in the corresponding position, to the TDC of cylinder 1, (at compression end, as shown in the procedure at page 19). Now block with the specific system the pump shaft; this way the pump should be timed, so that when refitting (if no maintenance intervention is required on it) no adjustment is necessary.

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NOTE Engine disassembly operations to remove the engine from the vehicle are described in the specific section. Engine disassembly operations, as well as engine overhaul, must be executed by qualified engineers only, duly provided with the specific tools required.

NOTE Depending on the appliance, some units may have different position on the engine.

NOTE Here are the F5CE5454 engine overhaul operations which, except for the EGR external assembly apply as well to the engines F5CE9484 and F5CE9454.

NOTE Before fitting the engine on the rotary stand disassemble the parts which may interfere with the bracket assembly. Depending on the appliance, it may be necessary to remove the starter and the oil filter.

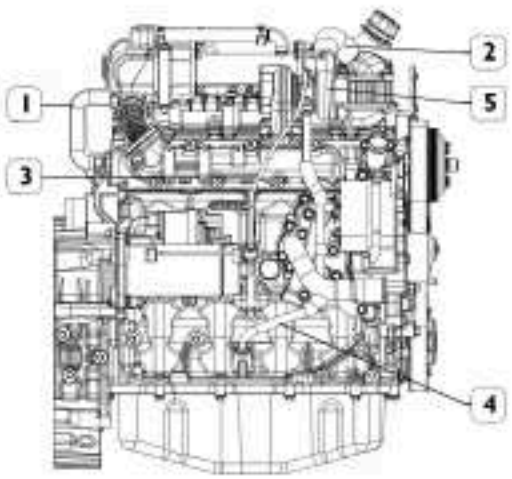
Drain the engine oil from the oil pan collecting it in a suitable container.

Warning! Avoid skin contact with the engine oil: in case of contact wash your skin with running water.

The engine oil is highly polluting: waste disposal must be executed complying with the laws and regulations in force.

- Remove the wiring harness from all components indicated in part II, electrical equipment.

Figure 1

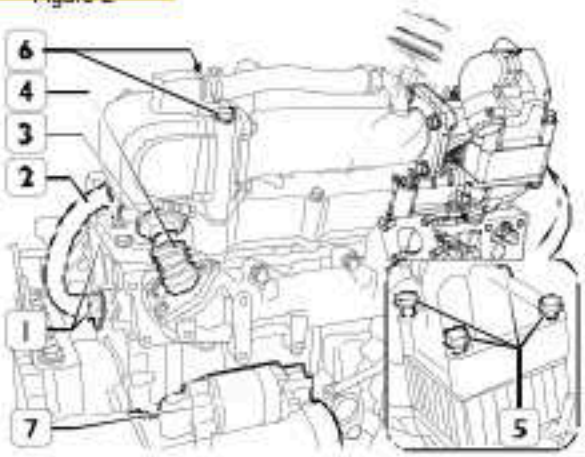


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- Remove the water delivery pipe (1) from the exchanger.
- Loose the clip and disconnect the pipe (2); remove oil delivery pipe connected to the turbocharger (3) and t the oil return pipe (4).

Remove the turbocharger unit (5)

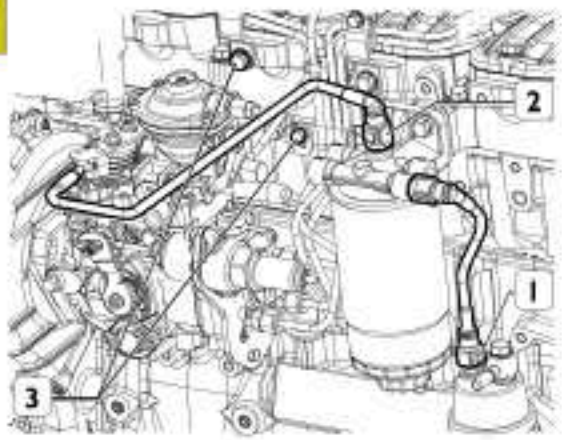
Figure 2



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- Using pincers, remove the clips (1) and the water delivery pipe connected to the valve support and the exchanger (2). Loosen the clip (3) and detach the pipe (4), from the EGR valve housing. Unscrew the EGR fastening screws on the front side (5), and those on the valve support side (6), then remove the EGR unit.
- Duly hold the starter (7), unscrew the fastening screws and remove the starter.

Figure 3



119105

- Remove the L.D.A. pipe. Remove the fast clutch fuel pipes from the priming pump (1) to the filter and from the filter to the ignition pump (2), then fit the specially provided caps to the pipes, the pumps and the filter. Unscrew the screws (3), fastening the fuel ignition pipes and remove them.

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