

Chapter Thirteen

LUBRICATION SYSTEM, SERVICING AND MAINTENANCE

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Oil pressure filter			Fig. 1

This chapter contains instructions for adjusting, removing, and refitting the lubrication system components. The general information contained in Chapter 5 should be referred to as necessary.

OIL SUMP, DRAINING

The capacity of the oil sump is 2 gallons, and, therefore, a container of at least that capacity must be placed under the drain plug before the plug is removed. To drain the oil sump, release the locking tab and unscrew the drain plug which is situated at the rear port corner of the underside of the sump.

Ensure that the threads and mating surfaces of the drain plug and the oil sump are clean and free from any burrs or damage which might prevent an oil-tight joint being obtained. Place a new tab washer (Part No. N3703) on the drain plug and screw the plug into the sump. Securely tighten and lock the plug.

OIL SUMP, FILLING AND TOPPING UP

Instructions for filling and topping up the oil sump are contained in Chapter 9.

OIL SUMP, REMOVAL

The joint between the oil sump and the bottom wheelcase is sealed with a synthetic rubber sealing strip fitted in a groove in the top face of the sump flange. In addition to the external studs and nuts, the oil sump is secured to the bottom wheelcase by two internal studs and nuts and, therefore, it is impossible to separate the oil sump from the bottom wheelcase whilst the wheelcase is mounted on the engine.

OIL SUCTION FILTER, RENEWAL, REFITTING

Removal of the oil suction filter is not a periodic servicing operation specified in the Maintenance Schedule dated 22-2-1951. Since this filter fits directly into an opening in the bottom of the oil sump, the sump should be drained as described on this page before commencing to remove the filter. If preferred, a container of at least 2 gallons capacity may be placed under the filter and the oil allowed to drain out of the sump through the filter opening; although this may save a little time it will make removal of the filter a very messy operation. In any case, the oil sump must be refilled as described in chapter 9 whenever the oil suction filter has been removed and refitted.

When it is required to remove the oil suction filter proceed as follows. Drain the oil sump. Remove the four $\frac{1}{4}$ " B.S.F. plain nuts, spring washers, and plain washers which secure the suction filter cover to the oil pump body immediately behind the metering pumps. Remove the suction filter cover and the gauze suction filter element.

Thoroughly clean the suction filter element in clean kerosene, using a syringe to force the kerosene through the gauze. Move the syringe up, down, and around inside the gauze so that the kerosene is forced through every part of it, brushing any sediment off the exterior of the element. Dry off the element with a jet of dry compressed air.

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The element should be examined for damage to the gauze. Slight damage may be repaired by soldering. Ensure that the mating faces of the filter cover and the oil pump body are clean and undamaged; remove all traces of any previous coating of jointing compound. A joint washer is not used between these parts.

Apply a thin even film of the approved jointing compound to the filter cover joint face. Position the gauze filter element in the recess in the cover. Holding the cover and the filter element, insert the element into its housing in the oil pump body ensuring that the upper end of the element enters the recess in the bottom of the sump, and that the four studs pass through the holes in the suction filter cover. Refit the four plain and spring washers, and the four nuts.

OIL PUMP, REMOVAL AND REFITTING

The oil pump cover which carries the metering pumps is fastened to the oil pump body by two studs, plain and spring washers, and 2 B.A. plain nuts; there are also two dowels which ensure the positive location of the cover. The oil pump is fastened to the underside of the oil sump by six studs which pass through the oil pump body and its cover, four studs which pass through the oil pump body and the suction filter cover, and a short stud which passes through a lug on the oil pump body only adjacent to the suction filter. A plain $\frac{1}{4}$ " B.S.F. nut is screwed on to each of these eleven studs, the six nuts on the studs which pass through both pump body and cover are locked with tab washers but the remainder have merely a plain washer and a spring washer under the nut. All the joints in this sub-assembly are metal-to-metal, no joint washers being employed. If it is required to remove the oil pump for any reason, proceed as described in the following paragraphs.

Drain the oil sump and remove the oil suction filter as described already. Disconnect the flexible pipes from the two metering pumps, as described when dealing with these units.

Remove the $\frac{1}{4}$ " B.S.F. plain nut, spring washer and plain washer, from the stud adjacent to the oil suction filter. Do not disturb the two 2 B.A. plain nuts which secure the oil pump cover. Release the locking tabs and remove the six $\frac{1}{4}$ " B.S.F. nuts and the tab washers which secure the oil pump and its cover to the sump.

If the oil pump is stuck, a light tap will usually free it. As the oil pump is removed, the drive shaft sleeve and the driving shaft will probably drop out of the oil sump. If they do not, they should be withdrawn.

When refitting the original or a replacement oil pump, proceed thus. Remove all traces of any previous coating of jointing compound from the mating faces of the oil sump and oil pump body. Apply a thin even film of the approved jointing compound to one of the faces. Ensure that the circlip (Part No. 26066) is correctly located and secure in the drive shaft sleeve. Assemble the sleeve to the splines of the oil pump driving gear and insert the end of the oil pump driving shaft into the sleeve. Check the oil pump for freedom of rotation. Ensuring that the upper end of the oil pump driving shaft enters the oil pump driven gear in the bottom wheelcase correctly, assemble the oil pump to the sump. Fit a plain and a spring washer on the stud adjacent to the suction filter and six new tab washers (Part No. N1592) on the studs which pass through the oil pump body and cover, and secure the pump in position by fitting the seven nuts. Before reconnecting the metering pump pipes, remove one of the metering pumps, as described on page 4, and check the correct assembly of the oil pump drive thus. Rotate the impeller by hand and, by observing through the metering pump mounting, ensure that the cam on the main oil pump spindle is rotated. When the result of this check is satisfactory, refit the metering pump as described on page 4, and reconnect the metering pump feed pipes. Refit the drain plug and suction filter and refill the oil sump as described already.

OIL PRESSURE FILTER (Fig.1)

When the oil pressure filter is removed, a certain amount of oil will drain out of the filter compartment in the oil sump and out of the passages on the outlet side of the filter. Therefore, a receptacle of about half a gallon capacity should be placed underneath the oil pressure filter cover before its removal is commenced.

Before the oil pressure filter can be removed, if the engine is installed in an aircraft, the oil temperature gauge must be disconnected from the oil temperature gauge resistance bulb which is in the thermometer pocket in the centre of the pressure filter cover. To do this, unscrew the plastic nut which secures the electrical connections to the resistance bulb and pull out the plug. Alternatively the resistance bulb can be withdrawn after unscrewing the $\frac{3}{8}$ " B.G.P. union nut which retains it in the filter cover.

To remove the oil pressure filter, cut the locking wire which locks the adjacent plug to the lockwire tab under one of the pressure filter cover nuts, undo the six plain $\frac{1}{4}$ " B.S.F. nuts securing the pressure filter cover, and remove the spring washers, the lockwire tab, and the cover. As the cover is removed, the pressure filter assembly will be forced out of the oil sump by the overload valve spring, ensure that one hand is ready to catch the filter assembly and the spring as they are not attached to the cover in anyway.

To dismantle the pressure filter assembly proceed as follows. The overload valve spring is not attached to the spring supporting end plate and may be lifted off. Similarly, the pressure filter assembly may be separated from the cover and the neoprene seating washer, which is between the pressure filter end plate and the cover, removed. Extract the soft iron retaining wire from the upper end of the support tube and slide the following parts off the support tube: spring supporting end plate, neoprene washer, felt pressure filter element, and second neoprene washer. Thoroughly clean the detail parts with the exception of the felt filter element, in clean kerosene; the gauze-covered support tube should be cleaned as

already described for the suction filter element on page 1. Ensure that the holes, which form the overload relief valve, in the end plate attached to the support tube are clean. No cleaning of the felt filter element is permissible and a new filter element (Part No. 22772) should be fitted every 150 hours.

The gauze surrounding the support tube should be examined for damage; slight damage may be repaired by soldering. Ensure that the joint faces of the filter cover and the sump, and the mating faces of the support tube and cover which form the overload valve, are clean and undamaged. Examine the klingerit joint washer (Part No. 29915), the neoprene seating washer (Part No. 25505), and the two neoprene end plate washers (Part No. 48355); if any of these parts, or the felt filter element, are in any way unserviceable, new parts should be fitted.

Having ensured that all parts are clean and serviceable, reassemble and refit the filter as follows. Place one of the neoprene end plate washers on the upper surface of the end plate which is attached to the support tube. Slide the felt filter element, the second neoprene washer and the spring supporting end plate on to the support tube. Secure these parts by inserting a new length of 14 S.W.G. soft iron wire through the holes in the support tube. Bend over the ends of the wire to retain it in position and ensure that the ends do not project beyond the smaller diameter of the spring supporting end plate; as this must slide freely in the recess in the upper part of the compartment in the oil sump in order that the filter assembly may be free to operate as an overload valve. Place the joint washer on the cover and place the neoprene seating washer over the boss at the centre of the cover. Position the overload valve spring in the recess in the flange of the spring supporting end plate and position the complete sub-assembly on the cover. Ensuring that the smaller diameter of the spring supporting end plate enters the bore in the top of the filter compartment and that the spring fits around the boss containing this bore, insert the filter assembly into the oil sump and position the cover over the six studs. Refit the lockwire tab on the stud adjacent to the plug in the sump, and refit the six spring washers and plain nuts. Wire-lock the plug to the lockwire tab with 22 S.W.G. stainless steel locking wire, and reconnect the electrical leads to the oil temperature gauge resistance bulb, or refit and reconnect this bulb.

OIL PRESSURE RELIEF VALVE

The setting of the oil pressure relief valve should not be interfered with until it is certain that the incorrect oil pressure is due to incorrect setting of the valve. The normal and minimum oil pressures, and maximum and minimum temperatures permissible are stated in the Operating Limitations at the beginning of this handbook. Low oil pressure may be the result of particles of foreign matter preventing the relief valve closing and, where this is suspected, the valve should be dismantled and cleaned, without disturbing its setting, as described in the next paragraph. Failure of, or leakage past, the synthetic rubber seal between the relief valve housing and the oil sump could also cause low oil pressure.

If it is required to dismantle the oil pressure relief valve for any reason and it is desired to retain the original setting, do not remove the plug from the end of the relief valve cap but proceed thus. Unscrew the two $\frac{1}{4}$ " B.S.F. plain nuts and remove the spring washers. Remove the plain washer from one of the studs; the lockwire tab will come away with the relief valve cap. Pull the relief valve cap off the two studs, and take out the spring and steel ball. If it is required to examine the synthetic rubber seal, withdraw the relief valve housing.

Thoroughly wash the detail parts in clean kerosene. Carefully examine the ball valve, spring, and housing; paying particular attention to the ball valve seating. Remove all traces of old jointing compound from the mating faces of the flanges and the sump. If there is any doubt about the serviceability

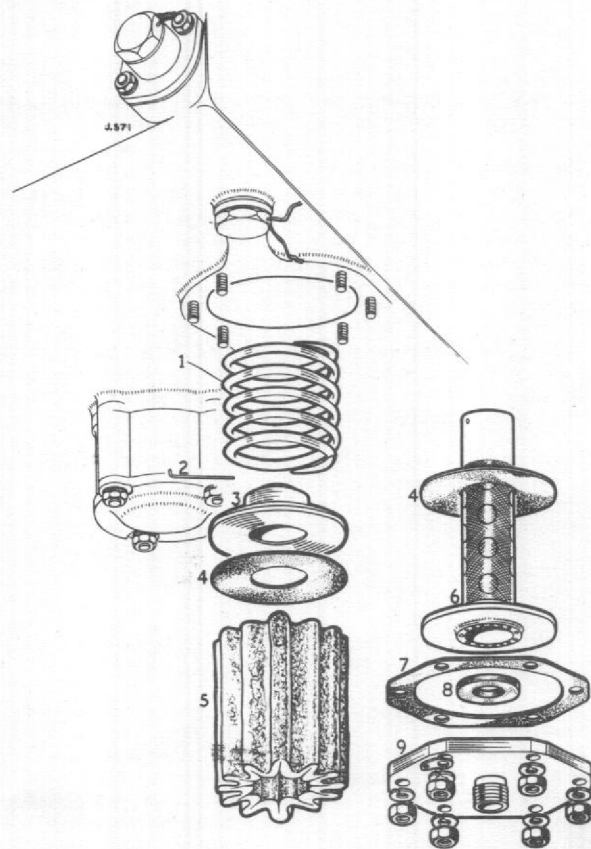


Fig. 1 Oil pressure filter

1. Overload valve spring.
2. Soft iron retaining wire.
3. Spring supporting end plate.
4. Neoprene washer, 2 off.
5. Felt filter element.
6. Gauze-covered support tube assembly.
7. Klingerit joint washer.
8. Neoprene seating washer.
9. Pressure filter cover.

of the synthetic rubber seal (Part No. N4278) a new one should be fitted into the groove on the exterior of the housing. Ensure that the valve seating and the bore in the housing are perfectly clean.

If the oil pressure relief valve has been dismantled completely it must be reassembled as detailed in this paragraph, but if the plug and adjustable stop have not been separated from the cap certain of the operations described will be unnecessary. Screw the adjustable stop into the cap, from the inside, and refit the 2 B.A.* thin nut which is used as a lock nut. Ensure that a serviceable rubber seal is in position on the relief valve housing, smear a thin film of approved jointing compound on the flange, and push the housing into position in the oil sump. Smear a thin film of approved jointing compound on the flange of the relief valve cap, place the steel ball in the housing, position the spring on the relief valve stop, and refit the cap and spring to the housing. Place the lockwire tab on one of the studs and the plain washer on the other. Refit the two spring washers and plain nuts. Run the engine to check the relief valve setting and adjust, if necessary, as described in the next paragraph. When the oil pressure is satisfactory, refit the washer and plug to the relief valve cap. Wire-lock the plug to the lockwire tab with 22 S.W.G. stainless steel locking wire.

To adjust the oil pressure relief valve, cut the locking wire and remove the plug from the relief valve cap. Using the combined spanner and screwdriver T74176 slacken the 2 B.A. lock-nut,* which is then exposed, and, using the screwdriver, turn the adjustable stop clockwise (screw in) to increase the oil pressure, and vice versa. Holding the adjusting screw with the screwdriver, lock the setting by tightening the lock-nut. Ideally, the oil temperature, when checking or adjusting the oil pressure relief valve setting, should be 45 ± 5 deg. C. and the relief valve should be adjusted so that an oil pressure of 45 lb. per sq. in. is indicated by the pressure gauge connected to the top wheelcase when the engine is running at maximum continuous r.p.m. When the oil pressure has been proved satisfactory by engine running, refit the plug and washer, and wire-lock the plug.

METERING PUMPS

If new metering pumps are fitted or defective lubrication is suspected it will be necessary to check the metering pumps delivery as described below.

With the exception of its delivery pipe connections each of the metering pumps is identical and, therefore, instructions for removing, refitting, and checking one only are given. To remove one of the metering pumps proceed thus. Rear bearing metering pump, remove the banjo bolt which connects the flexible pipe to the metering pump, remove the two washers, and ease the pipe clear of the metering pump. Front bearing metering pump, do not disturb the banjo bolt but disconnect the flexible pipe from the banjo on the metering pump by unscrewing the union nut. Unscrew the two 2 B.A. plain nuts which secure the metering pump to the main oil pump cover, remove the spring and plain washers, and carefully ease the metering pump off the studs. Should the synthetic rubber sealing ring, which forms the joint between the metering pump and the main oil pump cover, remain in the latter, it should be extracted and placed on the spigot of the metering pump.

Do not dismantle the metering pump or alter its setting. Make a thorough visual examination of the exterior of the metering pump for signs of damage, and ensure that the plunger is not bent or damaged and that the visible spring is serviceable.

Unless care is taken when refitting a metering pump, the metering pump plunger may be displaced and bent, thus rendering the pump inoperative. Therefore, these instructions should be followed carefully. If there is any doubt about the serviceability of the sealing ring, place a new sealing ring (Part No. 20272) on the metering pump spigot. Ensure that the sealing ring does not obstruct the oil inlet duct in the metering pump. Rotate the engine until the cam on the main oil pump spindle is seen to be at bottom dead centre (position of 'no lift') relative to the particular metering pump which is being refitted. Insert the metering pump spigot into the bore in the main oil pump casing and hold it in position against the load of its spring so that the flange on the metering pump is firmly bedded against the main oil pump casing. Holding the metering pump firmly in position, fit the two plain and spring washers, and the plain nuts; the metering pump must be held in position until both nuts are at least finger-tight.

As mentioned above, whenever new metering pumps are fitted, or when refitting a metering pump which has been removed for any reason, or if defective lubrication is suspected, it is necessary to check the metering pump delivery in the following manner. With the delivery pipe disconnected, run the engine at 3000 r.p.m. and measure the flow of oil from the metering pump into a graduated vessel over a timed period. The metering pumps are adjusted by turning the knurled end until the locking spring engages the lowest numbered notch which will give the delivery specified (not less than 180 cc. (0.317 pints) per hour at 3000 r.p.m.); normally notch 10 is the setting for both metering pumps, but a metering pump should not be rejected merely because it is necessary to employ a slightly different setting in order to obtain the required delivery. The range of adjustment consists of eleven notches numbered 0 to 10 and on no account may the adjustment be turned beyond the notch marked 10 to obtain the required delivery. If it is necessary to continue running the engine for more than five minutes with the metered oil supply disconnected, it is essential to supply the main bearings with clean filtered oil of the correct grade by means of a syringe through the normal supply pipe. If the flow is insufficient at No. 10 setting, the metering pump is faulty - before rejecting the metering pump, ensure that the oil supply duct is not blocked, possibly by displacement of the sealing ring - and must be changed for a serviceable metering pump. On satisfactory completion of this check, or adjustment, the locking spring should be tightly wired into position. Reconnect the flexible pipe to the metering pump, using, in the case of the rear bearing metering pump, new washers (Part No. N1502) if the original ones are in any way unserviceable.

* $\frac{1}{4}$ " B.S.F. when mod. 199 is embodied.

When reconnecting the front bearing oil feed pipe to the metering pump (in engines where mod. 431 has not been embodied) care must be taken to ensure that the banjo union on the metering pump points towards the port side of the engine, that is so that its threaded end is as close to the oil sump as possible, Fig. 1A. Failure to take this precaution may result in the ball-end of the front bearing oil feed pipe fouling the engine bay cowl- ing. Where such a foul occurs, the 'necked' por- tion of the banjo union will eventually fracture and cause failure of the front bearing oil supply.

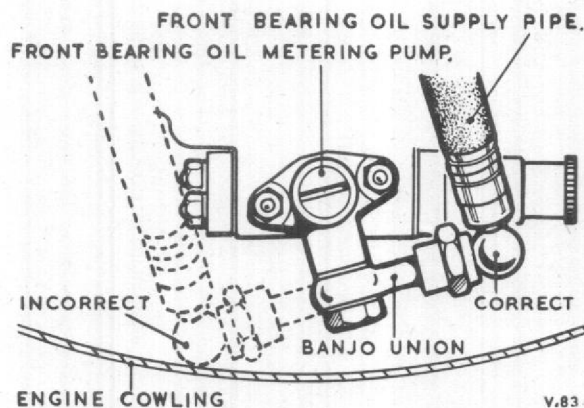


Fig. 1A. Front bearing metering pump, show- ing correct position of banjo connection.

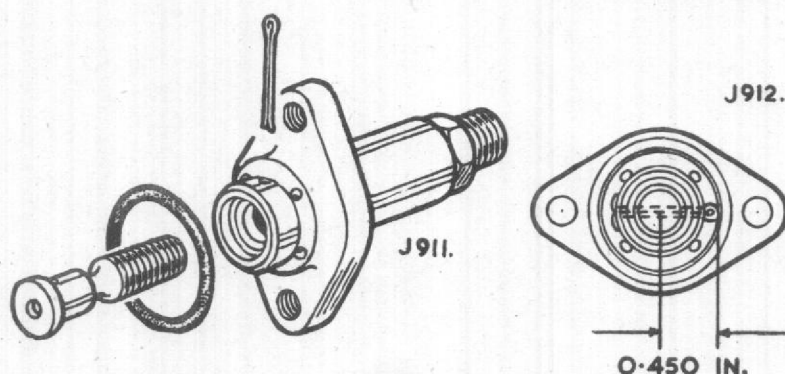


Fig. 2. Front-bearing oil feed restrictor showing dimension over split pin.

FRONT-BEARING OIL FEED RESTRICTOR

At the intervals specified in the Maintenance Schedule, when mod.431 has been embodied, the front-bearing oil feed restrictor must be removed and cleaned. To do this, disconnect the flexible pipe from the outboard end of the oil feed restrictor which is mounted on the main oil pump cover in place of the front-bearing metering pump which was fitted pre-mod.431. Unscrew the two 2 B.A. plain nuts which secure the oil feed restrictor, remove the spring and plain washers, and carefully ease the restrictor assembly off the studs. Carefully extract the split pin which passes through the inboard end of the assembly and which re- tains the restrictor in the restrictor housing. Withdraw the restrictor from the housing; the restrictor resembles a banjo bolt. Thoroughly clean each part by washing it in kerosene. Reassemble the restrictor to its housing and insert a new split pin (Part No. SP.908); if the split pin holes do not line up, turn the restrictor within the housing, through 180 degrees. The head of the split pin must be flattened so that it does not project beyond an 0.450 inch radius from the centre of the restrictor - Fig.2.

When the oil feed restrictor assembly has been cleaned, refit it to the engine by reversing the removal instructions. If there is any doubt about the serviceability of the sealing ring, which must be fitted on the spigot on the inboard side of the restrictor housing flange, a new sealing ring (Part No. 20272) should be fitted. Ensure that the sealing ring does not obstruct any of the four oil inlet ducts which are drilled in the housing.

FLEXIBLE PIPES, TESTING AFTER STORAGE

Under certain circumstances, there is a tendency for flexible pipes to deteriorate after a period of storage. Since signs of such deterioration are not apparent until the pipes have been subject to pressure it is considered imperative that flexible pipes which have been in store for a period of six months or more should be pressure tested in accordance with the instructions which follow before being fitted to an engine.

The testing of pipes which are fitted to engines in storage is considered to be unnecessary since these pipes will have taken up their 'set' and due to the fact that they contain inhibiting fluid they are not subject to the same degree of deterioration.

EQUIPMENT

No elaborate equipment is required to carry out these tests. The essentials are a hand pump with a pressure gauge and a set of suitable adapters and blanks. The Varley testing unit recommended for inhibiting the B.P.C. and the air-fuel ratio control, see chapter 20 page 3 and Fig. 7, will be found quite suitable for carrying out these tests. Suitable adapters and blanks are listed on this leaf; and dimensioned sketches from which similar adapters, etc., can be manufactured are given at the end of these notes.

TESTING

The test fluid must be aviation kerosene to specification D. Eng. R.D. 2482, and it should be used at the prevailing ambient temperature.

Each pipe should be tested as follows. Blank off one end of the pipe and, having ensured that the pipe is full of fluid (no air locks), apply the fluid pressure specified in the table below. Maintain the pressure for three minutes. During the last minute of the test the pipe must be flexed

through approximately plus and minus 15 degrees. During this test the pipe must be carefully examined for leakage. No leakage is permissible.

These instructions are based on de Havilland Gas Turbine Test Specification TTS. 34 issue 2.

IDENTIFICATION

The date of manufacture and initial testing, is marked on the brass part number identification tag thus—the letter T followed by the month and the year, for example T7/50 indicates that the pipe was manufactured and tested in July, 1950. After re-testing any pipe in accordance with these instructions, operators are recommended to mark the pipe in a similar, or in some other suitable, manner.

STORAGE

Flexible pipes should be stored in a dark location where the temperature does not exceed 60 deg. F. (15.6 deg. C.) and be so arranged as to be in a completely unstressed condition—that is neither coiled nor piled in such numbers as will cause the bottom layers to be partially flattened. Care should be taken also to avoid damage to the hose cover by the end fittings. End fitting blanking caps must remain in position until assemblies are required for service. Under tropical conditions, the pipes should be stored in the coolest possible position, with maximum air circulation, avoiding close proximity to walls of metallic construction. High ambient temperatures will cause premature ageing with subsequent hardening of the outer cover of the hose. To protect the metal end fittings in a very moist atmosphere, preservative to Specification No. C.S.2298 may be used; heat the preservative to 212 deg. F. (100 deg. C.) and dip the end fitting into the solution. This preservative may be removed with petrol.

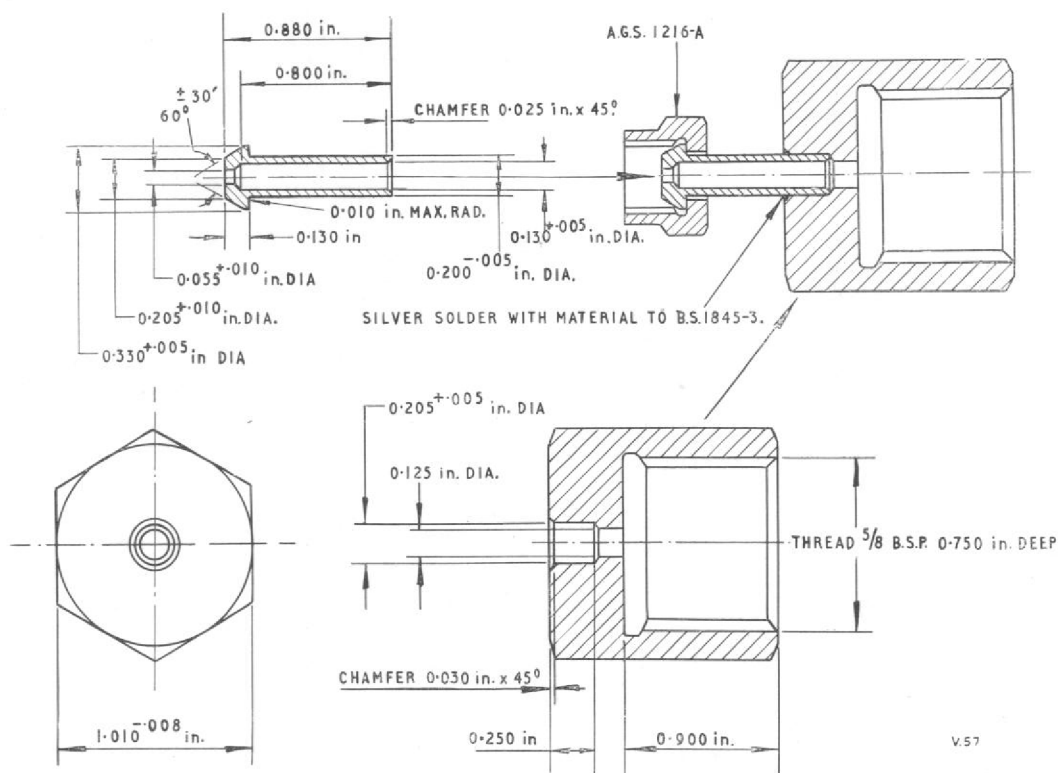
TABLE OF PIPES, ADAPTERS, BLANKS, AND PRESSURES

Pipe	Adapter for use with Varley testing unit	Blank	Test pressure lb. per sq. in.
Front pump to delivery pressure	B.P.C., 601757 or T.77097 $\frac{1}{8}$ " B.S.P. to $\frac{1}{4}$ " B.S.P	Union A.G.S.949/B Blank A.G.S.1197/B Union nut A.G.S.1216/B	3400
Rear pump to H.P. filter	601763 $\frac{1}{8}$ " B.S.P. to $\frac{3}{8}$ " B.S.P	Union A.G.S.949/E Blank A.G.S.1197/E Union nut A.G.S.1216/E	3400
Front pump to rear pump, delivery pressure	601772 $\frac{1}{8}$ " B.S.P. to $\frac{3}{8}$ " B.S.P	2 Banjo bolts A.G.S.1135/E 4 Aluminium washers A.G.S.1138/E 1 Cap nut 601788	3400
B.P.C. to A-F.R.C., servo pressure	None required	Union A.G.S.949/A Blank A.G.S.1197/A Union nut A.G.S.1216/A	3400
Pump to pump, servo pressure	None required	Union A.G.S.949/A Blank A.G.S.1197/A Union nut A.G.S.1216/A	3400

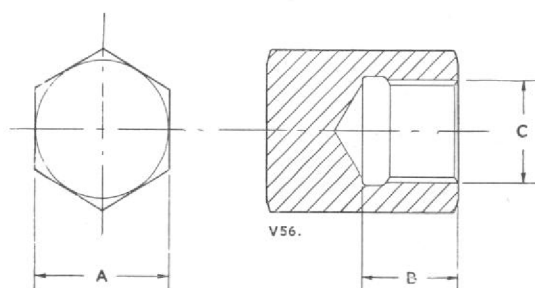
<i>Pipe</i>	<i>Adapter for use with Varley testing unit</i>	<i>Blank</i>	<i>Test pressure lb. per sq. in.</i>
Front pump to B.P.C., servo pressure	None required	Union A.G.S.949/A Blank A.G.S.1197/A Union nut A.G.S.1216/A	3400
H.P. filter to control valve	601763 $\frac{1}{8}$ " B.S.P. to $\frac{5}{8}$ " B.S.P	Union A.G.S.949/E Blank A.G.S.1197/E Union nut A.G.S.1216/E	3380
Control valve to air-fuel ratio control, metered pressure	601757 or T.77097 $\frac{1}{8}$ " B.S.P. to $\frac{1}{4}$ " B.S.P	Union A.G.S.949/B Blank A.G.S.1197/B Union nut A.G.S.1216/B	3000
Control valve to distributor	601763 $\frac{1}{8}$ " B.S.P. to $\frac{5}{8}$ " B.S.P	Union A.G.S.949/B Blank A.G.S.1197/B Union nut A.G.S.1216/B Blanking plate 96313 Seal N.4279 2 $\frac{1}{4}$ " B.S.F. bolts 6A1/10E 2 $\frac{1}{4}$ " B.S.F. bolts 6A1/3E 4 $\frac{1}{4}$ " B.S.F. plain nuts A.16.Y.EP 4 Washers A.G.S.162/D	3000
Burner feed	601757 or T.77097 $\frac{1}{8}$ " B.S.P. to $\frac{1}{4}$ " B.S.P	Union A.G.S.949/B Blank A.G.S.1197/B Union nut A.G.S.1216/B	2900
Control valve to B.P.C. to pump, spill	601760 $\frac{1}{8}$ " B.S.P. to $\frac{3}{8}$ " B.S.P	Union A.G.S.949/C Blank A.G.S.1197/C Union nut A.G.S.1216/C Cap nut 601789 2 Aluminium washers N.1502 Banjo bolt N.2270	250
L.P. filter to front pump	601769 $\frac{1}{8}$ " B.S.P. to 1" B.S.P	Blanking plate 601828 4 $\frac{1}{4}$ " B.S.F. bolts 6A1/3E 4 $\frac{1}{4}$ " B.S.F. plain nuts A.16.Y.EP 4 Washers A.G.S.162/D	250
A-F.R.C. to control valve, spill	None required	Banjo bolt A.G.S.1135/A 2 Aluminium washers A.G.S.1138/A Cap nut 601790	250
Combustion chamber drain	601757 or T.77097 $\frac{1}{8}$ " B.S.P. to $\frac{1}{4}$ " B.S.P	2 Unions A.G.S.949/C 2 Blanks A.G.S.1197/C 2 Union nuts A.G.S.1216/C	250
Metering pump to No. 10 diffuser bolt	None required	Banjo bolt N.2270 2 Aluminium washers N.1502 Cap nut 601789	250
Metering pump to front bearing	None required	Union A.G.S. 949/A Blank A.G.S.1197/A Union nut A.G.S.1216/A	250

ADAPTERS AND BLANKS

When making up these adapters and blanks, materials and sections should be chosen with the specified test pressures in mind. All undercuts and corners should be generously radiused. Joint surfaces must be smooth and free from tool marks.



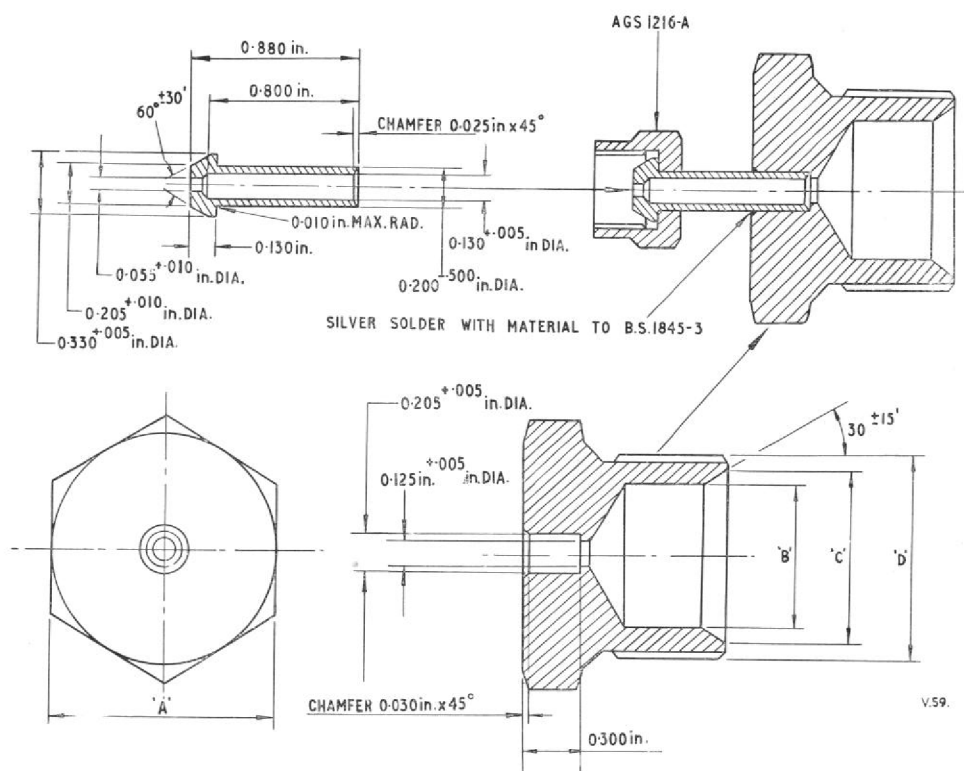
Adapter for pipe which connects the front fuel pump to the rear pump—the equivalent adapter number is 601772.



Cap nut for use in conjunction with banjo bolt and washers for blanking banjo type and fittings.

Dimensions in inches			Equivalent cap nut number
A	B	C	
1.100 - .008	0.750	$\frac{5}{8}$ B.S.P.	601788
0.710 - .005	0.500	$\frac{1}{4}$ B.S.P.	601789
0.500 - .005	0.525	$\frac{1}{8}$ B.S.P.	601790

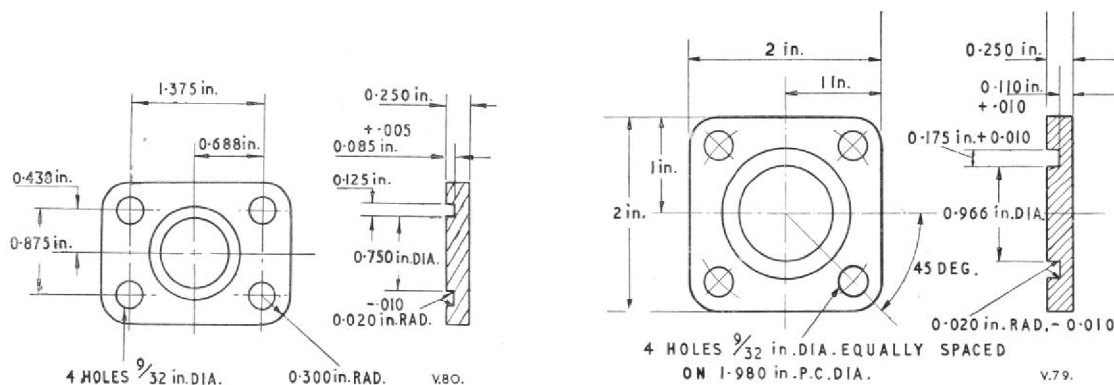
Issued by Amendment No. 110
July, 1953



Adapter for pipes terminating with a union nut.

Dimensions in inches				Equivalent adapter number
A	B	C	D	
0.715 - .005	$\frac{9}{32}$	0.405 + .010	$\frac{1}{4}$ B.S.P.	601757*
0.820 - .005	$\frac{13}{32}$	0.545 + .010	$\frac{3}{8}$ B.S.P.	601760
1.100 - .008	$\frac{5}{8}$	0.755 + .010	$\frac{5}{8}$ B.S.P.	601763
1.480 - .012	$\frac{31}{32}$	1.175 + .010	1 B.S.P.	601769

* Alternatively, use adapter T.77097 from the tool kit.



Blanking plate for pipe which connects control valve to distributor—the equivalent blanking plate number is 96313.

Blanking plate for pipe which connects L.P. filter to front pump—the equivalent blanking plate number is 601828.

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