

SECTION D
THE COOLING SYSTEM
OF THE MORRIS MINOR (Series MM)

Description of the circulating system.

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|------------------------|---|
| Section No. D.1 | Removing the radiator filler cap. |
| Section No. D.2 | Draining the cooling system. |
| Section No. D.3 | Filling the cooling system. |
| Section No. D.4 | Removal and replacement of the radiator. |
| Section No. D.5 | Dynamo and fan belt adjustment. |
| Section No. D.6 | Radiator bottom hose. |
| Section No. D.7 | Removing the water pump. |
| Section No. D.8 | Dismantling the water pump. |
| Section No. D.9 | Locating the bottom water pipe. |

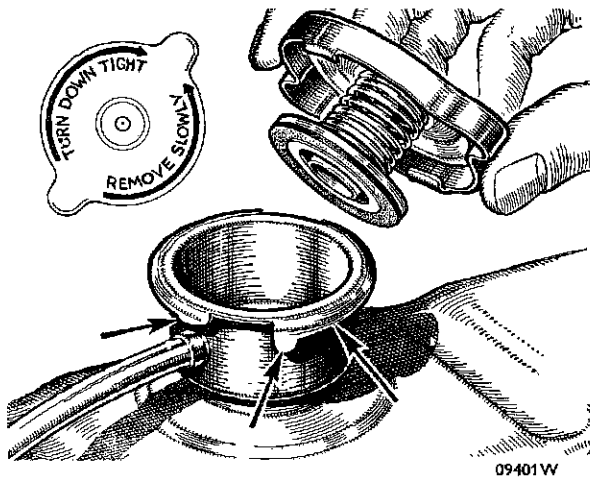


Fig. D.1

The filler cap of the pressurized cooling system, showing its retaining cam with safety lobe

GENERAL DESCRIPTION

The cooling system is of the pressurized thermosiphon type in which water circulates from the base of the radiator and passes around the cylinders and cylinder head, reaching the header tank of the radiator core via the top water hose. From the header tank it passes down the radiator core to the base tank of the radiator. Air is drawn through the radiator by a fan attached to the dynamo pulley, which is driven by a belt from the crankshaft.

Section D.1

REMOVING THE FILLER CAP

The cooling system is under considerable pressure while the engine is hot after a run, and the radiator filler cap must be removed very carefully or left in position until the water has cooled.

If it is necessary to remove the filler cap when the engine is hot it is absolutely essential to remove it gradually, and the filler spout is provided with a specially shaped cam to enable this to be done easily.

Unscrew the cap slowly till the retaining tongues are felt to engage the small lobes on the end of the filler spout cam, and wait until the pressure in the radiator is fully released before finally removing the cap.

It is definitely advisable to protect the hand against escaping steam while removing the cap when the system is hot.

Section D.2

DRAINING THE COOLING SYSTEM

Remove the radiator header tank filler cap.

Open the drain tap on the right-hand side of the base of the radiator.

NOTE.—If Bluecol or other anti-freeze mixture is being used it should be drained into a suitable container and carefully preserved for replacement.

Later models have a rubber extension on the radiator drain tap to facilitate this.

Section D.3

FILLING THE COOLING SYSTEM

Close the radiator drain tap.

Ensure that the water hose clips are tightened.

Fill up the system through the filler in the radiator header tank until the water is $\frac{1}{2}$ in. (12 mm.) below the top of the filler orifice.

When possible, rain-water should be used for filling the system.

Avoid overfilling when anti-freeze is in use to avoid unnecessary loss on expansion.

Screw the filler cap firmly into position.

The cooling system is unsuitable for use with anti-freeze mixtures having an alcohol base owing to the high temperatures attained in the top tank. Only anti-freeze mixtures of the ethylene glycol or glycerine type should be employed.

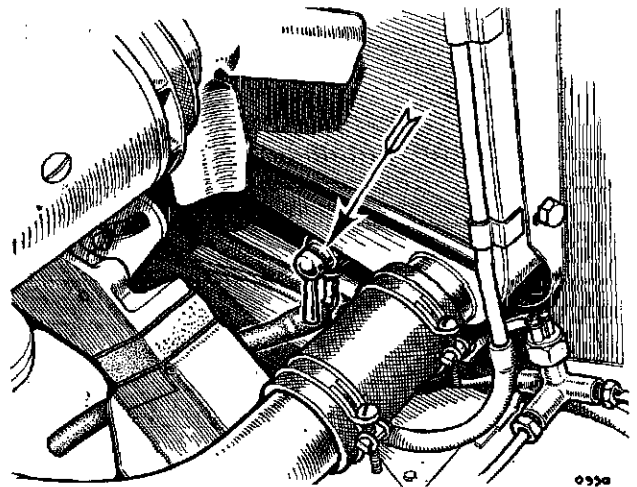


Fig. D.2

The location of the drain tap for the cooling system

Section D.4

REMOVAL AND REPLACEMENT OF THE RADIATOR

It is unnecessary to detach the radiator mask to remove the radiator core.

Drain the water from the radiator as in Section D.2.

Release the clips on the top and bottom water hoses and detach the hoses from their connections.

Remove the four $\frac{1}{4}$ in. bolts and spring washers securing the radiator assembly to the cowl and lift out the radiator.

The radiator core is replaced by a reversal of the above procedure.

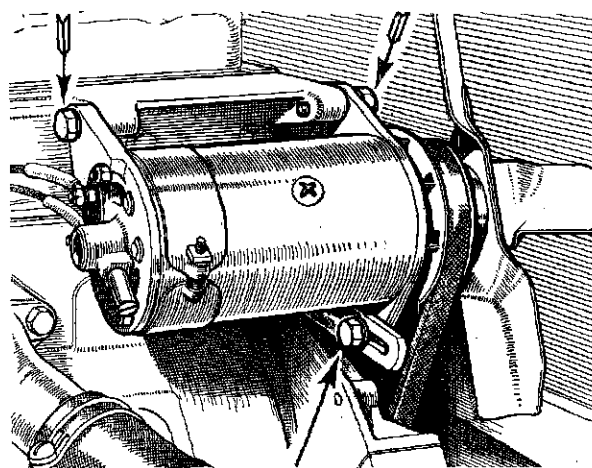


Fig. D.4

The two upper arrows indicate the pivot bolts of the dynamo mounting and the lower arrow the adjusting bolt

Section D.5

DYNAMO AND FAN BELT ADJUSTMENT

The adjustment of the dynamo and fan belt tension is effected by slackening off slightly the two bolts on which the dynamo pivots, releasing the bolt securing it to the slotted link, and raising the dynamo bodily until the belt tension is correct. Tighten up the three bolts with the dynamo in this position.

NOTE.—A gentle hand pull only must be exerted on the dynamo, otherwise the belt tension will be excessive and undue strain thrown on the dynamo bearings.

To check the tension for correctness rotate the fan blades. If the dynamo pulley slips inside the fan belt the tension is insufficient. When the tension is correct it should be possible to move the belt from side to side to the extent of 1 in. (2.5 cm.) at the centre of the belt run.

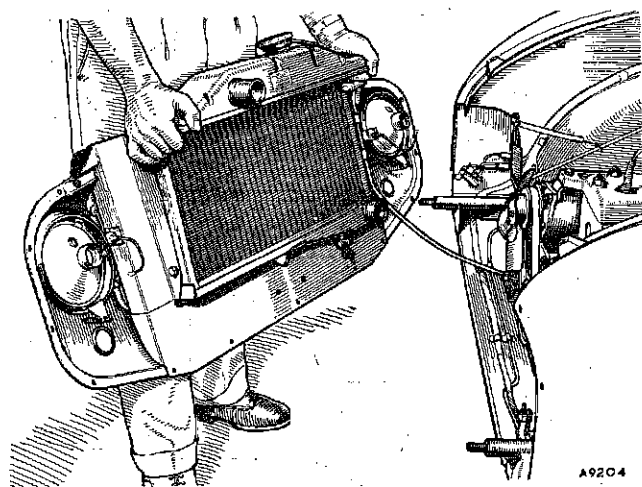


Fig. D.3

The radiator can be removed complete with its mask, as shown in this illustration, if desired

Section D.6

RADIATOR BOTTOM HOSE

A new one-piece radiator bottom hose (Part No. 139232) now replaces the connecting pipe and short hoses used on the earlier models.

This provides greater flexibility and reduces the number of joints.

Section D.7

REMOVING THE WATER PUMP

Morris Minor cars subsequent to Engine No. 77000 which are fitted with heater equipment are provided with a water pump of the impeller type which also carries the cooling fan. The water pump and fan assembly is attached to the front of the cylinder block by four studs and nuts.

To remove the water pump it is first necessary to drain the water from the cooling system by opening the tap at the base of the radiator and removing the filler cap, remembering to collect the water for re-use if it contains anti-freeze mixture, and then disconnect the battery lead from the negative terminal.

Slacken the attachment clips for the top radiator hose and remove the hose.

Release the hose clips from the radiator inlet at the base of the radiator and release the hose from the pipe.

Remove the radiator by unscrewing the two set bolts on each side which attach it to the cowl assembly and withdrawing it vertically.

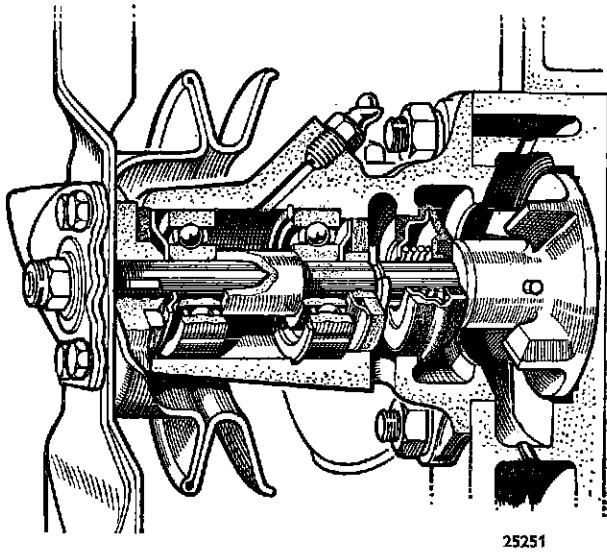


Fig. D.5

The water pump in section, showing the disposition of its components

Release the heater pipe from the pump after undoing the hose retaining clips.

Release the belt tension by slackening the three dynamo attachment bolts.

Unscrew the four nuts attaching the pump assembly to the front of the cylinder block and withdraw the fan and pump assembly from the studs.

Replacement of the fan and pump assembly is a reversal of this procedure, but care must be taken to see that the joint gasket between the pump body and the cylinder block is in good condition and not damaged in any way. It is always best to fit a new gasket.

Section D.8

DISMANTLING THE WATER PUMP

When the fan and water pump assembly have been removed from the engine, as indicated in Section D.7, the water pump may be dismantled for attention in the following way.

Unscrew the four set bolts which attach the fan and belt pulley to the hub and remove the fan and pulley.

Unscrew the self-locking nut from the end of the pump spindle and pull off the fan hub with a suitable extractor, taking care of the felt oil seal at the back of the hub.

Remove the Woodruff key from the spindle and remove any burrs from the keyway. Withdraw the dished oil seal washer.

D.4

Gently tap the pump spindle rearwards out of the pump body. This will release the spindle assembly with the sealing gland and impeller and also the flat dust cover for the rear bearing felt oil seal.

If it is necessary to withdraw the water seal for renewal the impeller should be released from the spindle by driving out the taper pin and pulling the impeller and water seal off the spindle.

Alternatively the circlip washer can be released from its groove in the spindle, but this is generally more difficult.

Should it be necessary to withdraw the ball races, the front one can be withdrawn without difficulty with an extractor or by tapping it out carefully from the rear with a suitable drift, after removing the rear felt oil seal, seal collar, and dished dust cover.

When the front bearing is removed it releases the distance tube between the bearings and gives access to the circlip retaining the rear bearing in the pump body. When this circlip is extracted it permits the withdrawal of the rear bearing from the front of the pump body. This circlip is, however, difficult to remove without damage and it should not be disturbed unless it is necessary to replace the rear bearing.

Reassembly is a reversal of the dismantling procedure, but care must be taken to see that both the water seal and its seating on the impeller are in good condition before proceeding. If these show signs of damage they should be replaced by new components, and it must be noted that the seating for the water seal on the water impeller is brazed in position and is part of the impeller.

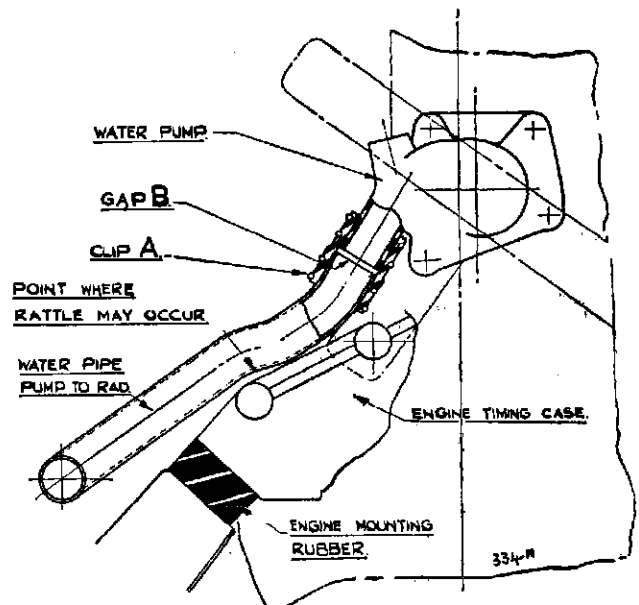


Fig. D.6

Illustrating the point where the bottom water pipe occasionally contacts the engine mounting foot

The seating is serviced as a separate item and can be renewed by turning off the old seating and brazing on a new one if desired.

It is also advisable to renew the felt oil-sealing washers for the ball races if these show signs of damage.

Section D.9

LOCATING THE BOTTOM WATER PIPE

In some cases complaints of noise on Morris Minor cars equipped with water pumps have indicated that

the cause is contact between the bottom water pipe and the engine front mounting foot.

When this is established as the cause the trouble can be corrected by releasing the lower clip (A in Fig. D.6) and moving the pipe upwards towards the pump body in order to close up the gap between the end of the pipe and the pump inlet.

In cases where sufficient clearance is not obtained before the gap (B in Fig. D.6) closes completely material may be removed from the top end of the water pipe to provide the required clearance.



SECTION DD

THE COOLING SYSTEM

OF THE MORRIS MINOR (Series II)

Description of the circulating system.

- Section No. DD.1 Removing the radiator filler cap.
- Section No. DD.2 Draining the cooling system.
- Section No. DD.3 Filling the cooling system.
- Section No. DD.4 Removal and replacement of the radiator.
- Section No. DD.5 Dynamo and fan belt adjustment.
- Section No. DD.6 Removing the water pump.
- Section No. DD.7 Dismantling the water pump.
- Section No. DD.8 Improved water pump.

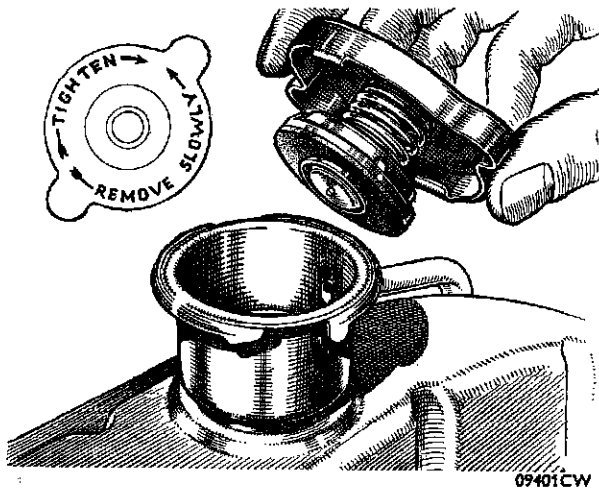


Fig. DD.1

The filler cap of the pressurized cooling system, showing its retaining cam with safety lobe

GENERAL DESCRIPTION

The cooling system is pressurized, and the water circulation is assisted by a pump attached to the front of the engine and driven by a belt from the crankshaft. The water circulates from the base of the radiator and passes around the cylinders and cylinder head, reaching the header tank of the radiator core via the thermostat and the top water hose. From the header tank it passes down the radiator core to the base tank of the radiator. Air is drawn through the radiator by a fan attached to the water pump pulley.

The thermostat opens at approximately 72° C. (162° F.) except in the case of a car fitted with a heater, which has a thermostat set to open between 80 and 85° C. (176 and 185° F.).

Section DD.1

REMOVING THE FILLER CAP

The cooling system is under appreciable pressure while the engine is hot after a run, and the radiator filler cap must be removed very carefully or left in position until the water has cooled.

If it is necessary to remove the filler cap when the engine is hot it is absolutely essential to remove it gradually, and the filler spout is provided with a specially shaped cam to enable this to be done easily.

Unscrew the cap slowly till the retaining tongues are felt to engage the small lobes on the end of the filler spout cam, and wait until the pressure in the radiator is fully released before finally removing the cap.

DD.2

It is definitely advisable to protect the hand against escaping steam while removing the cap when the system is hot.

Section DD.2

DRAINING THE COOLING SYSTEM

Remove the radiator header tank filler cap.

Open the two drain taps. One is fitted on the left-hand side of the base of the radiator and the other at the rear of the cylinder block on the left-hand side.

NOTE.—If Bluecol or other anti-freeze mixture is being used it should be drained into a suitable container and carefully preserved for replacement.

A rubber extension is provided on the radiator drain tap to facilitate this.

Section DD.3

FILLING THE COOLING SYSTEM

Close the radiator and cylinder drain taps.

Ensure that the water hose clips are tightened.

Fill up the system through the filler in the radiator header tank until the water is $\frac{1}{2}$ in. (12 mm.) below the top of the filler orifice.

When possible, rain-water should be used for filling the system.

Avoid overfilling when anti-freeze is in use to prevent unnecessary loss on expansion.

Screw the filler cap firmly into position.

The cooling system is unsuitable for use with anti-freeze mixtures having an alcohol base owing to the high

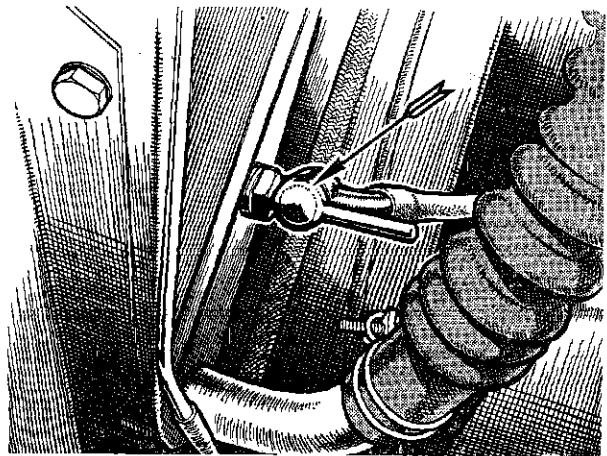


Fig. DD.2

The location of the drain tap on the radiator

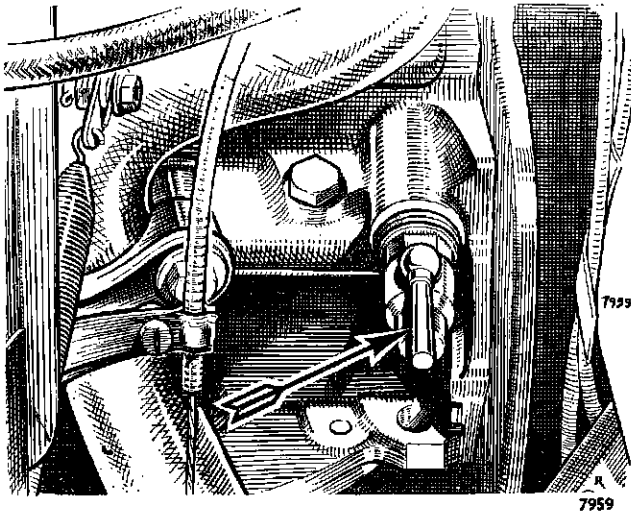


Fig. DD.3

The position of the drain tap on the cylinder block

temperatures attained in the top tank. Only anti-freeze mixtures of the ethylene or glycerine type should be employed.

Section DD.4

REMOVAL AND REPLACEMENT OF THE RADIATOR

It is unnecessary to detach the radiator mask to remove the radiator core.

Drain the water from the radiator as in Section DD.2.

Release the clips on the top and bottom water hoses and detach the hoses from their connections.

Remove the heater hose from its connection at the

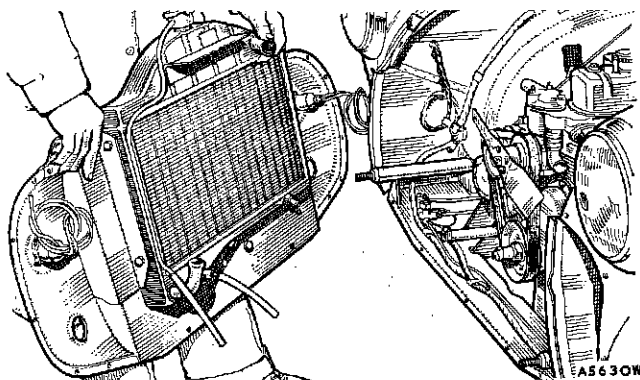


Fig. DD.4

The radiator can be removed complete with its mask, as shown in this illustration, if desired

bottom right-hand side of the radiator on cars fitted with heaters.

Remove the four $\frac{1}{4}$ in. bolts and spring washers securing the radiator assembly to the cowl and lift off the radiator.

The radiator core is replaced by a reversal of the above procedure.

Section DD.5

DYNAMO AND FAN BELT ADJUSTMENT

The adjustment of the dynamo and fan belt tension is effected by slackening off slightly the two bolts on which the dynamo pivots and releasing the bolt securing it to the slotted link and the nut securing the slotted link to the engine. This can be done most easily from

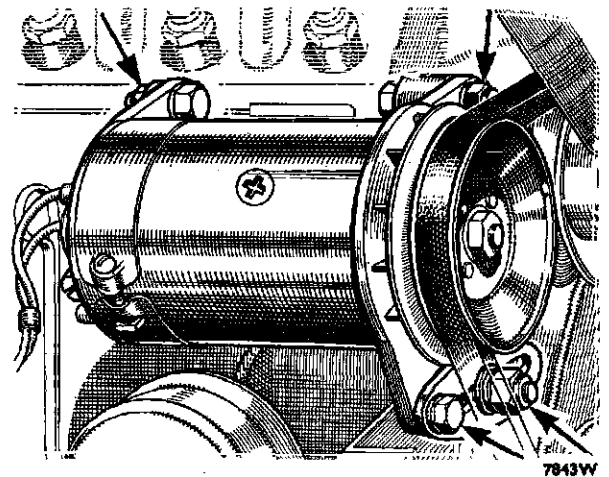


Fig. DD.5

The two upper arrows indicate the pivot bolts of the dynamo mounting and the lower arrows the adjusting bolts

beneath the car. Raise the dynamo bodily until the belt tension is correct. Tighten up the bolts with the dynamo in this position.

NOTE.—A gentle hand pull only must be exerted on the dynamo, otherwise the belt tension will be excessive and undue strain thrown on the dynamo bearings.

To check the tension for correctness rotate the fan blades. If the dynamo pulley slips inside the fan belt the tension is insufficient. When the tension is correct it should be possible to move the belt from side to side to the extent of 1 in. (2.5 cm.) at the centre of the longest belt run.

Section DD.6

REMOVING THE WATER PUMP

The water pump and fan assembly is attached to the front of the cylinder block by four studs and nuts.

To remove the water pump it is first necessary to drain the water from the cooling system by opening the two drain taps as described in Section DD.2, at the same time remembering to collect the water for re-use if it contains anti-freeze mixture. Then disconnect the battery lead from the negative terminal.

Unscrew the four nuts attaching the pump assembly to the front of the cylinder block and withdraw the fan and pump assembly from the studs, together with the thermostat by-pass hose.

Replacement of the fan and pump assembly is a reversal of this procedure, but care must be taken to see that the joint gasket between the pump body and the cylinder block is in good condition and not damaged in any way. It is always best to fit a new gasket.

Section DD.7

DISMANTLING THE WATER PUMP

When the fan and water pump assembly has been removed from the engine, as indicated in Section DD.6, the water pump may be dismantled for attention in the following way.

Unscrew the four set bolts which attach the fan and belt pulley to the hub and remove the fan and pulley.

Unscrew the nut and spring washer from the end of the pump spindle and pull off the fan hub with a suitable extractor.

Remove the Woodruff key from the spindle and remove any burrs from the keyway. Withdraw the dished oil seal washer after removing its circlip.

Gently tap the pump spindle rearwards out of the pump body. This will release the spindle assembly with the sealing gland and the vane.

The water seal consists of a hard moulded seal which has two lugs which fit in recesses in the spring-locating cup. This cup is spring-loaded against the vane and splined to it. Between the spring-locating cup and the hard seal is an additional rubber seal. Any of these components may be renewed without difficulty.

Should it be necessary to withdraw the ball races, the front one can be withdrawn with an extractor. When the front bearing is removed it releases the distance tube between the bearings and gives access to the rear bearing. When the rear bearing is extracted it permits the withdrawal of the felt washer along with its inner and outer retainers. The rear distance piece now remains in the pump body and may be removed if required.

Reassembly is a reversal of the dismantling procedure, but care must be taken to see that the seal assembly is in good condition before proceeding. If it shows signs of damage any defective parts should be replaced by new components.

It is also advisable to renew the felt oil-sealing washer for the rear ball race if it shows signs of damage.

Repack the bearings with grease to Ref. C (page PP.2).

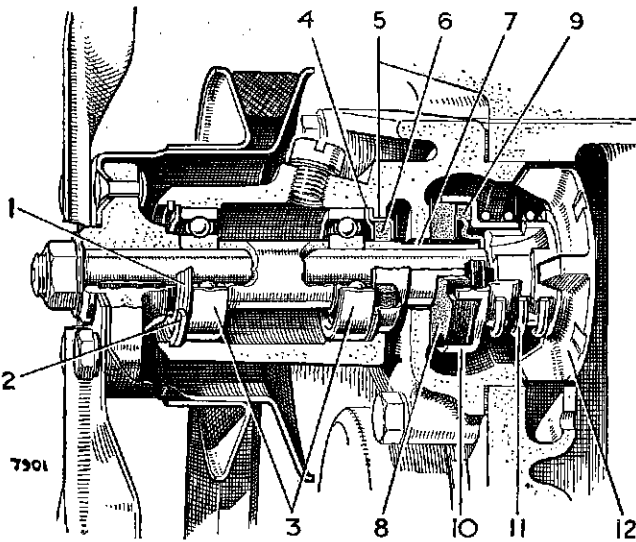


Fig. DD.6

The component parts of the water pump

- | | |
|-----------------------------|--------------------------|
| 1. Bearing grease retainer. | 7. Distance piece. |
| 2. Circlip. | 8. Seal. |
| 3. Bearing. | 9. Rubber seal. |
| 4. Outer felt retainer. | 10. Spring locating cup. |
| 5. Inner felt retainer. | 11. Water seal spring. |
| 6. Felt. | 12. Vane with spindle. |

Slacken the attachment clips for the top radiator hose and remove the hose.

Release the hose clips from the radiator inlet at the base of the radiator and release the hose from the pipe. If the car is fitted with a heater disconnect the heater outlet pipe from the bottom right-hand side of the radiator. Remove the radiator by unscrewing the two set bolts on each side which attach it to the cowl assembly and withdrawing it vertically.

Slacken the top clip on the thermostat by-pass hose.

Remove the dynamo attachment bolts and take off the dynamo.

Section DD.8

IMPROVED WATER PUMP

A water pump of improved design with a modified seal was introduced at Engine No. 72610. Commencing

at the same engine number, a new wedge-type fan belt was also introduced and the pulleys were modified to suit.

The new fan belt and pulleys are only interchangeable with the components on the earlier engines in sets.



SECTION DDD
THE COOLING SYSTEM
OF THE MORRIS MINOR 1000

- Section No. DDD.1 Removing and dismantling the water pump.
- Section No. DDD.2 Modified fan hub.

Section DDD.1

REMOVING AND DISMANTLING THE WATER PUMP

Remove the radiator as detailed in Section DD.4.

Slacken the top clip of the thermostat by-pass hose.

Remove the dynamo attachment bolts and take off the dynamo.

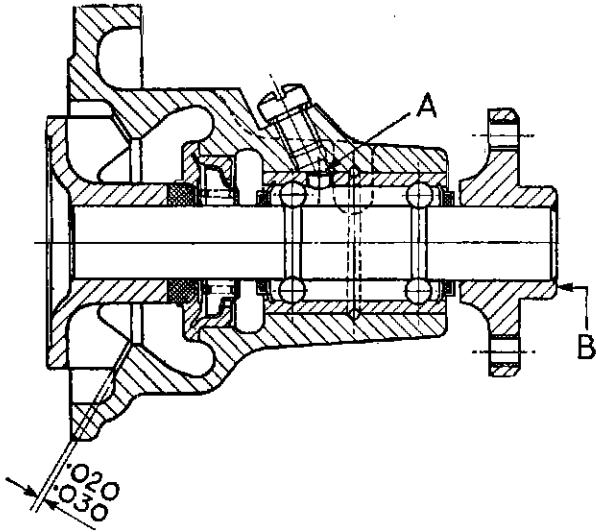


Fig. DDD.1

A section through the water pump showing the location of the components. When assembled, the hole in the bearing must coincide with the lubricating hole in the water pump (A) and the face of the hub (B) must be flush with the end of the spindle

Unscrew the four bolts attaching the pump assembly to the front of the cylinder block and remove the fan and pump assembly together with the thermostat by-pass hose.

Replacement of the fan and pump assembly is a reversal of this procedure.

Dismantling

Unscrew the four set bolts which attach the fan and belt pulley to the hub and remove the fan and pulley.

Remove the fan hub with a suitable extractor.

Pull out the bearing locating wire through the hole in the top of the pump body.

Gently tap the pump bearing assembly rearwards out of the pump body. This will release the combined bearing and spindle assembly together with the seal and vane.

Remove the vane from the bearing assembly with a suitable extractor and remove the pump seal assembly.

Reassembly is a reversal of the dismantling procedure, but care must be taken to see that the seal assembly is in good condition. If there is any sign of damage the seal should be replaced by a new component. When the bearing assembly is assembled into the pump the hole in the bearing must coincide with the lubricating hole in the water pump body.

Section DDD.2

MODIFIED FAN HUB

Commencing at Car Nos. 9M-U-H93701 and 9M-U-L88392, if the fan hub is removed from the spindle it must now be replaced by a new one as there is an increased interference fit in the hub.