SERVICE MANUAL

LW270.B
Wheel Loader

6036707100

LW270.B

WHEEL LOADER

Service Manual

Print N° 603.67.071.00 English

THIS ALERT SYMBOL SIGNALS IMPORTANT MESSAGES INVOLVING YOUR SAFETY.

Read and heed carefully the safety instructions listed and follow the precautions recommended to avoid potential risks and to safeguard your health and your safety.

You will find this symbol in the text of this Manual referred to the following key words:

***WARNING* - Cautions directed to avoid improper repair interventions involving potential consequences for the operator's safety.**

***DANGER* - These warnings qualify specifically potential dangers for the safety of the operator or other persons directly or indirectly involved.**

IMPORTANT NOTICE

All maintenance and repair interventions explained in this Manual **must be performed exclusively by the Service Organization of the Manufacturer**, observing strictly the instructions explained using, whenever necessary, the recommended specific tools.
Whoever performs the operations reported without following exactly the precautions is responsible on his own, for the damages that may result.

Neither the Factory nor any Organizations in its Distribution Network, including but not limited to national, regional or local distributors, are responsible for any liability arising from any damage resulting from defects caused by parts and/or components not approved by the Factory for use in maintaining and/or repairing products manufactured or merchandized by the Factory.
In any case, no warranty of any kind is made or shall be imposed with respect to products manufactured or merchandized by the Factory, when failures are caused by the use of parts and/or components not approved by the Factory.

AVOID ACCIDENTS

Most accidents and injuries occurring in industry, on the farm, at home or on the road, are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason, MOST ACCIDENTS CAN BE PREVENTED by recognizing the real cause and taking the necessary precautions, before the accident occurs.

Regardless of the care used in design and construction of any type of equipment, there may be conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.

A careful operator is the best insurance against accidents. The complete observance of one simple rule would prevent many thousands serious injuries each year.

This rule is: Never attempt to clean, lubricate or adjust a machine while it is in motion.

WARNING

On machines having hydraulically, mechanically and/or cable controlled equipment (such as showels, loaders, dozers, scrapers etc.) be certain the equipment is lowered to the ground before servicing, adjusting and/or repairing.

If it is necessary to have the equipment partially or fully raised to gain access to certain items, be sure the equipment is suitably supported by means other than the hydraulic lift cylinders, cable and/or mechanical device used for controlling the equipment.

S U M M A R Y

SAFETY RULES

GENERALITIES

Read this Manual carefully before starting, operating, maintaining, fuelling or servicing the machine.

Read and comply with all safety precautions before any intervention.

Do not allow unauthorised personnel to operate or service this machine.

Do not wear rings, wrist watches, jewellery, loose or hanging garments, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can get caught in moving parts. Wear certified safety clothes such as: hard hat, no-slip footwear, heavy gloves, ear protection, safety glasses, reflector vests, respirators. Ask your employer about specific safety equipment requirements.

Keep the operator's compartment, step plates, grab-rails and handles clean and clear of foreign objects, oil, grease, mud or snow to minimize the danger of slipping or stumbling. Remove mud or grease from your shoes before attempting to mount or operate the machine.

Do not jump on or off the machine. Always keep both hands and one foot, or both feet and one hand in contact with steps and grab rails.

Do not use controls or hoses as hand holds when climbing on or off the machine. Hoses and controls are movable parts and do not provide solid support. Besides, controls may be inadvertently moved and cause unexpected movement of the machine or its attachments.

Never operate the machine or its attachments from any position other than sitting in the driver's seat.

Keep head, body, limbs, hands and feet inside the operator's compartment at all times to reduce exposure to external hazards .

Be careful of possible slippery conditions of the steps and hand rails as well as of the ground around the machine.

Do not leave the machine until it is has come to a complete stop.

Check the seat safety belt at least twice per year and replace it if it shows signs of wear, fraying or other weakness that could lead to failure.

STARTING

NEVER START OR OPERATE A FAILED MACHINE. Before operating the machine, always ensure that any unsafe condition has been satisfactorily corrected.

Check brakes, steering and attachment controls before moving off. Report any malfuctioning part or system to the maintenance managers for proper action.

Ensure all protective guards and panels as well as all safety devices provided are in place and in good operating condition.

Ensure that nobody is in the machine operating range before moving off or operating the attachment. WALK COMPLETELY AROUND the machine before mounting. Sound the horn.

Before starting machine, check, adjust and lock the driver's seat for maximum comfort and control of the machine.

Fasten your seat belts(when fitted).

Obey all flag signals and signs.

Due to the presence of flammable fluids on the machine, never check or fill fuel tanks or accumulator batteries near fires, open flames, or sparks.

REMEMBER THAT SPECIAL STARTING FLUIDS ARE FLAMMABLE. Scrupolously follow recommendations printed on the containers and in this Manual.

DO NOT PUNCTURE OR BURN CONTAINERS.

Containers must be stored in fresh, well ventilated places and out of the reach of unauthorised persons. Strictly follow the instructions provided by the Manufacturer.

Never use these products near fires, open flames, or sparks.

OPERATING

Check wheel and rim retainers before each working shift. If necessary, tighten to the torque specified.

Do not run the engine of this machine in closed buildings without proper ventilation capable to remove harmful exhaust gases.

Roll Over Protective Structures (ROPS) are required on wheel or crawler loaders, dozers, or graders. NEVER OPERATE the machine if such protective structure is removed.

Keep the operator's compartment free of foreign objects, especially if not firmly secured. Never use the machine to transport objects, unless proper securing points are provided.

DO NOT CARRY RIDERS ON THE MACHINE

Study and familiarize with escape routes alternate to normal exit routes.

According to law provisions, seat belts must be fitted with Roll Over Protection Structures or cabs. Keep safety belts fastened during operation.

For your personal safety, do not climb on or off the machine while it is in motion.

Make sure that bystanders are clear of the machine operating range before starting the engine and operating the attachment. Sound the horn. Obey all indications provided by flags, signs and signals.

DO NOT COAST OR FREEWHEEL down hills. Engage the most suitable gear speed to keep the machine under control.

SAFETY RULES

Do not operate the machine if you are extremely tired or feel ill. Be especially careful towards the end of the working shift.

Do not operate a machine with misadjusted brakes.

Operate the machine at low speed which can ensure complete control at all times.

Travel slowly over very rough terrain, slopes or near drop-offs, in congested areas or on frozen or slippery surfaces.

When backing, always look to where the machine is to be moved. Be alert of the position of bystanders. Should someone enter the work area, STOP THE MACHINE.

Maintain a safe distance from other machines or obstacles to ensure required visibility conditions. Give way to loaded machines.

Maintain a clear vision of the surroundings of the travel or work area at all times. Keep cab windows clean and repaired.

When machines are operating in tandem, the pusher (rear) must be equipped with the appropriate deflectors to protect the front unit driver against the air stream coming from the blower fan.

When pulling or towing through a cable or chain, do not start suddenly at full throttle. Take-up slack carefully.

Carefuly inspect the towing items for flaws or problems before proceedig.

Avoid kinking or twisting chains or cables. Do not pull through a kinked chain or cable as the high stresses existing in this condition may induce failures. Always wear heavy gloves when handling chains or cables.

Chains and cables should be securely anchored. Anchor points should be strong enough to withstand the expected load. Keep anyone clear of anchor points and cables or chains.

DO NOT PULL UNLESS THE OPERATOR'S COMPARTMENTS OF THE MACHINES INVOLVED ARE PROPERLY PROTECTED AGAINST POSSIBLE BACKLAS IN CASE OF CABLE OR CHAIN FAILURE OR DETACHMENT.

Be alert of soft ground conditions close to newly constructed walls. The fill material and machine weight may cause the wall to collapse.

In darkness, check area of operation carefully before moving in with the machine. Use all lights provided. Do not move into low visibility areas.

If the engine tends to stall for whatever reason under load or at idle, immediately report this problem to the maintenance managers for proper action. Do not operate the machine until this condition has been corrected.

On machines fitted with suction radiator fans, regularly check the engine exhaust system for leaks, as exhaust fumes expelled towards the operator are toxic.

Operators must know thoroughly the performances of the machine they are driving.

When working on slopes or near sudden level drops in the terrain, avoid areas where ground is loose or soft since overturn or loss of machine control could result.

If noise level is high and continuosly exceeds 90 dBA over 8 hours at the operator's ear, wear approved ear protection in compliance with local regulations.

Where counterweights are provided, do not operate the machine if they have been removed.

When transporting a loaded bucket, keept it as rolled-back and low as possible for maximum visibility, stability and safety of there machine. Ground speed should be adequate to the load and ground conditions.

The load must always be properly arranged in the bucket; move with extreme care when transporting oversize loads.

Use only the type of bucket recommended for the machine and the materials to be handled. Follow the recommendations concerning loading capacity, arrangement of the materials, characteristics of the ground and job to be performed.

Do not lift and move loads overhead where persons are standing or working, nor downhill when working crosswise on slopes. In this case, the bucket should be unloaded on the uphill side, whenever possible.

Start and stop the machine carefully when the bucket is full. Do not move off without first reducing engine speed.

Overtaking manoeuvres should be performed only when absolutely necessary and unavoidable. Beware possible uneven terrains, poor visibility, presence of other machinery or persons out of sight.

Operate the machine at a speed adequate to the working site conditions and in any case slow enough to ensure complete control at all times.

Check instruments at start-up and frequently during operation. Stop the machine immediately should any malfunction be signalled.

Never use the bucket as a man lift or to carry riders.

Never use the machine as a work platform or scaffolding, nor for other improper use (such as pushing railway cars, trucks or other machines).

Pay attetion to people within the machine operating range. Load trucks from the driver's side whenever possible.

Prior to operating the machine, check which obstacles and/or difficulties you will encounter, such as narrow streets, overhead doors, cables, piping, as well as ground, bridges, paving and ramps bearing load limitations.

In case of road transfers, find out beforehand what conditions are likely to be encountered, such as size restrictions, heavy traffic, paving type, etc. . Beware fog, smoke or dust that obscure visibility.

When crossing gullies or ditches, move at an angle with reduced speed after ensuring ground conditions will permit a safe traverse.

SECTION 1

ENGINE

TABLE OF CONTENTS

1.1 IDENTIFICATION DATA

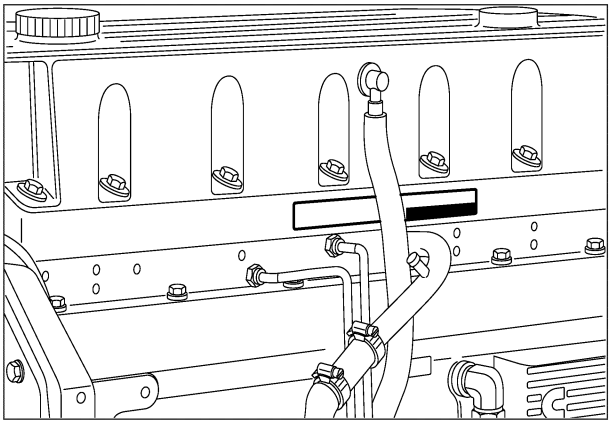


Fig. 1-1

Engine series "QSM11" data plate

The identification plate provides specific information about your engine.

Note – *The engine plate must not be replaced without the approval by Cummins Engine company Inc.*

The identification plate is located on the injection pump side of the engine, on the rocker arm cover side.

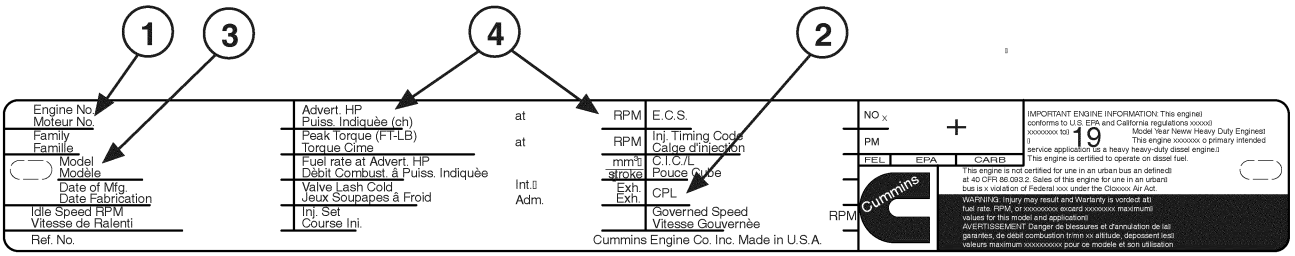


Fig. 1-2

1. Engine serial number (ESN)
2. Control Part List (CPL)
3. Model
4. Power and speed of engine

1.2 GENERAL SPECIFICATIONS ENGINE SERIES "QSM11"

ENGINE

Brand and model ..... CUMMINS QSM11-C290
Net power at flywheel ..... 199 kW
Max. power speed ..... 2100 rpm
Max. torque … ..... 1478 Nm
Max. torque speed ..... 1400 rpm
Type Diesel, 4-stroke, direct injection, and turbocharged with after-cooler.

Number of cylinders 6
Bore and stroke ..... 125 x 147 mm
Total displacement ..... 10 800 cu cm
Clearance between valves and rocker arms:
- suction ..... 0.36 mm
- exhaust ..... 0.69 mm
Firing order … 1-5-3-6-2-4
Minimum starting temperature ..... - 20 °C (- 4 °F)
Setting of engine coolant high temperature sender … ..... 101 + 2 °C (214 +3.5 °F)
Setting of engine oil low pressure switch … ..... 0.5 ± 0.1 bar (at low idle)
Weight (without fluids) … ..... 940 kg (2,072 lbs)
Crankshaft rotation (seen from fan side) … ..... clockwise

FUEL PUMP

Brand ..... Cummins
Type ..... Celect Electronid
Model … ..... QS GP
Injection advance: ..... 11° BTDC.

ENGINE SPEEDS

Low idle engine speed … ..... 700 rpm
Max. idle engine speed ..... 2220 rpm
Torque converter stall … ..... 2110 ± 50 rpm
Steering stall at low idle … ..... >690 rpm
Equipment stall ..... 2110 ± 50 rpm
Full stall ..... 1960 ± 100 rpm

Location of cylinders and firing order

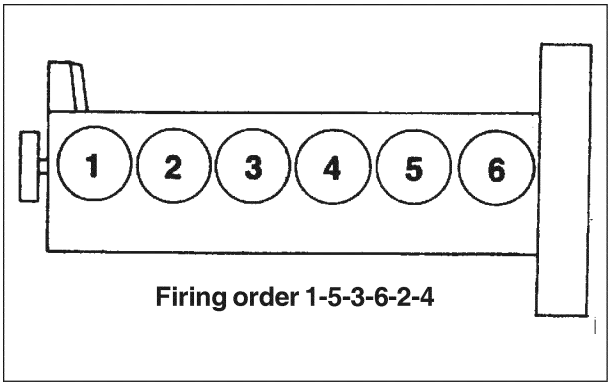


Fig. 1-3

Location of intake and exhaust valves

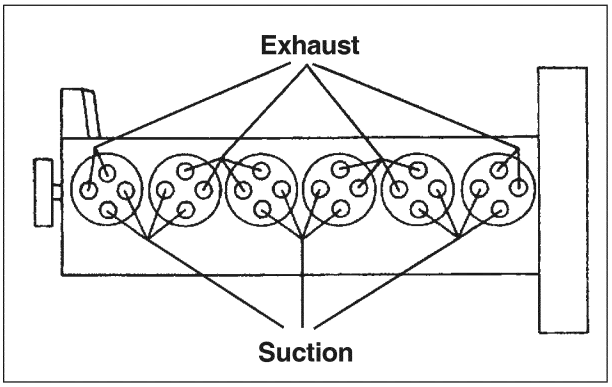


Fig. 1-4

Intake system

Maximum intake clogging (clean air cleaner element) ..... 254 mm H_2O [10 in H_2O]
Maximum intake clogging (dirty air cleaner element) ..... 635 mm H_2O [25 in H_2O]
Maximum pressure drop from turbocharger to intake manifold ..... 152 mm Hg
Maximum pressure drop after after-cooler ..... 152 mm Hg

Exhaust system

Maximum counter-pressure of silencer piping (combined)
Hg ..... 76 mm [3 in]
H_2O ..... 1016 mm [40 in]

Cooling system

Coolant capacity (engine-after-cooler only) ..... 12.9 lt (3.4 US/gal)
Standard modulation thermostat - Range ..... 82 - 93 °C (180 - 200 °F)
Coolant pressure in the cylinder block (pressure cap removed):
Minimum
Thermostat closed - 1800 rpm - no discharge ..... 1.07 bar (138 kPa)
Maximum
Thermostat open .....2.75 bar (275 kPa)
Maximum allowed operating temperature ..... 100 °C (212 °F)
Minimum recommended operating pressure ..... 71 °C (160 °F)

Lubrication system

Oil pressure
At low idle speed (minimum allowed) ..... 0.69 bar (70 kPa)
At 1200 rpm or Torque Peak (minimum allowed) ..... 2 bar (207 kPa)

Oil capacity of standard engine
Filter capacity ..... 2.6 lt (0,7 US/gal)
Oil sump (high low) ..... 34 - 26.5 lt (9 - 7 US/gal)

Electrical system

System voltage	Ambient temperature			
	-18 °C (-0.4 °F)		0 °C (32 °F)	
	Cold starting Amp	Reserve Cap.[1] Amp	Cold starting Amp	Reserve Cap.[1] Amp
24 Volt	90	320	640	240

1. The quantity of plates for a determined dimension of batteries determines its capacity. The reserve capacity determines the length of the period during which a sustained starting is maintained.
2. The CCA specifications are based upon two 12-Volt batteries in series.

1.4 ENGINE SUPPORTS

The engine is mounted on the rear module of the frame in four points: frontally, by the transmission-torque converter group, that in turn, is supported by brackets bolted on elastic pads and on the rear, by plates bolted to the engine and supported by elastic pads as well.

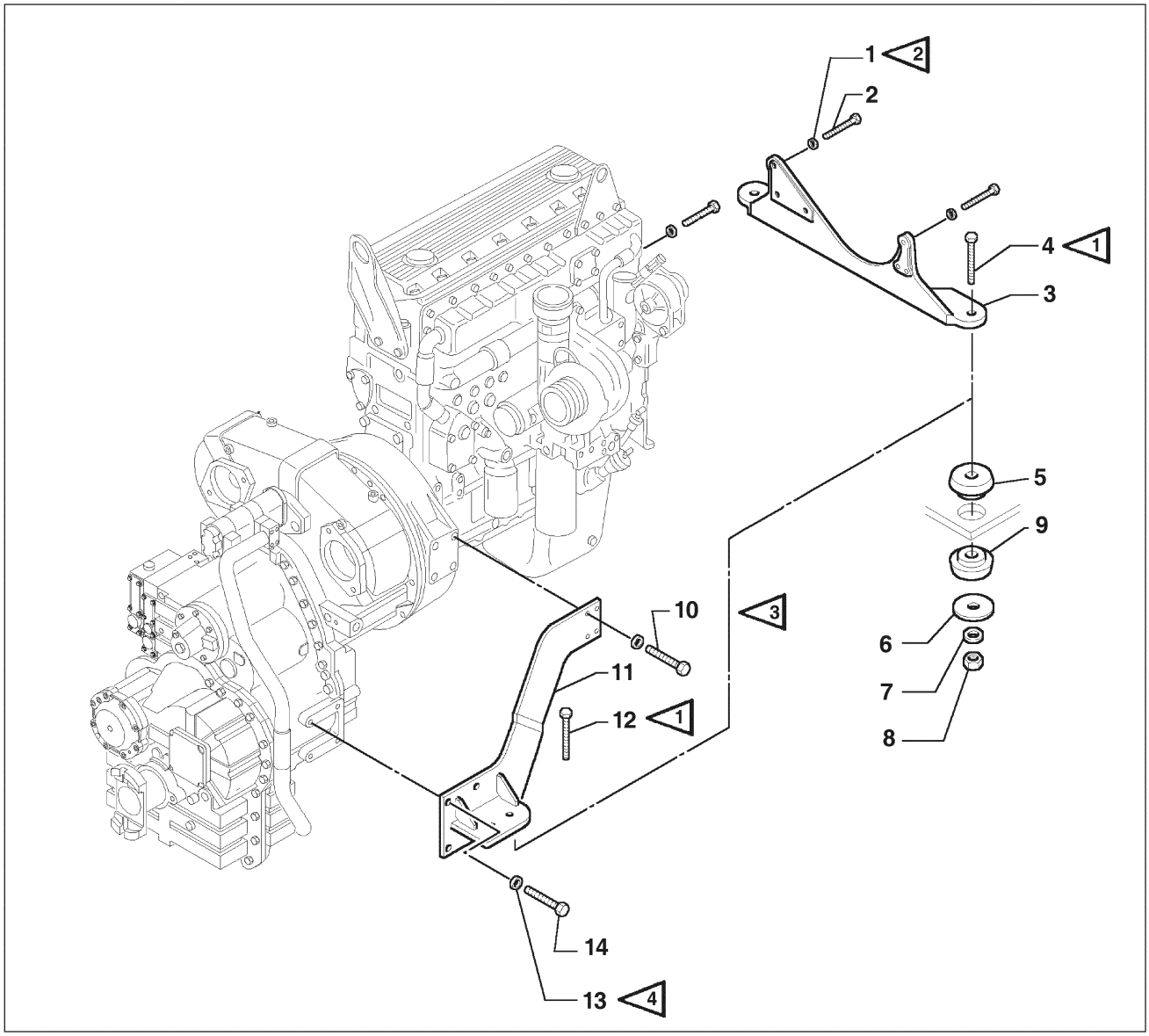


Fig. 1-6 Engine supports

Notes – 1 — 22.4 daNm; 2 — 6 daNm; 3 — 19.5 daNm; 4 — 22.4 daNm

1. SCREW M10x1.5x110
2. WASHER
3. LEFT REAR SUPPORT
4. SCREW M16x2x110
5. UPPER PAD
6. PLATE
7. WASHER
8. NUT
9. LOWER PAD
10. SCREW M16x2x45
11. LEFT FRONT SUPPORT
12. SCREW M16x2x110
13. WASHER
14. SCREW M16x2x45

1.5 DIAGNOSING THE ENGINES CUMMINS QSM11

The QSM11 engine is equipped with an electronic controller capable of self-diagnosing possible troubles occurring during the operation (electronic control Module).
A panel with a signal indicator is located behind the operator's seat in the cab that can be reached by removing a panel with screws.

FUNCTIONS:

Test

Every time the engine controller is activated a test of the integrity of the 3 indicator lights, staying ON for a few seconds, is performed.

Diagnosis

By actuating the switch "Diagnosis" it is possible to check the operation of the engine controller and to verify the presence of active error codes.

Method

Engine inoperative
Key on second step (**ON**)
"Diagnosis" switch in **ON**

Possible results:

1. Indicator lights **Warning** and **Stop** come ON and stay ON until the "diagnosis" switch is returned to **OFF**. This behaviour indicates the absence of active error codes and it is possible to return the "Diagnosis" switch into **OFF** and start the engine.

2. In the event error codes are memorised, on the other hand, the **Warning** indicator flashes once, then the red indicator flashes the three digits of the first active error code. As an example, if the first active code is 431, there is:

   a. 1 flash of the Warning indicator
   b. 4 flashes of the Stop indicator
   c. pause
   d. 3 flashes of the Stop indicator
   e. pause
   f. 1 flash of the Stop indicator
   g. pause

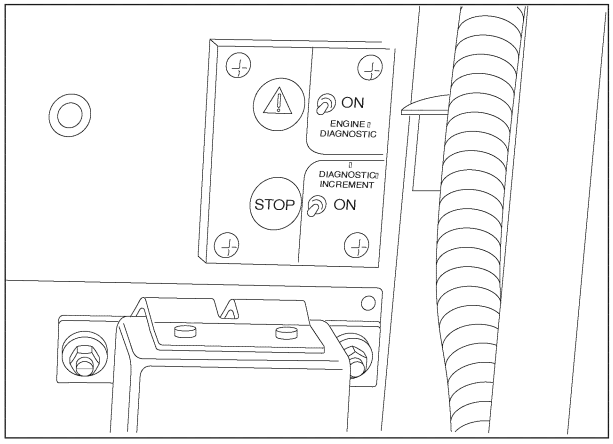


Fig. 1-7

1.6 COOLING SYSTEM (FAN DRIVE SYSTEM)

General description

The configuration of the engine cooling system is as follows:
A hydraulic pump (**1**) is installed on the engine (fuel pump side) powers by two hydraulic motors driving, respectively, the coolant radiator fan and the after-cooler fan. A controlling valve is located between the two circuits with a dual function: modulating the oil flow to the hydraulic motors, depending upon the speed of the engine and invert the rotation direction of the radiator fan, upon the command by the button located in the cab.

The oil, once it is sucked by pump (**1**) is forwarded to a controlling valve block (**2**) and through solenoid valve (**3**), reaches two-direction hydraulic motor (**4**) driving the main fan. Also through solenoid valve (**3**), oil under pressure reaches the second hydraulic motor (**5**) driving the after-cooler fan, then it turns to the discharge.

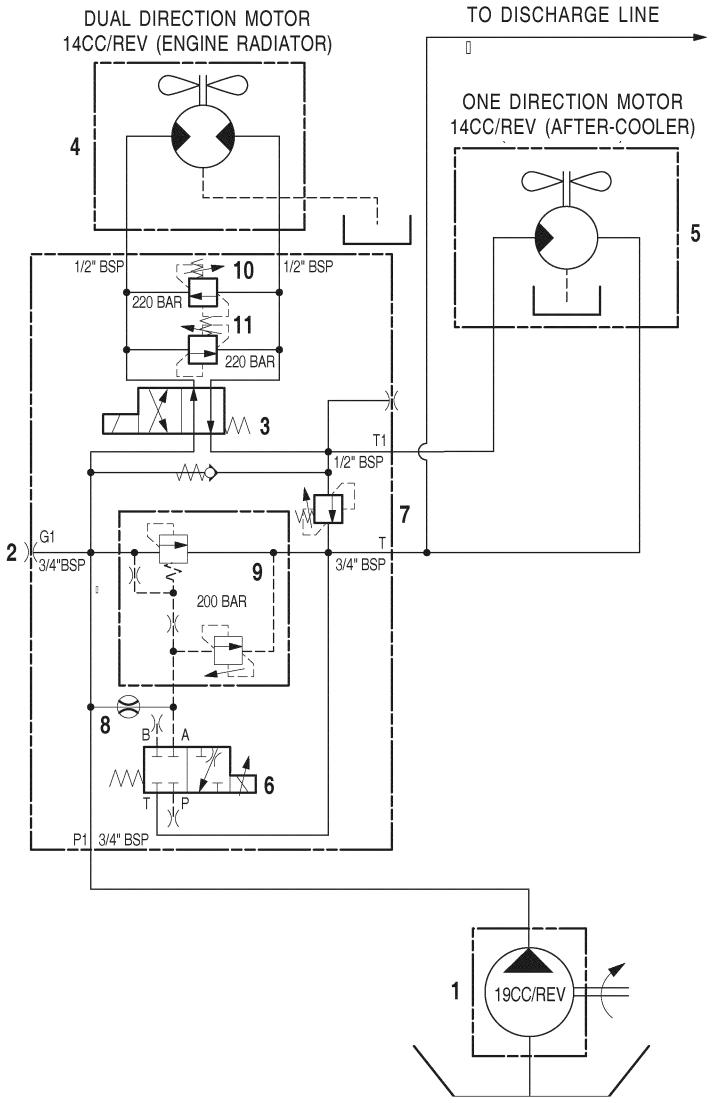


Fig. 1-8

1. Pump - **2.** Fan hydraulic control block - **3.** Solenoid valve - **4.** Dual direction hydraulic motor - **5.** One direction hydraulic motor - **6.** Proportional valve - **7.** Safety valve - **8.** Orifice (2 mm) - **9.** Safety valve - **10.** Safety valve - **11.** Safety valve

1.6.1 COOLING SYSTEM HYDRAULIC MOTORS

DUAL DIRECTION HYDRAULIC MOTOR

Radiator valve

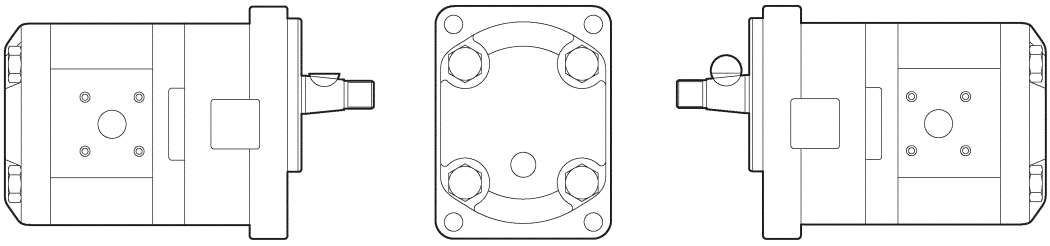


Fig. 1-9

INLET Pmax (constant)	210 bar
INLET Pmax (intermittent)	240 bar
INLET Pmin (constant)	25 bar
INLET Pmin (intermittent)	25 bar
OUTLET Pmax (constant)	210 bar
DISCHARGE Pmax	5 bar
MAX SPEED	4000 rpm
MIN SPEED	500 rpm

Displacement: 14 cu cm/turn
Rotation: dual direction

ONE DIRECTION HYDRAULIC MOTOR

After-cooler fan

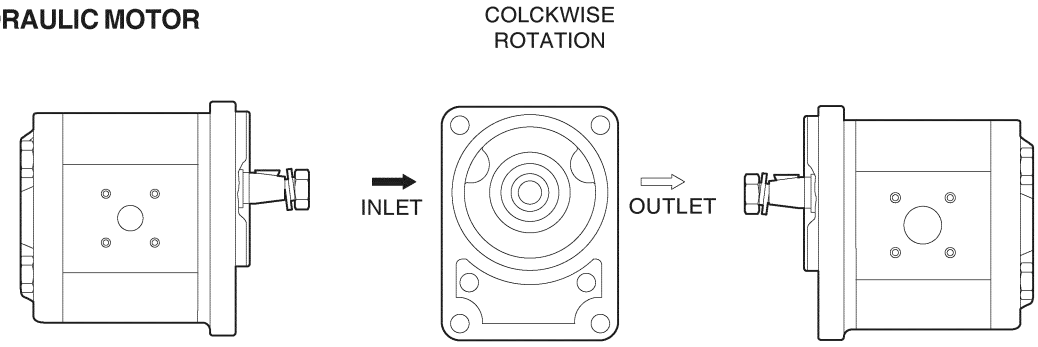
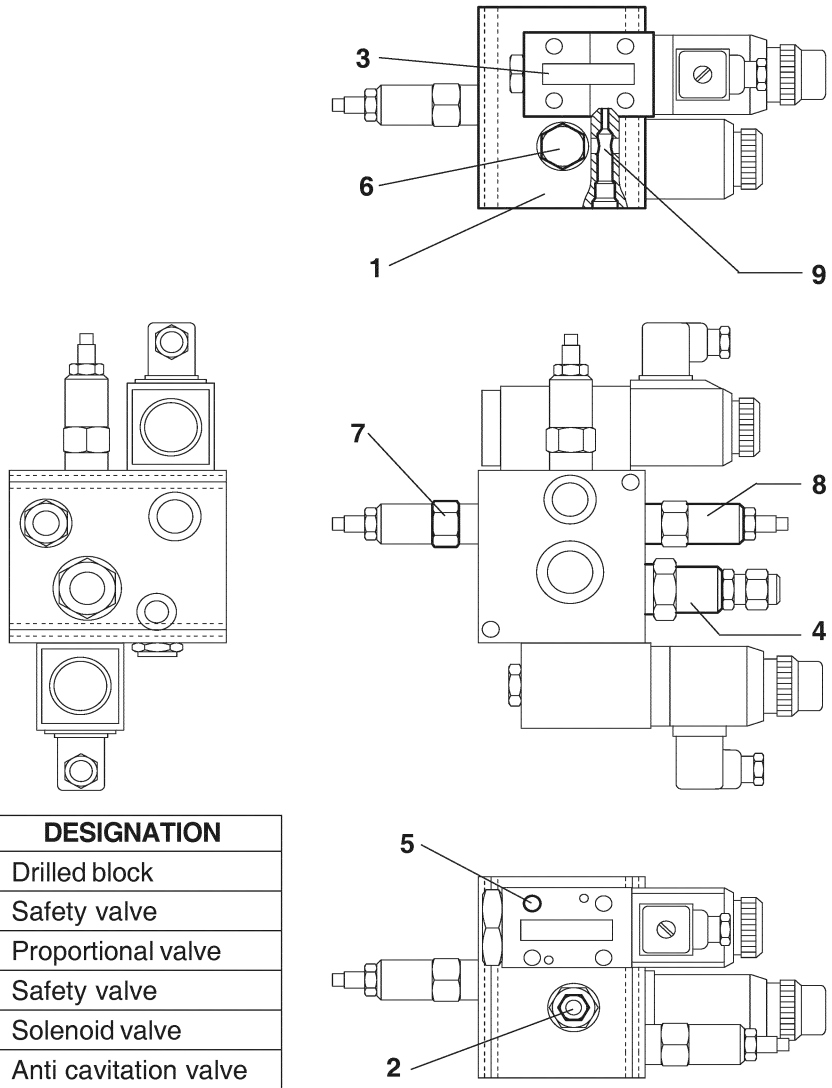


Fig. 1-10

INLET Pmax (constant)	276 bar
INLET Pmax (intermittent)	300 bar
INLET Pmin (constant)	25 bar
INLET Pmin (intermittent)	25 bar
OUTLET Pmax (constant)	10.5 bar
DISCHARGE Pmax	N.A.
MAX SPEED	3500 rpm
MIN SPEED	500 rpm

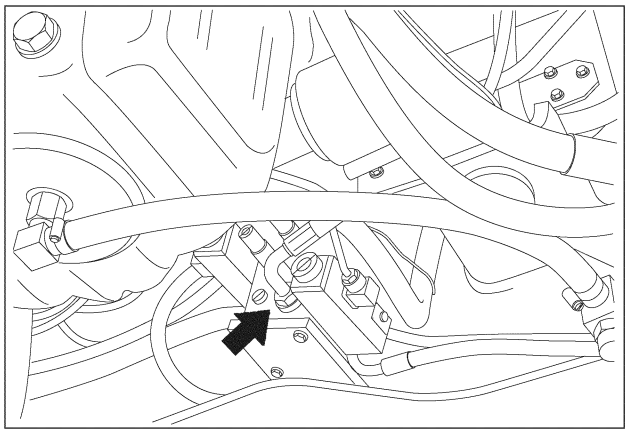
Displacement: 14 cu cm/turn
Rotation: leftward / anticlockwise

1.6.2 FAN HYDRAULIC CONTROL BLOCK



POS.	DESIGNATION
1	Drilled block
2	Safety valve
3	Proportional valve
4	Safety valve
5	Solenoid valve
6	Anti cavitation valve
7	Safety valve
8	Safety valve
9	Dowel

Fig. 1-11



Fan hydraulic control block
Location on the machine

Fig. 1-12

Suggest:

If the above button click is invalid.

Please download this document

first, and then click the above link

to download the complete manual.

Thank you so much for reading

SECTION 2

TRANSMISSION

TABLE OF CONTENTS