COOLING SYSTEMS

CHAPTER R1

CONTENTS

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DESCRIPTION

The Serck-Behr hydrostatic fan control system (Fig. 1) is governed by the fan thermostat controller which is sensitive to the engine coolant temperature. The thermostatically controlled axial flow fan maintains the coolant temperature constant irrespective of variations in ambient air temperature and engine load. The fan controller also automatically governs the fan speed infinitely between standstill and maximum speed by the by-pass regulation of the oil.

The system is also fitted with fully automatic controlled radiator shutters, these are actuated by a control cylinder operated by oil pressure taken from the main pressure line.

The hydraulic oil tank houses a magnetic filter or filters.

The various units which make up the system require no lubrication, since all moving parts are surrounded by oil at all times, it is only necessary to check the oil level in the hydraulic oil tank.

OPERATION

Assuming the engine is starting up from cold, the positive displacement hydraulic Plessey pump (1) (Fig. 1), which is mounted on and directly driven by the engine, draws hydraulic oil from the tank (2) and delivers it to the fan thermostat controller (3). The controller sensitive to the engine coolant temperature, governs the speed of the fan motor by by-pass regulation of the hydraulic oil.

The coolant water for the engine flows round the fan thermostat controller element (Fig. 2) containing a wax-like substance, but due to the coolant being below a predetermined temperature, has no effect on its operation. The hydraulic oil, due to the controller element being in this position, flows through the open by-pass back to the tank.

As the coolant temperature rises, and reaches the predetermined temperature, the thermostat element in the fan controller (Fig. 3) expands and causes the actuating rod to move, which in turn causes axial movement of the spring-loaded oil valve plunger. This movement restricts the cross-sectional area of the by-pass, and by doing so, the amount of oil being by-passed, is reduced, and oil is allowed to flow to the axial motor (4) on which the fan is mounted, which then starts to rotate. The axial fan motor is of the constant displacement type.

The oil after passing through the fan controller and motor, flows back to the oil tank via the fan controller. The speed of the fan motor increases until there is sufficient cooling to maintain the coolant at the predetermined temperature. As the load on the engine is increased, so the fan runs at a correspondingly greater speed, always controlling the coolant at the desired temperature.

The amount of oil flowing to the fan motor is proportional to the rise in temperature of the coolant. In this manner the speed of the fan motor is regulated so that only the necessary amount of air is passed through to maintain the required coolant temperature in the engine. In the pipe carrying the hydraulic oil to the fan motor, a pressure builds up to a value approximately proportional to the required fan performance.

To protect the fan motor against sudden undesirable

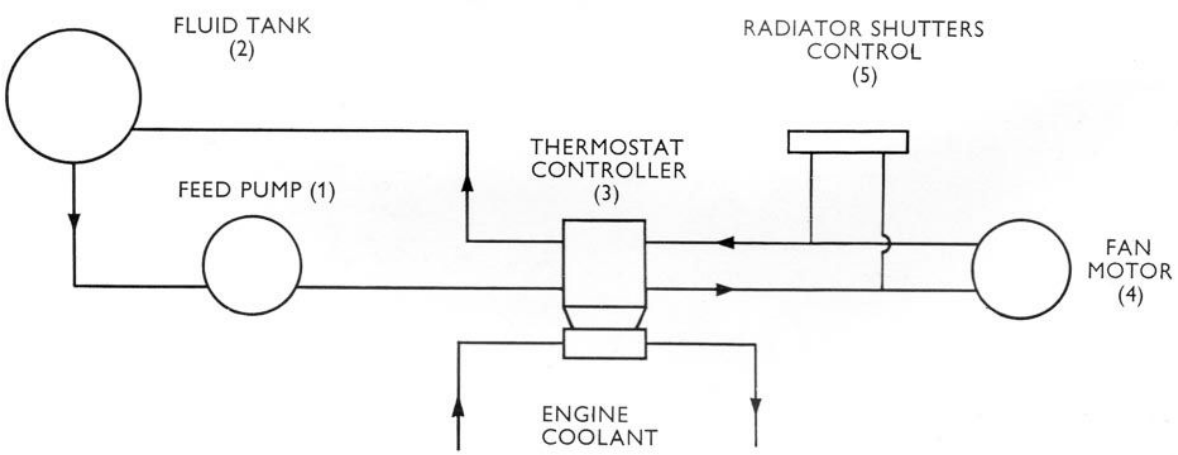

FIG. 1. SERCK-BEHR HYDROSTATIC SYSTEM

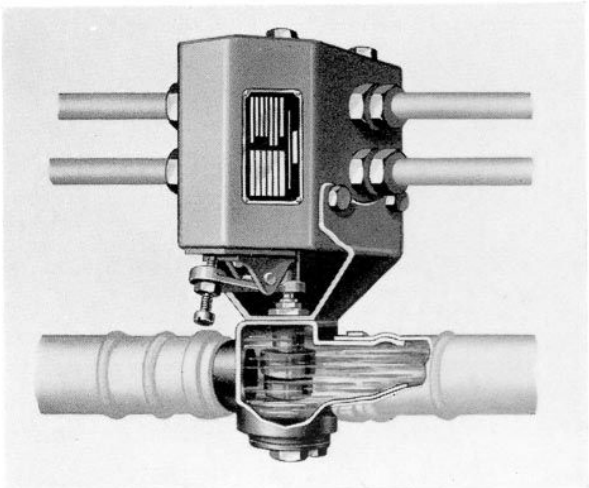

FIG. 2. THERMOSTAT CONTROLLER

high pressures, the fan controller incorporates a pressure relief valve through which the oil can pass to the return pipe, and so into the oil tank. This valve comes into action if the fan is for some reason mechanically prevented from rotating, or if excessive pressures should build up during rapid acceleration of the feed pump. The pressure relief valve also protects the fan pump, and the entire circuit against overloading. The fan thermostat controller is also fitted with an adjusting screw, which enables the correct functioning of the system to be checked even if the fan is stationary due to low coolant temperatures.

Still higher efficiency is obtained by the fitting of automatic shutters to the radiator. The shutter blades are actuated by a control cylinder (5) operated by oil taken from the main pressure line in the system, between the thermostat controller and the fan motor.

When the fan motor starts to rotate the shutter blades will be opened by the slowly increasing oil pressure in the control cylinder. Until the fan motor begins to rotate, and starts delivering air, the shutters remain completely closed so that the engine will quickly reach its optimum working temperature. When the fan is rotating at speed the shutters will automatically move to the fully open position. Correspondingly, the shutters are closed again when the fan motor stops rotating. The shutters close when no cooling is required to prevent frost damage to the radiator equipment and over cooling.

TESTING OF SYSTEM AFTER INSTALLATION

After complete installation of the system, the following operation must be carried out before service:

1. Remove the hydraulic oil tank filler cap and open the high level cock.

2. Fill the tank with clean, filtered oil of the grade specified on the tank, to the level of the high level cock.

3. Close the high level cock and replace the filler cap.

4. Start up the engine, and run the Plessey pump at its normal working speed. Release the locking nut on the thermostat controller over-ride-screw, and using a screw driver, screw this in until the fan is rotating slowly. There is some lost motion on the screw and this must be taken up before rotation of the fan will commence. Leave in this state for five minutes.

5. Fully screw out the controller over-ride-screw, and top up the tank with oil as in (1) and (2).

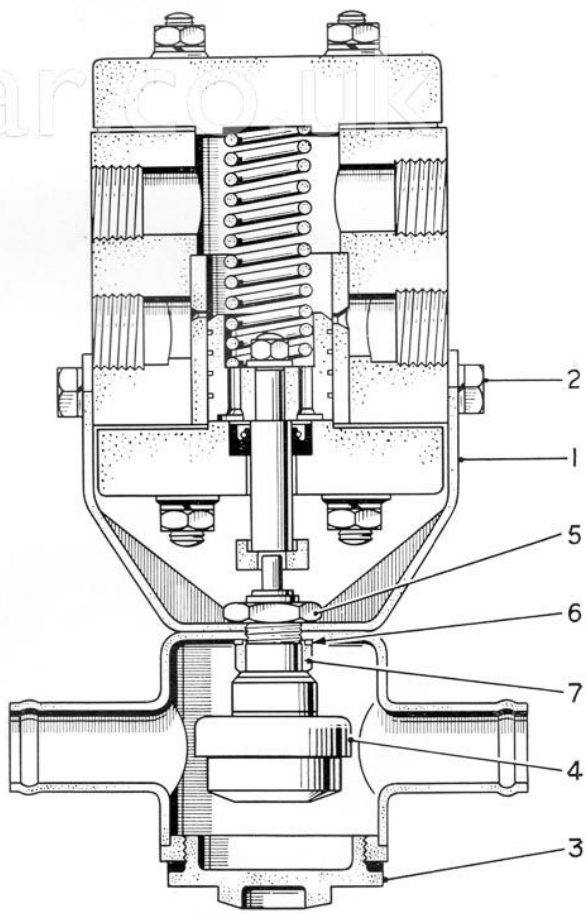

FIG. 3. SECTION THROUGH THERMOSTAT CONTROLLER

6. Again screw in the controller over-ride-screw to an amount which will cause the fan to rotate at full speed. Leave in this state for 30 minutes.

   Meanwhile, examine the system for leaks and if necessary tighten joints.

7. Fully screw out the controller over-ride-screw and lock by means of the locking nut in this position.

8. Shut down engine.

9. Remove, clean and refit the magnetic filter in the hydraulic oil tank (see **Hydraulic Oil Tank**).

HYDRAULIC OIL TANK

The hydraulic oil tank (Fig. 4) which houses a magnetic filter is approximately at the same level in the system as the Plessey pump inlet.

A name plate on the tank specifies the recommended grade of oil to use.

After testing the complete system after installation the magnetic filter should be removed from the tank and cleaned as follows:

1. Unscrew the nuts securing the magnetic filter to the tank.

2. Remove filter from tank.

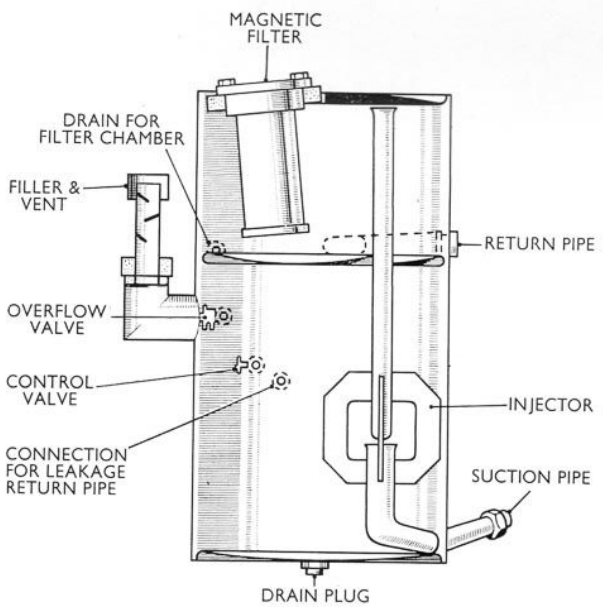

FIG. 4. HYDRAULIC OIL TANK

3. Clamp filter flange lightly in a vice.

4. Unscrew the filter cage by hand, gripping the knurled nut at the base of the cage or if necessary using a $\frac{5}{16}$ in. (7.93 mm.) diameter tommy bar in the holes provided in the nut.

5. Withdraw the cage from the central bar magnet.

6. Wash the cage in clean paraffin and wipe the bar magnet with a clean cloth to remove any particles adhering to it.

7. Reassemble the cage into the bar magnet and screw down.

8. Refit the filter to the tank.

   Note: Care must be taken that the bar magnet does not come in contact with ferrous metal, as this would reduce its effectiveness.

Remove, clean and refit the magnetic filter two weeks after going into service, and thereafter at every change of oil. This must be done with the engine stopped.

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TO DRAIN AND FILL HYDRAULIC OIL TANK

To Drain

Place a suitable container in position and drain the oil from the system by removing the drain plug from the bottom of the tank. Replace the plug after draining.

To Fill

1. Remove the oil tank filler cap and open the high level cock.

2. Fill the tank with clean, filtered oil of the grade specified on the tank, to the level of the high level cock.

3. Close the high level cock and replace the filler cap.

THERMOSTAT CONTROLLER

The control temperature of the element in the thermostat controller (Figs. 2 and 3) is preset, but the sensitive elements can be changed if necessary without altering the valves or actuating mechanisms.

Wherever possible operators are strongly advised to return the controller to Serck Radiators Limited for replacement of the thermostat element.

To Remove Thermostat Element

1. Screw the over-ride-screw fully in.
2. Detach the thermostatic carrier (1) from controller by removing four setscrews (2).
3. Unlock and remove cap (3).
4. Hold thermostat element (4) and remove lock nut (5) (on some models there may be two lock nuts).
5. On the neck of the element are a copper sealing washer (6), a collar (7), and one or more spacing rings. These rings can be used to adjust the operating temperature by a small amount.

   The rings are 1 mm. thick, removal of one ring lowering the operating temperature by 1 deg. C. and vice-versa.

To Assemble

1. Replace spacing rings, collar and sealing washer on the element and fit into carrier.
2. Hold element, without damaging it, and fit lock-nut(s) (5).
3. Replace cap and washer and wire lock.
4. Replace carrier on controller body.
5. Unscrew over-ride-screw fully, and tighten lock nut.

FAN MOTOR

Every six months during the course of the life of the equipment, a leakage test should be applied to measure possible wear of the fan motor (Fig. 5), the procedure being as follows:

1. Insert a two-way cock in the leakage return line from the motor. Fit a pressure gauge at the motor inlet, and a thermometer in the oil tank.

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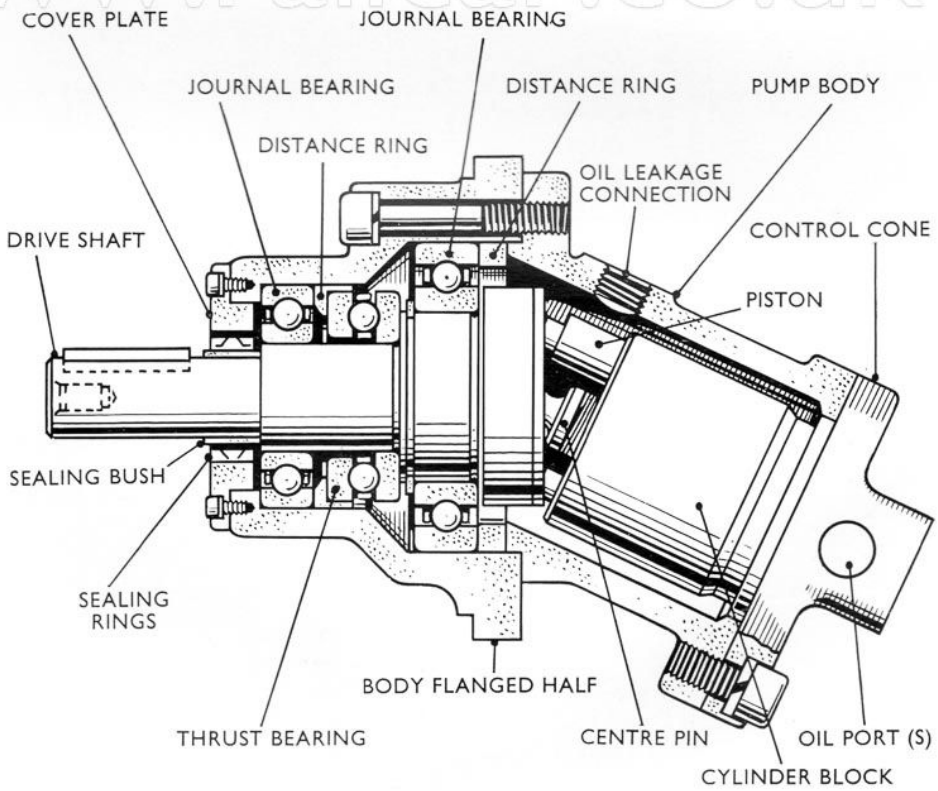

FIG. 5. SECTION THROUGH FAN MOTOR

2. Run the set under manual control until the oil temperature reaches 122 deg. F. (50 deg. C.). Then set motor inlet pressure at 1,425 p.s.i. (97 atmospheres).

3. Turn the cock in motor leakage return line and measure leakage flow in one minute. Turn cock back to normal flow.

4. Check level of oil in tank and top up if necessary.

5. To obtain the maximum leakage allowed, multiply figure shown in Table 1 below by factor F for the oil being used, obtained from Table 2.

If the leakage exceeds the permitted maximum value, the fan motor must be returned to Serck Radiators Limited or an accredited agent.

LUBRICATION

A small leakage of oil is arranged so that the bearings in the fan motor are self lubricating, this leakage is returned to the oil tank.

MAINTENANCE

The only permissible maintenance to be carried out on the fan motor by operators is changing of the oil seals together with fitting a new bush to the shaft. This can be done without dismantling the motor, by removing the cover plate or in the case of the 5/12 motor, removal of the circlip which will allow the unit to be dismantled sufficiently to change the oil seal.

TABLE 1

Size of Unit	Max. Leakage	
	Litres	Galls.
12	1.0	.22
16	1.8	.40
20	2.4	.53
25	4.5	.99
32	6.5	1.43
40	12.5	2.75
50	18.0	3.96

TABLE 2

Oil Grade	Factor F
Teresso 52	1.0
S.A.E. 10W	1.76
S.A.E. 20W	1.01
S.A.E. 30W	0.61
Shell Talpa 10W	1.76
20W	0.94
20	0.9
30	0.61
Turbo 29	1.35
Tellus 29	1.5
R.14	1.0

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FIXED BLOCK RADIATOR

DESCRIPTION

The radiator comprises of a non-ferrous streamline secondary surface cooling block bolted to cast water headers. An axial flow fan is mounted at the rear of the cooling block.

OPERATIONAL NOTES

Water System

As aerated water promotes corrosion, keep air out of the system by paying attention to the condition and security of pump glands and pipe connections, and by bleeding air at regular intervals from the system by the points provided.

Since the system is an open one, avoid if possible, the use of 'hard' water, as this will deposit lime in the hotter parts of the engine water jackets and in restricted water passages, causing cracks in the former and interfering with circulation in the radiator.

Chemically treated water will provide full insurance against scale formation or corrosion, but distilled water should be quite reliable. D.M. solution, manufactured by Houseman & Thompson Ltd., of Newcastle upon Tyne, is an effective corrosion inhibitor and scale preventative. A blend of organic compounds, it serves to soften scale and, by absorbing oxygen, diminishes corrosion. Before using it in an old system, it is advisable to clean out the system, including the radiator, using an acid base solvent, such as inhibited hydrochloric acid (a 4 per cent solution in fresh water) or a suitable proprietary scale solvent. This is circulated throughout the system until all the scale is dissolved. The solvent may be heated to accelerate the process, to a temperature not exceeding 120 deg. F. (49 deg. C.). After descaling, thoroughly wash out the system using a hot solution of fresh water and 5 per cent washing soda, and finally with hot fresh water.

Note: The engine should not be run during descaling; all rubber joints or glands coming into contact with the acid should be renewed.

Refill the system using soft water if possible and to each 25 gallons (113.5 litres) of water add ½ pint (.57 litres) of D.M concentrate. The concentrate should be introduced into the system, preferably when the engine is running and the water is hot.

Since the inhibitor will remove scale and rust from various parts of the cooling system, it is advisable to drain and thoroughly flush out every six months with clean water after introducing the inhibitor. The system should then be refilled with water, and then treat with D.M. concentrate.

Other inhibitors, such as potassium chromate and bichromatic (dichromate) and sodium bichromate (or mixtures of them), sodium nitrate and benzoate and oil emulsions are available for water treatment. The manufacturers instructions should be closely followed.

Performance

Water temperature fall and pressure loss across the radiator are indicators of its performance. If the water temperature at the radiator outlet increases gradually, it is likely that the radiator tubes are becoming fouled by internal deposits; heavy fouling of the fins on the outside will have a similar effect. In either case, cleaning is necessary to restore the performance.

CLEANING

Air Side

In a dusty place and particularly where oil fumes contaminate the atmosphere, it is possible for the cooling block to become very dirty. A jet of low pressure steam will remove most deposits, but in particularly stubborn cases, it is advisable to wash or hose down the element using any reliable detergent, such as Teepol, in hot water. The fins are of pure copper and therefore, fragile, so care should be exercised during cleaning to avoid any damage.

Water Side

Very little guidance is necessary since this side should not normally become fouled. If leaky joints have necessitated constant topping up over a long period, however, it is possible for the system to be badly clogged with hardness scale. In this case it is advisable to descale the entire water system, including the radiator, as outlined under **Water System.** It is, however, possible to descale the radiator only, as follows:

1. Drain the water system by removing the drain plug in one of the headers of the radiator and at the same time opening the air vent plug.

2. Disconnect and blank off the water pipe connections to the engine.

3. Replace the drain plug.

4. Prepare a 4 per cent solution of inhibited hydrochloric acid and fresh water, more than sufficient to fill the radiator. Add the acid to the water, never vice-versa.

   Note: To inhibit concentrated hydrochloric acid, add "Hibitite" supplied by Monsanto Chemicals, at a proportion of 0.1 per cent.

5. Allow a few minutes for mixing, then heat the solution to 120 deg. F. (49 deg. C.) by means of a steam, gas or electric coil.

6. Run the solution slowly into the radiator. Effervescence will occur; when it ceases, fill the radiator completely with the acid solution.

7. Drain the solvent back into the mixing container through the drain plug on the header.

8. Examine the interior of the element as far as possible. If scale remains, increase the solvent to 8 per cent, then repeat as above. Finally drain solvent to waste.

   Note: If it is not convenient to heat the acid solution in the mixing container, it may be heated when in the radiator by injecting steam into the drain boss on the bottom header. The steam, at pressures not exceeding 10 p.s.i. (.703 kg.s.cm.), should be injected until the acid solution reaches 120 deg. F. (49 deg. C.).

9. Fill the mixing container with fresh water and heat to boiling point. Add soda crystals at a strength of 1 lb. (.454 kg.) soda to 5 gallons (22.7 litres) of water. Fill the radiator with this solution then drain it back into the container.

10. Flush through in this manner several times, finally leaving the radiator quite full for at least an hour. then drain to waste and wash out the radiator with clean hot water.

11. Before putting the radiator into service again, fill with water and apply a pressure of 40 p.s.i. (2.81 kg.s.cm.), then examine closely for any leaks which may have been revealed by descaling.

SERCK TECHNICAL ADVISORY SERVICE

For assistance with any problem in connection with a Serck radiator contact the Serck Technical Advisory Service, quoting the serial number on the nameplate. There is an extensive Service Department at Warwick Road, Birmingham, equipped to carry out repairs, cleaning or complete renovation of Serck heat transfer products.

MOUNTINGS

Maintenance

Inspect the radiator mountings for loose nuts etc., every 10,000 miles (16,000 kilometres).

ERMETO COUPLINGS

Ermeto couplings are fitted to ends of pipes by the following process (see Fig. 6).

1. Cut end of tube square to its axis, file cut face flat and remove burrs from inside and outside tube.

2. Lubricate all parts with oil.

3. Slide nut and Ermeto ring over end of tube with the collar end of the ring facing towards the nut and the thin end of the ring towards the cone of the coupling body.

4. Grip the coupling body in a vice and insert the tube into the body, ensuring that the tube end butts firmly on the step at the base of the cone.

5. Position the ring in the cone, engage the nut and screw up to hard tightness.

6. Screw up nut strongly with a spanner; the nut should be given 2 to 2½ full turns after hand tightness.

7. Dismantle the coupling and clean tube.

8. Remake the joint on site by inserting the tube into the body, engaging the nut and tightening strongly, using two spanners, one on the body and the other on the nut.

Cleaning of Steel Pipes

After all cutting, bending, fitting of couplings, etc., has been completed:

1. Remove all burrs and swarf.
2. Degrease.
3. Rinse in water.
4. Pickle in 15 per cent hydrochloric acid solution.
5. Neutralize in sodium carbonate solution.
6. Rinse in water.
7. Bonderize or equivalent.
8. Rinse in water.
9. Dry with warm air.
10. Flush with hydraulic oil.
11. If not fitted into circuit immediately, seal ends with adhesive tape.

MAINTENANCE

It is absolutely essential that care be taken to maintain all items scrupulously clean throughout. The ingress of any foreign matter will impair the efficiency and life of the equipment.

Oil Level in Tank

Inspect the oil level in the tank weekly, and top up to the level of the high level cock if necessary. If the oil level is appreciably down, inspect the system for leaks and tighten couplings, etc., if required.

Change of Oil

The hydraulic oil should be changed every 30,000 miles (48,000 kilometres).

After changing the oil the following operation should be carried out before service.

1. Start up engine, and run the Plessey pump at its normal working speed. Release the locking nut on the thermostat controller over-ride-screw, and using a screw driver, screw this in until the fan is rotating slowly. There is some lost motion on the screw and this must be taken up before rotation of the fan will commence. Leave in this state for five minutes.
2. Fully screw out the controller over-ride-screw, and top up the tank with oil to the high level cock.

Magnetic Filters

Remove, clean and refit the magnetic filter two weeks after going into service, and thereafter at every change of oil. This must be done with the engine stopped.

Flexible Hoses

Replace all flexible hoses every two years, ensure replacements are of the right type and size.

Service Checks

If the system appears to be operating incorrectly the following procedure should be adopted:

1. Check oil level in tank, if down, check for leaks.
2. Start up engine, and run the Plessey pump at its normal working speed.

   (a) Release the locking nut on the thermostat controller over-ride-screw, and using a screw driver, screw this in until the fan is running at its rated speed.

   (b) Check if the radiator shutters are open.

   (c) If the fan does not rotate check that the pump spindle is turning.

   (d) Check for rotation, if incorrect check pipework, reversal of fan motor connections reverses rotation.

If the mechanical side of the system is satisfactory then check thermostat element:

3. To check thermostat element.

   (a) Start up engine, and run the Plessey pump at its normal working speed.

   (b) Allow temperature of oil to increase to that rated on the thermostat controller.

   (c) Fan motor should now rotate.

Radiator Mounting

Inspect the radiator mounting for loose nuts, etc., every 10,000 (16,000 kilometres).

WATER LEVEL

Daily

Check that the water header tank is full to ensure a constant supply of water to the cooling system, top up if necessary.

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RADIATOR, FAN AND FAN DRIVE

DATA

Controlled by	Thermostat—opens at 185°F. (85°C.).
Type	Withnell flat tube.

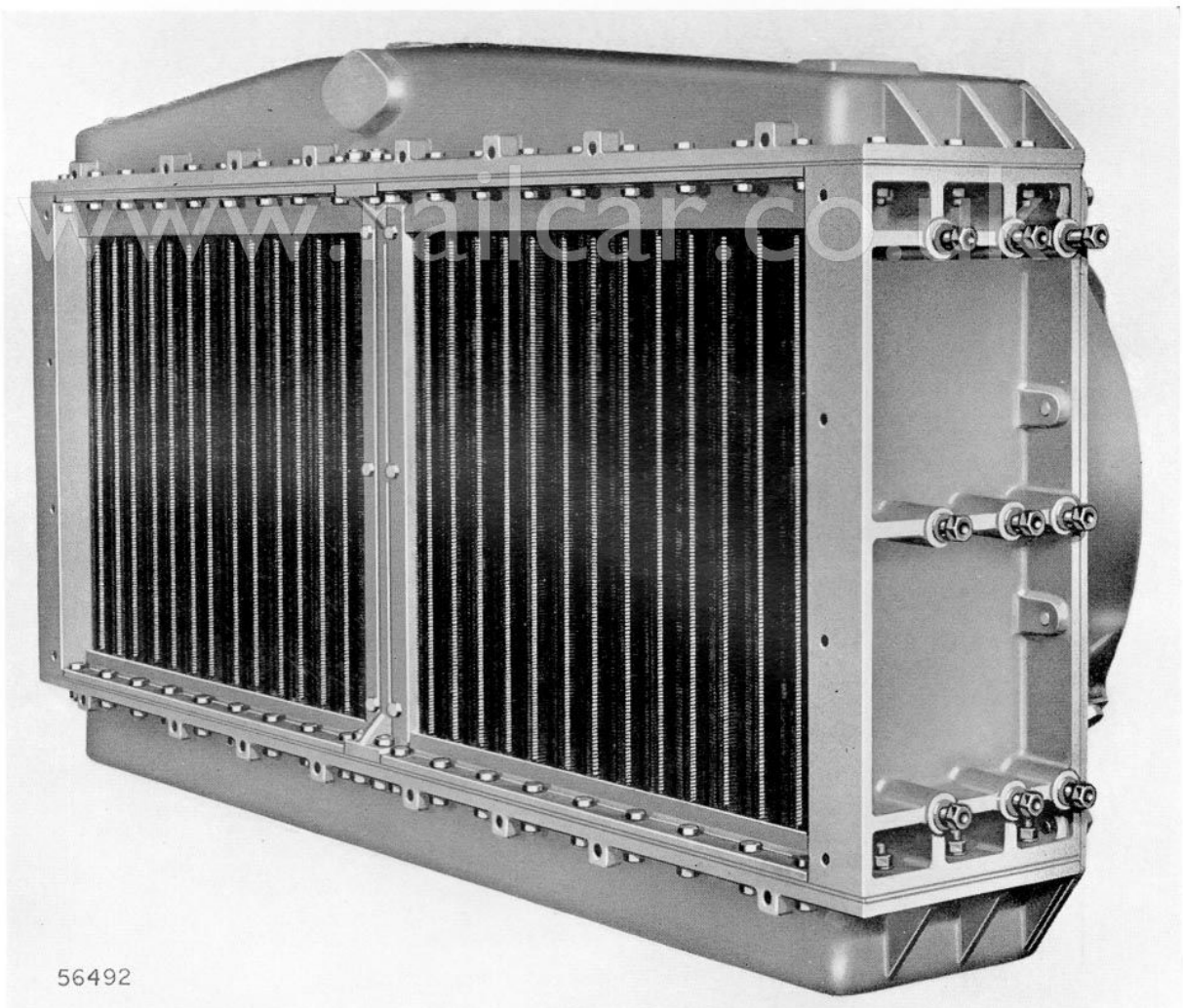

FIG. 6. FRONT VIEW OF RADIATOR

DESCRIPTION

The radiator is flexibly suspended from two brackets attached to the side standards. The main components are twin Withnell flat tube cooling stands coupled together with single cast-iron top and bottom water tanks, and two side standards (Fig. 6). Both top and bottom tanks and side standards can be removed without disturbing the cooling tubes.

The radiator is filled through a pipe connected to the header tank. An overflow pipe connection is fitted to the top tank.

Attached to the radiators by studs and nuts are twin fan cowls which enclose six bladed fans (Fig. 7).

On the radiators, twin thermostats are fitted in the water inlet pipe flange which enable the engine to reach the correct running temperature in the shortest possible time. The thermostats seal the inlet to the radiator while the water is cold, but allows it to circulate through the engine until the water temperature rises to 185 deg. F. (85 deg. C.), when the thermostat is fully open and brings the radiator into full operation.

A drain cock is provided to enable the water to be completely drained when required.

MAINTENANCE

Radiator Mountings

Inspect the radiator mounting for loose nuts etc., every 10,000 miles (16,000 kilometres).

DAILY

Check that the radiator or water header tank is full to ensure a constant supply of water to the cooling system, top up if necessary.

WEEKLY

Check the tension of the fan drive belts.

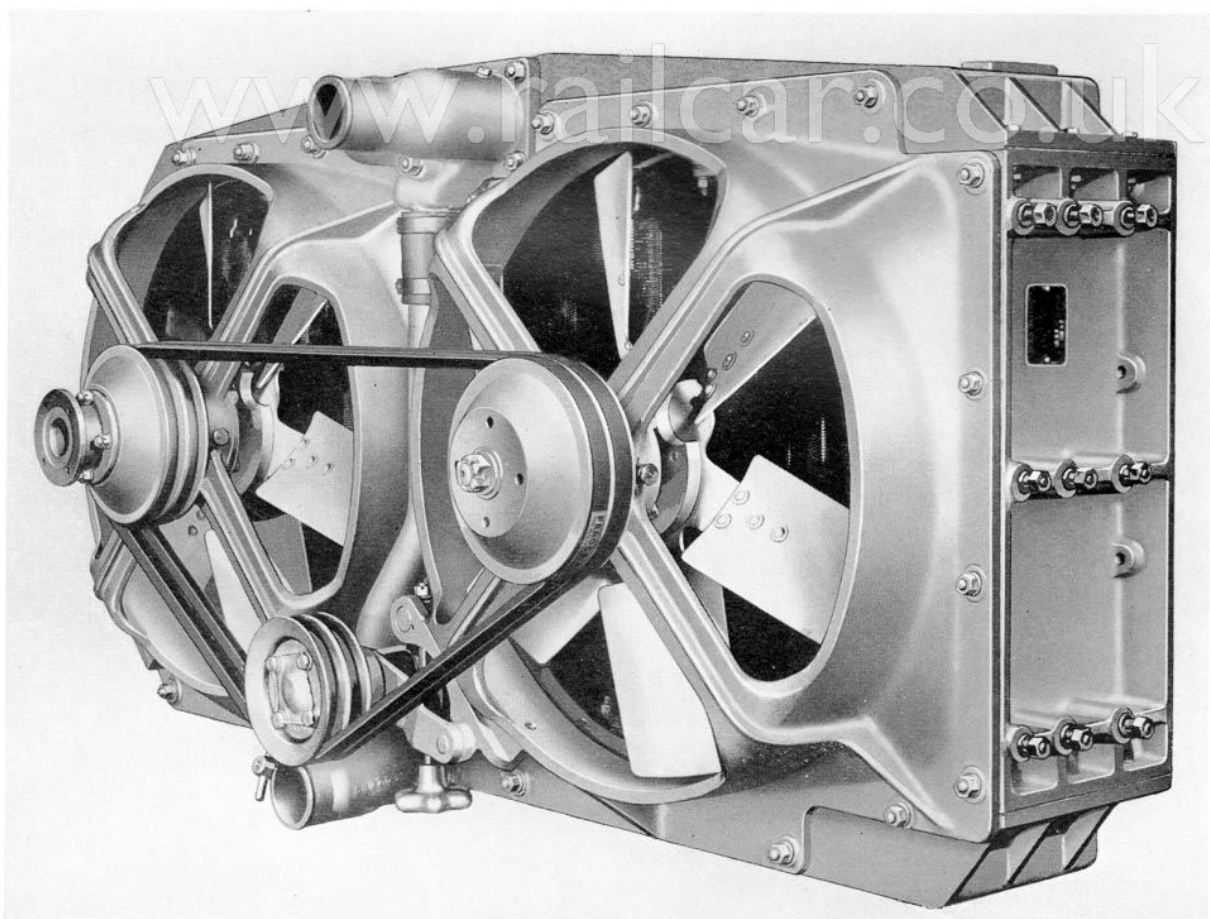

FIG. 7 REAR VIEW OF RADIATOR

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10,000 MILES (16000 KILOMETRES)

Check that the thermostat is working correctly.

DRAINING THE COOLING SYSTEM

This operation should be carried out with the unit holding the engine being level, and while the engine is hot. Do not leave until the water is completely drained.

Vertical Type Engine

To drain the cooling system open the drain cock provided, which is situated at the rear of the engine block on the fuel injection pump side.

Horizontal Type Engine

To drain the cooling system open the drain cock which is provided in the radiator water outlet pipe.

Notes: After draining display a notice in a prominent position to the effect that the cooling system is empty and the drain cocks are open.

Engines with anti-freeze solution in the cooling system should be worked accordingly, and if the engine is so marked do not drain the cooling system.

Drain cocks should be tested at frequent intervals by inserting a length of wire to ensure that they are clear. This should be done immediately they are opened so that any obstructions freed by the wire may be flushed out by the water.

FROST PRECAUTIONS

If the engine cooling system is not filled with anti-freeze solution and the engine is to remain standing in the open with temperatures approaching freezing point, the cooling system must be completely drained by the drain cock provided.

To Remove

1. Drain the cooling system.
2. Disconnect the top and bottom water pipes at the flanged joints on the radiator.
3. Disconnect the fan drive shaft.
4. Remove the bolts from the radiator supports.
5. Take the weight of the radiator and draw off square with the mounting brackets.

To Dismantle

1. Remove radiator complete with fans and cowls.
2. Remove fan cowls complete with fans from the radiators.
3. Remove the nuts and bolts securing the side standards to the top and bottom tanks and remove the side standards.
4. Remove the nuts and bolts securing the top and bottom water tanks to the tube blocks and separate.
5. An individual tube can be removed from the block by inserting a lever under the locating washer at the bottom of the tube and inserting pressure to push the tube upwards until it is free of the rubber ferrule.

To Assemble

Assembly is the reversal of the dismantling procedure but before assembling examine the rubber ferrules at the top and bottom of each tube for signs of perishing. If one or two have perished it is advisable to replace the whole set as follows and as illustrated in Fig. 8:

1. Lightly smear the tube holes in the tube plates (Fig. 8A) with petroleum jelly and treat the outside diameter of the rubber ferrule (B) in a similar manner.
2. Press the ferrule into the tube holes (C) and lightly strike the ferrules with a hammer (D) to ensure that the flanges on the ferrules fit flush on the tube plate.

To replace the radiator tubes proceed as follows:

1. Smear the inside of the rubber ferrule with petroleum jelly (Fig. 8E) and treat each end of the radiator tube in a similar manner.
2. The top and bottom ends of the tubes are distinguished by the top end having a long length of tube bare of gilling and the bottom end being fitted with a locating washer (F).
3. Enter the top end of the tube into the rubber ferrule in the top tank and press upwards until the short end of the tube is clear of the flange of the

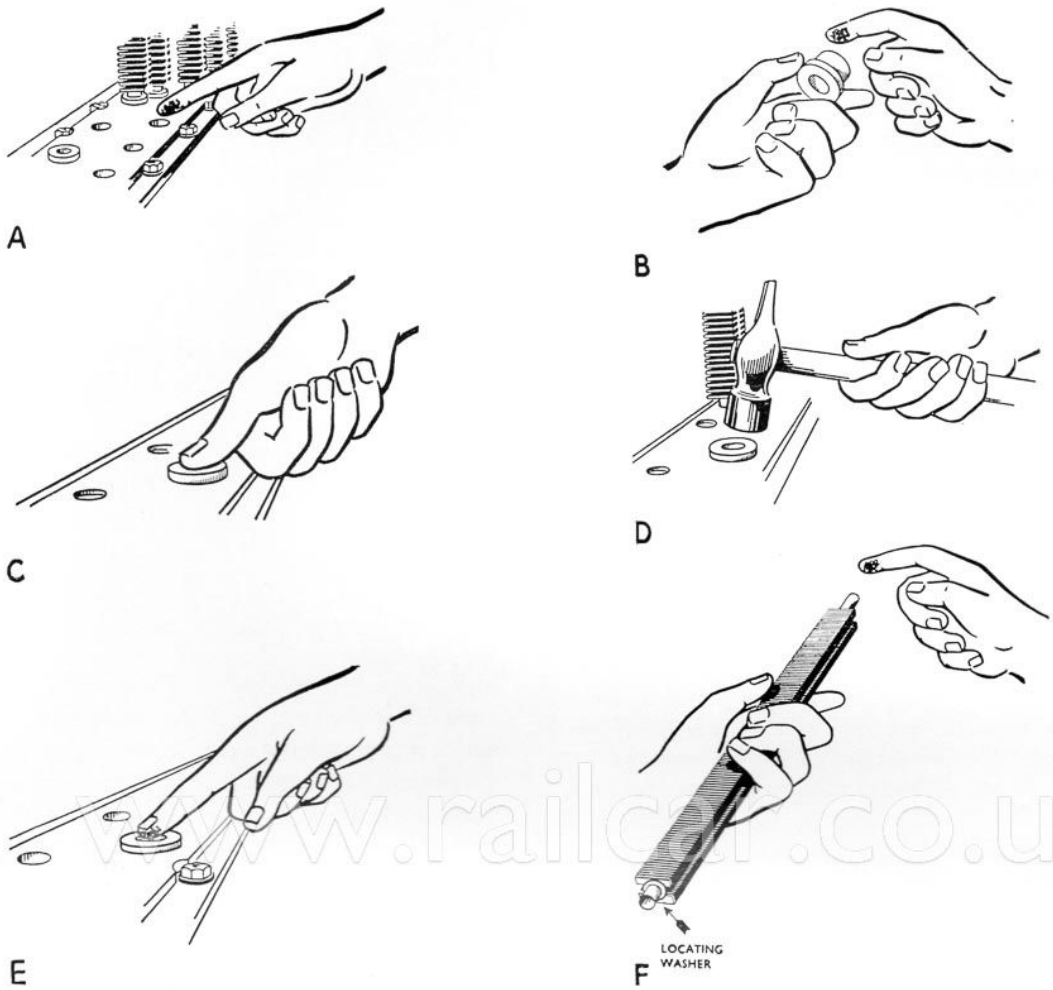

FIG. 8. METHOD OF FITTING RUBBER FERRULES IN RADIATOR

ferrule in the bottom tank. Carefully enter the bottom of the tube into the rubber ferrule taking care not to damage the ferrule by scoring and press down firmly until the locating washer rests on the flange of the rubber ferrule joint.

It is recommended that whilst the radiator is stripped it should be cleaned thoroughly both externally and internally. Any deposit in the tubes can be loosened by passing a rod down each tube.

When refitting the top and bottom water tanks use new joints, and paint with red lead before fitting.

To Fit

To fit the radiator is the reverse of the removal procedure.

THERMOSTAT

DESCRIPTION

The thermostat assembly consists of gas filled metal bellows which expands and contracts at predetermined temperatures, thereby operating the valve which is housed within the bellows in a metal frame.

The thermostat is either on the engine itself or mounted on the radiator.

When the water is cold, the valve is down on its seat, thus closing the intake to the radiator. The water then flows through the by-pass only after passing through the engine water jackets. At about 160 deg. F. (71 deg. C.) the expansion of the bellows gradually opens the valve

and allows circulation to an increasing degree through to the radiator until at 183 deg. to 190 deg. F. (84 deg. to 88 deg. C.) the valve is fully open allowing maximum flow through the radiator.

The thermostat incorporates a $\frac{3}{16}$ in. (4.75 mm.) hole which provides a release for excessive pressure or steam accumulating in the engine block or cylinder heads.

The maximum lift of the valve is $\frac{7}{16}$ in. (11.1 mm.).

Note: If the thermostat does not function correctly, do not attempt to repair or adjust it, but fit a new one.

FAN AND FAN DRIVE

DESCRIPTION

The two six-bladed fans cool the radiator. The fans are secured by setscrews to the fan shafts, which are carried in ball and roller bearings housed in the fan cowls (Fig. 9). A right-angle-drive unit mounted on the engine, drives through a Hardy Spicer propeller shaft, one of the fan shafts, and thence through twin "V" belts to the second fan shaft. A belt tensioner mounted on one of the fan cowls is used for belt adjustment.

LUBRICATION

A limited-supply greaser is provided on the side of each of the fan cowls. The grease nipple should receive lubricant once a month.

MAINTENANCE

Adjustment of the twin "V" belts is effected by turning the handle of the belt tensioner, thus moving the belt tensioner assembly about a pivot mounted on one of the fan cowls. It is important not to overtighten the "V" belts as this may cause premature bearing wear.

The belt tensioner should be adjusted so that it is possible to press the belts in $\frac{1}{2}$ in. (13 mm.) at the centre of the longest run between pulleys.

To Remove

1. Release tension of belts and remove the "V" belts.
2. Remove the fan cowls complete with fan from the radiator.

To Dismantle

1. Remove the coupling adaptor from the driving pulley only.
2. Remove the split pin, nut and washer securing the pulley to the fan shaft and remove pulley.
3. Remove the nuts securing the oil seal housing to the fan cowl at the pulley end, and remove oil seal housing together with the oil seal.
4. Remove the fan and shaft assembly from fan cowl.
5. Remove the nuts securing the oil seal housing to the fan cowl at the fan end, and remove oil seal housing together with the oil seal.
6. Remove inner race of roller bearings, and also the inner distance piece.
7. Remove ball bearing by pressing on outer race of roller bearing.
8. Remove outer distance piece.
9. Remove outer race of roller bearing if required (if not removing outer race of roller bearing, press back to original position).

To Assemble

Wash all parts in clean paraffin and assemble, reversing the dismantling procedure, and noting the following points:

1. Examine the oil seals and joints and renew if necessary.
2. Fill with new grease.

To Fit

Replacement of the fan cowls complete with fan and fan drive is the reverse of the removal procedure, but the following points should be noted:

1. Before fitting the "V" belts check the alignment of the pulleys.
2. If new "V" belts are fitted, a matched pair should be fitted together.

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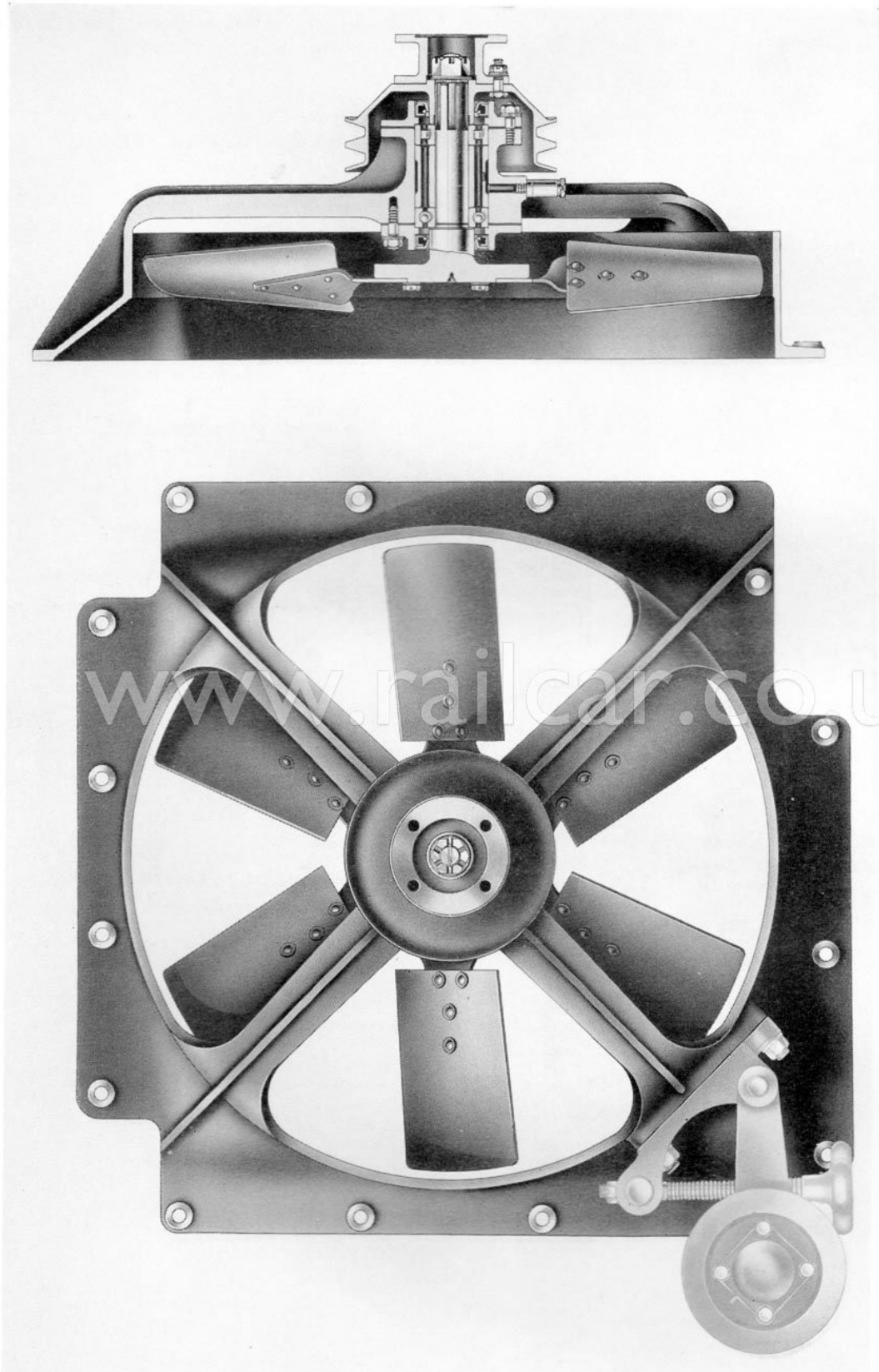

FIG. 9. SECTION THROUGH FAN AND FAN DRIVE

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BELT TENSIONER

DESCRIPTION

The belt tensioner which is mounted on one of the fan cowls, is used for keeping the cooling fan drive belts in tension (See Fig. 9).

Adjustment of the belts is provided by a housing, carrying the pulley and spindle, being able to swing about a pivot mounted on one of the fan cowls.

The housing is positioned by a handle and an adjusting screw, screwed through a pivot block (Fig. 12).

The tensioner (Fig. 12) consists of a housing in which the spindle is fastened to the housing, and the pulley is carried on a ball and roller bearing.

A greaser is provided in the housing for greasing the bearings. Leakage of grease is prevented by an oil seal.

MAINTENANCE

Adjustment of the twin "V" belts is effected by turning the handle of the belt tensioner, thus moving the belt tensioner assembly about a pivot mounted on one of the fan cowls.

The belt tensioner should be adjusted so that it is possible to press the belts in $\frac{1}{2}$ in. (13 mm.) at the centre of the longest run between pulleys.

It is important not to overtighten the "V" belts, as this may cause premature bearing wear.

MONTHLY—GREASE NIPPLE

Lubricate with grease gun through the greaser provided.

12,000 MILES INSPECTION (19300 KILOMETRES)

Remove unit and inspect, renew parts if necessary.

To Remove

1. Release tension of "V" belts and remove.
2. Remove the three nuts and washers securing the belt tensioner to its mounting, and remove the unit.

To Dismantle

Remove the unit from its mounting.

1. Remove the setscrews securing the retaining cover to the pulley.
2. Remove the nut and washer securing the spindle to the main housing, and remove spindle and pulley assembly.
3. Remove circlip from end of spindle.
4. Using a hammer and brass drift, tap on the screwed end of the spindle, to remove bearings and distance pieces from pulley.
5. Remove bearings and distance pieces from spindle.

To Assemble

Wash all parts in clean paraffin and assemble, reversing the dismantling procedure, and noting the following points:

1. Examine the oil seals and joints and renew if necessary.
2. Pack the bearings initially with prescribed grease.

To Fit

Reverse the removal procedure.

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