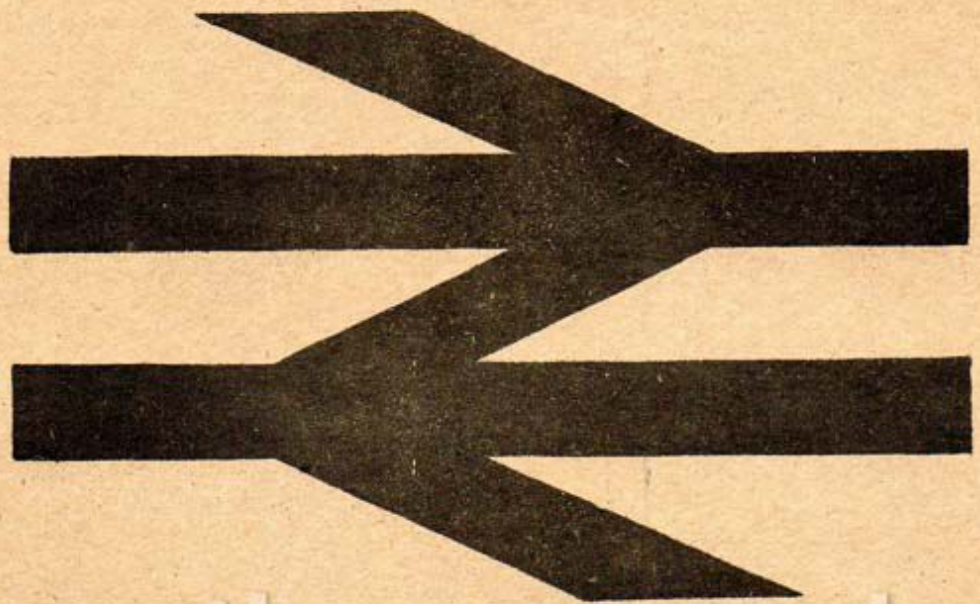


B.U.M.F!

No. 2

NO. 2 AUGUST 1969

B. U. M. F.

Better

Understanding of

Maintenance

Facts.

This is BUMF No. 2

Did you find BUMF No. 1 interesting? - Useful?

Or is it at home in the bottom of the cupboard? If it is, pull it out and read it!

Then read <u>this</u> issue!

What would you like to see in BUMF? (Dirty stories and naked women are out - unfortunately!)

Tell your Foreman or one of our Technical Inspectors what you want to know, and they will see that the answer goes in BUMF.

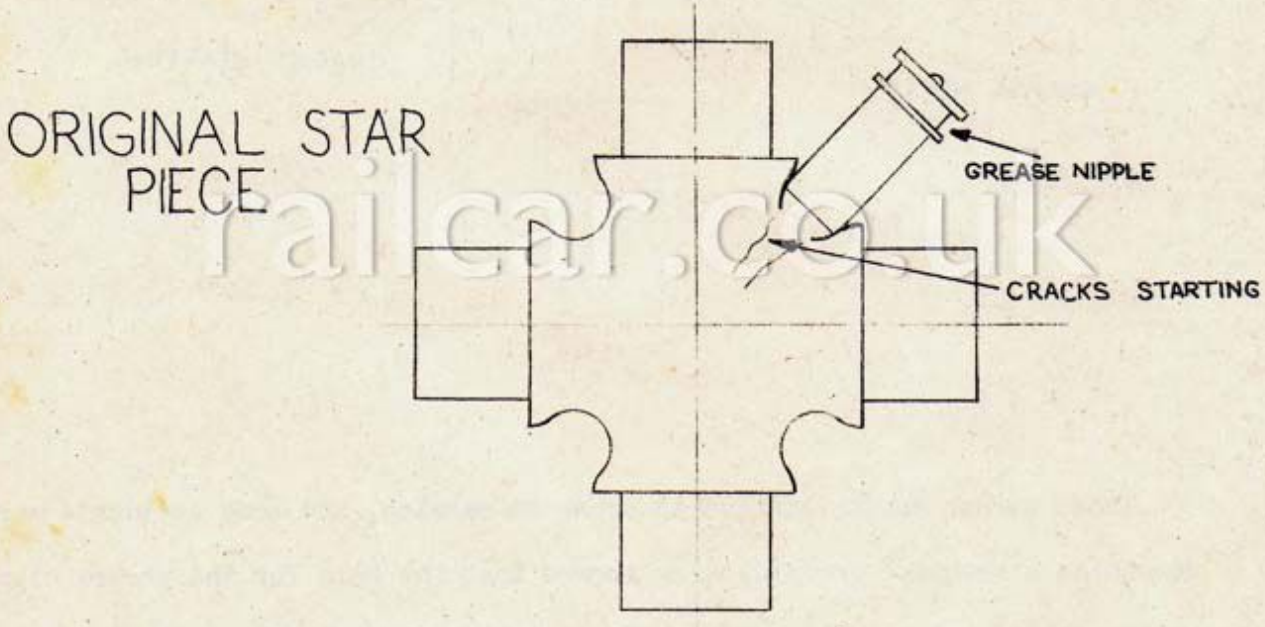
Do you want a board cover to keep your copies of BUMF?
Again, let us know, and we'll get them for you.

Maintenance Section
READING

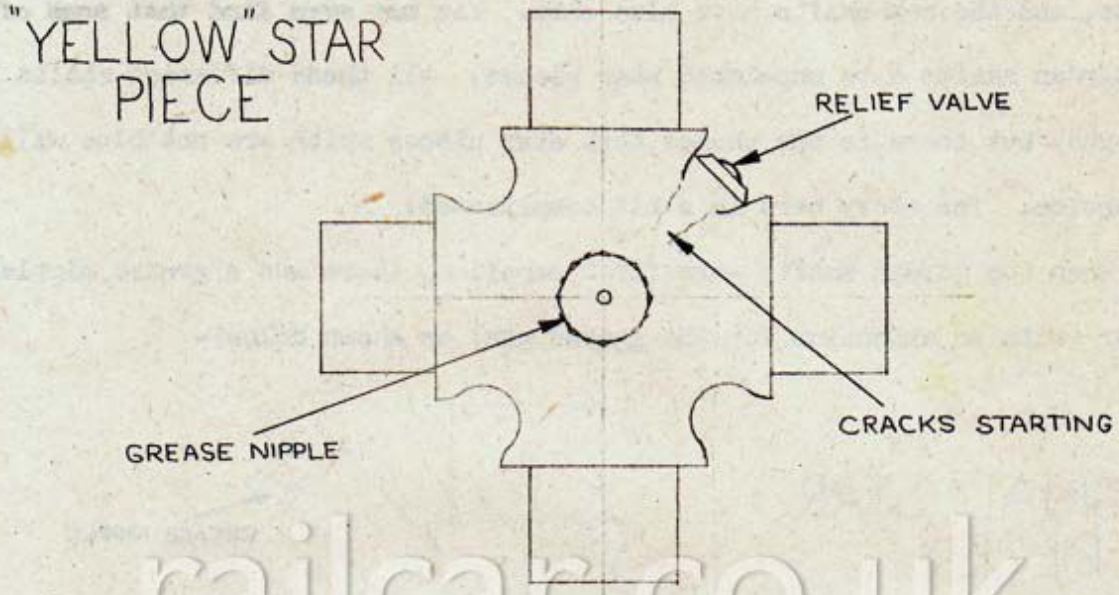
5 D.M.U. CARDAN SHAFTS

We are at present changing all our DMU Cardan shafts. The only difference which is obvious is that the old shafts have yellow star pieces in the universal joints, and the new shafts have blue ones. You may even find that some of the old Cardan shafts have unpainted star pieces. All these different shafts seem to be sound, but there is the chance that star pieces which are not blue will break in service. The story here is a bit complicated.

When the Cardan shafts were first supplied, there was a grease nipple in the corner (with an extension for the grease gun) as shown below:-

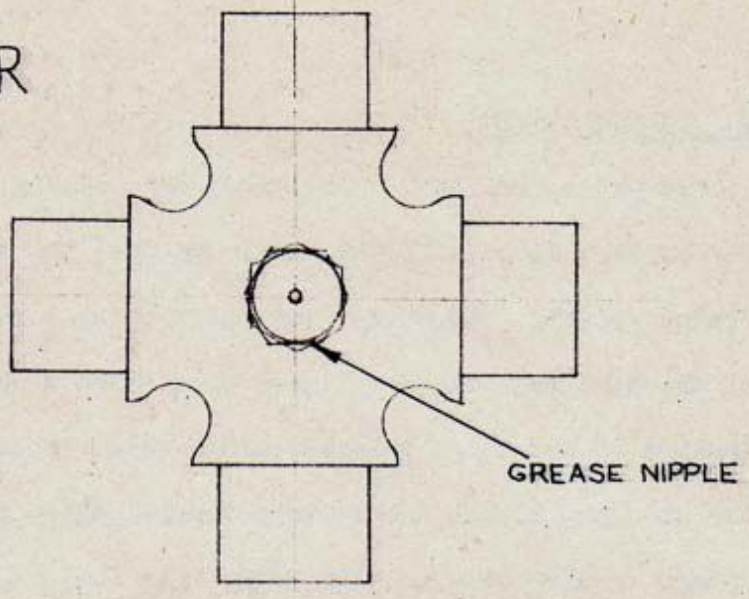


After a time, it was considered by the technical boys that there ought to be a relief valve to prevent building up a pressure inside the star piece, so this was fitted where the grease nipple was, and the nipple moved to the middle of the star piece. The sketch shows this arrangement and they were painted yellow to distinguish them from the ordinary ones. We have been using this type of star piece for some time now.



Then Cardan shafts started to break in service, and some accidents were caused as a result. Investigation showed that the hole for the grease nipple or the relief valve in the corner caused a high stress, and so it was decided that the best thing to do was to have no hole and just fit the grease nipple in the middle of the star piece. These are the star pieces which are painted blue, and we are fitting these on all sets as fast as we can get new shafts from Swindon. The blue star pieces are also to be fitted to freewheel shafts, and in fact the first ones have been received at Reading and fitted to sets.

"BLUE" STAR PIECE



All the star pieces used up to now are fitted in needle roller bearings, but as the bearings have been known to give trouble, they are going to be changed to plain bushes. These star pieces will still be painted blue, so you will not know which type of bearing is fitted. However, it doesn't matter, because both star piece assemblies will be completely interchangeable.

6. LEYLAND COOLING SYSTEMS

Ever since LMU's have been in service, the cooling system has been a source of despair. We have lived with the knowledge that the systems lose coolant and require topping up very frequently, and until about a year ago we did not really think about the problem - blown cylinder head gaskets were more urgent!

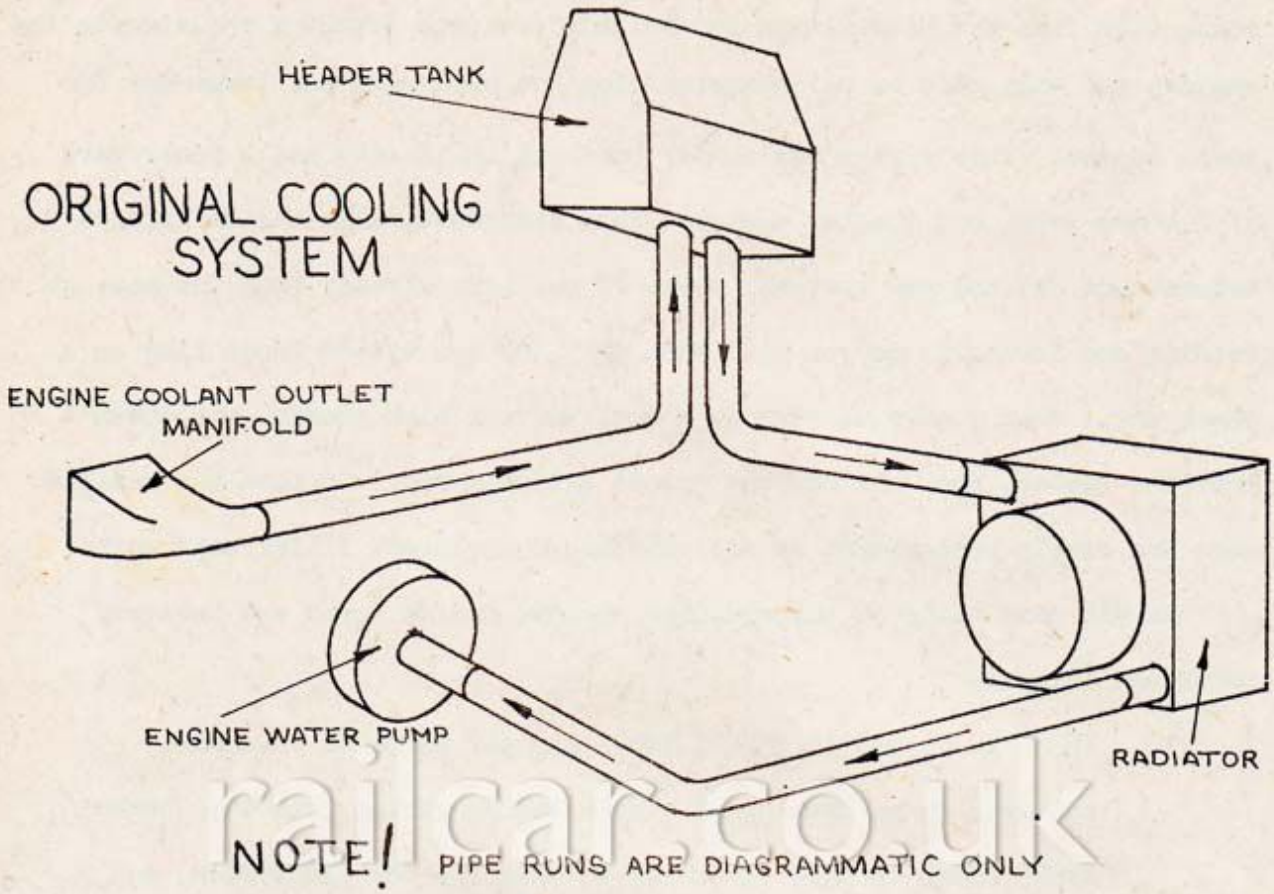
Examination of the blown gaskets showed that overheating was occurring in spots on the head and block, and further investigation proved that there was a high percentage of air being carried round with the coolant which would, of course, cause poor cooling and hot spots.

Overheating, plus leaks from loose hose clips, plus scale in engine coolant passages, plus poor radiator overhaul plus uncleaned radiator screens all combined to cause quite a mess, and cost us a lot of money and goodwill with engines dropping out on low coolant. So what to do? Only two of these can be sorted out on maintenance work - tighten hose clips regularly and clean radiators and radiator screens regularly (Item 40 of the monthly exam.) These jobs must be done properly, and the cleaning job will be a lot easier when we get our GRACO machine.

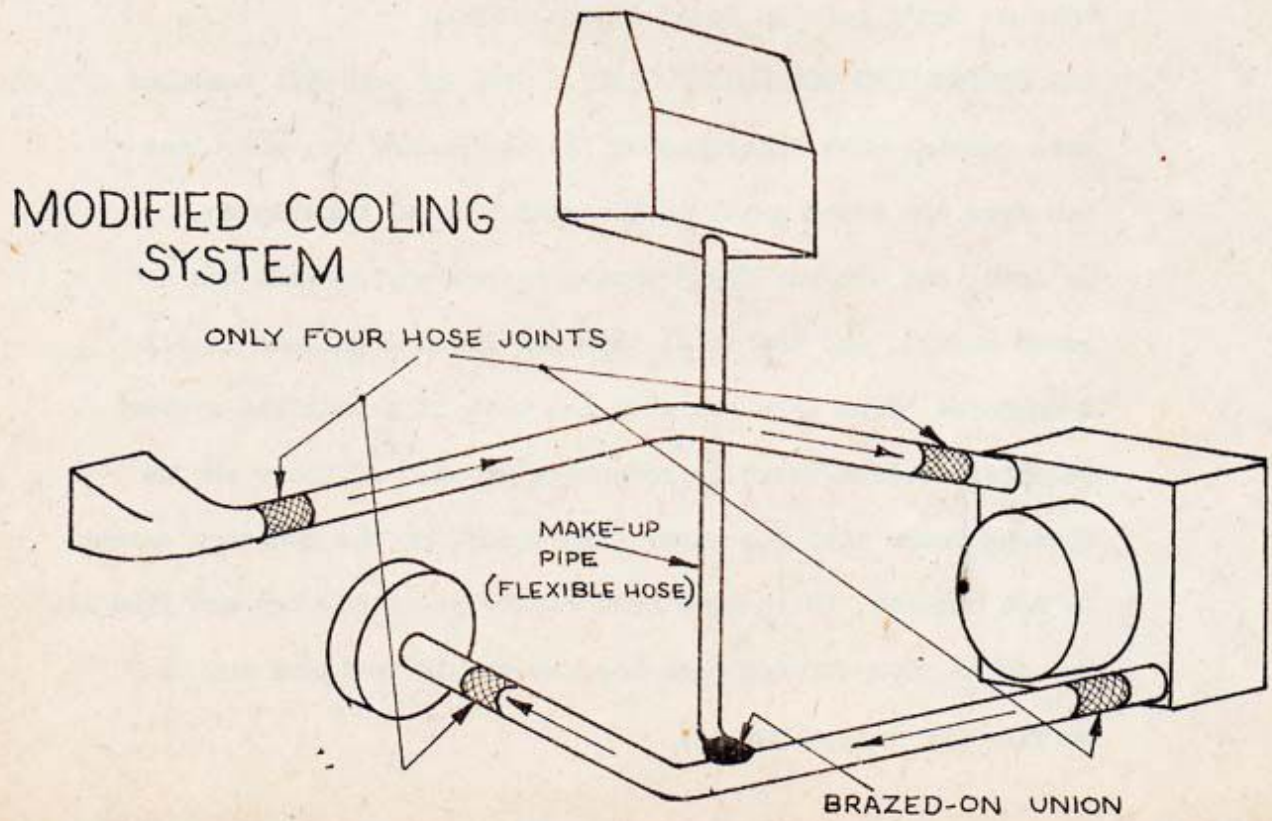
The scale in engines is being cleaned out at overhaul, as Swindon Works are giving an acid washout which dissolves the lot.

Radiator overhaul is steadily being improved. They are being cleaned out properly, and lumps of scale removed, and we are being more critical of things like bent fins on the tubes.

Now the big one! The complete cooling system has been redesigned to turn it into a 'make-up' system with better air venting. In this system, coolant flows



NOTE! PIPE RUNS ARE DIAGRAMMATIC ONLY



from the engine to the radiator and returns direct to engine. A small connection from the header tank is fed into the pipe from the radiator to the engine, and this acts as an expansion pipe and also supplies 'make-up' for small losses. This system has so far been put in 12 sets and 2 power cars of 2 other sets, and the two sketches show diagramatically the difference between the old and new systems. Some of you have already done the mod. at Reading and Southall, so you will know what the new system looks like on a power car. When you're working on a modified car with someone who doesn't know the system, show him how the pipes actually run. So that the modified cars are easily recognised, we are painting the coolant filler caps white.

We did some tests on the modified system, and we found out two very important things:-

1. THERE IS NO AIR IN THE SYSTEM. Any air which is in comes out as soon as the engine starts and is vented into the header tank (which is more than can be said for the old system) so that we don't get hot spots in the engine.

2. THE SYSTEM DOES NOT LOSE COOLANT. Some of you will remember sets running with the radiator fillers locked up, and these ran from one depot exam. to the next without topping up. In fact, one set ran for 3 months before any coolant was added at all, and the total then was about 2 gallons in all 4 engines! From this you will see that if a modified system requires coolant there is something wrong. If there are no obvious leaks like the water pump gland, or the radiator screen is not blocked, there must be a fault, so either try and find it, or advise your foreman that the set should be taken out of service for investigation.

7. LEYLAND FUEL INJECTION PUMP SETTING

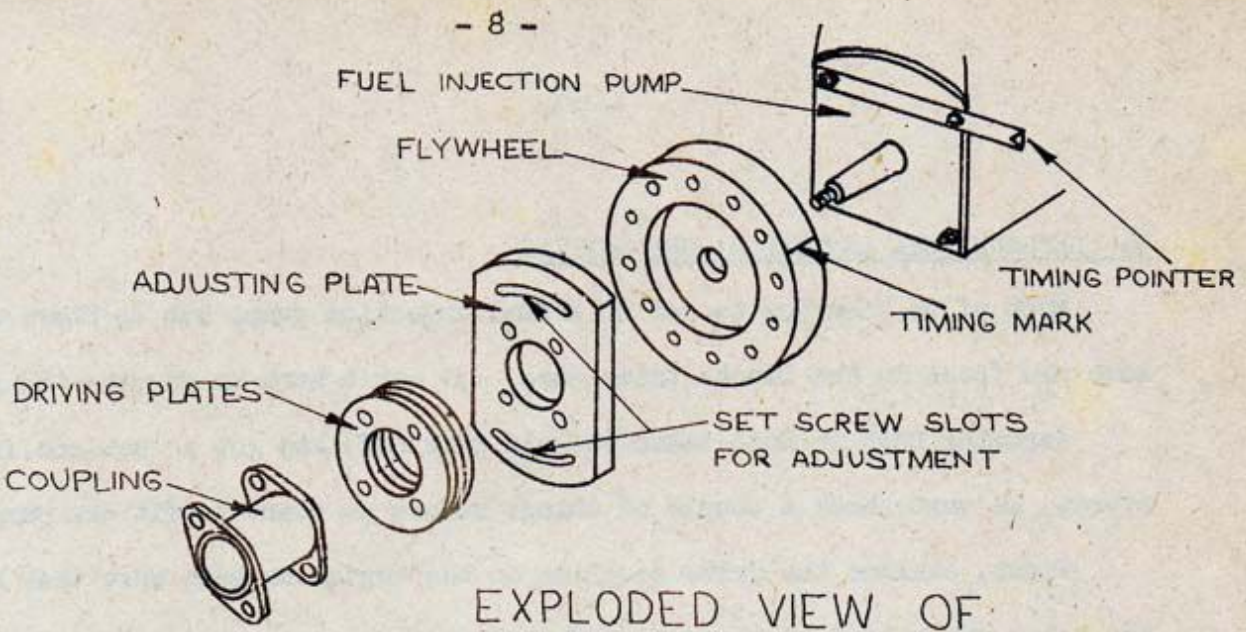
Most of us know how to set up a fuel injection pump, but as there are some new faces in the Depots these days, it won't hurt to go over the procedure.

Assuming that we have taken the old pump off, and got a new one from the stores, we must check a couple of things before we start to fit the pump.

First, examine the drive coupling on the engine to make sure that none of the holes are burred or elongated, that the plates are sound and that all the nuts and bolts are tight and split-pinned.

Second, turn the engine until No. 1 INJ mark on the fluid coupling is opposite the pointer, and No. 1 piston is on compression. You can check this easily because both No. 1 valves should be closed, and you should be able to rattle the rockers. A point of interest here is that you will find timing marks 'AB' and 'PP' on some fluid couplings. You only use the 'AB' mark and ignore the other one. In a later issue of BUMF we will tell you all about these marks when we tell you something about engine timing generally.

Next, turn the fuel pump flywheel until the timing mark on it is in line with the pointer fixed to the pump body, and offer the pump up to its position on the engine, entering the mounting bolts, but not tightening them.



EXPLODED VIEW OF
FUEL PUMP DRIVE

Connect up the drive coupling and tighten up. To do this you may find that you will have to move the pump flywheel slightly so that the marks are out of line. If so, slacken the set screws on the pump coupling adjusting plate, turn the flywheel so that the mark lines up with the pointer again, and re-tighten the set screws. Couple up and tighten the fuel pipe, and then tighten up the pump mounting bolts.

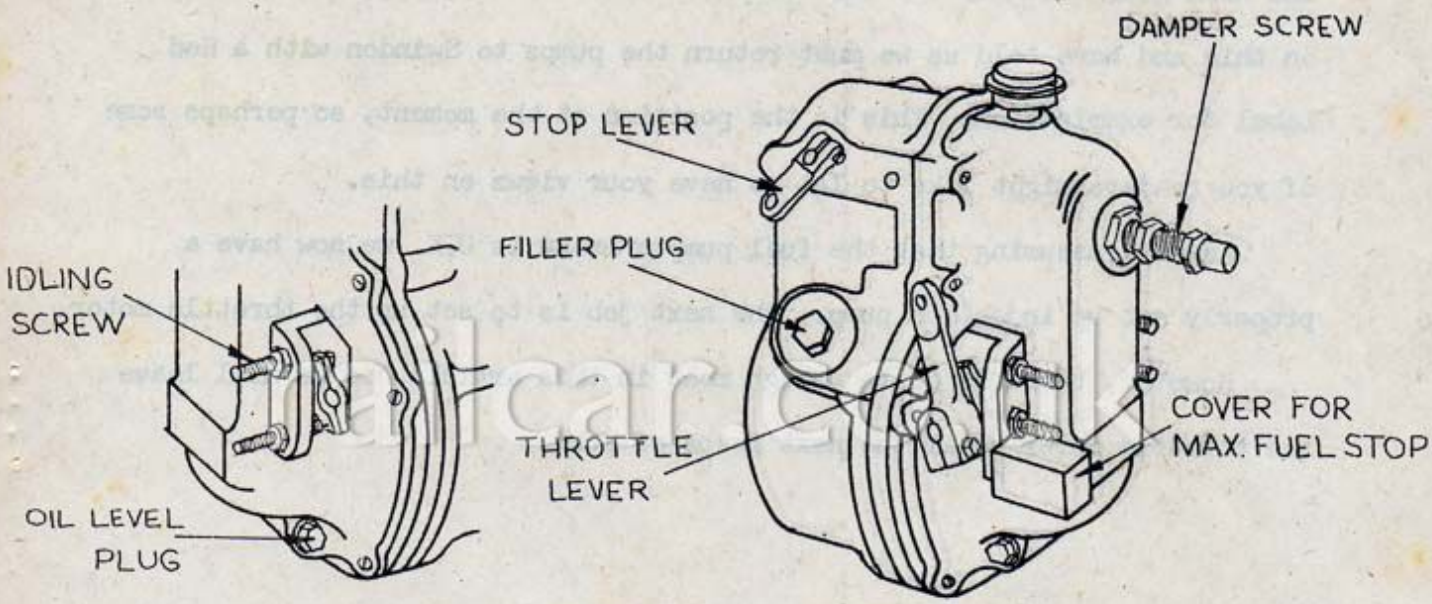
Finally, connect up the stop solenoid.

Bleed the pump through the air vent by operating the lever on the lift pump mounted on the side of the injection pump until bubbles stop coming out, and then fill up the injection pump sump with engine oil through the filler plug on the governor until it comes out of the level plug (see sketch below).

Now we are ready to set up the fuel injection pump, but this must be done with the engine warmed up, so couple up the throttle motor control rod and start the engine. Obviously the engine will warm up quicker if you blank off the radiator with a sack or sheet of newspaper. When warmed up, disconnect the throttle rod again, slacken the locknut on the governor damper, and screw out

the damper - well out!

The engine revs are adjusted using the idling screw on the governor, so check the speed with a hand tachometer on the crankshaft fan pulley - NOT the cab gauge - and adjust if necessary to 410 rpm and retighten the lock nut. The speed is not all that critical, 415 or 420 makes no difference but 410 is a minimum.



FUEL PUMP GOVERNOR

The next job is the governor damper. Remember, this is NOT the means of adjusting engine idling speed, and must not be used as such. On the end of the damper screw is a spring loaded plunger which bears on the end of the injection pump rack to stabilise it at idling speed and stop the engine hunting.

Screw the damper in until the engine runs slightly faster, then screw out again until the revs are back to normal, and then screw out a further half-turn. Tighten the lock nut on the damper screw.

Now the fuel injection pump is set up, and we have one more check to do. Race the engine up to full speed and see that it drops smoothly and

quickly back to idling and does not 'hang'. If it does hang, then almost certainly the governor springs are at fault. As you all know, we've had a lot of trouble in the past with new pumps from Swindon Works, and when changing them, the replacement has been faulty as well. So what do we do?

In the past we've adjusted quite a few pump governors at the depots, and with good results, but our technical chiefs at Paddington don't go much on this and have told us we must return the pumps to Swindon with a Red Label for examination. This is the position at the moment, so perhaps some of you readers might like to let us have your views on this.

Anyway, assuming that the fuel pump governor is O.K. we now have a properly set up injection pump. The next job is to set up the throttle motor.

However, there is quite enough meat in this article, so we will leave the throttle motor until the next issue of BUMF.