SERVICE MANUAL

TD3.50
Tractor

Part number 48012910
English
May 2016

SERVICE MANUAL

TD3.50

Link Product / Engine

Product	Market Product	Engine
TD3.50	Europe	8045.45.747

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INTRODUCTION

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INTRODUCTION

Safety rules

Pay attention to this symbol

⚠ This warning symbol points out important messages involving personal safety. Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and safeguard your safety and personal integrity.

In this manual you will find this symbol together with the following keywords.

WARNING: It gives warning about improper repair operations and potential consequences affecting the service technician's personal safety.
DANGER: It gives specific warning about potential dangers for personal safety of the operator or other persons directly or indirectly involved in the operation.

To prevent accidents

Most accidents and personal injuries taking place in workshops are due from non-observance of some simple and essential prudential rule and safety precautions.

For this reason, in most cases they can be avoided. It suffices to foresee possible causes and act consequently with necessary caution and care.

The possibility that an accident might occur with any type of machines should not be disregarded, no matter how well the machine in question was designed and built.

A wise and careful service technician is the best precautions against accidents.

Careful observance of this only basic precaution would be enough to avoid many severe accidents.

⚠ DANGER
Never carry out any cleaning, lubrication or maintenance operations when the engine is running.

General

Carefully follow specified repair and maintenance procedures.

- Do not wear rings, wrist watches, jewelry, unbuttoned or loose articles of clothing such as: ties, torn clothing, scarves, open jackets or shirts with open zips which may remain entangled in moving parts. We advise to use approved safety clothing such as anti-slipping footwear, gloves, safety goggles, helmets, etc.
- Never carry out any repair on the machine if someone is sitting on the operator's seat, except if they are certified operators to assist in the operation to be carried out.
- Never operate the machine or use attachments from a place other than sitting at the operator's seat.
- Never carry out any operation on the machine when the engine is running, except when specifically indicated.
- Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.
- All repair and maintenance operations must be carried out using extreme care and attention.
- Service steps and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.
- Disconnect the batteries and label all controls to indicate that the vehicle is being serviced. Block the machine and all equipment which should be raised.
- Never check or fill fuel tanks or batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.
- Brakes are inoperative when they are manually released for maintenance purposes. In such cases, the machine should be kept constantly under control using blocks or similar devices.

- The fuel filling gun should always remain in contact with the filler neck. Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity build-up.
- Use exclusively specified towing points for towing the tractor. Connect parts carefully. Ensure that foreseen pins and/or locks are steadily fixed before applying traction. Do not stop near towing bars, cables or chains working under load.
- To transfer a failed tractor, use a trailer or a low loading platform trolley if available.
- To load and unload the machine from the transportation means, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or trailer platform and block wheels as required by the forwarder.
- For electrical heaters, battery-chargers and similar equipment use exclusive auxiliary power supplies with a efficient ground to avoid electrical shock hazard.
- Always use lifting equipment of appropriate capacity to lift or move heavy components.
- Pay special attention to bystanders.
- Never pour gasoline or diesel oil into open, wide and low containers.
- Never use petrol, diesel oil or other inflammable liquids as cleaning agents. Use non-flammable non-toxic proprietary solvents.
- Wear safety glasses with side guards when cleaning parts using compressed air.
- Do not exceed a pressure of 2.1 bar, in accordance with local regulations.
- Do not run the engine in a closed building without proper ventilation.
- Do not smoke, use naked flames, or cause sparks in the area when fuel filling or handling highly inflammable liquids.
- Do not use flames as light sources when working on a machine or checking for leaks.
- Move with caution when working under a tractor, and also on or near a tractor. Wear proper safety accessories: helmets, goggles and special footwear.
- During checks which should be carried out with the engine running, ask an assistant to seat at the operator's seat and keep the service technician under visual control at any moment.
- In case of operations outside the workshop, drive the tractor to a flat area and block it. If working on an incline cannot be avoided, first block the tractor carefully. Move it to a flat area as soon as possible with a certain extent of safety.
- Ruined or plied cables and chains are unreliable. Do not use them for lifting or trailing. Always handle them wearing gloves of proper thickness.
- Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stop near the fastening point, trailing chains or cables.
- The working area should be always kept CLEAN and DRY. Immediately clean any spillage of water or oil.
- Do not pile up grease or oil soaked rags, as they constitute a great fire hazard. Always place them into a metal container.
  Before starting the tractor or its attachments, check, adjust and block the operator's seat. Also ensure that there are no persons within the tractor or attachment operating range.
- Do not keep in your pockets any object which might fall unobserved into the tractor's inner compartments.
- Whenever there is the possibility of being reached by ejected metal parts or similar, use protection eye mask or goggles with side guards, helmets, special footwear and heavy gloves.
- Wear suitable protection such as tinted eye protection, helmets, special clothing, gloves and footwear whenever it is necessary to carry out welding procedures. All persons standing in the vicinity of the welding process should wear tinted eye protection. NEVER LOOK AT THE WELDING ARC IF YOUR EYES ARE NOT SUITABLY PROTECTED.
- Metal cables with the use get frayed. Always wear adequate protections (heavy gloves, eye protection, etc.)
- Handle all parts with the greatest caution. Keep your hands and fingers far from gaps, moving gears and similar. Always use approved protective equipment, such as eye protection, heavy gloves and protective footwear.

Start up

- Never run the engine in confined spaces that are not equipped with adequate ventilation for exhaust gas extraction.
- Never place the head, body, limbs, feet, hands or fingers near fans or rotating belts.

Engine

- Always loosen the radiator cap very slowly before removing it to allow pressure in the system to dissipate. Coolant should be topped up only when the engine is stopped or idle if hot.
- Do not fill up fuel tank when the engine is running, mainly if it is hot, to avoid ignition of fires in case of fuel spilling.
- Never check or adjust fan belt tension when the engine is running.
  Never adjust the fuel injection pump when the tractor is moving.
- Never lubricate the tractor when the engine is running.

Electrical systems

- If it is necessary to use auxiliary batteries, cables must be connected at both sides as follows:
  (+) with (+) and (-) with (-). Avoid short-circuiting the terminals. GAS RELEASED FROM BATTERIES IS HIGHLY FLAMMABLE. During charging, leave the battery compartment uncovered to improve ventilation. Avoid checking the battery charge by means of ”jumpers” made by placing metallic objects across the terminals. Avoid sparks or flames near the battery zone. Do not smoke to prevent explosion hazards.
- Before servicing operations, check for fuel or current leaks. Remove these leaks before going on with the work.
- Do not charge batteries in confined spaces. Ensure that ventilation is appropriate to prevent accidental explosion hazard due to build-up of gases released during charging.
- Always disconnect the batteries before performing any type of service on the electrical system.

Hydraulic systems

- Some fluid slowly coming out from a very small port can be almost invisible and be strong enough to penetrate the skin. Therefore, NEVER USE HANDS TO CHECK FOR LEAKS but use a piece of cardboard or wood for this purpose. If any fluid is injected into the skin, seek medical aid immediately. Lack of immediate medical attention, serious infections or dermatosis may result.
- Always take system pressure readings using the appropriate gauges.

Wheels and tires

- Check that the tyres are correctly inflated at the pressure specified by the manufacturer. Periodically check possible damages to the rims and tyres.
- Keep off and stay at the tyre side when correcting the inflation pressure.
- Check the pressure only when the tractor is unloaded and tyres are cold to avoid wrong readings due to over-pressure. Do not reuse parts of recovered wheels as improper welding, brazing or heating may weaken the wheel and make it fail.
- Never cut, nor weld a rim with the inflated tyre assembled.
- To remove the wheels, block both front and rear tractor wheels. Raise the tractor and install safe and stable supports under the tractor in accordance with regulations in force.
- Deflate the tyre before removing any object caught into the tyre tread.
- Never inflate tires using flammable gases, as this may result in explosions and injury to bystanders.

Removal and installation

- Lift and handle all heavy components using lifting equipment with adequate capacity. Ensure that parts are supported by appropriate slings and hooks. Use lifting eyes provided to this purpose. Take care of the persons near the loads to be lifted.
- Handle all parts with care. Do not place your hands or fingers between two parts. Wear approved protective clothing such as safety goggles, gloves and footwear.
- Do not twine chains or metal cables. Always wear safety gloves when handling cables or chains.

Lubricant capacities and specifications

Component to be filled or Topped up	Quantity		Recommended products	International specifications
	liter/dm3	US gallon		
Cooling system:	10	2.6	Water and liquid **NEW HOLLAND AMBRA ACTIFULL™ OT EXTENDED LIFE COOLANT 50 %** + **50 %** (NH 900 A)	-
Fuel tank	52	13.75	Decanted and filtered diesel fuel	-
Engine sump:			**NEW HOLLAND AMBRA MASTERGOLD™ ENGINE OIL CJ-4 SAE 10W-30** or **NEW HOLLAND AMBRA MASTERGOLD™ HSP ENGINE OIL SAE 15W-40** (NH 330-324 H)	API CI-4/CH-4 or CI-4
with filter	7.6	2.0		
Hydrostatic steering	2.0	0.53	Oil **NEW HOLLAND AMBRA MULTI F** (NH 410B)	API GL4 ISO VG 32/46 SAE 10W 30
Front axle				
-axle housing	4.5	1.2		
-final drives (each):	0.8	0.2		
Rear transmission (bevel drive and brakes), gearbox, hydraulic lift and PTO	23	6.01		
Front wheel hubs	–	–	Grease **NEW HOLLAND AMBRA GR-9 MULTI-PURPOSE GREASE** (NH 710A)	NLHI 2
Grease fittings	–	–		

CONSUMABLES INDEX

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NEW HOLLAND AMBRA ACTIFULL™ OT EXTENDED LIFE COOLANT	Safety rules	6
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Loctite® 242®	Water pump - Overhaul	10.8 / 18

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Engine and crankcase - 001

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Engine and crankcase - 001

Engine - General specification

Technical information		3 cylinders
Engine type:		
TD 3.50Turbocharged - (BOSCH pump)		TTF8035.25F313T
Type		Diesel, 4 stroke
Injection method		Direct
Number of cylinders		3
Piston diameter		
	- TD 3.50 model	**104.000 mm** (**4.094 in**)
Stroke		**115.000 mm** (**4.528 in**)
Cylinder displacement:		
	- TD 3.50 model	**2930.000 cm³** (**178.800 in³**)
Compression rate		18:1
Maximum power:		
	- TD 3.50 model	**35.3 kW** (**48.0 Hp**)
Torque Values:		
Max.torque (Nm) at 1400 d/dak:	- TD 3.50 model	**180 N·m** (**133 lb ft**)
Number of bearings		4
Oil sump		Cast iron
Lubrication		Forced feeding, gear pump
Pump drive		Through camshaft
Engine speed/pump speed ratio		2:1
Oil filter		Strainer at the intake and full output cartridge
Normal oil pressure at engine running at full throttle:		**2.9 - 3.9 bar** (**42.0 - 56.6 psi**)
All models		
Pressure safety valve		In pump body
Opening pressure		**3.5 bar** (**50.8 psi**)
Cooling system		Water cooled
Radiator	– TD 3.50 models	3 rows of vertical pipes, aluminum channels
Fan installed on water pump pulley	– TD 3.50 models	Air sucking type with 10 blades
Water pump		Centrifugal type
Engine speed/water pump speed ratio		1.03/1
Temperature control		Via thermostat
Temperature gauge		with colored scale divided into three sectors
Temperature values corresponding to each sectors:		
	First, white sector	**30 - 65 °C** (**86 - 149 °F**)
	Middle, green sector	**65 - 105 °C** (**149 - 221 °F**)
	Last, red sector	**105 - 115 °C** (**221 - 239 °F**)
Tractor meter		Instrument panel (from alternator)
Timing gears		Top valves operated through push rods on camshaft Camshaft is driven by crankshaft
Inlet:		
	Opening: Before TDC	**12 °C** (**54 °F**)
	Closing: After BDC	**31 °C** (**88 °F**)
Exhaust:		
	Opening: Before TDC	**50 °C** (**122 °F**)
	Closing: After BDC	**16 °C** (**61 °F**)
Valve Clearance (engine cold):		
– Inlet		**0.250 - 0.350 mm** (**0.010 - 0.014 in**)

– Exhaust	**0.250 - 0.350 mm** (**0.010 - 0.014 in**)
Fuel System	
Air filter	Dry type, with centrifugal prefilter and automatic dust extractor and filter clogged indicator
Supply pump	With double diaphragm
Fuel Filtering	Through wire filter in supply pump, and replaceable cartridge on delivery line to injection pump
Minimum fuel flow rate with pump shaft rotating at **1600 RPM**	**100 L/hour** (**26 US gal/hour**)
Operated by camshaft	Through camshaft
BOSCH injection pump	Distributor type
Governor for all speeds, installed within the pump: BOSCH	Centrifugal, with counterweights
For more information about fuel system	
Fixed advance (pump setting for start of delivery before TDC) - Pressure setting - Injection order, and other information regarding the BOSCH pump	see Section 10
Turbocharger	
Holset	HX25
Injection pump	distributor type with speed governor and automatic advance
BOSCH pump:	
– TD 3.50 model	L 1135
Rotation direction	counter clockwise
Firing order	1-2-3
Injectors:	
BOSCH	84300592 84404382
– Injector nipple holder type	KBAL 86P163
– Injector type	0432291494
Number of holes	6
Nipple orifice diameter	**0.190 mm** (**0.007 in**)
Pressure setting	**260 - 272 bar** (**3770 - 3944 psi**)
High pressure pipes - BOSCH pump	
– Type	4797506
Pipe sizes	**6.000 mm** (**0.236 in**) x **1.600 mm** (**0.063 in**) x **530.000 mm** (**20.866 in**)
Fuel lift pump	
Shaft eccentricity	**3.000 mm** (**0.118 in**)
Shaft diameter	**31.975 - 32.000 mm** (**1.259 - 1.260 in**)
Bushing inner diameter (after reaming)	**32.050 - 32.075 mm** (**1.262 - 1.263 in**)
Bushing seat snug fit size	**0.063 - 0.140 mm** (**0.002 - 0.006 in**)
Bushing shaft gap	**0.050 - 0.100 mm** (**0.002 - 0.004 in**)
Internal thrust washer thickness	**1.450 - 1.500 mm** (**0.057 - 0.059 in**)
External thrust washer thickness	**2.930 - 3.000 mm** (**0.115 - 0.118 in**)

Engine - Torque

Angular tightening torque values

Description	Thread size	Pre-torque		Angle
Cylinder head bolts	M12 x 1.25	**40 N·m** (**354 lb in**)	**4.0 kgm** (**28.9 ftlbs.**)	**120 °** + **120 °**
Main journal cap screws	M14 x 1.5	**80 N·m** (**708 lb in**)	**8.2 kgm** (**28.9 ftlbs.**)	**90 °**
Connecting rod cap screws	M12 x 1.5	**40 N·m** (**354 lb in**)	**4.1 kgm** (**29.7 ftlbs.**)	**60 °**
Flywheel bolts	M12 x 1.25	**40 N** (**9 lb**)	**4.1 kgm** (**29.7 ftlbs.**)	**60 °**

Tightening torques

Description	Thread size	Tightening torque	
Rocker arm shaft support clearance	M8	**25.0 N·m** (**18.4 lb ft**)	**2.5 kgm** (**18.1 ftlbs.**)
Crank pulley hub bolt	M30 x 1.5	**294.0 N·m** (**216.8 lb ft**)	**30.0 kgm** (**217.0 ftlbs.**)
Fan and alternator pulley bolts	M10 x 1.25	**55.0 N·m** (**40.6 lb ft**)	**5.6 kgm** (**40.5 ftlbs.**)
Intake manifold retaining bolts	M8	**25.0 N·m** (**18.4 lb ft**)	**2.6 kgm** (**18.8 ftlbs.**)
Alternator and belt tensioner adjuster nut	M10 x 1.25	**55.0 N·m** (**40.6 lb ft**)	**5.6 kgm** (**40.5 ftlbs.**)
Water pump fixing bolts	M10 x 1.25	**55.0 N·m** (**40.6 lb ft**)	**5.6 kgm** (**40.5 ftlbs.**)
Rocker cover bolts	M8	**25.0 N·m** (**18.4 lb ft**)(*)	**2.6 kgm** (**18.8 ftlbs.**)(*)
Rocker arm shaft support clearance	M8	**25.0 N·m** (**18.4 lb ft**)	**2.6 kgm** (**18.8 ftlbs.**)
Oil pump and pump cover fixing bolts	M8	**25.0 N·m** (**18.4 lb ft**)	**2.6 kgm** (**18.8 ftlbs.**)
Timing gear housing and cover bolts	M 8	**25.0 N·m** (**18.4 lb ft**)	**2.6 kgm** (**18.8 ftlbs.**)
Idle gear flange bolts	M10 x 1.25	**55.0 N·m** (**40.6 lb ft**)	**5.6 kgm** (**40.5 ftlbs.**)
Camshaft clearance adjustment plate fixing bolt	M8	**35.0 N·m** (**25.8 lb ft**)	**3.6 kgm** (**26.0 ftlbs.**)
Crankshaft back cover bolts	M8	**25.0 N·m** (**18.4 lb ft**)	**2.6 kgm** (**18.8 ftlbs.**)
Rocker shaft adjustment nut	M8	**22.0 N·m** (**16.2 lb ft**)	**2.2 kgm** (**15.9 ftlbs.**)
Exhaust manifold retaining bolts	M8	**25.0 N·m** (**18.4 lb ft**)	**2.6 kgm** (**18.8 ftlbs.**)
Injection pump fixing bolts	M8	**25.0 N·m** (**18.4 lb ft**)	**2.6 kgm** (**18.8 ftlbs.**)
bolts fixing, • Oil sump cover to back cover • Cylinder block and flywheel	M10 x 1.25	**39.0 - 49.0 N·m** (**28.8 - 36.1 lb ft**)	**4.0 - 5.0 kgm** (**28.9 - 43.4 ftlbs.**)
All models	M10 x 1.25	**49.0 - 59.0 N·m** (**36.1 - 43.5 lb ft**)	**5.0 - 6.0 kgm** (**36.2 - 43.4 ftlbs.**)

Engine - Special tools

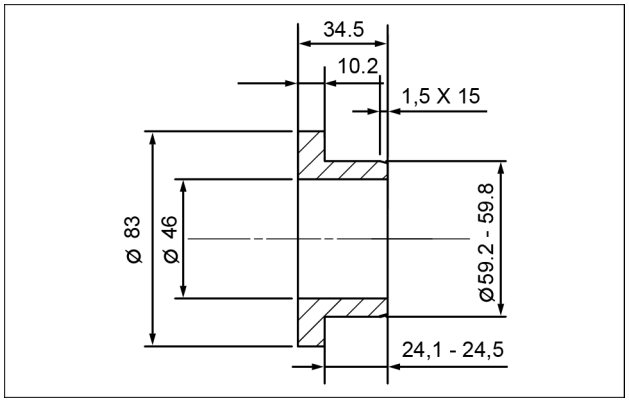
⚠ DANGER

The tools listed below must be manufactured and used in order to work safely and efficiently and obtain the best results.

List of special tools necessary to carry out the different operations described in this Section.

380000226	Engine front pulley puller	380000277	Exhaust valve guide reamer set
380000322	Fuel pump gear puller	380000302	Valve spring compressor
296044	Valve adjustment wrench	380000301	Graduated protractor for angular tightening measurements
380000223	Water pump propeller puller	380000247	Water pump propeller seal installation punch
999900015	Advance adjustment apparatus (suitable for **8.000 - 10.000 mm** (**0.315 - 0.394 in**) connection)	380000303	Cylinder compression test set
380000219	Valve guide removal/installation punch	380000246	Injector seat refurbishment set
380000242	Valve guide installation bush (used together with tool 380000219)	380000308	Injector detachment support
380000222	Reamer bit for valve guide	380000309	Injector detachment wrench set
380000276	Drill bit for valve guide (**7.900 mm** (**0.311 in**))		

Measurements necessary for manufacturing crankshaft front seat installation apparatus, are given in mm. Material UNI C40.



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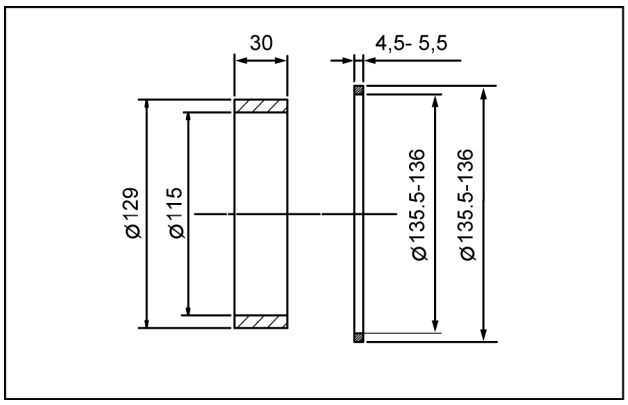
Measurements necessary for manufacturing crankshaft front seat installation apparatus, are given in mm. Material UNI C40.



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Crankcase - Technical Data

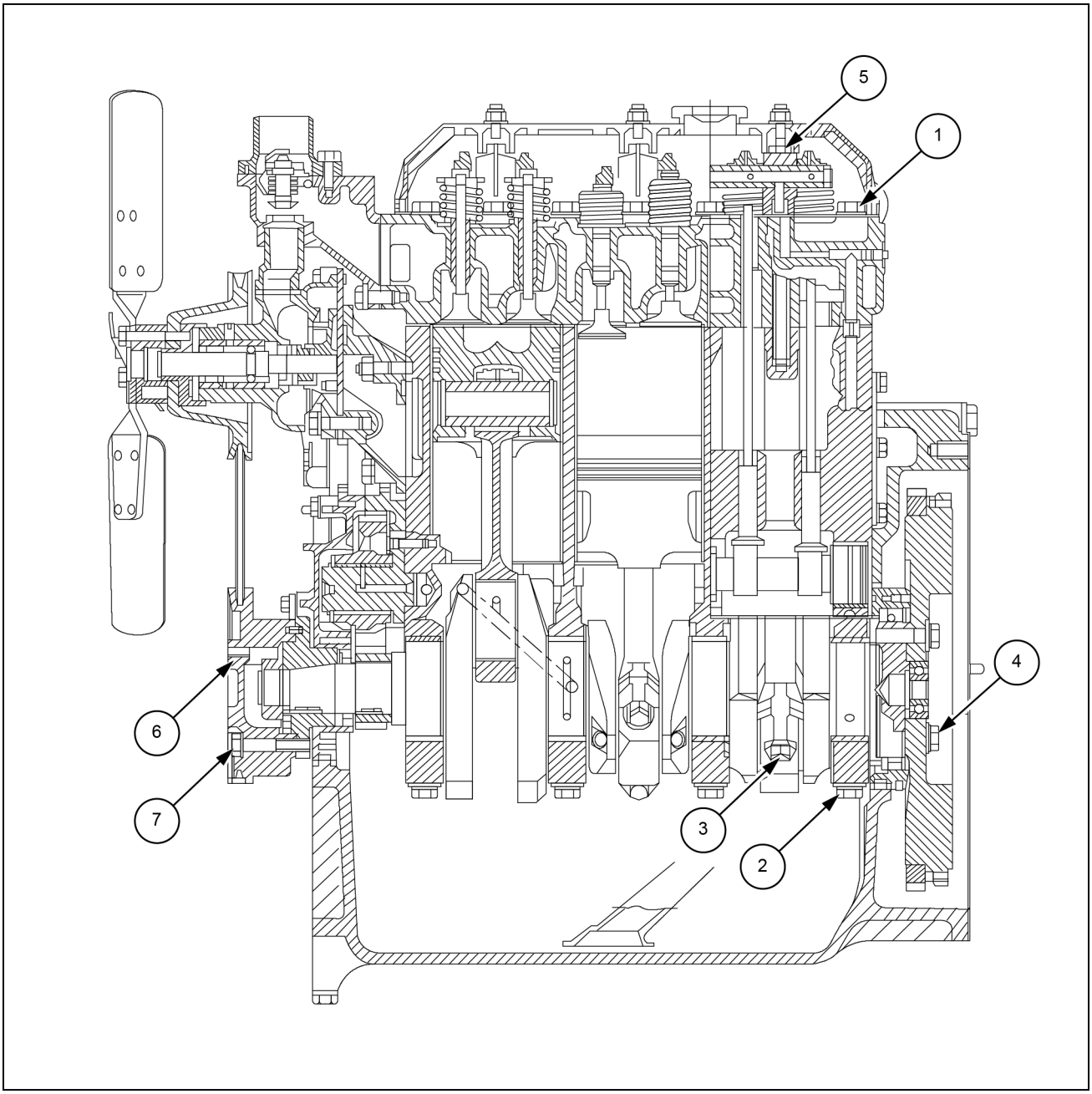
Engine oil sump and crankcase	
Cylinder block	Cast monoblock houses crankshaft, camshaft, valve push rod cups
Inner diameter	**104.000 - 104.024 mm** (**4.094 - 4.095 in**) (1)
Outer diameter	**107.020 - 107.050 mm** (**4.213 - 4.215 in**)
Block snug fit size	**106.850 - 106.900 mm** (**4.207 - 4.209 in**)
Inner diameter upper range	**0.120 - 0.200 mm** (**0.005 - 0.008 in**)
Outer diameter upper range	**0.400 - 0.800 mm** (**0.016 - 0.031 in**)
Ovality and taper	**0.200 mm** (**0.008 in**)
Main bearing race diameter	**0.120 mm** (**0.005 in**)
Main bearing race diameter	**84.200 - 84.230 mm** (**3.315 - 3.316 in**)
Camshaft bushings race diameter:	
- Front	**54.780 - 54.805 mm** (**2.157 - 2.158 in**)
- Middle	**54.280 - 54.305 mm** (**2.137 - 2.138 in**)
- Rear	**53.780 - 53.805 mm** (**2.117 - 2.118 in**)
Valve push rod cup seat diameter	**15.000 - 15.018 mm** (**0.591 - 0.591 in**)
Valve push rod cup upper range	**0.100 mm** (**0.004 in**) – **0.200 mm** (**0.008 in**) – **0.300 mm** (**0.012 in**)

(1) After honing.

(2) Take measures parallel and perpendicular to the axis of the engine, where snap rings are operating.

Engine - Sectional view

Longitudinal section of 3 cylinder engine



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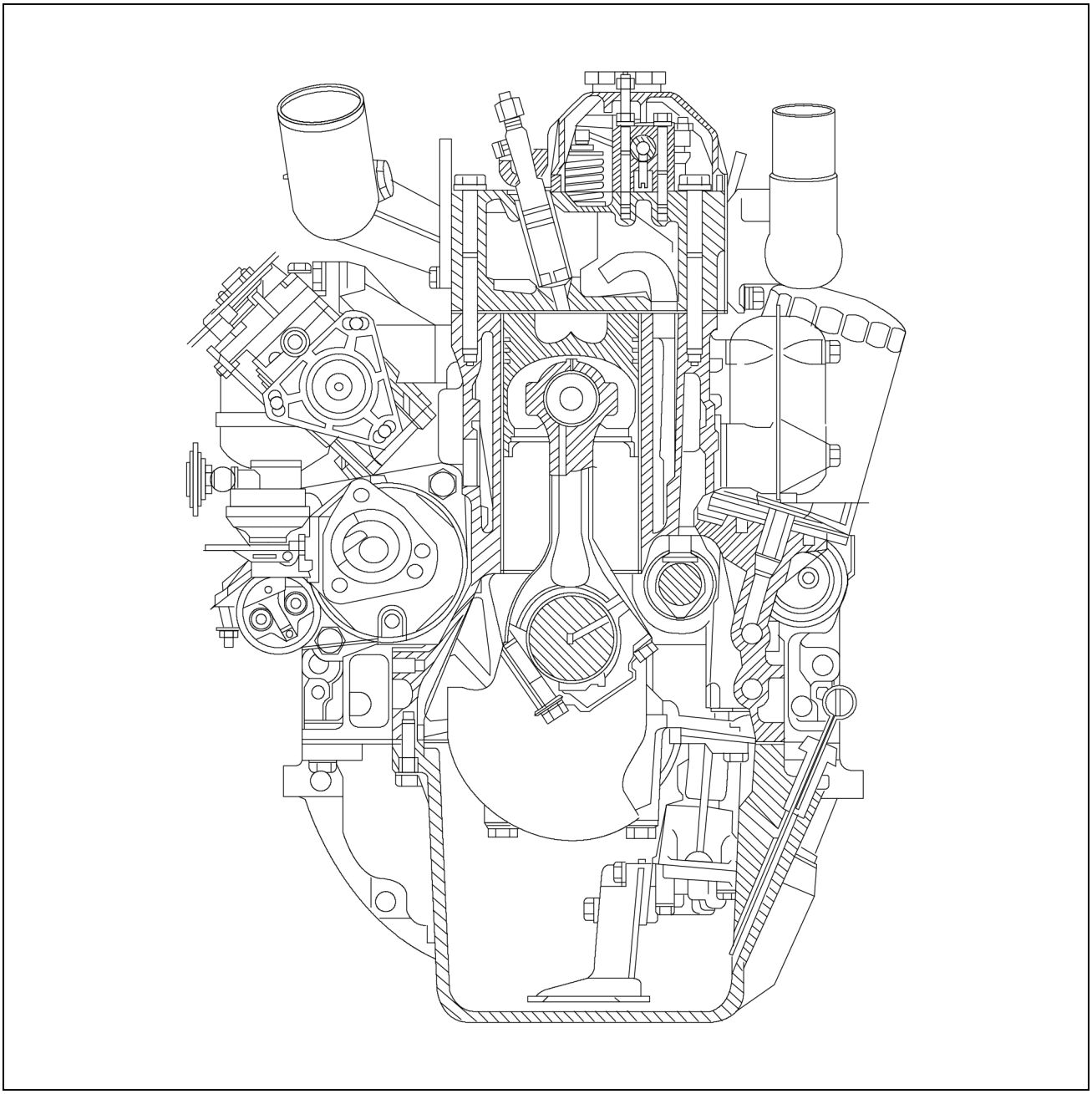
Engine - Sectional view

Cross section of 3 cylinder engine



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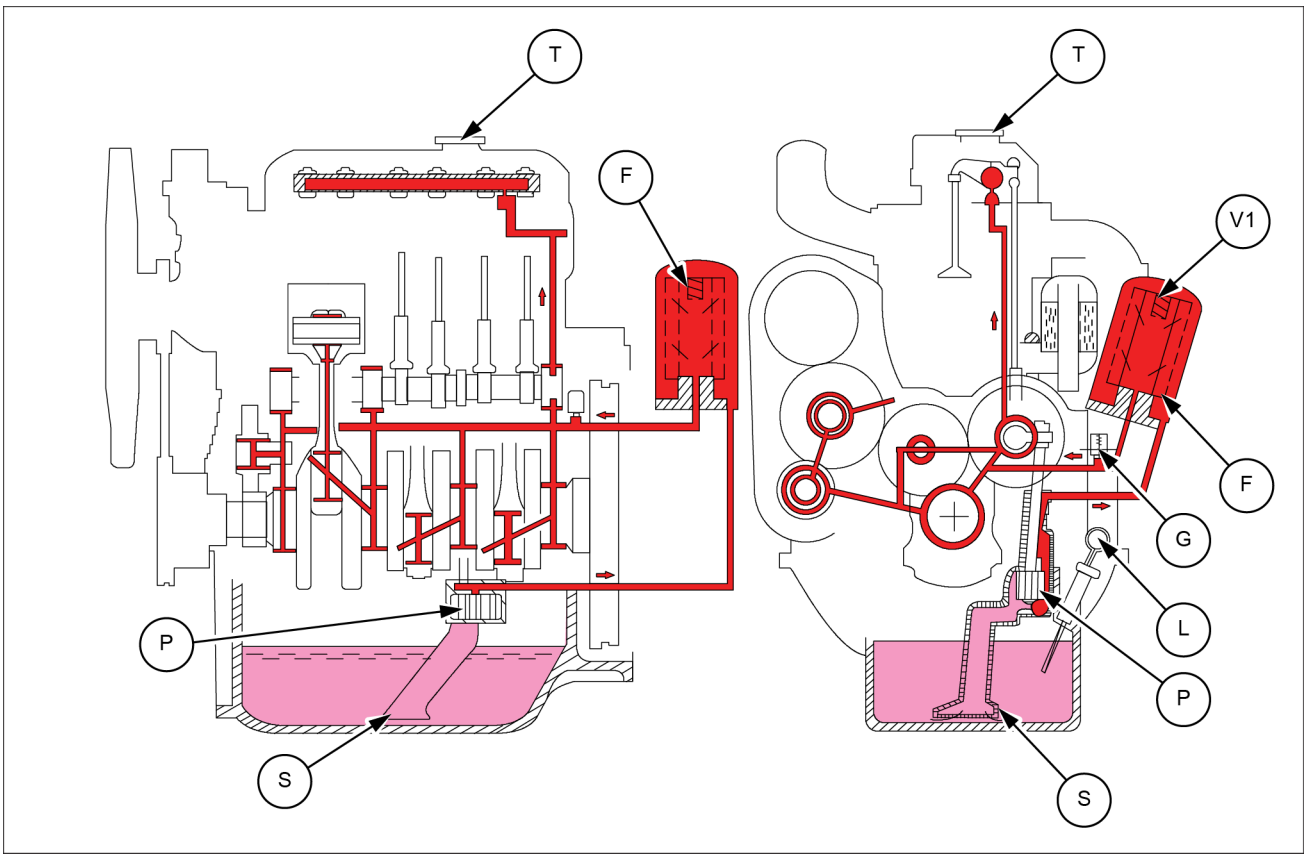
Engine - Sectional view



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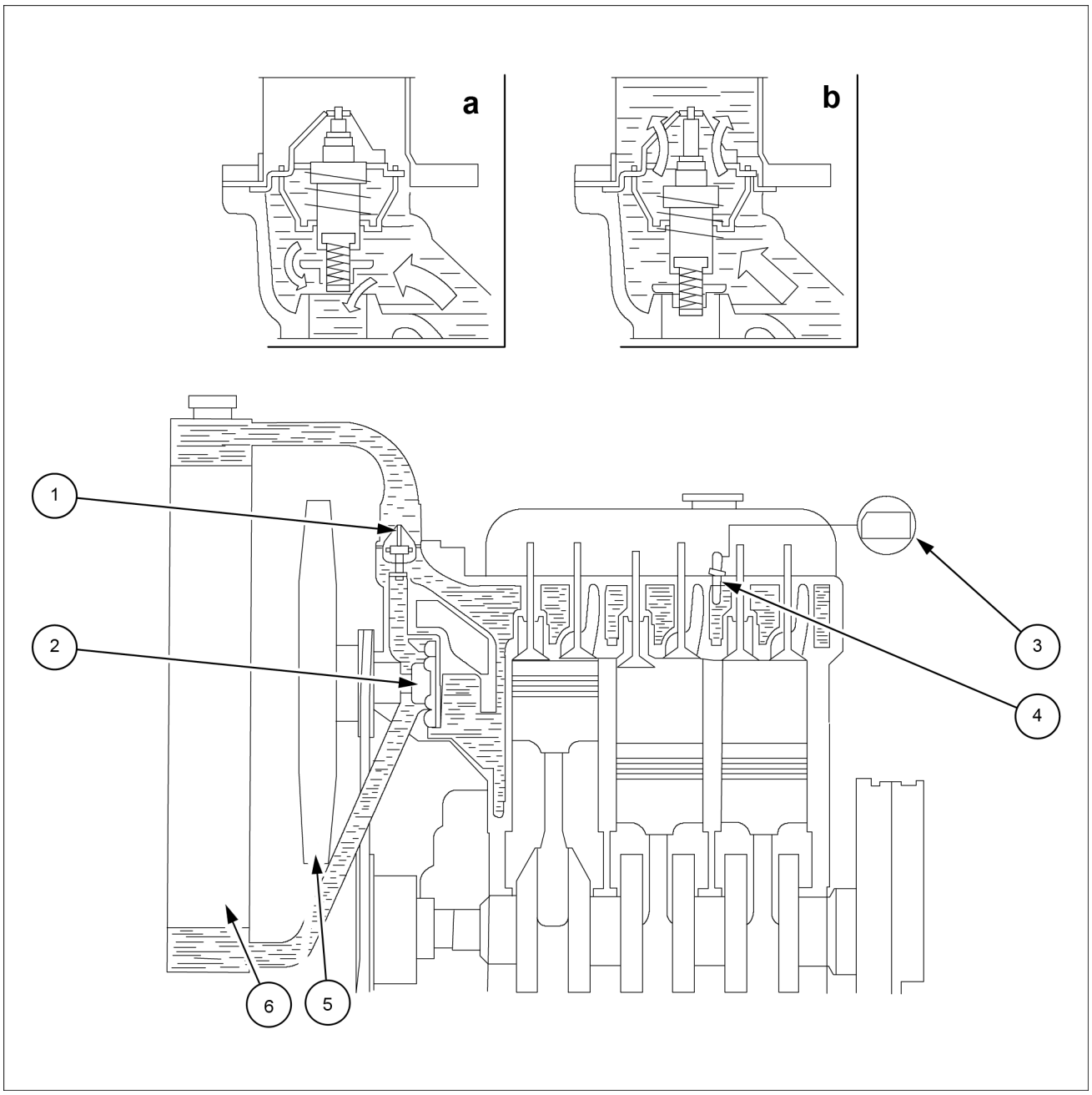
Lubrication system of 3 cylinder engine

F.	Filter	S.	Suction screen
G.	Oil pressure gage	T.	Oil fill cover
L.	Oil dipstick	V.	Pressure bypass valve
P.	Pump	V1.	Filter bypass valve



ANIL15TRO0030GB 2

Engine cooling system

a. Thermostat open
b. Thermostat closed
c. 3-cylinder models
1. Thermostat
2. Pump
3. Water temperature gage
4. Engine coolant temperature sender
5. Fan
6. Radiator

Engine - Remove

⚠ WARNING

Heavy objects!
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply could result in death or serious injury.

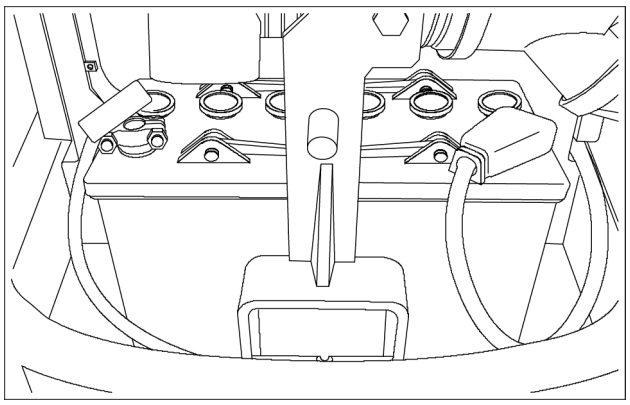
W0398A

⚠ CAUTION

Pinch hazard!
Always use suitable tools to align mating parts. DO NOT use your hand or fingers. Failure to comply could result in minor or moderate injury.

C0044A

1. Remove the negative (-) pole of the battery.



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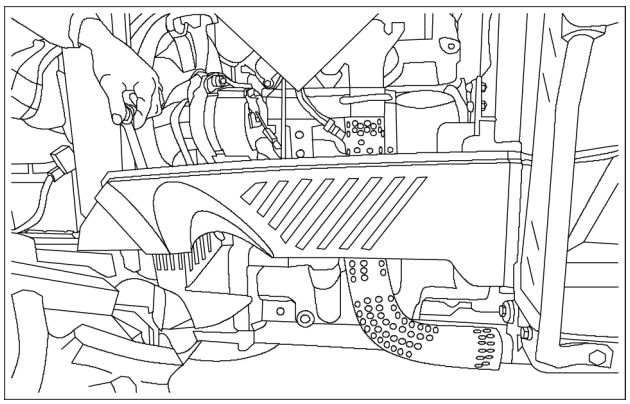
2. Remove the guards at the right and left hand side of the engine.



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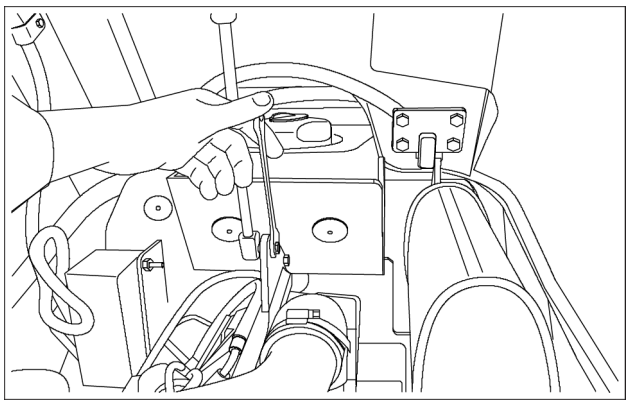
3. Remove the fixing bolt **(1)** of the gas strut.



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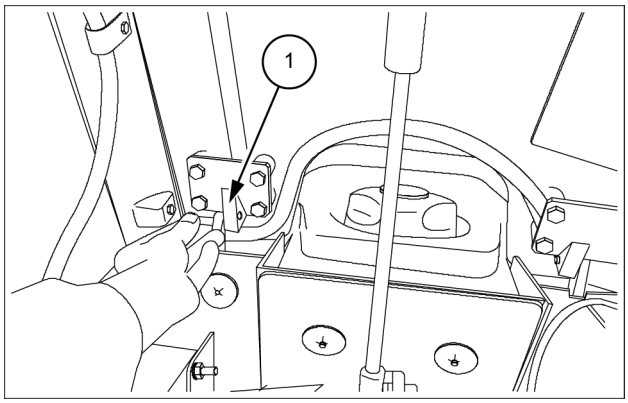
4. Loosen the pins, which hold the hood, from it's socket.



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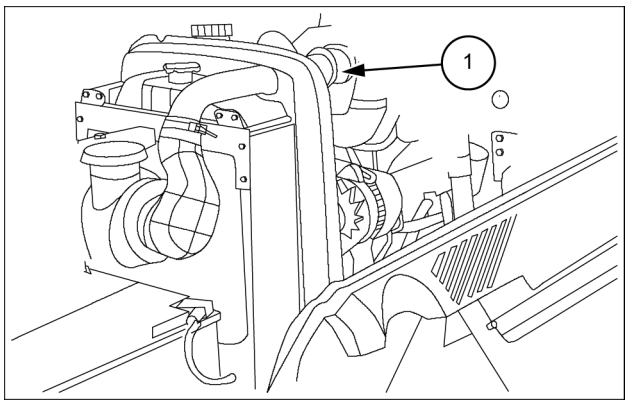
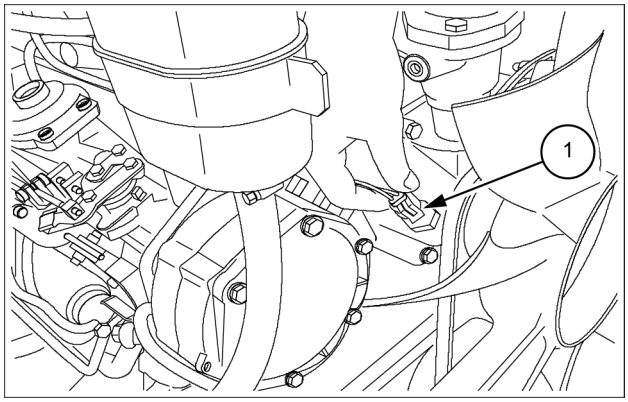
5. Disconnect the connections **(1)** from the clogged air filter sensor.



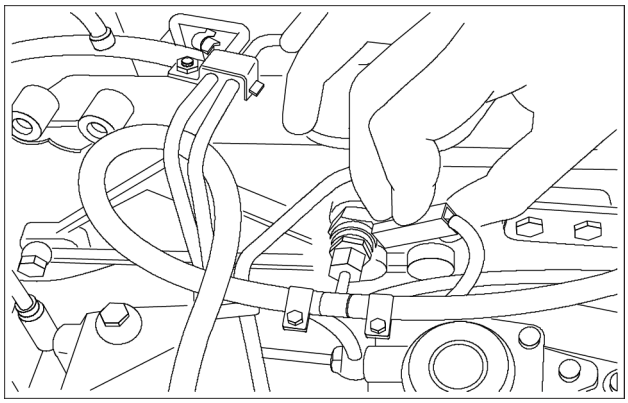
ANIL15TRO0036AB 5

6. Disconnect the connection **(1)** from the coolant water temperature sensor



ANIL15TRO0037AB 6

7. Disconnect the electrical connection of heater on fuel system.



ANIL15TRO0038AA 7