D

Lubrication

FACTORY

SERVICE INSTRUCTION LEAFLET

ISSUED BY

BENTLEY MOTORS (1931) LTD.

BM/D2(b).

SB/VA.1

Subject :

LUBRICATING OILS - ALL CARS.

Date of Issue 14th October, 1949

IMPORTANT

THE CONTENTS OF THIS DOCUMENT ARE STRICTLY CONFIDENTIAL AND ARE NOT TO BE TRANSMITTED TO ANY UNAUTHORIZED PERSON.

Will Retailers please note that we approve the use of the Shell X.100 Series lubricating oils, which are being introduced to replace Single, Double and Triple Shell.

These oils are designated X.100, SAE 20, 30 and 50, and should be used, when available, in all cases where Single, Double and Triple Shell were recommended.

Continued:-

We have been in communication with the Manufacturers whose oils we recommend for the Bentley, and in each case they have a lighter grade which they put forward as suitable for Winter use. The grades are as follows:-

Wakefield's "CW".
Single Shell.
Mobiloil "AF".
Price's Motorine "M".

It should, however, be emphasised that if these thin oils are left in the crankcase during the Summer, considerable increase in oil consumption is almost bound to take place, which will result in increased carbon formation in the head.

Hd.

Sg.
C.
Sr. - FBA. Ltd.
Mln. - Bombay.
Mr. Birkett. - New Delhi.
Rv.
Mr. de Boeck. - Nice.
H.
Tr.
Cx.
Mr. Evans. - Lillie Hall.
Mr. Crawford. - Lillie Hall.
Br. - N.
PH. C/o Clyde Auto.Co.Ltd.
Bentley Repair Depot, London,
Mr. Reid. - Glasgow.
Instruction School.

Hs.
BY.
Rm.
RHC.
Mx.
LA.
Mr. Hancock.
BY/NN.
D/BP.
Mr. Robinson. - Holland.
Repair Department.
Kellow Falkiner Pty Ltd.
Appleby & Ward.
Perrot Duval & Cie,, Geneva.
Binelli & Ehrsam, Zurich.
R. P. Collyer, Ltd., Canada.
J. S. Inskip. Inc.

24th November 1937.

DEPOT SHEET NO. Hd.364.

ENGINE OILS.
All Chassis.

Origin of information:-
Rm/Gry.10/MH.23.9.37.

It should be noted that the recommended list of oils now appearing in our Instruction Books is being amended as follows:-

	Summer. (S.AE.50).	Winter. (S.AE.30).	Extreme Cold. (S.AE.20).
Wakefield.	XL.		CW. (S.AE.20).
Prices.	C.	M.	---
Vacuum.	BB.	A.	Arctic.
Shell.	Triple.	Double.	Single.
Duckhams.	N.P.3.	N.P.XX.	N.P.X.

-continued-

Continued:-

This applies to all cars, except that Prices' oils are being omitted from the Phantom III list.

The choice of oil should depend on the coldest conditions to be encountered.

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Rv.
Mr. de Boeck. - Nice.
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Perrot Duval & Cie, Geneva.
Binelli & Ehrsam, Zurich.
R. P. Collyer, Ltd. Canada.
J. S. Inskip. Inc.

PRIVATE AND CONFIDENTIAL
FOR THE USE OF OFFICIALS ONLY.

9th June 1938.

DEPOT SHEET NO. Hd.387.

CHASSIS LUBRICANTS.

Origin of information:-
Rm/Gry5/MH.24.5.38.

Viscosity 30 oils are going to be used in future for all new engines, commencing at 3.DL-2 Phantom III, and B.2-MR Bentley, in place of the 50 oils previously used.

The relative nomenclature corresponding to the various viscosity numbers, is as follows:-

VISCOSITY 20.	VISCOSITY 30.	VISCOSITY 50.
Price's E.	Price's M.	Price's C.
Patent Castrolite.	Castrol XL.	Castrol XXL.
Vacuum Arctic.	Vacuum A.	Vacuum BB.
Shell Single.	Shell Double.	Shell Triple.
Duckham's NPX.	Duckham's NPXX.	Duckham's NP3.

All these Companies have agreed to label their viscosity 30 and 20 oil containers from now on with the viscosity number.

-continued-

Continued:-

Castrol XL (underlined) is a 30 oil, but the old XL. was of 50 viscosity.

For new engines 30 oils are recommended except when difficulty is experienced in starting in Winter, in which case a viscosity 20 oil should be used. For cars already in service one of the 50 oils is recommended for Summer use and a 30 oil for Winter.

Viscosity 30 oils may be used for gearboxes, except in the case of the Phantom III. This requires a 50 oil to attain the necessary degree of silence. Therefore, when a Castrol oil is used it should be XXL.

Hd.

NOTE.

We are informed by Paris (VA.6/ET.24.C.38) that Castrol XL as sold in France has a viscosity of 40 and XXL. has a viscosity of 60. There is no intention at the present time of lowering the viscosity of the above two oils as conditions in France are not the same as those in England, the oil temperature in engines in France being generally higher than those in England owing to cars being run for longer distances at high speeds and sometimes in very hot weather etc.

Continued:-

DEPOT SHEET NO. Hd.313.
H.T. WIRES. ALL CHASSIS.

There are still 400 cars fitted with Maconite cables, but these cars have now run a sufficient mileage to justify dropping the changeover as a free-of-charge modification. It should, therefore, be treated purely as a chargeable item on a mileage basis unless there is any actual complaint.

DEPOT SHEET NO. Hd.330.
DISTRIBUTOR ROTOR.
20/25 HP., 25/30 HP. AND BENTLEY.

This Depot Sheet does not instruct retrospective changeover, but instructions were subsequently issued to change the rotors on all cars up to three years old. This should now be dropped, and any new rotors necessary can be charged for on a mileage basis.

DEPOT SHEET NO. Hd.316.
PETROL PUMP FIXING. BENTLEY.

There are 400 cars not yet fitted with the new fixing plate, but these can now be left alone except when it is necessary to change a pump on one of the earlier 4¼ litre cars fitted with the noise insulation scheme on the dashboard, in which case it is an advantage because it avoids having to disturb the felt packing at a later date.

DEPOT SHEET NO. Hd.322.
PETROL PUMP SWITCH. ALL CHASSIS.

There are 450 cars not yet fitted with switches and these can now be left alone except in serious cases of complaint which warrant a switch being fitted.

DEPOT SHEET NO. Hd.346.
ACCELERATOR PEDAL. BENTLEY.

No more accelerator pedals should be dismantled as a routine job, as the cars not yet attended to have now run a sufficient mileage to be pretty sure they are not going to stick. Depots should, however, keep a check by noting the freedom of the accelerator pedal as an ordinary inspection job.

-continued-

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Mln. - Bombay.
Mr. Birkett, New Delhi.
Rv.
Mr. de Boeck. - Nice.
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Tr.
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HS.
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Rm.
REC.
Mx.
LA.
Mr. Hancock.
NW.
D/BP.
Mr. Robinson. - Holland.
Repair Department.

20th January 1939.

DEPOT SHEET NO. Hd.399.

OIL FILTERS.
Bentley Chassis.

Origin of information:-
Rm/Swdl.13/R.8.12.38.

A by-pass type of oil filter, known as the "General" filter, has been standardised for Production, andas this fitting has many advantages, it is recommended that it is a modification which should be suggested to customers as a chargeable improvement.

The charge to the customer will be approximately £3, and it is particularly recommended as an addition when a customer has new main bearings fitted.

The filter has a detachable element, and a replacement, costing 7/6d should be fitted after the first 5,000 miles, and subsequently every 10,000 miles.

The inclusion of this filter has a desirable effect on the condition and life of the bearings, particularly in the case of aluminium (Hall's alloy) bearings.

Another advantage is that so long as the customers adhere to the instructions regarding replacement of the element, there is no necessity to drain the oil from the sump every 5,000 miles as at present, but every 10,000 miles, the suction strainer being cleaned at the same time.

-continued

Continued:-

The filter itself is supported on two brackets secured by means of four of the screws in the water jacket covers. The main delivery pipe from the pump to the side of the crankcase should be cut close up to the crankcase connection and a new T. piece brazed on to form the feed for the filter. The return is taken to the rocker feed pipe, to which a suitable connection is brazed as shown.

The existing pipes can be modified, and it is only necessary to fit two new pipes which connect to the filter itself.

A blue print No. SCD.1000, showing the general lay-out of the filter, is attached to Depots' copy of this sheet.

Hd.

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Lubrication

RREC, RROC & Misc Articles

chassis

ONE-SHOT LUBRICATION

From 1929 onwards Rolls-Royce chassis have been fitted with a one shot chassis lubrication system comprising an oil pump connected to points requiring oil by means of a maze of narrow bore brass pipes. Early cars had separate subsystems on front and rear axles which had to be charged by means of an oil gun.

At each point requiring lubrication is fitted a metering orifice known as a drip plug. The drip plugs contain a small felt filter and a brass insert drilled to pass the correct quantity of oil at each operation of the oil pump. Assuming that the filters in the oil pump itself are clean, and that the oil pipes are not fractured, failure of the system to lubricate a particular component is almost always due to a fault in the relevant drip plug, possibly combined with dirt in the pipelines. The official procedure is to replace any suspect drip plug, but it is as well to check that the pipe to the banjo union on the plug in question is free of dirt. This is quite simply done by pressing and releasing the oil pump with the union disconnected, when any dirt will be expelled. Drip plugs can have their output severely cut down by an accumulation of dirt on the small felt filter inside the plug. This is particularly serious in the case of the rear spring shackles, where the plugs are right at the end of the line and tend to accumulate a large share of the loosened scale from within the pipes. In the last case I treated, there was enough dirt to fill the whole of the inside of the union.

If you have an oil gun, it is very useful to make up a drip plug tester. You need a drip plug union, some pipe, and a screw type oil gun fitting. With this device, you can apply oil pressure to a suspect drip plug, and determine if it passes oil at a reasonable rate. I have put a side branch in the pipe of my tester, permanently connected to a plug of known value, so that I can compare the flow through a suspect plug with that through a good one. If you fit a blank plug with its innards drilled out to the end of this device you can use the oil gun to push oil through to a component which may have become dry due to a failure.

Never trust your one shot system until you have checked it over. It is amazing how many times one finds that a piece of pipe is broken, cutting off the oil supply completely from a large part of the system, and seriously reducing the supply to the rest. Just operate the pedal and have a careful look round underneath the car. If you can see oil steadily dripping or running out anywhere, check for a broken pipe. With the aid of the drip plug map in the instruction book, check that each part is receiving oil. If any part appears dry, check the drip plug. In all cases of work on the oil system, be really fastidious about getting the work area clean. If your hands are dirty you may get enough dirt into the system to make your efforts worthless. When replacing the caps on the drip plug unions, have the oil actually flowing. This may be a bit messy, but it helps to keep dirt out and avoid air locks.

N.H.H.

CHASSIS LUBRICATION

A loose nut at any of the unions will clearly result, on depression of the pedal, in most of the oil escaping there, and practically none going (via the restricted drip plugs) to the points required. In use, on the road, such a fault would not be obvious. It was only by depressing the pedal with the car standing in the garage that I discovered at last why the front swivel-pins were not getting oil satisfactorily. A small pool under a rear shock-absorber led me to the loose union at that point. Half a turn of the nut, and the oil immediately began to exude, top and bottom, from the swivel-pins.

A.F.Deveson

ENGINE VIBRATION

A member reports that engine vibration on his 20-25 was caused by lack of lubrication to the front engine mounting. The lubricator, which takes the R-R oil gun, is hidden away beneath the radiator and is all too easily neglected by the owner who believes the one shot lubrication system looks after everything.

A further item very frequently neglected by owners is the large number of points on the brake and servo linkages requiring attention from the oil can by hand. These are usually utterly dry and well worn where the rest of the chassis is lubricated by the one shot system, whereas on hand lubricated chassis the wear is more evenly distributed throughout.

STEERING BOX PROBLEMS

The pre-war R-R chassis up to, but not including 25/30 and P III, used a worm and nut steering box of R-R manufacture. These boxes usually perform very well, and show very little wear, apparently being designed to last several centuries before achieving ten-year-test standards of backlash. However, sometimes the oil bath type of box fitted to the late 20 HP, 20/25 and P II, and also 3½ Bentley, gives rise to trouble.

The first snag is a tendency to leak oil. Generally the leaks appear round the flange at the front of the box through which the control tubes pass. The flange may be removed by sliding the control levers off their tubes, slackening the nut on the outer tube, removing the flange retaining nuts and the tab washer under the inboard one, and giving the outer tube nut a smart bang towards the steering wheel by means of a soft drift. This last operation frees the outer tube from its taper in the flange, and enables the flange to be drawn off. You can then try to make an oil tight joint between the flange and the box (not easy). The Hythe Road treatment with persistent oil leakers is to fill them with a 50-50 mixture of hub grease and the recommended oil. Warm the mixture and pour it in.

Testing and Rebuilding Bijur Lubricating Systems

Story, drawing and photos by Neal Kirkham, CA

The centralized chassis lubrication system was developed by Joseph Bijur who formed the Bijur Lubrication Corporation in 1923. Bijur provided mechanical, vacuum automatic and thermal automatic systems for Auburn, Bentley, Cord, Daimler, Duesenberg, Graham-Paige, Horch, Lancia, Minerva, Packard, Rolls-Royce, Rover, Stutz and Willys-Knight automobiles. Their use on Rolls-Royce and Bentley motor cars began with the Springfield Phantom I, very late Twenty H.P. and 3½ Litre Bentley and ended with the Silver Cloud/S1 in 1959. These systems were made for British Rolls-Royce by Luvax, Ltd. before World War II and Tecalemit after the war under license from Bijur.

The heart of this system is the oil reservoir and pump unit (Figure 1 shows a type DF) mounted on the firewall of the engine compartment with the activating lever protruding into the passenger compartment where it was convenient for foot operation. When this activating lever is pushed, the piston in the pump is raised, allowing reservoir oil to fill the cylinder cavity. Lever resistance is due to a spring being compressed in the pump. When the lever is released, this spring moves the piston downward forcing oil into the oil delivery tubes which lead to drip plugs (Bijur calls these meter units) at chassis wear points. After several decades of use, dirt, lubricant oxidation and oil additives cause restrictions to oil flow at felt strainers and drip plugs. In addition, tubing fractures or flow restrictions often occurred due to metal fatigue or road hazards. It is comforting to press the foot lever and watch its slow return believing that lubricant is finding its way to all wear points. My experience has shown that this is wishful thinking, and this self delusion could ultimately cost someone (probably you) many thousands of dollars in chassis repairs. To date, I have overhauled my 3½ Litre Bentley, R Type and Silver Cloud I and found at least a third of the wear points were being inadequately lubricated. If you have no evidence that your Bijur system has been properly overhauled, you should assume it has not been since, typically, the owner's manual states, 'Normally no attention to the system is necessary beyond filling of the reservoir with the correct oil....' Additionally, under the heading Drip Plugs: 'The drip plugs are non-adjustable and non-demountable.... The drip plugs never require cleaning and being non-demountable, no attempt must be made to take them apart. If one is suspected of being defective, it should be replaced with a new plug of the same rating'. Several problems arise.

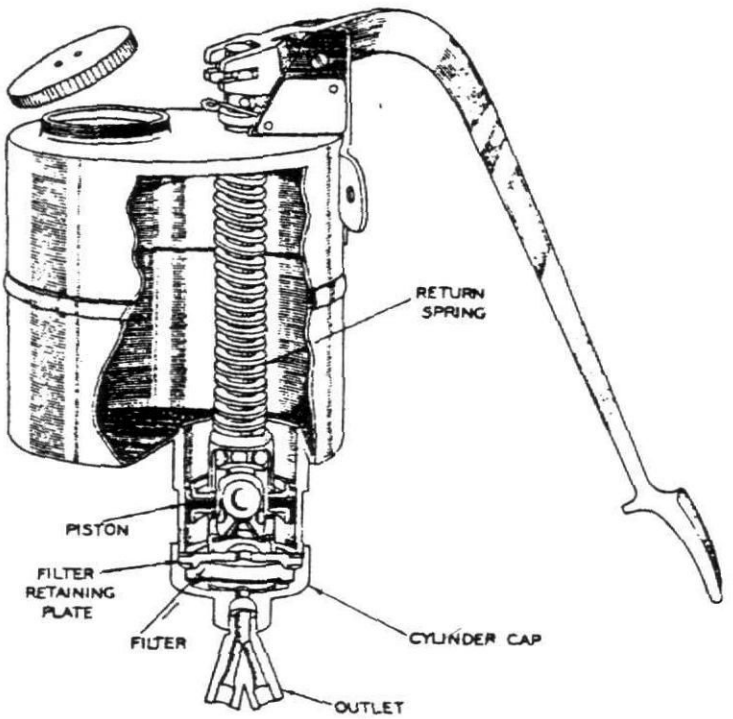
1. Rolls-Royce, obviously, never imagined their cars would outlive those who wrote these words.

2. New British replacement drip plugs are very difficult or impossible to find and somewhat expensive.

3. Drip plugs do require cleaning, do come apart and parts to rebuild them are readily available and inexpensive.*

My Phantom II handbook is typical in that it states 'Under no circumstances must any attempt be made to further dismantle the pump. If any defect in

Figure 1: Type DF Mechanically Operated Oil Reservoir and Pump Unit



Drawing courtesy N. Kirkham

Bijur recommends replacing malfunctioning British Z type drip plugs with their currently available type F U.S. threaded drip plugs. In order to use these, the British threaded chassis parts must be re-threaded to 1/8 NPT. Ideally, to do this, you would first remove the part to be re-threaded in order to preclude metal chips from entering oil passages where they could cause future damage. In most cases, this disassembly is totally impractical. In addition, the Bijur tubing will have to be re-made or cut and reformed in order to exchange the British tube nuts for those with U.S. threads.

operation should develop which is not rectified by removing the strainer pad as directed, the whole unit should be removed from the dashboard and returned to Rolls-Royce Ltd. for correction.' These units are repairable by a prudent do-it-yourself mechanic – see FL1248 'Luvax-Bijur Oil Pump Overhaul' – although this task is made a bit difficult due to the strong pump spring. Parts are generally available from Bijur (normally, only the leather piston cup or felt filter need replacement) or the pump and reservoir unit can be sent to Bijur for rebuilding. Before sending them your pump you should verify parts availability, particularly on pumps made by Luvax and Tecalemit since they have little information on them.

Simple Tests

Many of you have probably performed simple test routines with your Bijur system to determine if it is properly functioning, e.g.:

1. You can push the lever down and time its return. It should take between ten and thirty seconds depending on which technical article you believe and the car model in question. If it takes less time:

   a. Oil is escaping somewhere in the system where it should not, with the result that many or all wear points are being starved or

   b. The piston (sealing) cup in the pump is worn and allowing oil to bypass the leather seal with the result that little or no oil may be reaching wear points. If the pump lever takes an excessive time to return, it may mean that the felt strainer of the Bijur unit base is dirty and/or the drip plugs are dirty and retarding oil flow.

2. You can perform a crude oil distribution analysis by putting paper under the various drip plug locations (see handbook) and then push the Bijur lever a couple of times. After a suitable wait, check the paper. A large puddle suggests that you may have a broken or cracked fitting and other chassis points are being starved. While you should get some flow at each drip plug location, it is impossible to perform a sensible analysis in this manner. Drip plugs are, in effect, metering units and each location has a specified flow rate which, when new, can vary by a factor of five on most models. In addition, some delivery points (king pins, leaf springs, clutch release bearing, etc.) are shrouded and observation is difficult or impossible. However, this test can disclose gross leaks that must be repaired to have any hope of proper system function.

A word of caution is in order here. Exercise restraint in depressing the Bijur lever repeatedly since it is possible that brake or clutch linings will be so oiled as to require relining. How much is too much will vary with different models and be dependent on whether brake drum drain holes are clogged, improper drip plugs have been installed, etc.

As you can see from the above, there is no simple way to insure that your Bijur system is functioning properly.

Appropriate Oil

Before beginning a discussion of fault diagnosis it would be helpful to understand which oil is appropriate for your system. I checked a half dozen different owner's manuals and found all specified SAE 30 engine oil. When I discussed the use of engine oil with Deane Dingman of Bijur, he recommended using SAE 30 non-detergent motor oil (or mineral oil which is essentially the same thing) since detergent oil (with its various additives) has caused clogging problems in Bijur systems fitted to machine tools in long term, multiple shift operation. Interestingly, Silver Cloud I Service Bulletin CB 63 dated August 26, 1957 states, 'To improve lubrication of the steering joints and front suspension, it has been decided to change to a hypoid type oil and to discontinue the use of engine oil in the Chassis Lubrication System.... When carrying out the next Schedule 'A' on any car, retailers should empty the oil from the chassis lubricating pump and replace with one of the oils (hypoid 90) as listed below...."

Presumably, 'any car' refers to any Silver Cloud I or S1 since hypoid gear oil contains sulphur additives for extreme pressure applications which can attack brass parts often found in the chassis wear points of our older cars. This does, however, raise the question of which viscosity would be best for higher mileage cars with increased clearances at wear points. My personal recommendation for warm climates is the use of SAE 50 non-detergent motor oil (or SAE 90 mineral oil which has nearly the same viscosity). In mild climates, SAE 40 non-detergent would be appropriate. I am not concerned that these increased viscosities may inhibit lubrication. Since the pump is a positive displacement unit, the same volume will be delivered on each stroke independent of the viscosity. Time of delivery becomes the variable. For cars sometimes driven in cold weather, I would continue with SAE 30. Deane Dingman told me of an experimental Bijur system he was testing in a car years ago which was equipped with a pressure switch to

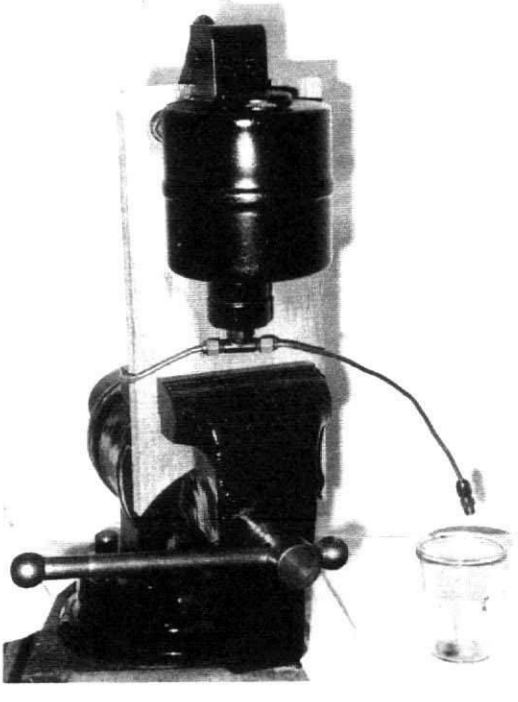


Figure 2: The oil reservoir and pump unit can be mounted on a wooden plank and held in a vise during testing. As shown here, a short length of Bijur tubing is attached to the pump outlet and to a drip plug in order to test the drip rate of the plug. In addition, the pump itself can be easily tested for leaks in this position by blocking the pump output and then operating the pump's foot pedal. A leaking seal here prevents oil from reaching the wear points in the system. Although handbooks warn against dismantling this pump, a careful mechanic can rebuild it. Refer to FL1248 "Luvax-Bijur Oil Pump Overhaul".

show when all oil from a piston stroke had been delivered. On cold winter days it could take over three hours to deliver 2 cc of SAE 30 oil!

Testing the Pump

Proper calibration of the Bijur system requires a consistently uniform pump pressure. This, in turn, requires a test of the pump to determine that the piston leather cup is not leaking, i.e., allowing the pressured oil to leak past the seal instead of being forced into the delivery tubes. Testing the pump and subsequent test and calibration of drip plugs can be done with the pump unit mounted in the car; however, these tasks are messy and will be made much easier by pump removal. I mount the pump on a wooden plank held in a vise for all tests that follow (Figure 2). To test the pump piston leather cup, you must block the pump output. Do this by one of the following means depending on which pump design your car uses:

a. Remove the output tube fitting at the bottom of the pump and substitute a ⅜ BSF bolt and sealing washer.

b. If the Bijur pump output fitting is a 'T', remove a short length of Bijur tubing from your car's installed system and connect each end to one side of the 'T' (alternatively, the parts to make this assembly are available from Bijur).

c. Use a short piece of 5/32" OD brass tubing with crimped end attached to the output fitting with a tube nut and sealing olive. The tubing and sealing olives can be purchased from Bijur.

Perform the seal test by depressing the foot pedal and waiting to detect pedal movement. Any pedal motion is caused by oil bypassing the pump seal. While there is no specification on how much leakage is tolerable, you can be assured that if the seal leaks that leakage will continue to worsen.

Next, remove the Cylinder Cap (Figure 1) and remove and inspect the filter. If it is dirty, replace with a new felt from Bijur (P/N A-2500 for the type DF pump shown).

Locate and Remove Drip Plugs

Your owner's handbook will show you a piping diagram of the chassis oiler system for your car. These diagrams (except for Silver Cloud and S1) will identify the various drip plug types installed at the factory. Figure 3 shows British ZE2 (90°) and ZS4 (straight) drip plugs. The letters describe the body configuration and the number describes the flow rate. For example, a number 1 will have half the flow rate of a number 2 and number 2 half that of a number 3 and so on.

The first step in testing and recalibration of the system should be removal of all drip plugs. The reason for this will be made clear in the discussion of testing the delivery tubes. It is important to make a sketch of the drip plug locations on a large sheet of paper and place each plug on this sketch to prevent future confusion. Note whether the flow number on the plug matches the number in the owner's manual. If the flow rate of the installed plug is different from that specified in the owner's manual, I would check further by reviewing other manuals (they were issued in several iterations over the build life of each model) or other vehicles. It is possible that a misguided individual replaced the original with an incorrect part or that the factory changed the drip plug flow rate on later models of your chassis.

Counting the Drops

Next, make up a summary sheet as shown in Figure 7. Test each drip plug by using a short length of Bijur tubing attached to the Bijur pump unit output and the drip plug (Figure 2). Use a consistent time base (30 seconds works well) and count the number of drops metered by each drip plug. You will need one other bit of information to determine which plugs are working properly and that is a calibrated flow rate for a known good plug. I have a new, unused number 2 that delivers 14 drops of SAE 30 oil in 30 seconds at 70°F (10 drops with SAE 90) with my Bijur pump. You can use this as a benchmark number for your calibrations; however, you should know that

Comments on Past Bijur System Articles

Quite a few articles on Bijur system repair have been published in *The Flying Lady* which would lead one to question why another? I have read all of these articles and quite a few from the Classic Car Club before I began overhaul of the three Bijur systems I have done to date and found them all lacking in one way or another. Many of them show special tools they thought necessary and give bad or inaccurate advice, viz.:

FL21: This is a very brief discussion of diagnosis and repair of drip plugs that omits too much necessary information.

FL410: Focus is on Springfield Phantom I. Recommends fabrication of a drip plug test unit that is not necessary. Author also recommends replacing drip plugs. This should not be necessary and may not be possible without considerable machine work. Author recommends cleaning plugs with toluol which was not satisfactory as evidenced by his flow test data on individual drip plugs after cleaning.

FL423: Refers only to Springfield cars. Emphasis is on several special tools to rebuild drip plugs which are not necessary. Also, recommends buying new drip plugs which do not have same threads as original, thus requiring adapters, etc.

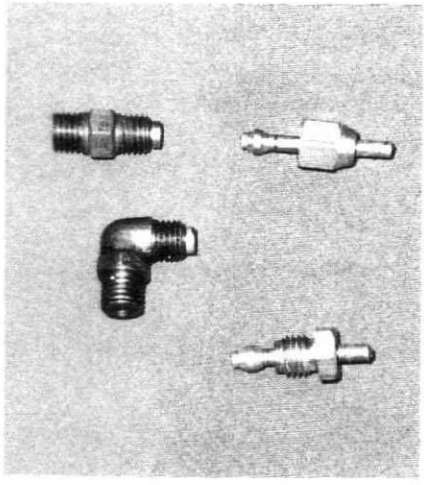
FL447: Discusses several special tubing assemblies the author used to 'unstick' drip plugs and clear blocked oil passageways. This approach is an undesirable method for unsticking drip plugs since it does not correct the internal problem which will return. The special tubing assemblies could be useful in case of severe blockage, but I have not found them necessary on my three jobs.

FL1244: This article only discusses replacing old drip plugs with new Bijur units plus adapters. Focus is on Springfield cars.

FL2028: Properly operating Bijur pump and drip plug check valves make this modification to the reservoir unnecessary.

General Provisos:

- Do not soak plugs in lacquer thinner.
- Do not use compressed air to clean dirt out of the plug.
- Do not heat the plug with a propane torch.
- All internal parts are available.



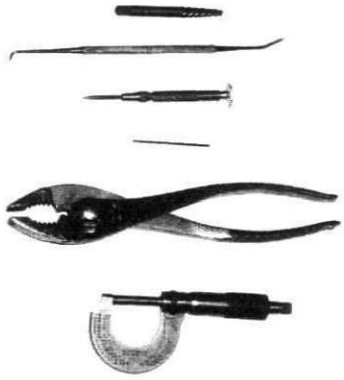


Photo © 1995 K. Karger

Figure 3: Bijur fittings for British cars. Clockwise, starting at lower left – British ZE2 (90°) drip plug; British ZS4 (straight) drip plug; compression sleeve or sealing 'olive' with female compression nut; same 'olive' with male compression nut. ***Figure 4:*** *Tools to overhaul your drip plugs. Top to bottom – 'Easy out'; dental tool; small scribe; number 55 drill bit (.052" diameter); swivel jaw pliers and micrometer.* ***Figure 5:*** *A chassis as dirty as this makes it extremely difficult to inspect the drip plugs, lines, or anything else for that matter.*

there is a ± 30% flow rate tolerance on new drip plugs and the flow rate can vary 10% in successive tests of the same drip plug depending on whether the metering pin is in the center or at the side of the body orifice. Additionally, after many years of use, pump output pressures may vary. Drip plugs that have a proper flow rate can be re-installed but I always disassemble them since the original check (sealing) valve disk (Figure 6) is nearly always badly deteriorated. A bad disk can allow oil to continue to run through the drip plug as the car sits and result in less oil delivery to this and other drip plugs the next time the Bijur lever is pressed.

No Soaking, No Air

It is very tempting at this time to follow the advice of several Bijur system articles I have read over the years and soak malfunctioning drip plugs in a solvent such as lacquer thinner overnight to restore the proper flow rate. This is not a good idea since harsh solvents may attack the drip plug check valve disk and destroy its effectiveness (Bijur Corporation). Also, I have never been successful in freeing stuck metering pins using either lacquer thinner or carburetor cleaner no matter how long I soaked them. You should, also, not attempt to clear a drip plug with inadequate flow by applying compressed air to the inlet. Air will do nothing to eliminate the 'varnish' deposits, and this procedure can result in all the tiny internal parts scattering throughout the workshop never to be found again.

Tools for Overhaul

Before beginning disassembly of individual drip plugs, I would recommend that you stock an inventory of parts to cover your basic needs. These items will be identified later in this article. Only a few simple tools (Figure 4) are needed to overhaul your drip plugs. In the top of the photo is an 'easy out' that I use to remove the Insert (Figure 6) without damage. (The ID of the Insert is .161 inches.) Once out, use the dental tool to remove the felt filter and mesh screen below it. Below the dental tool is a small scribe used to remove the Valve Retaining Cup at the outlet end of the unit (a #2-56 tap can also be used). Take this out carefully and be prepared to capture the check valve Spring as you do so. Next, carefully push out the metering Pin and with it the Valve and Plate Disks. Below the scribe in Figure 4 is a number 55 drill bit (.052 inch diameter) which I use to ream out the hole in the brass drip plug body to remove any varnish-like buildup. (All drip plugs on our cars have a .052 diameter hole.) A few passes with this drill, usually using just your fingers, will clean them out. During reassembly I use the swivel jaw pliers shown in Figure 4 to push the Valve Retaining Cup into position. It is a good idea to Locktite this Cup and the Insert at the other end into place. The micrometer in Figure 4 is helpful if you wish to check metering Pin diameters. As a matter of course, I measure each Pin diameter and determine if it has the proper diameter for the flow number on the drip plug body. Pin diameters are:

No. 1	.0487"
No. 2	.0478"
No. 3	.0465"
No. 4	.0445"

As you can see, it is a simple matter to change a flow rate if you wish more or less oil at a chassis point or if you cannot find a replacement drip plug with the flow rate you require.

The internal filtering unit used when these drip plugs were manufactured was a piece of felt restrained by a wire mesh screen from entering the metering orifice. This felt is usually quite dirty so, as a matter of course, I replace it and the wire mesh screen with the Filter, Spacer and Silicone Ring shown in Figure 6. As mentioned earlier, the Valve Disk should also be replaced. You should also order a small supply of each of the other parts shown in Figure 6 in case of loss or damage.

Check the Lines

One important further check is necessary before re-installing the drip plugs and that is to be sure that the lines leading up to each plug are clear. Put newspaper under the chassis at each drip plug location and press the pump lever. Wherever oil flows out, replace the restored drip plug. It will probably take several iterations before the most distant points show flow (due to line friction or plugged lines). Once you determine a line is plugged, it should be cleared with a wire and blown out with air. If these attempts fail to clear

your Bijur flow, refer to FL44" for a means to apply more oil pressure to free the line or passageway. I recommend the above procedure to minimize the amount of oil delivered through installed drip plugs in sensitive areas near clutch and brakes. Be sure to also replace any dirty felt filters in the system such as those in prewar front axle beams before you test to determine that axle oiling points are being fed. See your owner's manual for locations.

Bijur tubing is 3/32" OD brass and is available from Bijur in 12 foot coils (part number 5B25). You will require two Compression Sleeves or sealing 'olives' (Figure 3) for each new length of tubing you replace on British built cars. Springfield cars used flare fittings which will require a tube flaring tool instead of the Compression Sleeves. If you have damaged male or female (British) Compression Nuts (Figure 3) they are available from Fiennes Engineering (Female AE070 and Male AE080). Nuts for Springfield cars are available from Bijur. Once you have a count of the number of drip plugs in your system, I recommend you order one of the following for each drip plug:

Part No.	Description
B6118	Ring, Silicone
B6726	Spacer
A2074	Cup, Valve Retaining
B6052	Filter
A2075	Disk, Valve

One each of the above will cost about a dollar and a quarter.

I would also order a few extra of these and other drip plug parts since the minimum order is $40.00. Other items to consider are:

Part No.	Description
A1846	Piston Leather Cup
B525	3/32 OD Brass Tubing
B1061	Sleeve, Compression
A1475-1	Pin, Flow Rate no.1
A1475-2	Pin, Flow Rate no. 2, etc.
A2073	Disk, Plate
A2874	Spring

Bijur can supply current price lists and a two page 'Technical Data Sheet – Meter Units – Cyclic Delivery, Type F' which lists currently available U.S. threaded drip plugs.

Figure 6: Bijur Meter Unit (Drip Plug)
Bijur Lubrication Corporation Part Numbers
Rolls-Royce and Bentley Cars through Silver Cloud I

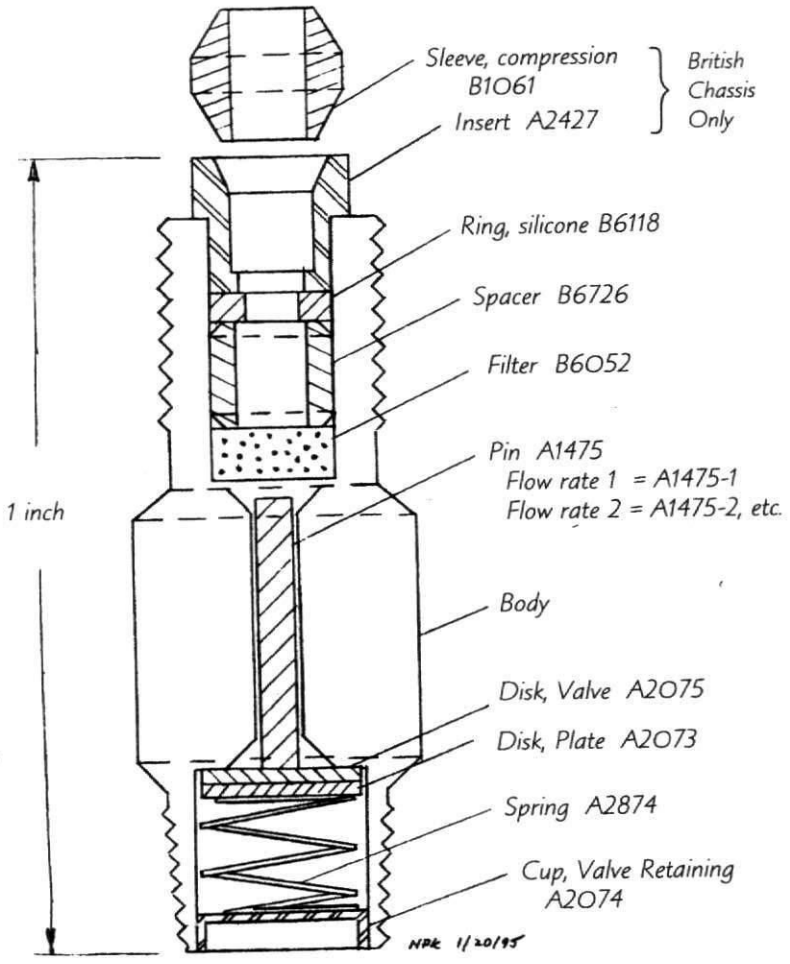


Figure 7: Bijur Drip Plug Test – 3½ Litre B35BL

Chassis Location	Drip Plug No.	Drop Count Removed	Cleaned	Expected	Comment
RH Handbrake Equalizer & Shaft	ZE2	6	6	8	
RH Footbrake Equalizer Shaft	ZS2	0	8	8	Plugged with 'varnish'
LH Handbrake Equalizer Shaft	ZE2	6	6	8	
LH Footbrake Equalizer & Shaft	ZT2 ZS2	7 Stream	7 8	8 8	Missing all internal parts

Remaining drip plugs omitted in this example.
Bijur pump tested and found to be without piston seal leak. Oil used SAE 30.
Calibration: New no. 2 plug – 8 drops/15 seconds.

Sources

The Bijur Lubricating Corporation is alive and well at 50 Kocher Dr., Bennington, VT 05201-1994, tel. 800-631-0168 or 802-447-2174, fax: 802-447-1365.

Fiennes Engineering, Clanfield Mill, Little Clanfield, Clanfield, Oxfordshire OX8 2RS, England, telephone 36781438, have a 10 page catalogue featuring Derby Bentley parts frequently unobtainable elsewhere.