Perkins 900 Series

Models CP and CR

WORKSHOP MANUAL

3 cylinder, naturally aspirated, and turbocharged diesel engines for agricultural and industrial use

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General information

Introduction

This Workshop Manual has been designed to provide assistance in the service and overhaul of Perkins 900 Series engines. For overhaul procedures the assumption is made that the engine is removed from the application.

The engine conforms with USA (EPA/CARB) stage 1 and EEC stage 1 emissions legislation for agricultural and industrial applications.

Read and remember the "Safety precautions" on page 4. They are given for your protection and must be used at all times.

Most of the general information which is included in the User's Handbook (Chapters 1 to 6) has not been repeated in this workshop manual and the two publications should be used together.

The details of some operations will be different according to the fuel injection pump that is fitted. The specific pump type used can be found by reference to the manufacturer's identification plate on the pump body. Generally, the type of pump fitted is as shown below.

- Delphi - DP200 Series
- Stanadyne - DB4

When reference is made to the "left" or "right" side of the engine, this is as seen from the flywheel end of the engine.

Special tools have been made available and a list of these tools is given in Chapter 16, Special tools. Reference to the relevant special tools is also made at the beginning of each operation.

Original setscrews or studs used in holes that are open to the inside of the engine, have a sealant that is applied by the manufacturer. If the setscrew or stud is to be used again, the threads must be cleaned and a suitable sealant should be used on the threads. POWERPART recommended consumable products are listed on page 8. Reference to the relevant consumable products are made at the beginning of each operation.

Data and dimensions are included in Chapter 2, Specifications.

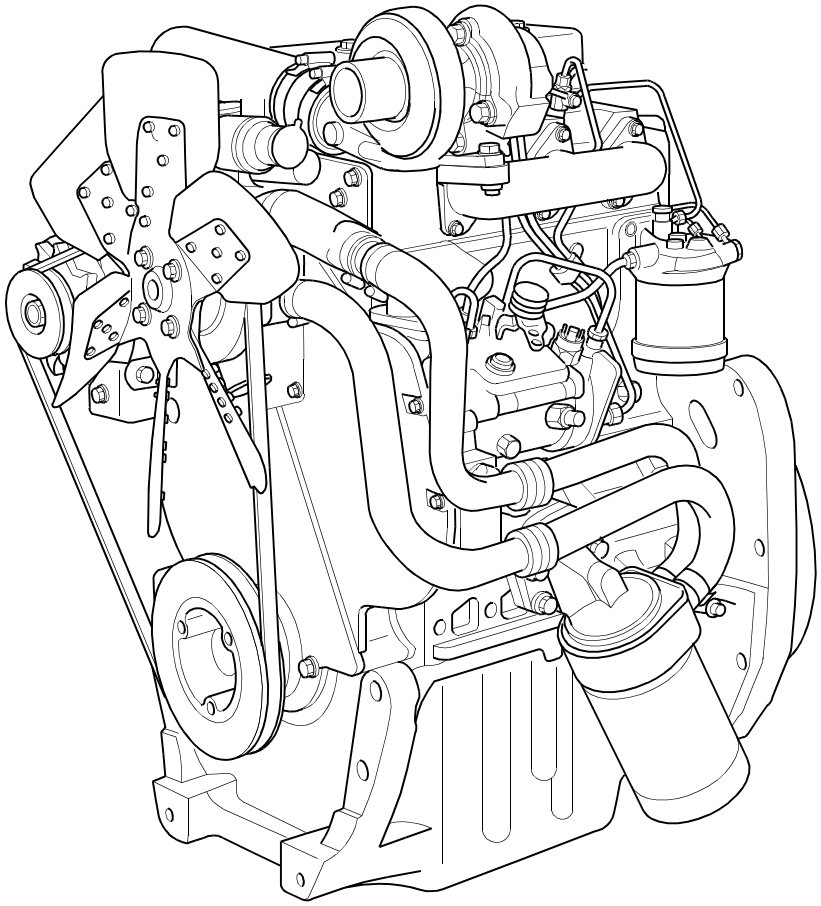
Danger is indicated in the text by two methods:

Warning! *This indicates that there is a possible danger to the person.*

Caution: *This indicates that there is a possible danger to the engine.*

Note: Is used where the information is important, but there is not a danger.

Engine views



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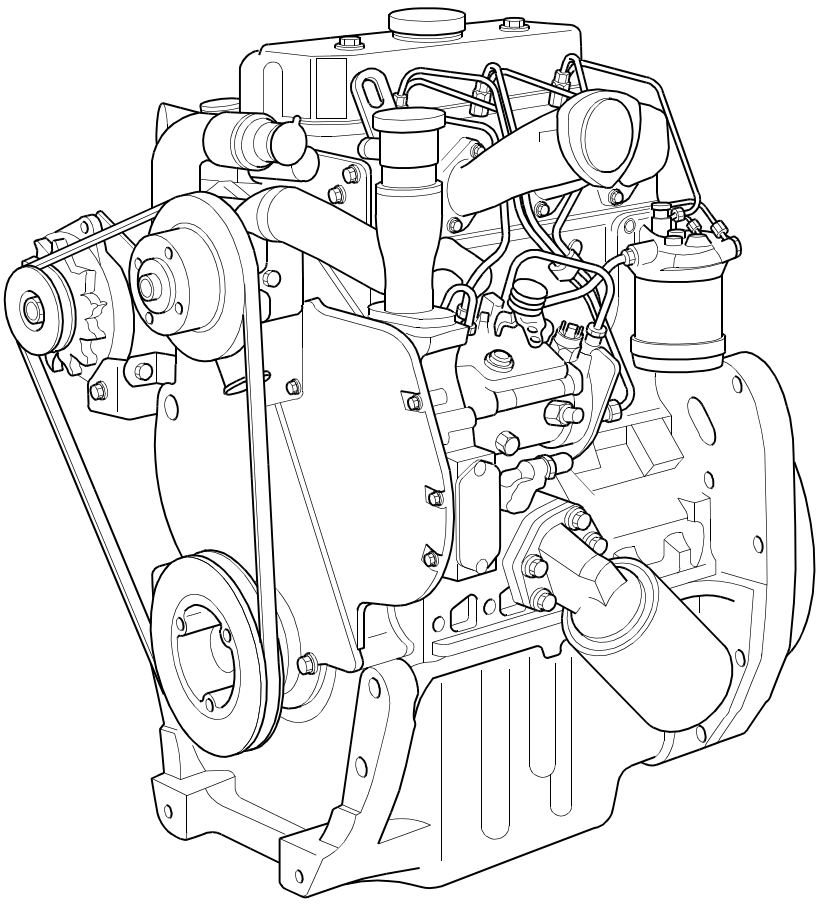

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Engine identification

The 900 Series is a 3 cylinder, water cooled, direct injection, diesel engine for industrial and agricultural applications. The complete engine family consists of both turbocharged and naturally aspirated models.

The engine number is stamped on a label (A2) fastened to the left side of the cylinder block.

The two letters at the beginning of the engine number are the code letters for the engine type.

Code letters	Engine type
CP	Three cylinder, naturally aspirated
CR	Three cylinder, turbocharged

An example of an engine number is:

CP12345U123456A

Further information about the engine number system can be found in the User's Handbook

If you need parts, service or information for your engine, you must give the complete engine number to your Perkins distributor. If there is a number in the area of the label marked TPL No, then this number must also be given to your Perkins distributor.

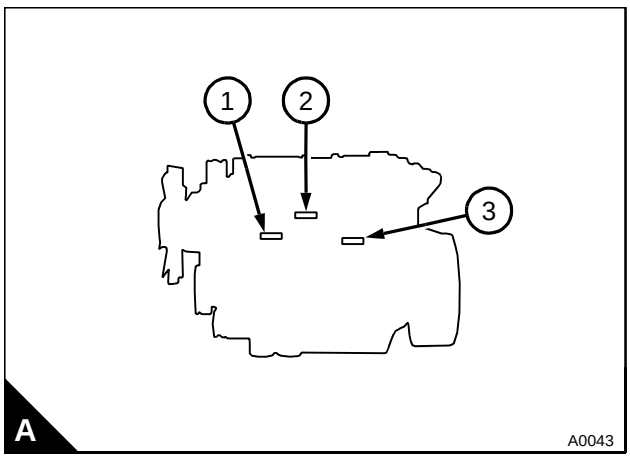
Other identification labels fitted to the engine include:

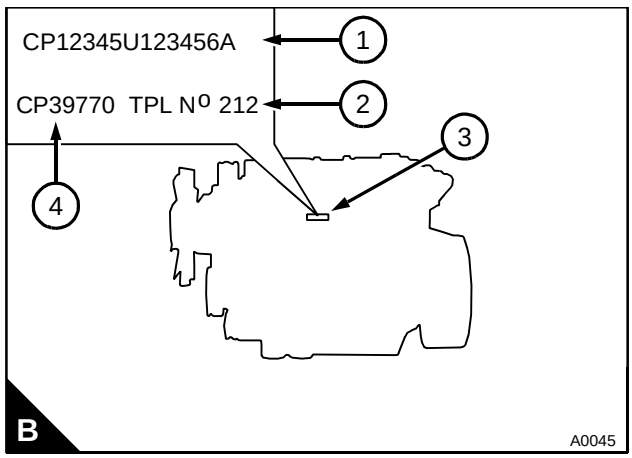
- An emissions legislation label (A3) fitted to the side of the cylinder block
- A label (A1), fitted to the fuel injection pump, with the fuel injection pump part number.

If a short engine has been fitted in service, two engine serial numbers and a TPL number are stamped on the engine serial number pad (B3).

Examples of the serial numbers are shown in (B).

If parts for the short engine are needed in service, use the serial number (B4). If parts that were moved from the original engine to the short engine are needed, use the serial number (B1) and the TPL number (B2).





Safety precautions

These safety precautions are important. You must refer also to the local regulations in the country of use. Some items only refer to specific applications.

- Do not fill the engine with lubricating oil above the mark on the dipstick (see Operation 10-1/B1) or damage could occur to the engine.
- If the lubrication system has been drained, the rocker gear and the camshaft reservoir must be lubricated before the engine is started or damage could occur to the engine.
- Only use these engines in the type of application for which they have been designed.
- Do not change the specification of the engine.
- Do not smoke when you put fuel in the tank.
- Clean away fuel which has been spilt. Material which has been contaminated by fuel must be moved to a safe place.
- Do not put fuel in the tank while the engine runs (unless it is absolutely necessary).
- Do not clean, add lubricating oil, or adjust the engine while it runs (unless you have had the correct training; even then extreme care must be used to prevent injury).
- Do not make adjustments that you do not understand.
- Ensure that the engine does not run in a location where it can cause a concentration of toxic emissions.
- Other persons must be kept at a safe distance while the engine or auxiliary equipment is in operation.
- Do not permit loose clothing or long hair near moving parts.

Warning! *Keep away from moving parts during engine operation.Some moving parts cannot be seen clearly while the engine runs.*

- Do not operate the engine if a safety guard has been removed.
- Do not remove the filler cap of the cooling system while the engine is hot and while the coolant is under pressure, because dangerous hot coolant can be discharged.
- Do not use salt water or any other coolant which can cause corrosion in the closed circuit of the cooling system.
- Do not allow sparks or fire near the batteries (especially when the batteries are on charge) because the gases from the electrolyte are highly flammable. The battery fluid is dangerous to the skin and especially to the eyes.
- Disconnect the battery terminals before a repair is made to the electrical system.
- Only one person must control the engine.
- Ensure that the engine is operated only from the control panel or from the operators position.
- If your skin comes into contact with high-pressure fuel, obtain medical assistance immediately.
- Diesel fuel and lubricating oil (especially used lubricating oil) can damage the skin of certain persons. Protect your hands with gloves or a special solution to protect the skin.
- Do not wear clothing which is contaminated by lubricating oil. Do not put material which is contaminated with oil into the pockets of clothing.
- Discard used lubricating oil in a safe place to prevent contamination.
- Ensure that the control lever of the transmission drive is in the "out-of-drive" position before the engine is started.
- Use extreme care if emergency repairs must be made in adverse conditions.
- The combustible material of some components of the engine (for example certain seals) can become extremely dangerous if it is burned. Never allow this burnt material to come into contact with the skin or with the eyes, refer to "Viton seals" on page 7.
- Read and use the instructions relevant to lift equipment, refer to "Engine lift equipment" on page 6.

Continued

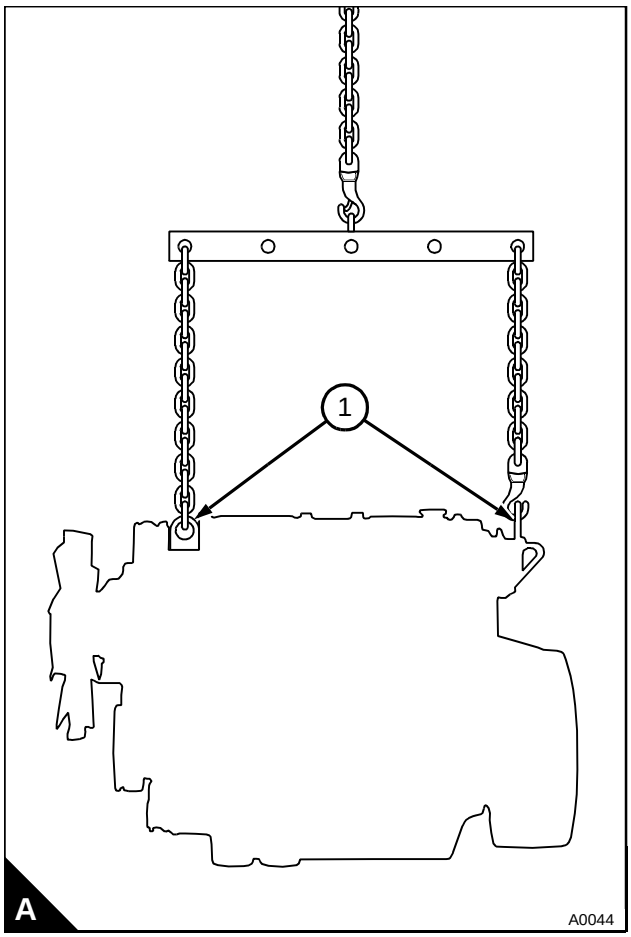
- Always use a safety cage to protect the operator when a component is to be pressure tested in a container of water. Fit safety wires to secure the plugs which seal the hose connections of a component which is to be pressure tested.
- Do not allow compressed air to contact your skin. If compressed air enters your skin, obtain medical help immediately
- Turbochargers operate at high speeds and at high temperatures. Keep fingers, tools and items away from the inlet and outlet ports of the turbocharger and prevent contact with hot surfaces.
- Do not clean an engine while it runs. If cold cleaning fluids are applied to a hot engine, certain components on the engine may be damaged.
- Fit only genuine Perkins parts.

Engine lift equipment

The maximum weight of the engine without coolant, lubricant or a gearbox fitted will vary for different applications. It is recommended that lift equipment of 313 Kg (690 lbs) minimum capacity is used.

Before the engine is lifted:

- Always use engine lift equipment of the approved type and of the correct capacity to lift the engine. It is recommended that lift equipment of the type shown in (A) is used to provide a vertical lift, directly above the engine lift brackets (A1). Never use a single lift bracket to raise an engine
- Check the engine lift brackets for damage and that they are secure before the engine is lifted. The torque for the setscrews for the engine lift brackets is 44 Nm (33 lbf ft) 4,5 kgf m
- To prevent damage to the rocker cover, ensure that there is clearance between the hooks and the rocker cover.
- Use lift equipment or obtain assistance to lift heavy engine components such as the cylinder block, cylinder head, flywheel housing, crankshaft and flywheel.



Viton seals

Some seals used in engines and in components fitted to engines are made of Viton. Viton is used by many manufacturers and is a safe material under normal conditions of operation. If Viton is burned, a product of this burnt material is an acid which is extremely dangerous. Never allow this burnt material to come into contact with the skin or with the eyes. If it is necessary to come into contact with components which have been burnt, ensure that the precautions which follow are used:

Warnings!

- *Ensure that the components have cooled.*
- *Use Neoprene gloves and discard the gloves safely after use.*
- *Wash the area with calcium hydroxide solution and then with clean water.*
- *Disposal of components and gloves which are contaminated must be in accordance with local regulations.*

If there is contamination of the skin or eyes, wash the affected area with a continuous supply of clean water or with calcium hydroxide solution for 15-60 minutes. **Obtain immediate medical attention**.

POWERPART recommended consumable products

Perkins have made available the products recommended below in order to assist in the correct operation, service and maintenance of your engine and your machine. The instructions for the use of each product are given on the outside of each container. These products are available from your Perkins distributor.

POWERPART Antifreeze

Protects the cooling system against frost and corrosion. Part number 21825166.

POWERPART Easy Flush

Cleans the cooling system. Part number 21825001.

POWERPART Gasket and flange sealant

To seal flat faces of components where no joint is used. Especially suitable for aluminium components. Part number 21820518.

POWERPART Gasket remover

An aerosol for the removal of sealants and adhesives. Part number 21820116.

POWERPART Griptite

To improve the grip of worn tools and fasteners. Part number 21820129.

POWERPART Hydraulic threadseal

To retain and seal pipe connections with fine threads. Especially suitable for hydraulic and pneumatic systems. Part number 21820121.

POWERPART Industrial grade super glue

Instant adhesive designed for metals, plastics and rubbers. Part number 21820125.

POWERPART Lay-Up 1

A diesel fuel additive for protection against corrosion. Part number 1772204.

POWERPART Lay-Up 2

Protects the inside of the engine and of other closed systems. Part number 1762811.

POWERPART Lay-Up 3

Protects outside metal parts. Part number 1734115.

POWERPART Metal repair putty

Designed for external repair of metal and plastic. Part number 21820126.

POWERPART Pipe sealant and sealant primer

To retain and seal pipe connections with coarse threads. Pressure systems can be used immediately. Part number 21820122.

POWERPART Radiator stop leak

For the repair of radiator leaks. Part number 21820127.

POWERPART Retainer (oil tolerant)

To retain components that have an interference fit, but is in contact with oil. Part number 21820603.

POWERPART Retainer (high strength)

To retain components which have an interference fit. Part number 21820638.

POWERPART Safety cleaner

General cleaner in an aerosol container. Part number 21820128.

Continued

POWERPART Silicone adhesive

An RTV silicone adhesive for application where low pressure tests occur before the adhesive sets. Used for sealing flange where oil resistance is needed and movement of the joint occurs. Part number 21826038.

POWERPART Silicone RTV sealing and jointing compound

Silicone rubber sealant which prevents leakage through gaps. Part number 1861108.

POWERPART Stud and bearing lock

To provide a heavy duty seal to components that have a light interference fit. Part number 21820119 or 21820120.

POWERPART Threadlock and nutlock

To retain small fasteners where easy removal is necessary. Part number 21820117 or 21820118.

POWERPART Universal jointing compound

Universal jointing compound which seals joints. Part number 1861117.

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