ENGINES CURSOR
Tier3 F2CE9684, F3AE9684

Service Manual

84314715 5/2010
Replaces 87686520

CASE IH AGRICULTURE

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INTRODUCTION

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INTRODUCTION

Foreword

This publication contains data, features instructions and methods for performing repair operations on the assembly and its components and is addressed to qualified, specialized personnel.
Check to make sure you have the right publication related to the component you are about to work on before you start. Make sure that you have all the necessary safety equipment: safety glasses, helmet, gloves, footwear, etc. Check that the working lifting and transport equipment is available and in working order. Make sure that vehicle is secured. Proceed by carefully observing the instructions contained in this publication and use the indicated specific tools to ensure correct repair procedures and safety of operators.

Safety rules

Standard safety precautions

Be informed and notify personnel of the laws in force regulating safety, and provide documentation available for consultation.

- Keep working areas as clean as possible.
- Ensure that working areas are provided with emergency boxes. They must be clearly visible and always contain adequate sanitary equipment.
- Fire extinguishers must be properly identified and always be clear of obstructions. Their efficiency must be checked on a regular basis and personnel must be trained on proper interventions and priorities.
- Keep all emergency exits free of obstructions and clearly marked.
- Smoking in working areas subject to fire danger must be strictly prohibited.

Prevention of injury

- Wear suitable work attire and safety glasses with no jewelry such as rings and chains when working close to engines and equipment in motion.
- Wear safety gloves and goggles when performing the following operations:
  - Topping off or changing lubrication oils.
  - Using compressed air or liquids at a pressure greater than **2 bar** (**29 psi**).
- Wear a safety helmet when working close to hanging loads or equipment working at head level.
- Always wear safety shoes and fitting clothes.
- Use protection cream for hands.
- Change wet clothes as soon as possible.
- In the presence of voltages exceeding **48 - 60 V**, verify the efficiency of the ground and mass electrical connections. Ensure that hands and feet are dry and use isolating foot boards. Workers should be properly trained to work with electricity.
- Do not smoke or start an open flame close to batteries and any fuel material.
- Place soiled rags with oil, diesel fuel or solvents in specially provided anti-fire containers.
- Do not use any tool or equipment for any use other than what it was originally intended for. Serious injury may occur.
- If running an engine indoors, make sure there is a sufficient exhaust fan in use to eliminate exhaust fumes.

During maintenance

- Never open the filler cap of the cooling system when the engine is hot. High temperature liquid at operating pressure could result in serious danger and risk of burn. Wait until the temperature decreases under **50 °C** (**122 °F**).
- Never add coolant to an overheated engine and use only appropriate liquids.
- Always work when the engine is turned off. Certain circumstances require maintenance on a running engine. Be aware of all the risks involved with such an operation.
- Always use adequate and safe containers for engine fluids and used oil.
- Keep engine clean of any spilled fluids such as oil, diesel fuel, and or chemical solvents.
- Use of solvents or detergents during maintenance may emit toxic vapors. Always keep working areas aerated. Wear a safety mask if necessary.
- Do not leave soiled rags that may contain any flammable substances close to the engine.
- Always use caution when starting an engine after any work has been performed. Be prepared to cut off intake air in case of engine runaway.
- Never disconnect the batteries while the engine is running.

- Disconnect the batteries prior to performing any work on the equipment.
- Disconnect the batteries to place a load on them with a load tester.
- After any work is performed, verify that the battery clamp polarity is correct and that the clamps are tight and safe from accidental short circuit and oxidation.
- Before disconnecting any pipelines (pneumatic, hydraulic, fuel pipes, etc.), verify that all pressure has been released. Take all necessary precautions bleeding and draining residual pressure. Always wear the proper safety equipment.
- Do not alter the lengths of any wires.
- Do not connect any electronic service tool to the engine electrical equipment unless specifically approved by Iveco.
- Do not modify the fuel system or hydraulic system unless approved by Iveco, Any unauthorized modification will compromise warranty assistance and may affect engine operation and life span.

For engine equipped with an electronic control unit

- Do not weld on any part of the equipment without removing the control unit.
- Remove the in case of work requiring heating over **80 °C** (**176 °F**).
- Do not paint the components and the electronic connections.
- Do not alter any data filed in the electronic control unit driving the engine. Any manipulation or alteration of electronic components will void engine warranty assistance and may affect the correct working order and life span of the engine.

Respect of the Environment

- Respect of the environment should be of primary importance. Take all necessary precautions to ensure personnel's safety and health.
- Inform the personnel of the laws regarding the dispensing of used engine fluids.
- Handle batteries with care, storing them in a well ventilated environment and within anti-acid container.

HYDRAULIC - PNEUMATIC - ELECTRICAL - ELECTRONIC SYSTEMS - A

ELECTRICAL POWER SYSTEM - 30.A

Cursor 10
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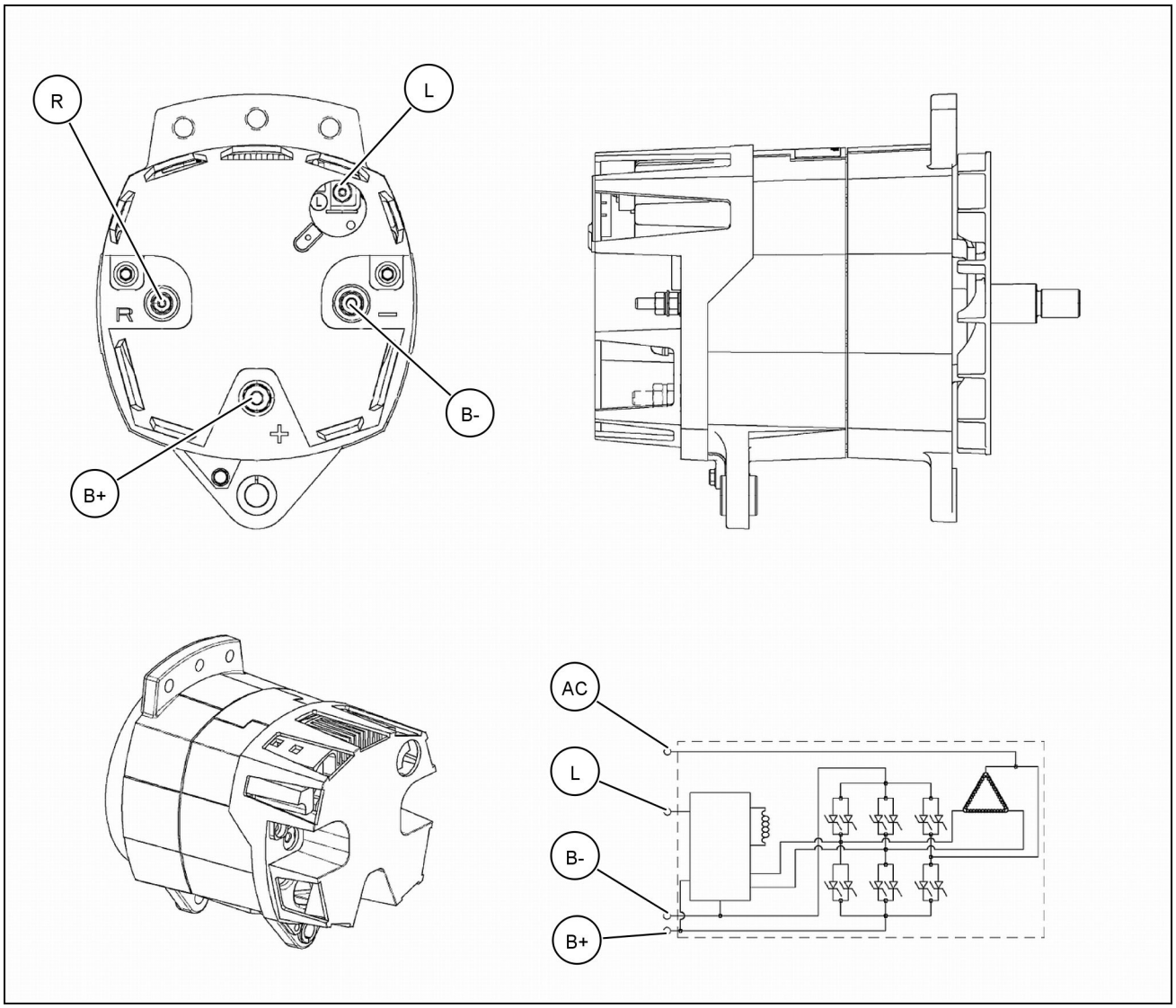
ELECTRICAL POWER SYSTEM - 30.A

Alternator - Overview

F2CE9684A*E004, F2CE9684A*E009, F2CE9684B*E001, F2CE9684C*E001, F2CE9684D*E001, F2CE9684H*E010, F2CE9684L*E005, F2CE9684N*E005, F2CE9684P*E006, F2CE9684P*E008, Cursor 10

Specicifications

- Manufacturer - LEECE NEVILLE
- Rating - **12 V**; **185 A**



ALTERNATOR2 1

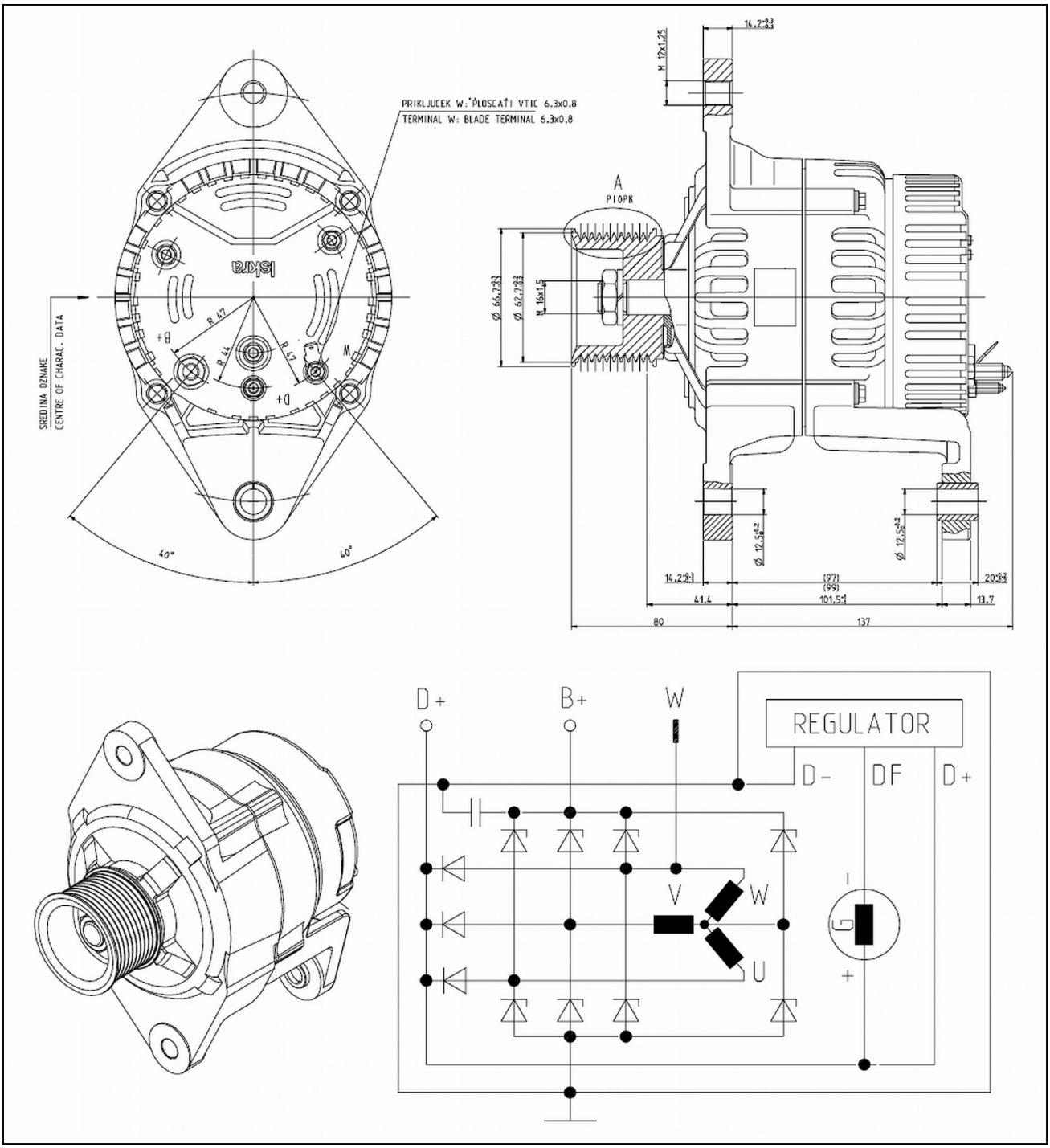
Pin	Description
(R)	AC connector
(L)	Driver warning light connector
(B-)	Negative
(B+)	Positive

Alternator - Overview

F2CE9684C*E002, F2CE9684E*E002

Specicifications

- Manufacturer - ISKRA
- Rating - **12 V**; **120 A**



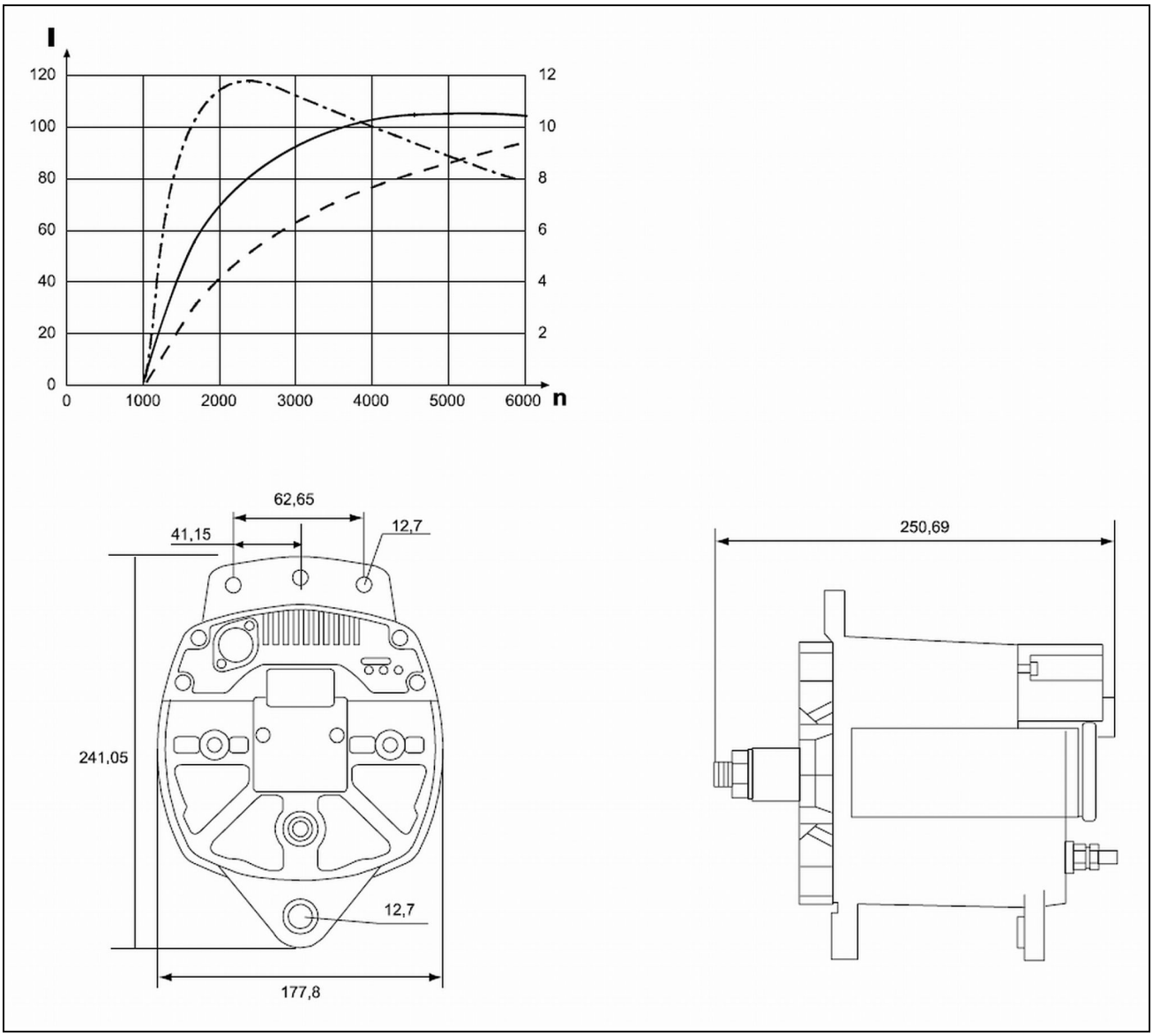
ALTERNATOR 1

Alternator - Overview

F2CE9684H*E003

Specicifications

- Manufacturer - LEECE NEVILLE
- Rating - **24 V**; **100 A**



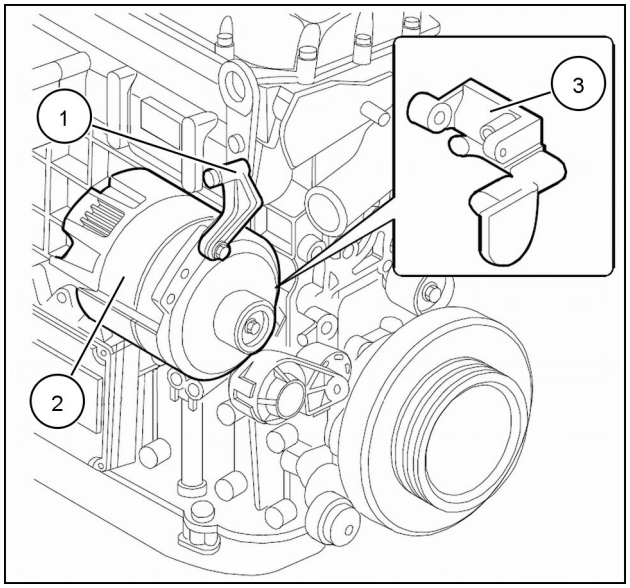
ALTERNATOR2 1

Alternator - Remove

Cursor 10

Prior operation:
Fan and drive Belt - Remove (B.50.A)

1. Remove the alternator **(2)** and its supporting brackets **(1)** and **(3)**.



ALTERNATOR 1

Next operation:
Alternator - Install (A.30.A)

Alternator - Install

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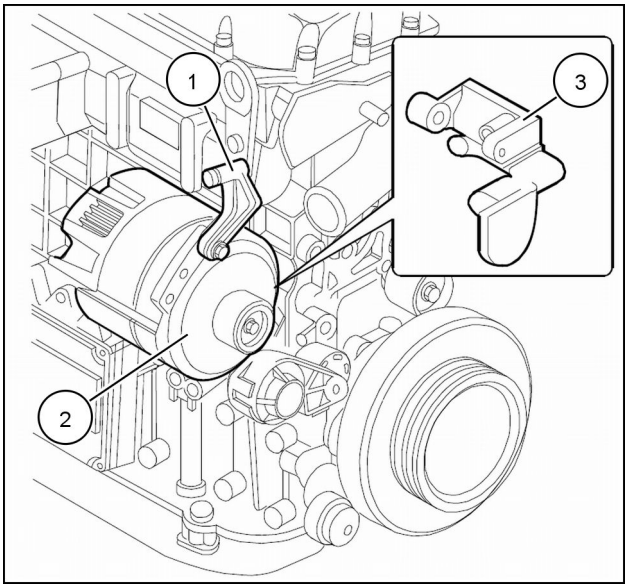
Prior operation:
Alternator - Remove (A.30.A)

1. Install the alternator supports **(1)** and **(3)**.
2. Install the alternator **(2)** and tighten the screws to the required torque.



ALTERNATOR 1

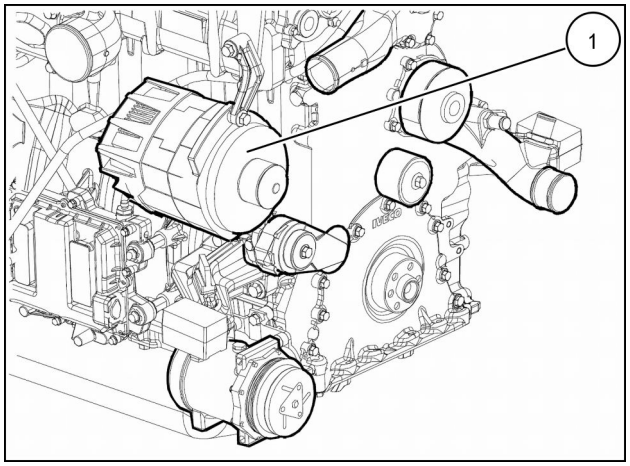
Next operation:
Fan and drive Belt - Install (B.50.A)

Alternator - Remove

Cursor 9

Prior operation:
Fan and drive Belt - Remove (B.50.A)

1. Remove the alternator **(1)**.



FRONTVIEW6 1

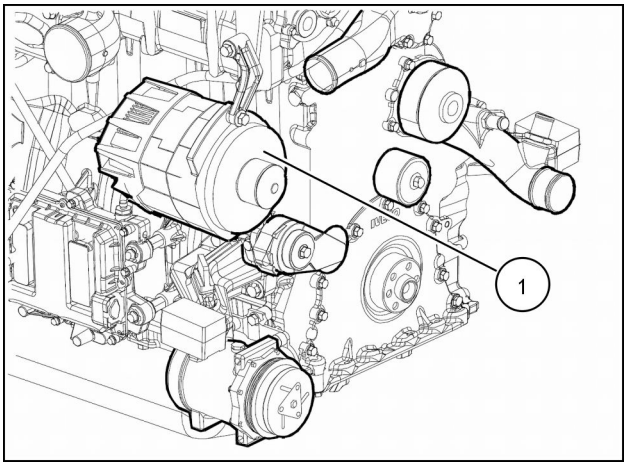
Next operation:
Alternator - Install (A.30.A)

Alternator - Install

Cursor 9

Prior operation:
Alternator - Remove (A.30.A)

1. Install the alternator **(1)**.



FRONTVIEW6 1

Next operation:
Fan and drive Belt - Install (B.50.A)

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ENGINE AND PTO IN - B

ENGINE - 10.A

Auxiliary drive

Crankshaft

Timing gear

Connecting rod and piston

ENGINE - General specification

F2CE9684A*E004

Engine Ratings	
Power @ Rated speed	**260 kW** (**354 Hp**) @ **2100 RPM**
Maximum Power	**290 kW** (**394 Hp**) @ **1800 RPM**
Maximum Torque	**1600 Nm** (**1180 lb ft**) @ **1500 RPM**
Engine RPM • Idle (no load) • Peak (no load)	**975 - 1025 RPM** **2100 RPM**

Engine Specifications	
Compression Ratio	15.9: 1
Bore	**117 mm** (**4.6 in**)
Stroke	**135 mm** (**5.3 in**)
Displacement	**8710 cm³**
Turbocharging	Inter-cooled, Direct injection
Turbocharger type	HX40
Lubrication	Forced by gear pump, relief valve single action oil filter
Oil Pressure (Warm engine) • Idling • Peak RPM	 **4 bar** (**58 psi**) **5 bar** (**73 psi**)
Cooling	Liquid cooled
Water pump control	Belt driven
Thermostat • Start of opening	 **83.5 - 86.5 °C** (**182.3 - 187.7 °F**)
Valve Timing • Intake • Opens before TDC • Closes after BDC • Exhaust • Opens before BDC • Closes after TDC	 **17 °** **31 °** **48 °** **9 °**
Valve lash setting (when engine is cold) • Intake • Exhaust	 **0.35 - 0.45 mm** (**0.014 - 0.018 in**) **0.55 - 0.65 mm** (**0.022 - 0.026 in**)
Firing Order	1 - 4 - 2 - 6 - 3 - 5
Injection pressure	**1800 bar** (**26100 psi**)
Injector calibration	**290 - 302 bar** (**4205 - 4379 psi**)
Cylinder Block and Crank Mechanism Components	

Bores for cylinder liners: • Upper • Lower	**130.500 - 130.525 mm** (**5.138 - 5.139 in**) **129.510 - 129.535 mm** (**5.099 - 5.100 in**)
Cylinder liners external diameter: • Upper • Lower	**130.461 - 130.486 mm** (**5.136 - 5.137 in**) **129.475 - 129.500 mm** (**5.097 - 5.098 in**)
Clearance between the OD of liners and ID of bores • Upper • Lower	**0.014 - 0.064 mm** (**0.001 - 0.003 in**) **0.010 - 0.060 mm** (**0.0004 - 0.0024 in**)
Cylinder liner • ID • ID • Protrusion	**117.000 - 117.012 mm** (**4.606 - 4.607 in**) **117.010 - 117.022 mm** (**4.607 - 4.607 in**) **0.035 - 0.065 mm** (**0.001 - 0.003 in**)
Pistons • Measuring dimension • External diameter (supplied as spares • External diameter (production only) • Pin bore	**15 mm** (**0.591 in**) **116.894 - 116.906 mm** (**4.602 - 4.603 in**) **116.904 - 116.916 mm** (**4.603 - 4.603 in**) **52.016 - 52.022 mm** (**2.048 - 2.048 in**)
OD of piston - ID of cylinder liner	**0.094 - 0.118 mm** (**0.004 - 0.005 in**)
Piston protrusion	**0.873 - 1.117 mm** (**0.034 - 0.044 in**)
Piston pin diameter	**51.994 - 52.000 mm** (**2.047 - 2.047 in**)
Piston pin OD - pin bore	**0.016 - 0.028 mm** (**0.0006 - 0.0011 in**)
Piston ring grooves • Top • Middle • Bottom	**3.120 - 3.140 mm** (**0.123 - 0.124 in**) **2.550 - 2.570 mm** (**0.100 - 0.101 in**) **4.02 - 4.04 mm** (**0.158 - 0.159 in**)
Piston rings • Combustion ring • Intermediate ring • Oil control ring	**3.000 mm** (**0.118 in**) **2.470 - 2.500 mm** (**0.097 - 0.098 in**) **3.970 - 3.990 mm** (**0.156 - 0.157 in**)
Clearance between piston rings and grooves • Combustion ring • Intermediate ring • Oil control ring	- **0.050 - 0.100 mm** (**0.002 - 0.004 in**) **0.030 - 0.070 mm** (**0.001 - 0.003 in**)

Piston ring end gap in cylinder liners • Combustion ring • Intermediate ring • Oil control ring	**0.3 - 0.4 mm** (**0.012 - 0.016 in**) **0.60 - 0.75 mm** (**0.024 - 0.030 in**) **0.35 - 0.65 mm** (**0.014 - 0.026 in**)
Connecting rod • Small end bush housing • Nominal • Big end bearing housing • Nominal • Class 1 • Class 2 • Class 3	 **55.700 - 55.730 mm** (**2.193 - 2.194 in**) **85.987 - 86.013 mm** (**3.385 - 3.386 in**) **85.987 - 85.996 mm** (**3.385 - 3.386 in**) **85.997 - 86.005 mm** (**3.386 - 3.386 in**) **86.006 - 86.013 mm** (**3.386 - 3.386 in**)
Small end bush diameter • Outside • Inside Big end bearing shell thickness • Red • Green • Yellow	 **55.780 - 55.820 mm** (**2.196 - 2.198 in**) **52.015 - 52.030 mm** (**2.048 - 2.048 in**) **1.994 - 2.002 mm** (**0.079 - 0.079 in**) **2.002 - 2.010 mm** (**0.079 - 0.079 in**) **2.010 - 2.018 mm** (**0.079 - 0.079 in**)
Clearance between small end bush and housing	**0.05 - 0.12 mm** (**0.002 - 0.005 in**)
Clearance between piston pin and bush	**0.015 - 0.036 mm** (**0.001 - 0.001 in**)
Connecting rod weight • Class A • Class B • Class C	 **3450 - 3470 g** (**121.7 - 122.4 oz**) **3471 - 3490 g** (**122.4 - 123.1 oz**) **3491 - 3510 g** (**123.1 - 123.8 oz**)
Maximum connecting rod axis misalignment tolerance	**0.08 mm** (**0.003 in**)
Crankshaft main journals • Rated value • Class 1 • Class 2 • Class 3	 **92.970 - 93.000 mm** (**3.6602 - 3.6614 in**) **92.970 - 92.979 mm** (**3.6602 - 3.6606 in**) **92.980 - 92.989 mm** (**3.6606 - 3.6610 in**) **92.990 - 93.000 mm** (**3.6610 - 3.6614 in**)

Crankpins • Rated value • Class 1 • Class 2 • Class 3	 **81.915 - 81.945 mm** (**3.225 - 3.226 in**) **81.915 - 81.925 mm** (**3.225 - 3.225 in**) **81.925 - 81.935 mm** (**3.225 - 3.226 in**) **81.935 - 81.945 mm** (**3.226 - 3.226 in**)
Main bearing shells • Red • Green • Yellow Big end bearing shells • Red • Green • Yellow	 **2.968 - 2.978 mm** (**0.117 - 0.117 in**) **2.978 - 2.988 mm** (**0.117 - 0.118 in**) **2.988 - 2.998 mm** (**0.118 - 0.118 in**) **1.994 - 2.002 mm** (**0.079 - 0.079 in**) **2.002 - 2.010 mm** (**0.079 - 0.079 in**) **2.010 - 2.018 mm** (**0.079 - 0.079 in**)
Main bearing housings • Rated value • Class 1 • Class 2 • Class 3	 **99.000 - 99.030 mm** (**3.8976 - 3.8988 in**) **99.000 - 99.009 mm** (**3.8976 - 3.8980 in**) **99.010 - 99.019 mm** (**3.8980 - 3.8984 in**) **99.020 - 99.030 mm** (**3.8984 - 3.8988 in**)
Clearance between bearing shells and main journals	**0.050 - 0.090 mm** (**0.0020 - 0.0035 in**)
Clearance between bearing shells and big ends	**0.040 - 0.080 mm** (**0.0016 - 0.0031 in**)
Main journal, thrust bearing	**39.96 - 40.04 mm** (**1.573 - 1.576 in**)
Main bearing housing, thrust bearing	**38.94 - 38.99 mm** (**1.533 - 1.535 in**)
Thrust bearing thickness	**3.38 - 3.43 mm** (**0.133 - 0.135 in**)
Crankshaft end play	**0.10 - 0.30 mm** (**0.0039 - 0.0118 in**)
Main journals and Crankpins • Alignment • Ovalization • Taper	 - **0.04 mm** (**0.002 in**) -
Cylinder Head and Valve Train	
Valve guide housing in cylinder head	**12.980 - 12.997 mm** (**0.511 - 0.512 in**)
Valve guide • Inside diameter • Outside diameter	 **8.023 - 8.038 mm** (**0.316 - 0.316 in**) **13.012 - 13.025 mm** (**0.512 - 0.513 in**)
Valve guides - housings in the cylinder head	**0.015 - 0.045 mm** (**0.0006 - 0.0018 in**)

Valves
• Intake
  • Valve stem diameter
  • Valve face angle
• Exhaust
  • Valve stem diameter
  • Valve face angle
	
	7.970 - 7.985 mm (**0.314 - 0.314 in**)
	60 °
	
	7.970 - 7.985 mm (**0.314 - 0.314 in**)
	45 °

Clearance between valve guide and valve stem	**0.040 - 0.070 mm** (**0.0016 - 0.0028 in**)
Valve seat in cylinder head. • Intake • Exhaust	 **41.985 - 42.020 mm** (**1.653 - 1.654 in**) **40.985 - 41.020 mm** (**1.614 - 1.615 in**)
Outside diameter of valve seat: • Intake • Exhaust Valve seat angle • Intake • Exhaust	 **42.060 - 42.075 mm** (**1.656 - 1.656 in**) **41.060 - 41.075 mm** (**1.617 - 1.617 in**) **60 °** **45 °**
Recessing of the valves: • Intake • Exhaust	 **0.5 - 0.8 mm** (**0.020 - 0.031 in**) **1.6 - 1.9 mm** (**0.063 - 0.075 in**)
Clearance between valve seat and cylinder head • Intake • Exhaust	 **0.040 - 0.090 mm** (**0.0016 - 0.0035 in**) **0.040 - 0.090 mm** (**0.0016 - 0.0035 in**)

Valve spring height:
• Free Height
• Under a load of:
  • **437 - 483 N** (**98 - 109 lb**)
  • **707 - 773 N** (**159 - 174 lb**)
	
	70.77 mm (**2.786 in**)
	
	51.00 mm (**2.008 in**)
	39.00 mm (**1.535 in**)

Injector protrusion	**1.2 - 1.5 mm** (**0.047 - 0.059 in**)
Camshaft bushing housing in the cylinder head	**69.000 - 69.030 mm** (**2.717 - 2.718 in**)
Camshaft bearing journals	**64.924 - 64.940 mm** (**2.556 - 2.557 in**)
O.D. of the camshaft bushings	**69.090 - 69.155 mm** (**2.720 - 2.723 in**)
I.D. of the camshaft bushings	**64.990 - 65.045 mm** (**2.559 - 2.561 in**)
Clearance between bushings and housings in the cylinder head	**0.060 - 0.115 mm** (**0.002 - 0.005 in**)

Clearance between bushings and bearing journals	**0.050 - 0.122 mm** (**0.002 - 0.005 in**)
Cam lift: • Intake lobe • Exhaust lobe	**7.4034 mm** (**0.2915 in**) **8.2108 mm** (**0.3233 in**)
Diameter of the rocker shaft	**31.964 - 31.980 mm** (**1.258 - 1.259 in**)
Bushing housing in the rocker arms • Intake • Exhaust	**32.025 - 32.041 mm** (**1.261 - 1.261 in**) **32.025 - 32.041 mm** (**1.261 - 1.261 in**)
Clearance between bushings and housings • Intake • Exhaust • Injector	**0.074 - 0.130 mm** (**0.0029 - 0.0051 in**) **0.081 - 0.140 mm** (**0.0032 - 0.0055 in**) **0.050 - 0.091 mm** (**0.0020 - 0.0036 in**)
Clearance between bushings of rocker arms and shaft • Intake • Exhaust	**0.045 - 0.077 mm** (**0.002 - 0.003 in**) **0.045 - 0.077 mm** (**0.002 - 0.003 in**)

ENGINE - General specification

F2CE9684A*E009

Engine Ratings	
Power @ Rated speed	**260 kW** (**354 Hp**) @ **2100 RPM**
Maximum Power	**290 kW** (**394 Hp**) @ **1800 RPM**
Maximum Torque	**1600 Nm** (**1180 lb ft**) @ **1500 RPM**
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Engine Specifications	
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Bore	**117 mm** (**4.6 in**)
Stroke	**135 mm** (**5.3 in**)
Displacement	**8710 cm³**
Turbocharging	Inter-cooled, Direct injection
Turbocharger type	HX55
Lubrication	Forced by gear pump, relief valve single action oil filter

Oil Pressure (Warm engine) • Idling • Peak RPM	**4 bar** (**58 psi**) **5 bar** (**73 psi**)
Cooling	Liquid cooled
Water pump control	Belt driven
Thermostat • Start of opening	**83.5 - 86.5 °C** (**182.3 - 187.7 °F**)
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