

SECTION 12

"ONE - SHOT" (KNOTS) LUBRICATION

SYSTEM

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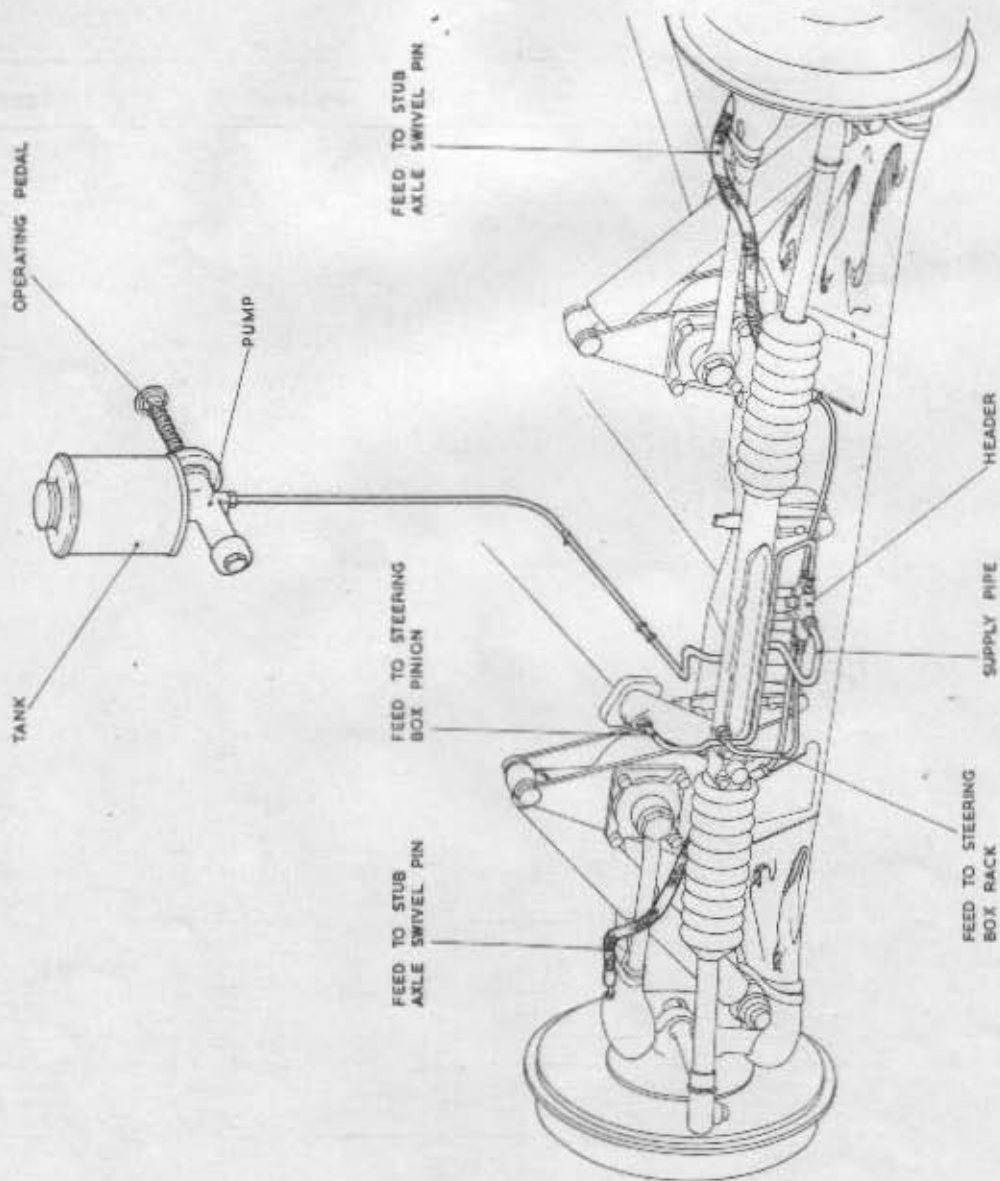


Fig. 1. Diagram of "One Shot" Lubrication System.

"ONE - SHOT" (ENOTS) LUBRICATION

SYSTEM

DESCRIPTION

The Enots "One Shot" lubrication system is used on type 400, 401 and 402 cars. It ensures adequate lubrication of the stub axle swivel pins and bushes, the steering box assembly and the ball joints at each end of the steering tie tubes by the pressure of a pedal conveniently situated above the accelerator pedal.

The system comprises an oil tank, connected via a non-return valve to a piston-type pump. The spring-loaded pump shaft forms the operative pedal. The pump is bolted to the bulkhead and is connected by a pipeline to a header situated on the forward face of the front suspension assembly.

The header consists of a bronze body containing four spring-loaded double-acting valves, each leading to an outlet and to one of four cylindrical air chambers which are screwed to the top of the body.

The lubrication system is as follows. The forward left-hand union of the header is linked by a rigid supply pipe to a union on the steering pinion bracket of the steering box, oil being supplied to the pinion shaft via an oil hole in the bracket and an oil groove in the pinion eccentric bush. The forward right-hand union is connected by a rigid pipe to a union on the front face of the steering box, oil being supplied to the steering box rack. Excess oil from these two unions on the steering box fills the box and enters an oil hole in the rack. The hollow rack allows the oil to pass to the inner ball bolts, through the oil holes

in the bolts to the hollow tie tubes and finally to the outer ball bolts via oil holes in the outer ball bolt seatings. The right and left-hand rear unions of the header are connected, via rigid and flexible pipes, to the right and left-hand stub axle swivel pin assemblies respectively. The rigid pipes from the header terminate in flexible tube connections secured to the right and left-hand attachment brackets of No. 1 cross-member. A flexible pipe from each connection is connected via a male tube adaptor to the rear end of the top pin of each swivel pin. Oil from the header passes through the pipes to the top pin and through an oil hole in the pin to the annulus formed in the head of the swivel pin by the swivel pin bushes. An oil channel links the annulus with the hollow bore of the swivel pin. Just beneath the point at which the oil channel enters the bore, an oil restrictor is fitted, followed by a further oil restrictor near the lower end of the bore. The extreme end of the bore is sealed by a plug. Oil enters the upper end of the swivel pin bore from the annulus, via the oil channel, and builds up in the chamber above the top restrictor until the pressure is sufficient to force oil through the small bore of the restrictor. This process is repeated in the chamber between the two restrictors, oil finally leaving the lower restrictor and building up in the chamber between the restrictor and the sealing plug. The swivel pin bushes are supplied with oil from the swivel pin by oil holes located immediately above each restrictor. An oil hole in the taper of the swivel pin links the lower chamber with a mating oil channel in the bottom bracket. Oil passes from the lower chamber of the swivel pin through the oil hole and into the oil channel in the rear arm of the bottom bracket. An oil hole in the bottom pin of the bracket aligns with the oil channel in the bracket by locating flats on the pin-head and supplies the blanked, blind bore of the pin with oil, which is then delivered to an oil flat on the pin through two oil holes.

When the pump is inoperative, oil from the tank flows past the non-return valve into the pump cylinder. On depressing the pedal, the oil in the cylinder is subjected to a pressure which closes the tank valve, and is transmitted, via the main supply pipe, to the header. The valves in the header move outwards, allowing oil to pass to the air chambers and closing the outlets from the chambers at the same time. When the pedal is released, the spring returns the piston to the end of its stroke; the pressure in the pump cylinder and header supply pipe then falls and the valves in the header move inwards, thereby transmitting the pressure in the air chambers to the component supply pipes and ducts. The tank valve drops from its seat, allowing the oil in the tank to pass and refill the pump cylinder. The components lubricated by the system will therefore continue to be lubricated until the pressure on the downstream side of the header valves falls to zero, when the action of pressing the pedal of the pump will replenish the supply; the pedal need only be pressed until resistance is felt. It will be seen that the amount of oil passed to each component is governed by the capacity of the air chamber of that particular line. Sufficient lubrication is ensured if this operation is carried out every 70 miles (110 Kms).

MAINTENANCE

The supply tank should be topped up with engine oil at least once every 1,500 miles (3,400 Kms.). If the tank is allowed to become empty, air may enter the pipe lines; this will necessitate bleeding the system. To do this, disconnect the pipe from the steering box pinion housing, the front of the steering box and the top pin of each stub axle swivel pin. Operate the pedal until air-free oil is observed at these points, then, while the pedal is being slowly depressed, connect up the pipes.

REMOVING AND BEFITTING

First drain the tank by removing the cap from the forward end of the pump and catching the oil in a suitable clean container. Detach the header supply pipe from the base of the pump, unscrew the pedal head from the driving seat end of the pump shaft and remove the spring. Unscrew the four $\frac{1}{4}$ in. B.S.F. attachment nuts and bolts and remove the pump, complete with tank, from the bulkhead. To refit the unit, adopt the reverse sequence of operations. The tank should then be refitted and the system bled as described previously.

DISMANTLING AND RE-ASSEMBLING PUMP

Unscrew the tank from the pump by means of a $\frac{7}{8}$ in. B.S.F. spanner applied to the union body on the underside of the tank. Remove the ball and the fibre gasket. Grip the pedal end of the pump shaft in a soft-jawed vice and, using a $\frac{5}{16}$ in. B.S.F. box spanner, remove the piston nut from the front end of the shaft. Withdraw the shaft from the pedal end of the pump; this will reduce the risk of damaging the pump glands. Hook out the steel and the leather piston washers. With a $\frac{1}{4}$ in. B.S.F. box spanner, unscrew and remove the gland housing complete with the glands. As the glands are integral with the housing, it will be necessary in the event of failure of the glands, to renew the gland housing complete with glands. Detail parts of this pump are obtainable only from Messrs. Benton and Stone, Aston Brook Street, Birmingham, or their agents.

To re-assemble the pump unit, reverse the sequence of the methods used in dismantling. To avoid damaging the pump glands, a pilot should be made up and fitted to the piston end of the pump shaft before inserting the shaft through the gland housing. This device will also prove advantageous when dismantling the unit.

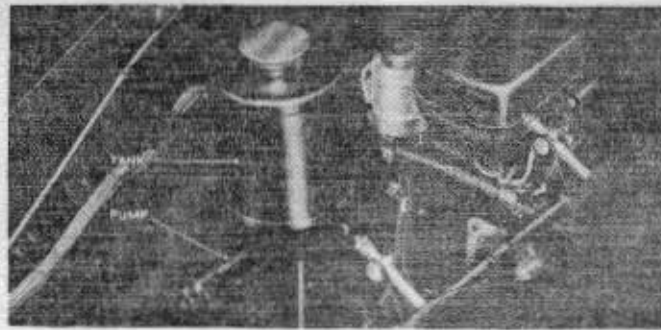


Fig. 2. Pump Unit.

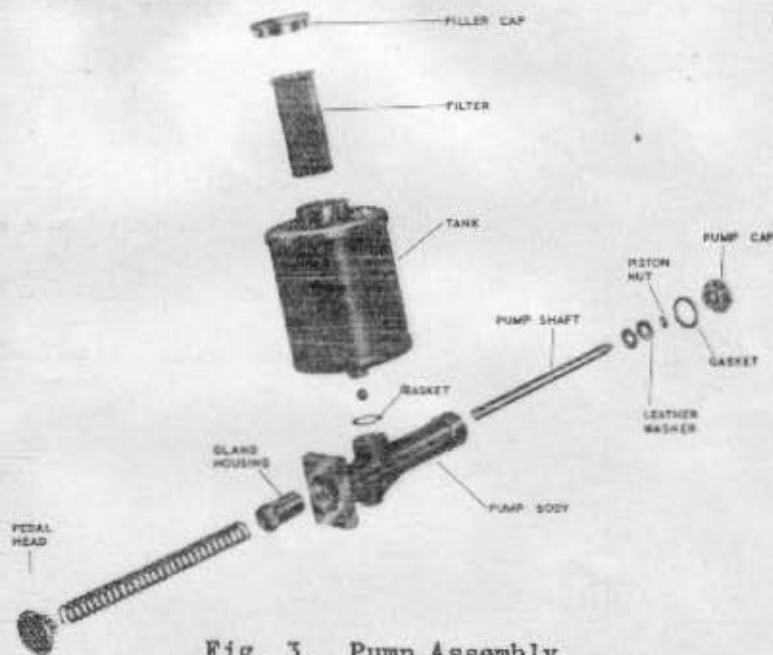


Fig. 3. Pump Assembly.

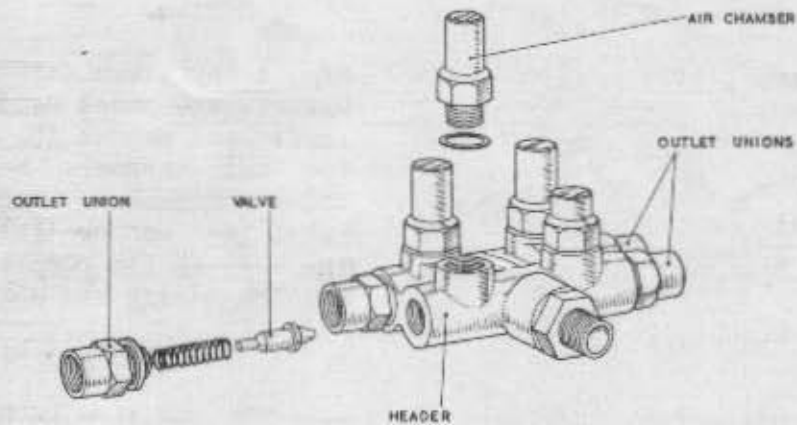


Fig. 4. Header.

DISMANTLING AND RE-ASSEMBLING HEADER

Unscrew the one inlet and four outlet pipe gland nuts and pull the ends of the pipes clear of the header. Retain the olives on the ends of the pipes unless they are to be renewed. Remove the header attachment set-bolt and detach the header from the chassis. Unscrew the four outlet unions and remove the unions and their shim washers together with the springs and valves. These components should be segregated and marked in order that they may be replaced in their original locations. Mark the air chambers and their locations in the header and remove them from the header.

When re-assembling the unit, ensure that all components are replaced in their original locations. After the unit has been refitted and all the pipes connected, refill the tank and bleed the system in the manner previously described.

FAULTS AND REMEDIES

No resistance felt at pedal

Tank empty.

Refill tank and bleed the system.

Broken pipe or loose or defective connection, indicated by oil leak.

Locate and rectify. Refill tank and bleed system.

Defective pump piston washer.

Remove cap from forward end of pump. Unscrew the pedal head from the pump shaft and remove the shaft with piston and washer. Renew the washer and re-assemble. Care should be taken to ensure that the seals in the rear of the pump are not damaged when replacing the shaft.

Refill the tank and bleed the system.

Tank valve not seating correctly, indicated by disturbance of oil in tank when pedal is operated.

Unscrew tank from pump, clean and examine the valve and seating. Rectify as necessary. Refill tank and bleed the system.

Lubrication of one or more points defective

Double-acting valve of defective line not seating correctly or valve spring broken.

Remove respective valve and spring from header, clean and rectify as necessary. Re-assemble, fill tank and bleed the system.

Oil pipe or oilway in component blocked.

Remove the pipe from header and component, blow out with an air blast and re-assemble. Bleed the system. If the defect persists, the blockage is in the oilway of the component and may be cleared by partially dismantling the component as described in the relevant section of this manual. An air blast may be applied with effective results during the early stages of dismantling. This will render further dismantling unnecessary. After the cause of the trouble has been found and rectified, the system should be bled.

Lubrication of all points defective

Tank outlet, pump outlet or header supply pipe blocked.

Remove pipe connection from header and operate the pump. If little or no oil appears, disconnect pipe from pump and apply an air blast. If pipe is clear the obstruction is in the pump outlet or tank outlet. These components should therefore be removed and cleared. On curing defect, fill the tank and bleed the system.