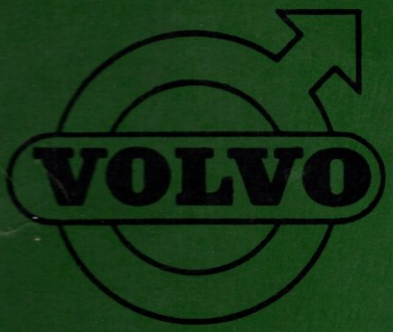
TRACTOR

TYPE 230



SERVICE MANUAL

TRACTORS

AKTIEBOLAGET BOLINDER-MUNKTELL

CONTENTS

DESCRIPTION

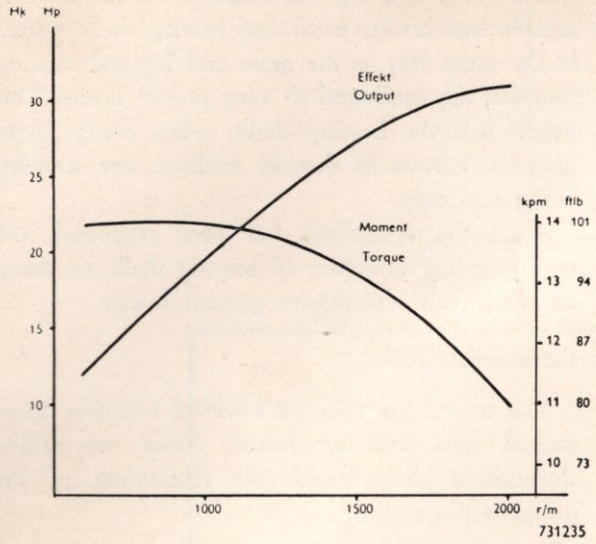


Fig. 1.

Engine

Type 1052 diesel engine for type 230 tractor is a direct-injection, 4-stroke engine with overhead valves. It is a twin-cylinder engine having a bore of 4.125″ (104.77 mm) and stroke of 5.118″ (130 mm), giving a total displacement of 136.7 cu. ins. (2.24 litres).

The output and torque curves of the engine are shown in fig. 1. Engine part number and serial number are stamped on a plate fixed on the right-hand side of the engine above the starter motor, see Fig. 2. Fig. 3 shows the engine viewed from the left.

The engine is mounted on two frame members which are bolted to the flywheel housing at the rear and to two brackets at the front which are fitted on either side of the front part of the crankcase.

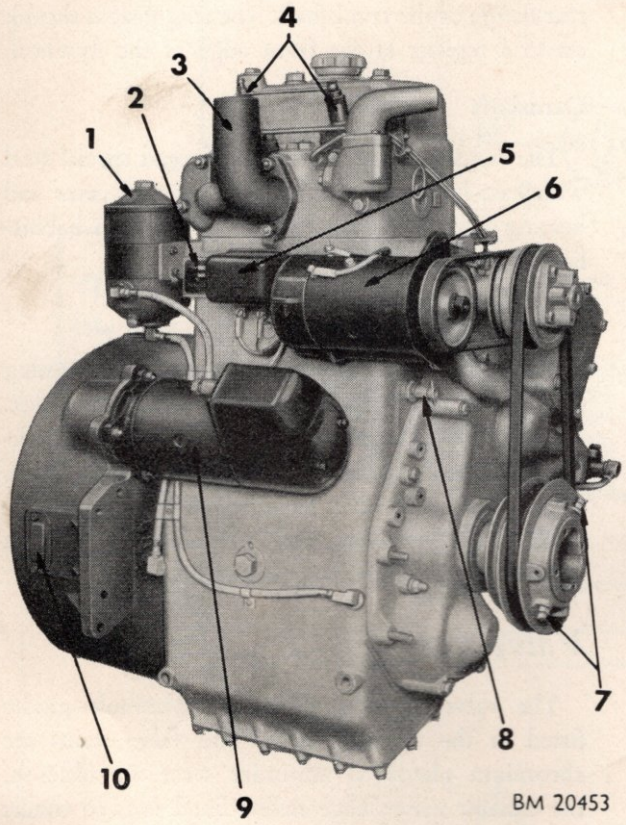


Fig. 2.

1. Oil cleaner
2. Engine plate
3. Exhaust manifold
4. Injectors
5. Relay
6. Dynamo
7. Belt pulley locking screws
8. Water drain-off cock
9. Starter motor
10. Inspection cover for lubricating support bearing

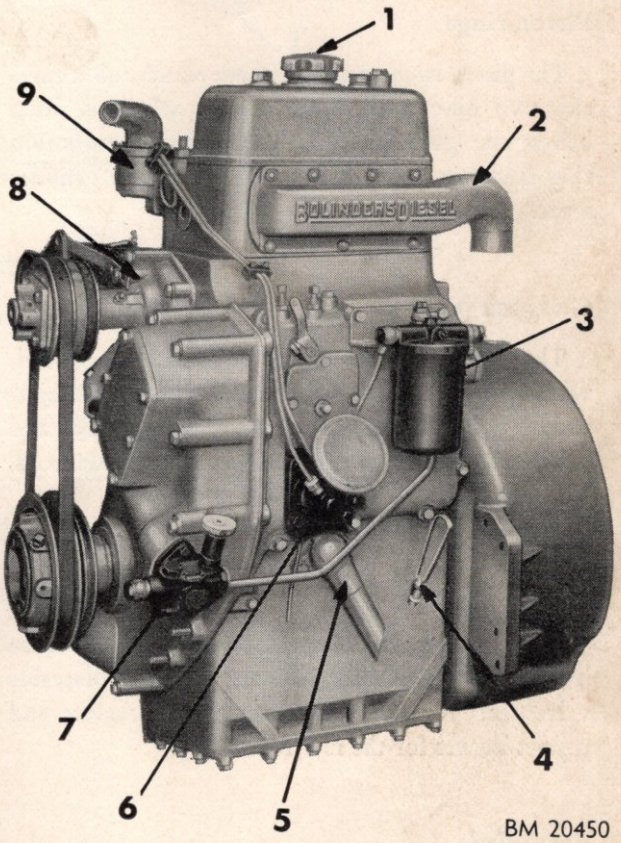


Fig. 3.

1. Ventilation cap (oil filling)
2. Induction manifold
3. Fine-filter with overflow valve
4. Oil dipstick
5. Breather tube
6. Injection pump
7. Feed pump with hand pump
8. Circulation pump for coolant
9. Thermostat housing

Cylinder block

The cylinder block is made of cast iron and cast in one piece with the crankcase. It has wet type cylinder liners and drilled channels for lubrication.

Cylinder liners

The cylinder liners are made of special-alloy cast iron. They are centrifugally cast and machined all over. Sealing between the cylinder block and liner is by means of two rubber rings at the bottom and the cylinder head gasket at the top.

Pistons

The pistons are of light-alloy and fitted with five piston rings.

Piston rings

The piston rings consist of three compression rings and two oil-control rings, one of which is fitted below the gudgeon pin. The upper compression ring is chromium plated which minimizes cylinder wear.

Gudgeon pins

The gudgeon pins are made of case-hardened steel, which combines great resistance to wear with toughness. They are fully floating in both piston and connecting rod at operating temperature. When cold, the gudgeon pin fits tightly in the piston.

Cylinder head

The cylinder head is made of alloy cast iron having great resistance to heat. It has replaceable valve seats for both inlet and exhaust valves and copper sleeves for the injectors.

Crankshaft

The crankshaft is made of drop-forged chrome steel with induction hardened and precisely ground bearing journals. The crankshaft is lubricated through channels drilled in the shaft. Sealing consists of sealing rings in the timing gear casing and flywheel housing.

Main and big-end bearings

The main and big-end bearings consist of replaceable lead-bronze lined steel bearing shells which, in the same way as the main and big-end bearing journals, are machined to very precise limits. This means that the bearing shells, when being fitted, give the correct fit directly without any scraping being necessary.

After the crankshaft has been reground, the corresponding undersize of bearing shells are fitted to which the shaft has been ground down.

Connecting rods

The connecting rods are made of I-section drop-forged steel and toughened. They are drilled throughout their length for lubrication of the gudgeon pin bushing.

Flywheel

The flywheel is made of cast iron and fitted on the rear flange of the crankshaft. The ring gear is shrunk on to a register at the front edge of the flywheel.

Camshaft

The camshaft is made of drop-forged special steel with case-hardened and precisely ground cams and bearing journals. It has three bearings with babbit-lined steel bushings.

Timing gears

The timing gear drive is fitted under the timing gear casing at the front end of the cylinder block. The gear wheel fitted on the front end of the crankshaft drives the camshaft gear which in turn drives the governor. All gears have helical teeth to achieve as silent operation as possible. The oil pump is driven directly by the crankshaft gear wheel.

Valve system

The valves are supported in replaceable guides fitted in the cylinder head. The valve stems are chromium plated to minimize wear. In addition, the exhaust valves have stellite-lined seats to enable them to withstand the hot exhaust gases.

The valve tappets consist of drilled studs fitted in the cylinder block. The push rods consist of steel tubes with balls and cups pressed into their respective ends.

The rocker arms are carried on a shaft fitted on the cylinder head in two plummer blocks.

Lubricating system

The engine has full pressure lubrication. Oil pressure is generated by an oil pump which sucks oil through a strainer and forces it through drilled channels out to the various lubricating points. There is also an oil cleaner for cleansing the oil and a reducing valve, the purpose of which is to maintain the oil pressure within certain limits. See further Fig. 4.

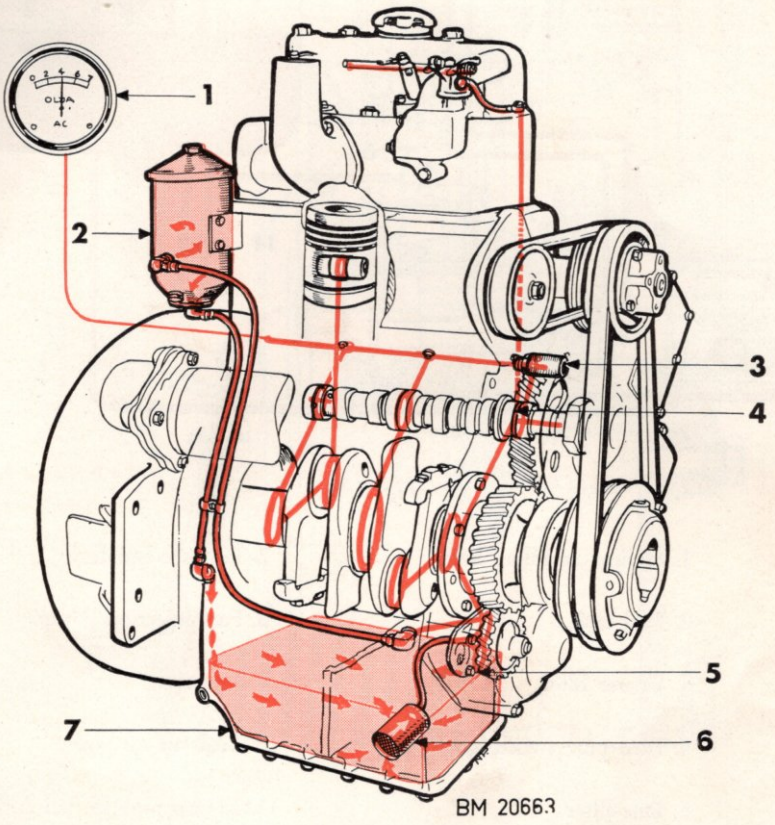


Fig. 4.

1. Oil pressure gauge
2. Lubricating oil cleaner
3. Reducing valve
4. Shot-lubrication to the valve mechanism
5. Oil pump
6. Oil strainer
7. Sump

Fuel system

The engine fuel system is shown in fig. 5. It consists of fuel tank, feed pump, prefilter, fine-filter, overflow valve, fuel injection pump and injectors together with pipes.

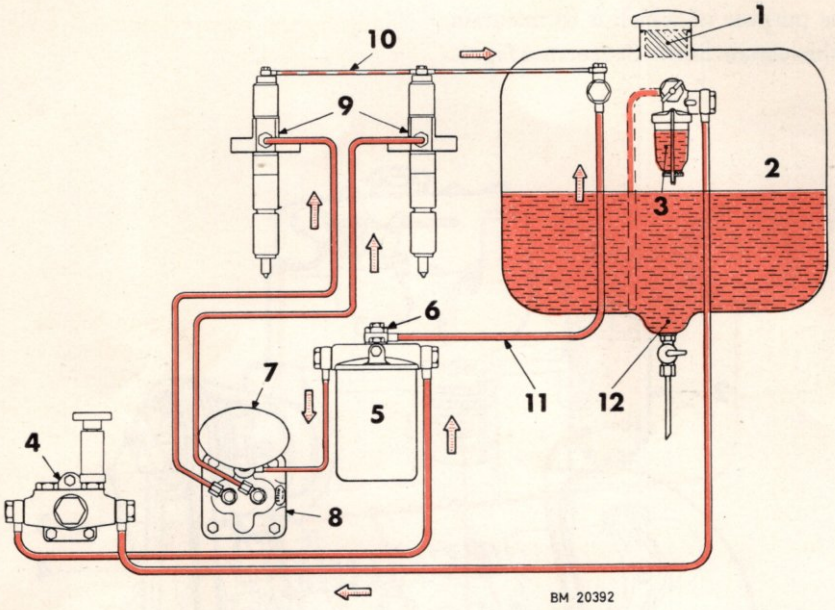


Fig. 5.

1. Strainer in filling hole
2. Fuel tank
3. Coarse filter
4. Feed pump with hand pump
5. Fine-filter
6. Overflow valve
7. Pressure equalizer
8. Fuel injection pump
9. Injectors
10. Leak-off oil pipe
11. Return pipe to fuel tank
12. Sludge trap with drain-off cock

Feed pump

The feed pump is of the plunger type. It is fitted on the left-hand side of the timing gear casing and is driven by an eccentric on the camshaft. The feed pump is fitted with a hand pump bolted on the top.

Coarse filter

The prefilter is located by the fuel tank in the feed pump suction pipe and serves to separate out the coarser particles in the fuel.

Fine-filter and overflow valve

The fine-filter, fig. 6, has a replaceable paper element. It separates out all the small, inherent impurities from the fuel which otherwise would damage the injection pump. The overflow valve, the purpose of which is to maintain a constant fuel feed pressure, is located on the fine-filter.

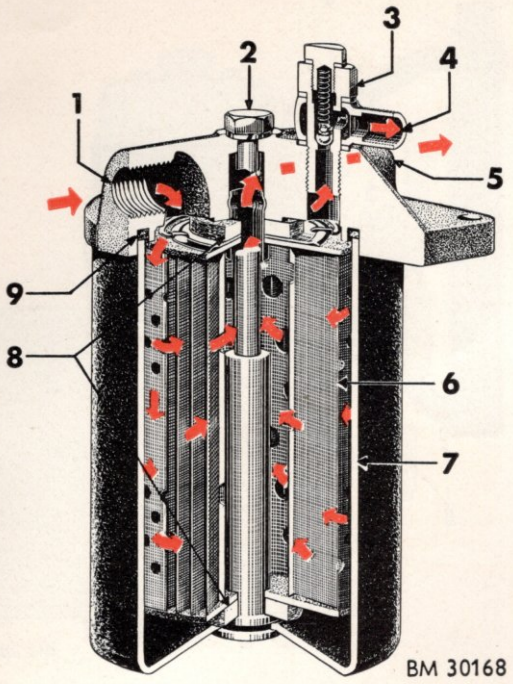


Fig. 6.

1. Connection from fuel tank
2. Centre bolt
3. Overflow valve
4. Return pipe to fuel tank
5. Connection to injection pump
6. Paper element
7. Container
8. Felt rings
9. Gasket

Fuel injection pump

The injection pump is fitted on the fuel pump bracket on the left-hand side of the engine. It is driven by two specially shaped cams on the camshaft.

The injection pump is of the plunger type with one pump element for each cylinder. It has constant stroke and the quantity injected is controlled by turning the pump element, see fig. 7.

1. Pump housing
2. Control rod
3. Fuel supply
4. Delivery pipe connections
5. Lifting roller
6. Lifter body
7. Plunger spring
8. Control sleeve with toothed segment
9. Plunger
10. Cylinder
11. Low pressure gland packing
12. High pressure gland packing
13. Delivery valve
14. Delivery valve spring

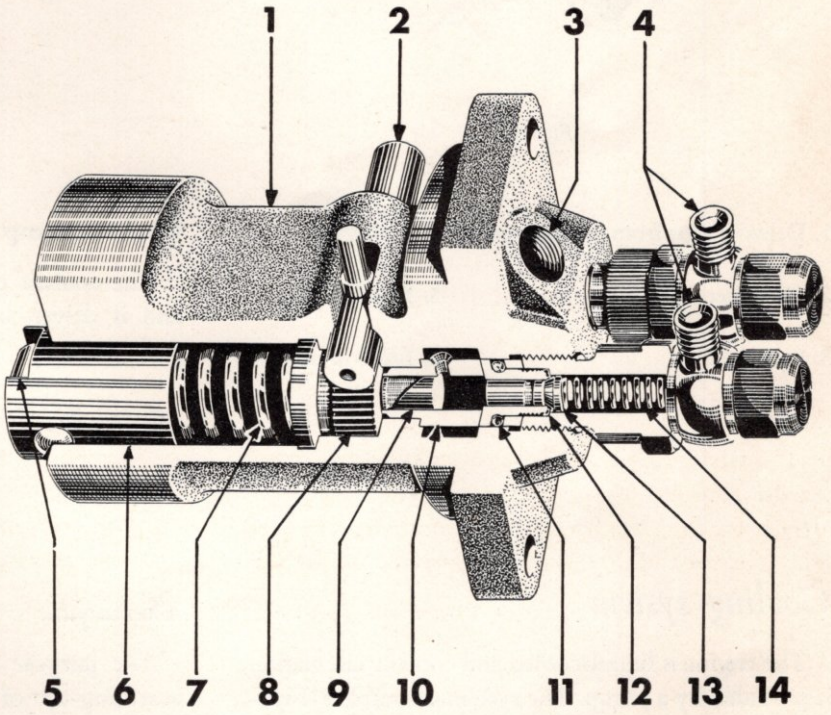


Fig. 7.

Injectors

The injectors are of the 4-hole type, that is to say, after having passed the nozzle needle, the fuel is forced out through four holes in the injector nozzle. A rod filter is fitted at the delivery pipe connection. A leak-off oil pipe connection is fitted at the top of the injector, see fig. 8.

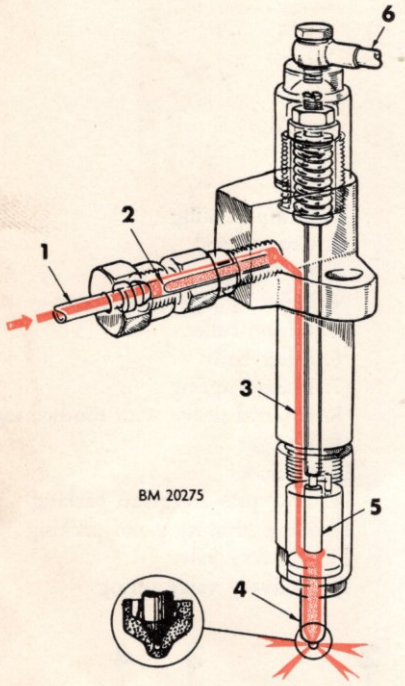


Fig. 8.

1. Delivery pipe from injection pump
2. Rod filter
3. Fuel channel
4. Nozzle
5. Nozzle needle
6. Leak-off oil pipe

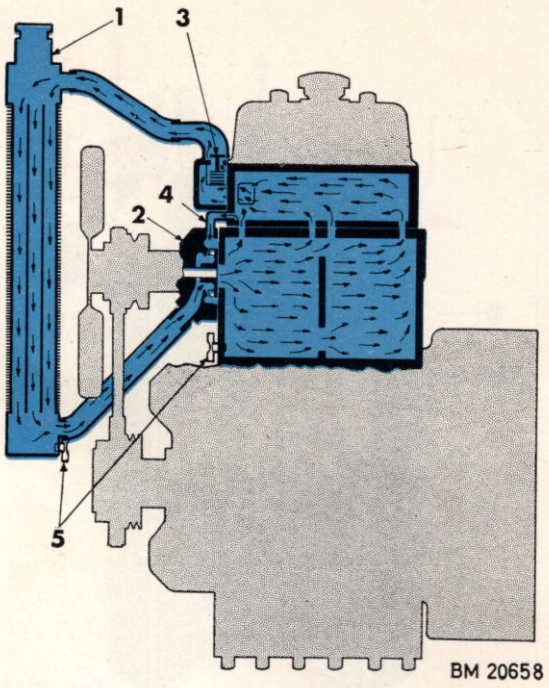


Fig. 9.

1. Radiator
2. Coolant pump
3. Thermostat
4. By-pass
5. Drain-off cocks

Coolant pump

The coolant pump, fig. 10, is of the impeller type and is driven by V-belt from the crankshaft belt pulley.

Cooling system

The engine is liquid-cooled and coolant circulation is provided by a pump. The system operates at »over-pressure». Under the influence of the pump, the coolant circulates as indicated by the arrows in fig. 9.

Thermostat

The purpose of the thermostat is to cause rapid warming-up of the coolant. The thermostat is balanced, that is to say, it does not open under the influence of pressure from the coolant pump.

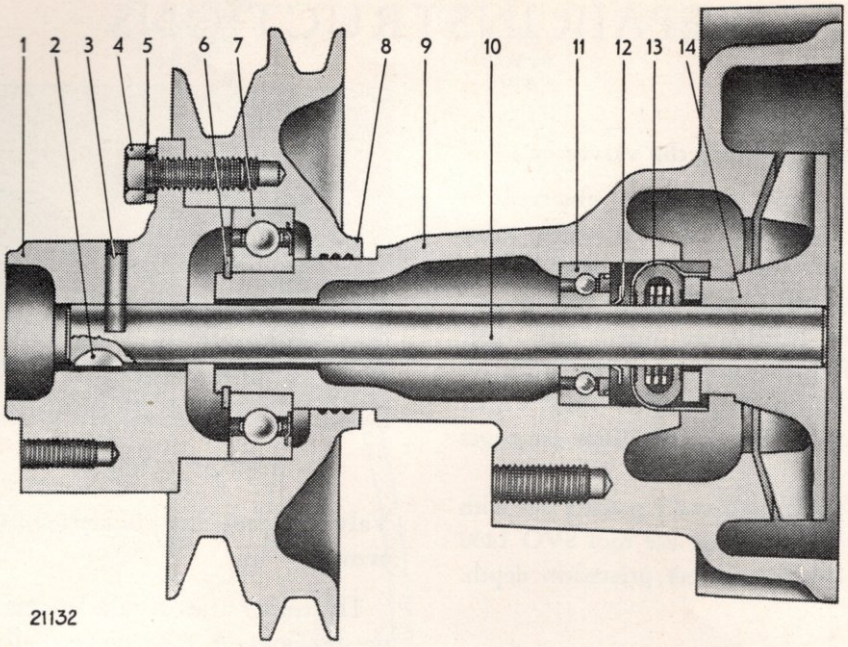


Fig. 10.

1. Fan hub
2. Woodruff key
3. Slotted pin
4. Set screw
5. Spring washer
6. Locking ring
7. Ball bearing, front
8. Belt pulley
9. Pump housing
10. Shaft
11. Ball bearing, rear
12. Deflector ring
13. Seal
14. Impeller wheel

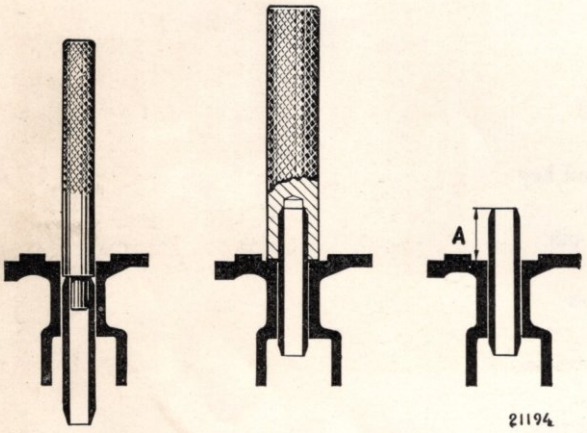
Valve system

Decarbonizing and grinding the valves

The following points should be observed in carrying out this work. Always clean valves, valve seatings, valve guides and induction and exhaust ports thoroughly before machining. Always use grinding paste for grinding-in valves and valve seatings. Do not forget to grind the valve stem end flat. Check valves and valve guides for wear. Values for this are given in the specifications on pages 36, 37 and 38.

The valve guides are most easily pressed out with drift SVO 1084. When fitting, use tool SVO 1430 which gives directly the correct pressed-in depth. See fig. 11.

SVO 1084 SVO 1430



A = 1.22″ (31 mm)

Fig. 11.

Valve seatings

If a valve seating has become too severely burned to be reconditioned, it can be replaced by a new one. Drill some holes with a hard-metal drill in the valve seating as shown in fig. 12 but not so deep as to damage the cylinder head. Split the seating with a chisel and clean the seating bed thoroughly. Measure the diameter in at least two places and use the measurement to determine whether a standard size or oversize seating should be used. In the latter case it is usually necessary to mill out the seating bed to the dimensions given in the specifications. When fitting, the valve seating must be cooled with carbon dioxode snow or similar and the cylinder head warmed to about 86° F (30° C). Before the new seating is machined, a new valve guide must always be pressed in.

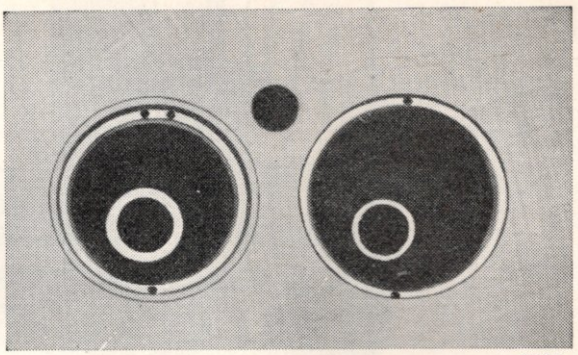


Fig. 12.

Valve mechanism, rocker arm shaft and rocker arms

The rocker arms should be examined for wear in the bushings. A wear of up to 0.004″ (0.1 mm) is permissible. When fitting new bushings, be careful to ensure that the lubricating holes in the bushings and rocker arms come opposite each other. After having been pressed in, the new bushings must be reamed to a push fit on the rocker arm shaft. The surface of the thrust end on the rocker arm should be ground with the help of a fixture so that any unevenness is removed. Note that the rocker arms are hardened so that a maximum of 0.002″ (1/2 mm) only may be ground off. The rocker arm shaft should be cleaned inside. The end washers should be removed and be replaced with new ones when fitting. The valve springs should be fitted with the closely coiled end against the cylinder head.

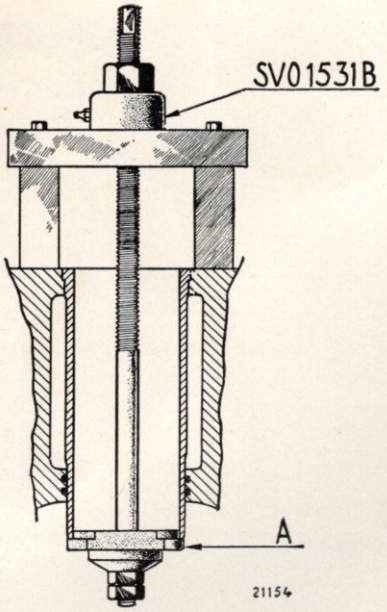
Push rods and tappets

The push rods must not be deformed in any way or have loose end plugs. They should be straight within 0.016″ (0.4 mm) of the whole length of the tube, which should be 15.235±0.0118″ (387±0.3 mm). If the contact surface of the tappet with the cam is worn down or damaged, the tappet should be replaced with a new one.

Pistons, liners, gudgeon pins and connecting rods

When replacing pistons and/or liners, the whole cylinder liner set must now be replaced as a unit. The reason for this is that the liner and piston are manufactured specially to fit together individually.

The liners should be replaced when worn 0.014—0.016″ (0.35—0.40 mm) or if there is excessive oil consumption. The cylinder liners should be removed with the help of cylinder liner puller SVO 1531 B as shown in fig. 13.



A = SVO 2103

Fig. 13.

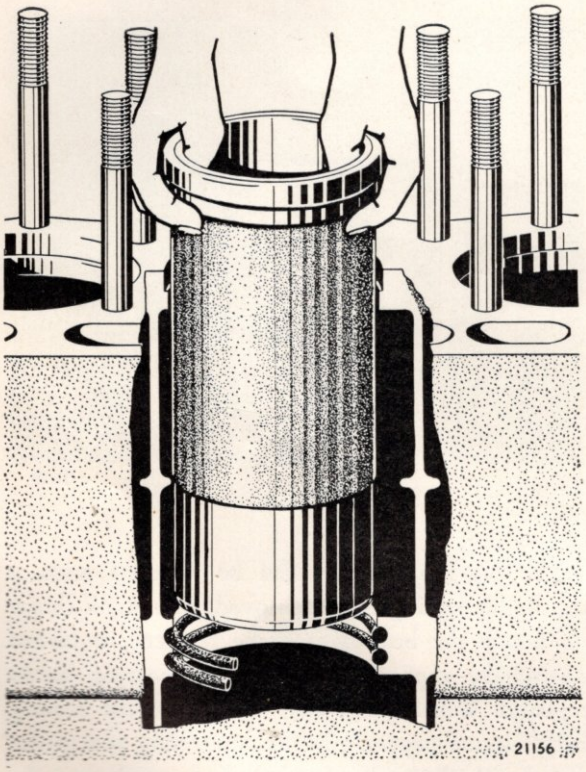


Fig. 14.

Before new liners are fitted, the registering shoulders in the cylinder block and the sealing ring grooves should be carefully cleaned. Place the new sealing rings in position and coat them and the lower part of the liners with soft soap or brake oil so that the liner can be pressed down as shown in fig. 14. If necessary, strike a few light blows with a rubber mallet on the top edge of the liner, which should lie 0.002—0.005″ (0.05—0.12 mm) above the surface of the cylinder block, see fig. 15. Note. Measuring should be done without the rubber rings fitted.

When fitting piston rings in a worn cylinder bore, use standard diameter rings. Chromium plated rings should not be used.

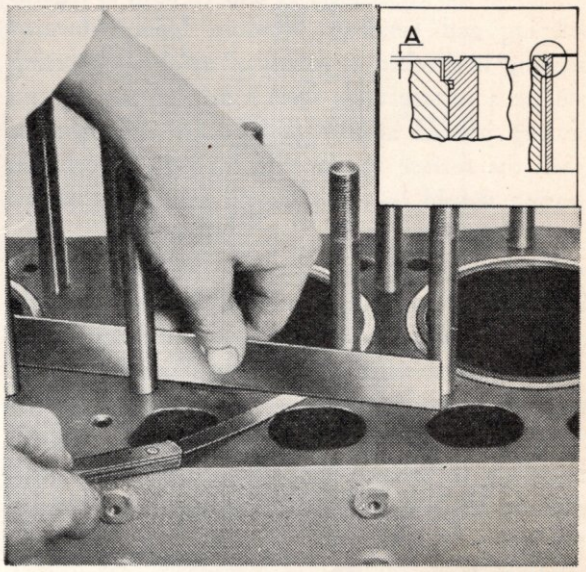


Fig. 15.

The gudgeon pins should be removed and fitted with the help of drift SVO 2009, fig. 16.

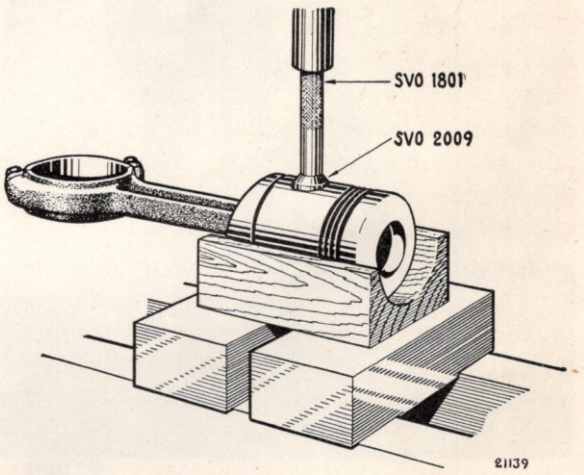


Fig. 16.

When fitting new gudgeon pins, ensure that the correct fit as given in the specifications is obtained in the bushing and in the piston when heated to 176°—212° F (80°—100° C). Note that the piston should always be warmed up to this temperature when the piston and connecting rod are fitted together.

Note also that the marking "Injector" on the piston should face the injector when the "Front" marking on the connecting rod faces forwards. For stationary and marine engines, the front end is the end on which the timing gear casing is fitted. Before the connecting rods are fitted they should be checked with a gauge and straightened if necessary. Checking is done as shown in Figs. 17 and 18 both as regards warping and bending. Freedom from S-formed bending is checked as follows. Lay the connecting rod on a surface table with a side of the big-end bearing pressed against the surface. The distance from the surface to the side of the gudgeon pin bearing should be the same on both sides of the connecting rod.

The connecting rods are marked with numbers 1—2 for the respective cylinders. The marking should be turned to face away from the camshaft. When replacing the connecting rods, these should be marked with the respective cylinder number before being fitted. Standard connecting rods are also classified according to weight. The class is stamped on the side which is turned to face the camshaft. In order for a new connecting rod to be fully interchangeable with the old one, it should be marked with Class 12, 13 or 14. The big-end bearing caps are guided axially by two guide pins. When fitting, ensure that these fit firmly in position. Fig. 19.

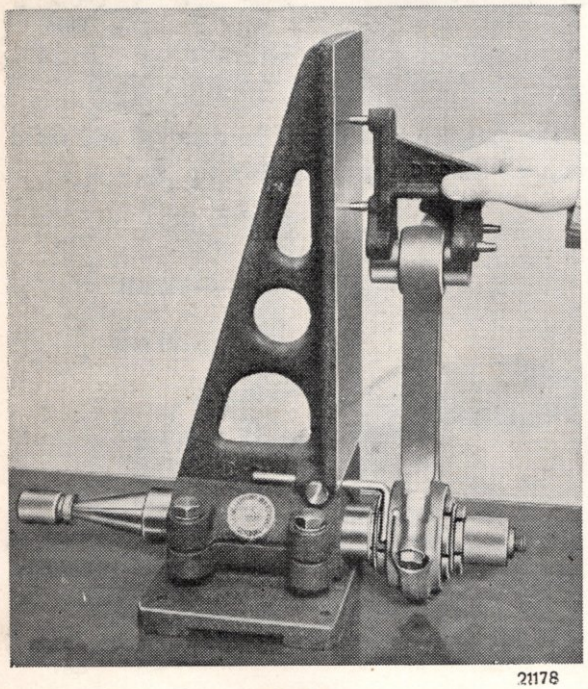


Fig. 17.

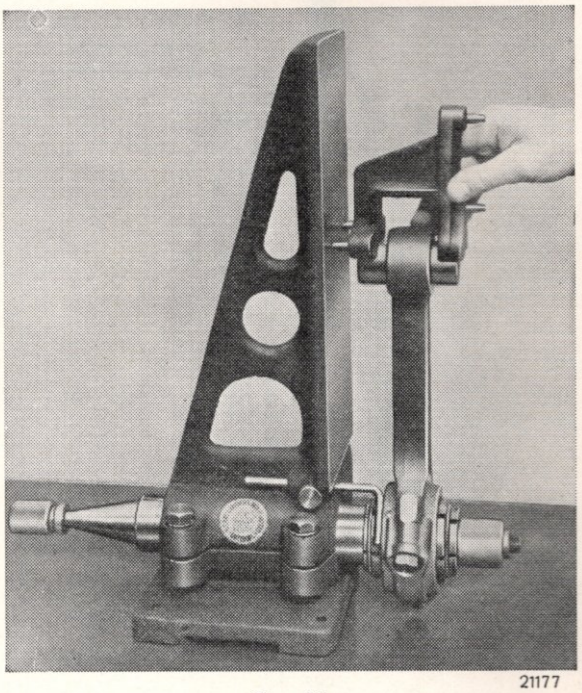


Fig. 18.

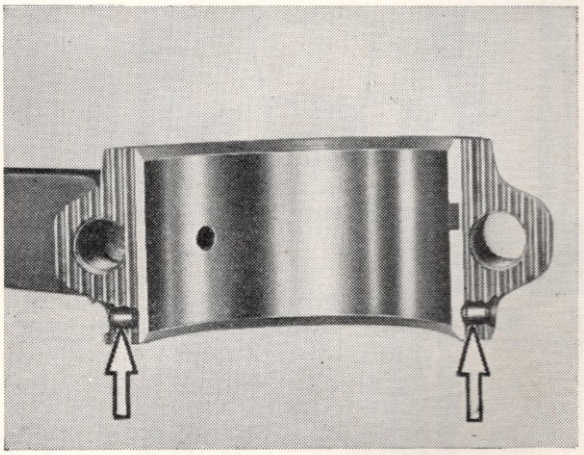


Fig. 19.

The big-end bearings can be replaced without the engine having to be removed. The crank throw on which the bearing is to be replaced, is turned down, the cap removed and the bearing halves replaced. When doing this, ensure that the bearing halves locate properly in the connecting rod guides and that the upper bearing half does not obstruct the lubricating hole to the gudgeon pin. See fig. 20.

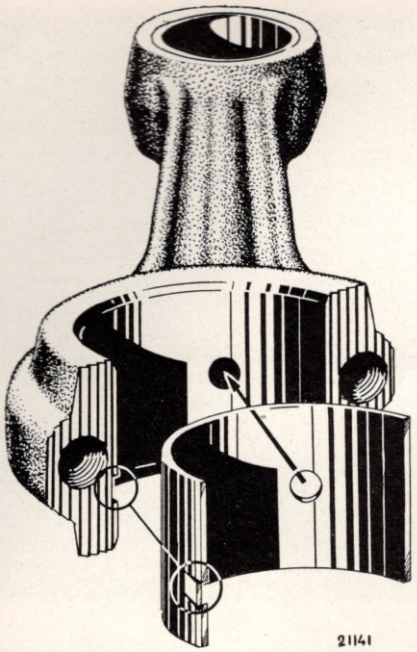


Fig. 20.

If a main bearing is to be replaced, the engine must be dismantled as follows:

First remove the pistons and connecting rods. Then remove the starter claw with SVO 2115 B, Fig. 21, and pull off the crankshaft belt pulley using puller SVO 2002, see fig. 22. The plunger feed pump, fig. 23 and the timing gear casing are removed and then the crankshaft and oil pump drive gear, fig. 24. The flywheel is pressed out with bolt SVO 3008—2, fig. 25, after which the flywheel housing with rear bearing bracket is removed. After the set screw for the intermediate bearing bracket, fig. 26, has been removed, the crankshaft with intermediate bearing bracket can be driven out to the rear with a lead hammer, fig. 27, and then lifted out, fig. 28.

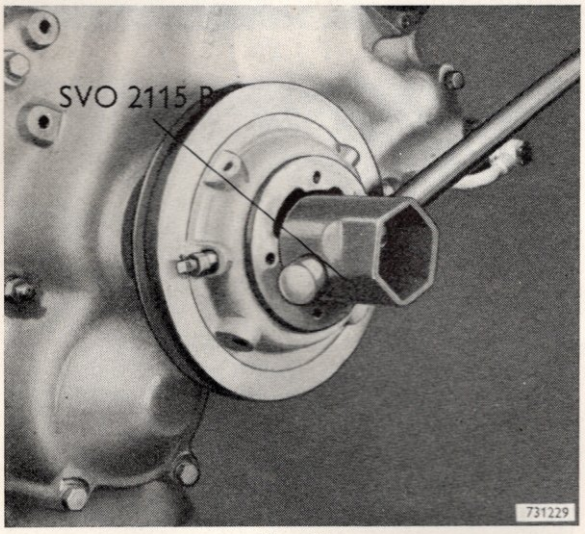


Fig. 21.

The front bearing bracket is removed and the bearing halves pressed out using SVO 3003, fig. 29. Pressing in is done with the same tool after the bearing halves have been carefully knocked into place with a hammer, fig. 30. The same tool is used for the rear bearing bracket bearing halves, fig. 31. The centre main bearing is replaced by parting the bearing bracket. In this case the bearing halves are not similar so that the greatest care must be observed. If the bearing halves are assembled incorrectly this will cause the bearing to seize. The halves of the bearing bracket can also be wrongly fitted and the result will be the same. Figs. 32, 33 and 34 show how the bearing halves and bracket should be fitted.

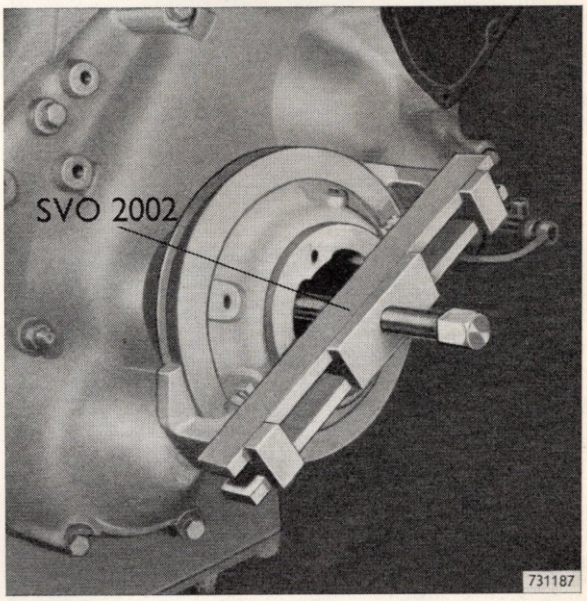


Fig. 22.

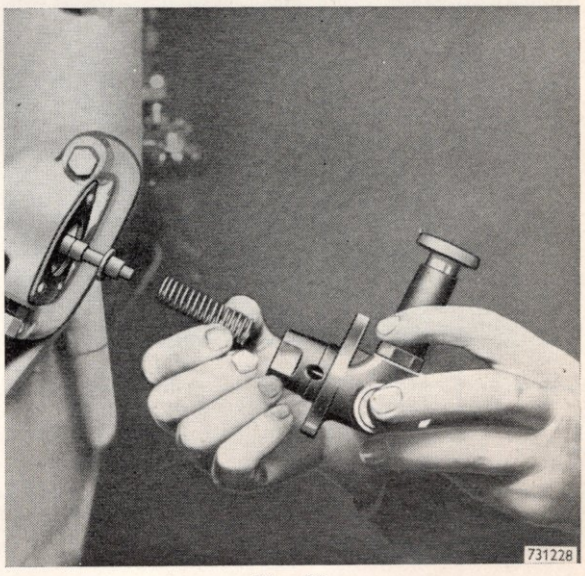


Fig. 23.

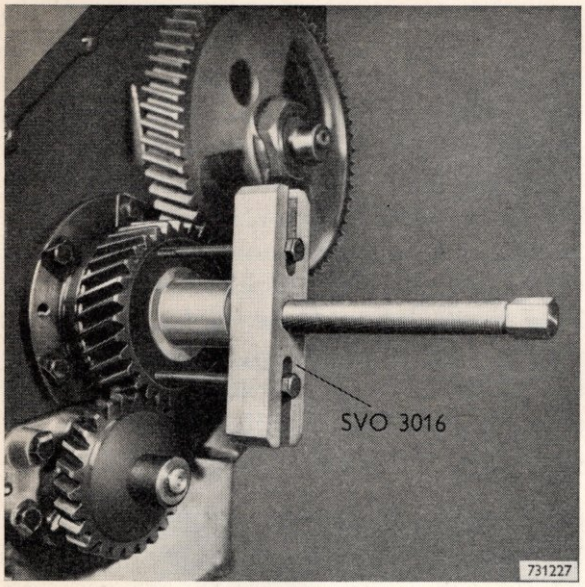


Fig. 24.

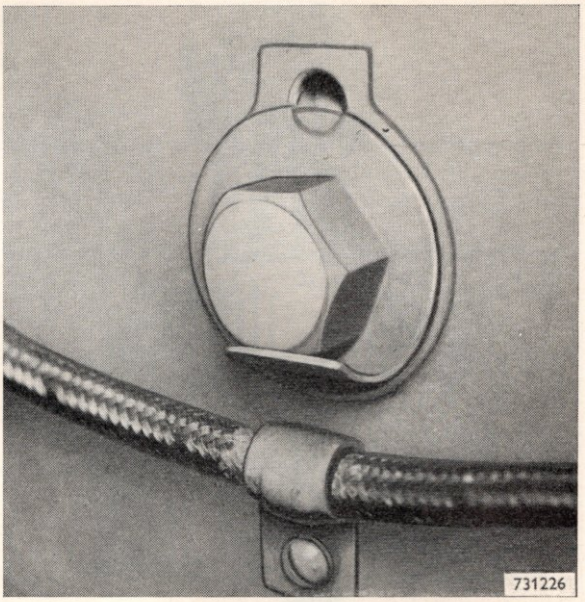


Fig. 26.

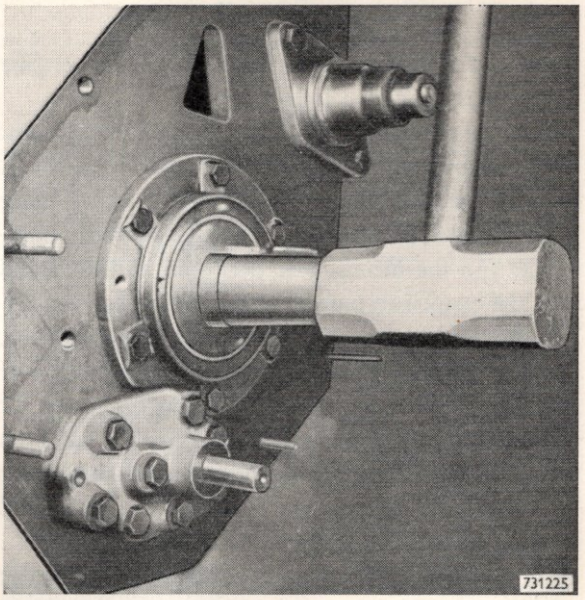


Fig. 27.

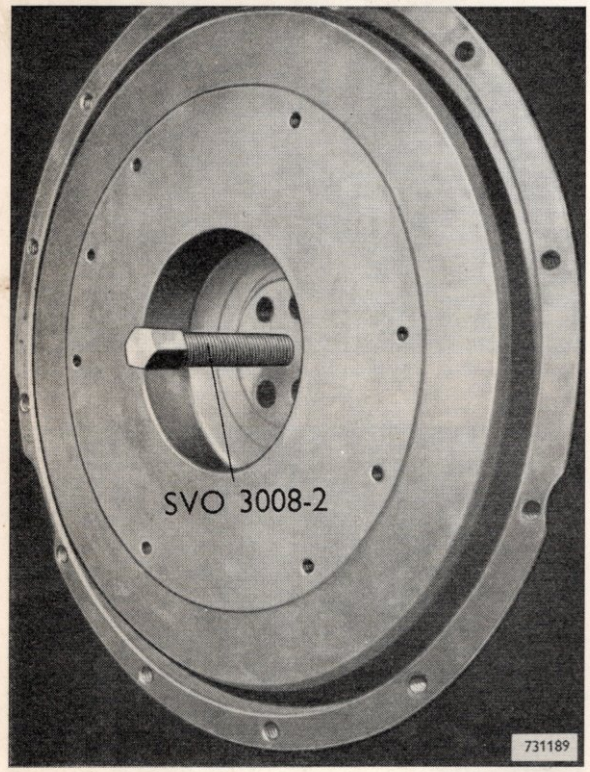


Fig. 25.

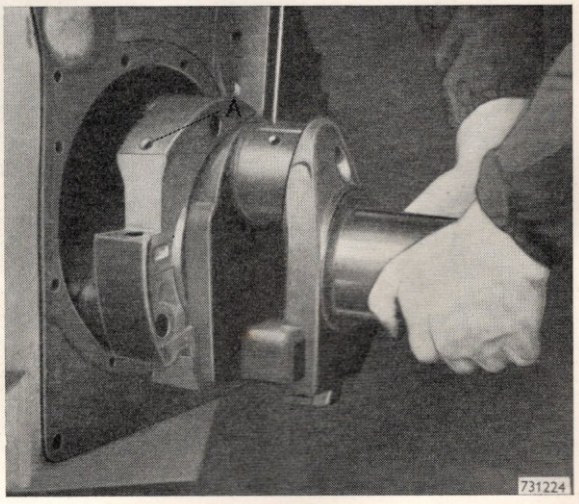


Fig. 28.

A = Lubricating channel

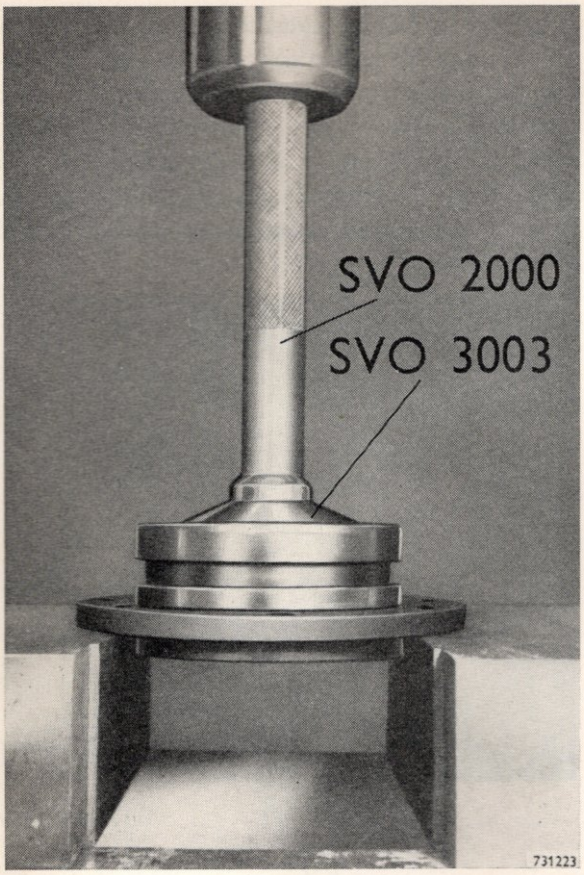


Fig. 29.

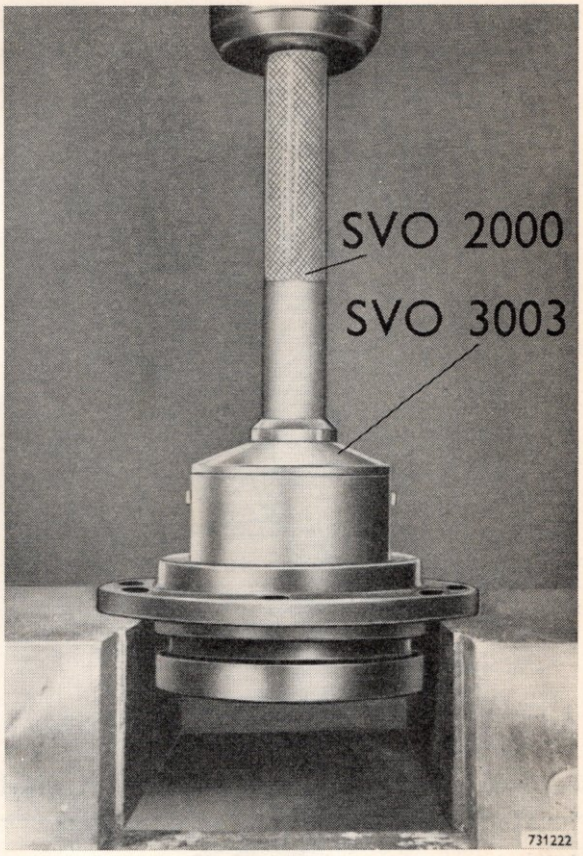


Fig. 30.

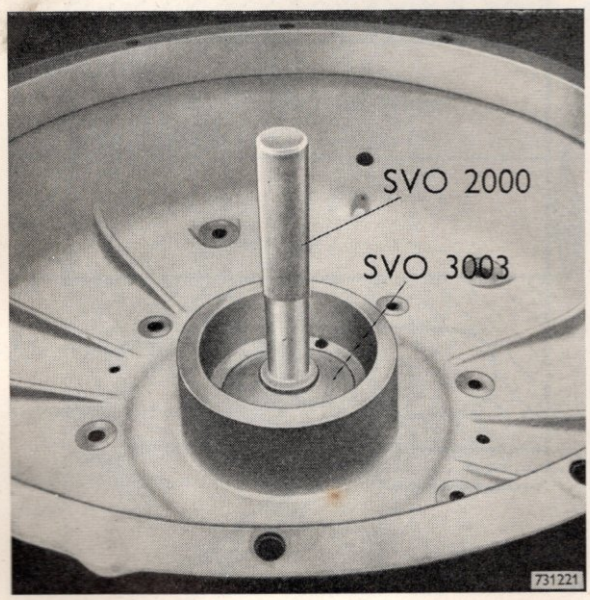
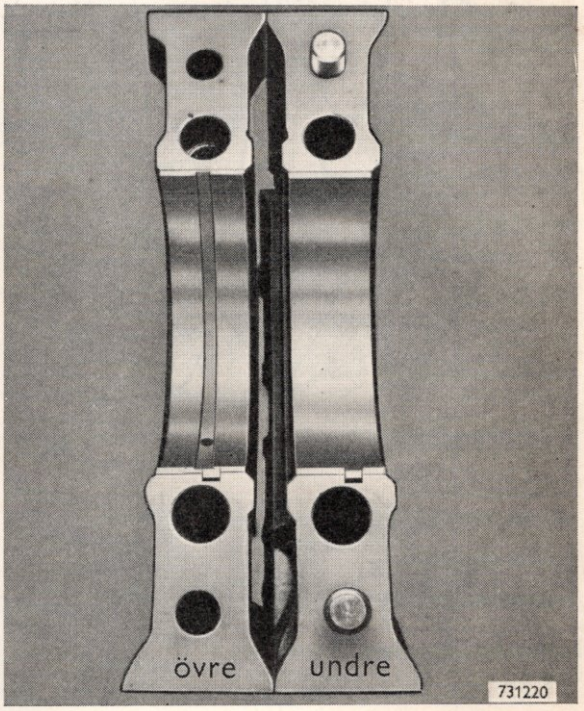


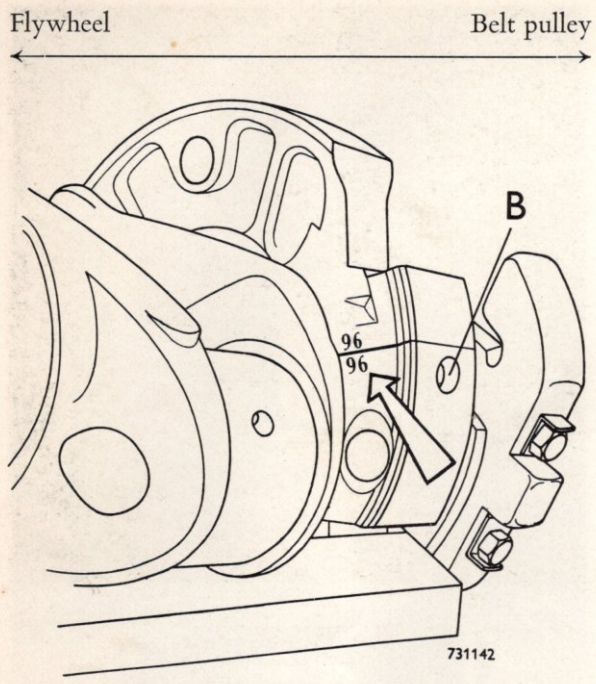
Fig. 31.



övre = upper

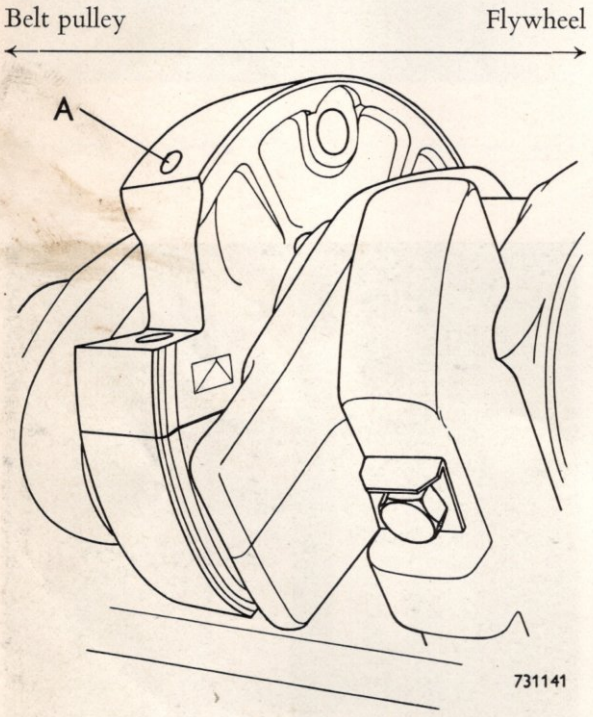
Fig. 32.

undre = lower



B = Hole for set screw

Fig. 33.



A = Lubricating channel

Fig. 34.

Replacing the crankshaft sealing rings

Front sealing ring

After the belt pulley has been removed, the sealing ring is pulled out with puller SVO 3012, fig. 35. There are two types of timing gear casing cover. Up to engine number 5046 there is only a deflector ring and sealing ring. In subsequent production this deflector ring is discontinued. With effect from engine number 5047 a labyrinth seal has been introduced consisting of oil deflector, oil trap and sealing ring. This labyrinth seal can be fitted in both the early and late production covers, see figs. 36 and 37 respectively.

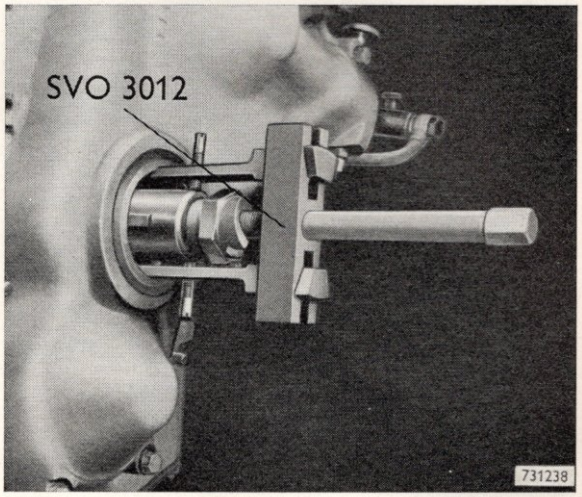


Fig. 35.

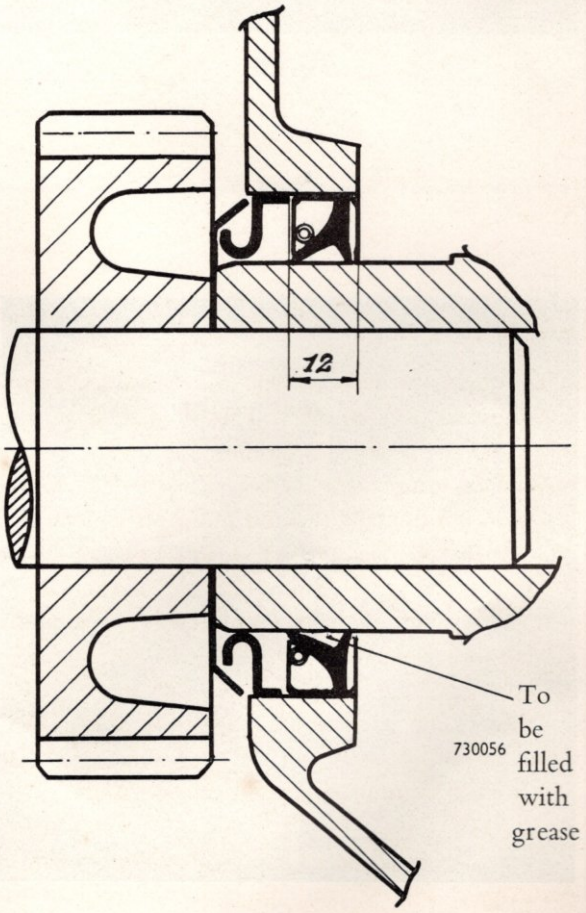
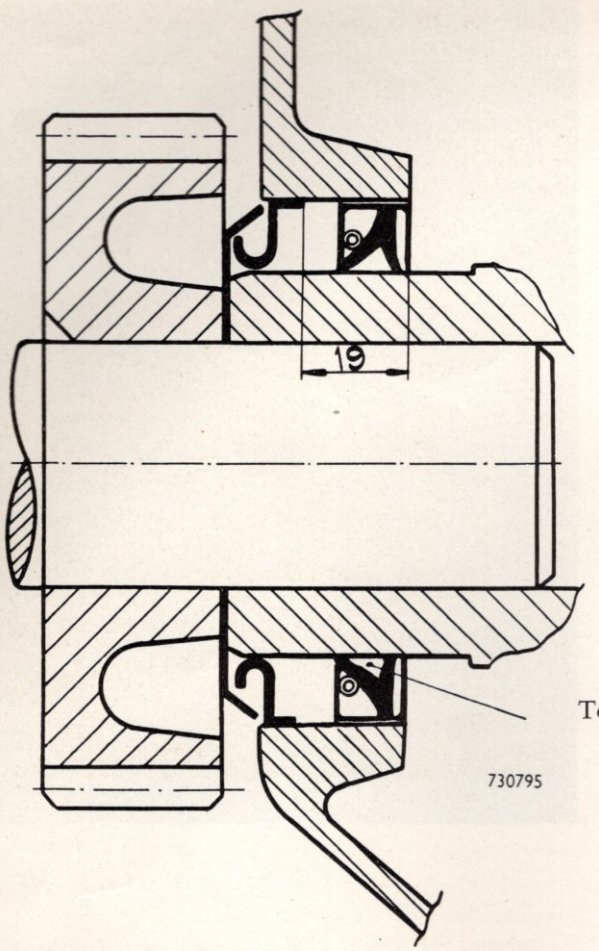


Fig. 36.



To be filled with grease

Fig. 37.

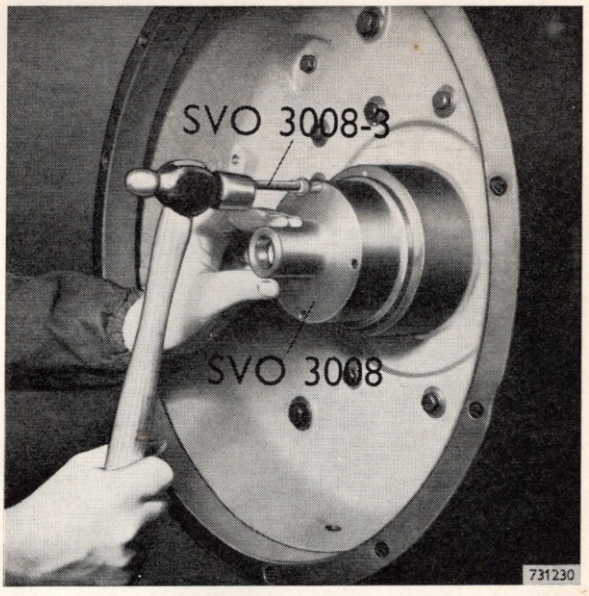


Fig. 38.

Rear sealing ring

The tractor is parted at the clutch and the clutch and flywheel are removed. The flywheel is pressed out using SVO 3008-2, fig. 25. The sealing ring is pulled out using SVO 3008 as follows. The tool is placed in position and the four puller arms are driven into the sealing ring with the spanner flats as shown in fig. 38. The arms are then turned 1/4 of a turn so that the spanner flats are positioned as shown in fig. 39, after which the screw SVO 3008-2 is screwed in and the sealing ring pulled out.

When fitting the sealing ring, fitting sleeve SVO 3009, fig. 40, is used and the ring driven in with SVO 3008 combined with standard handle SVO 2000, fig. 41.

Fitting the flywheel is facilitated by using a pair of guide pins, fig. 42, and the guide bearing in the flywheel is easily pulled out with SVO 1817, fig. 43.

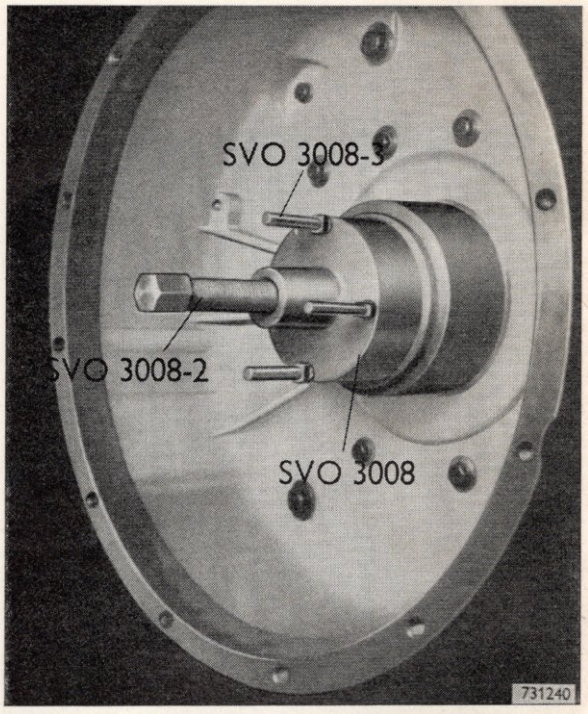


Fig. 39.

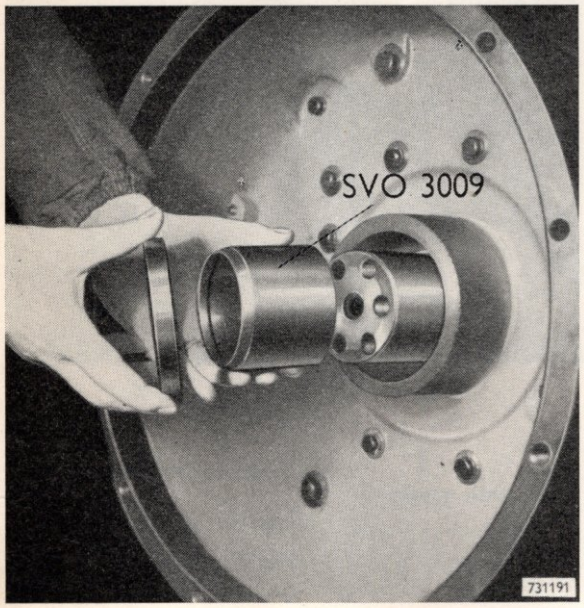


Fig. 40.

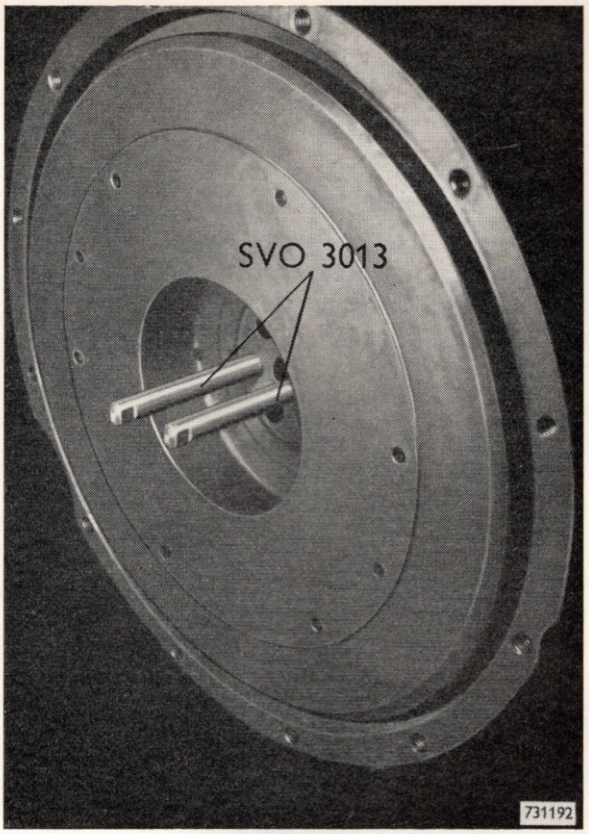


Fig. 42.

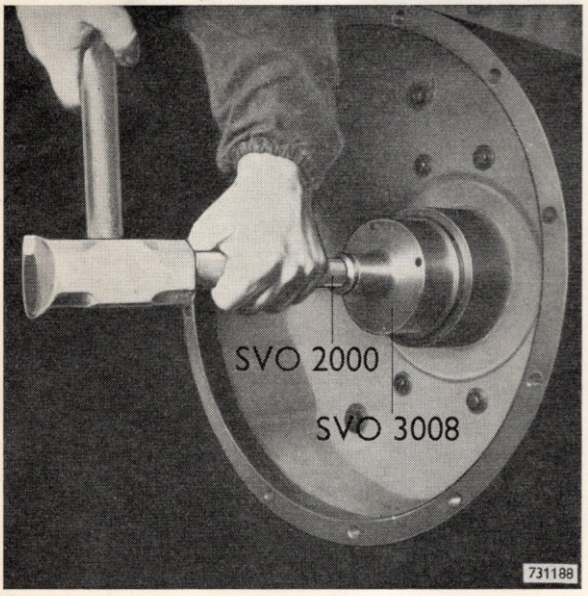


Fig. 41.

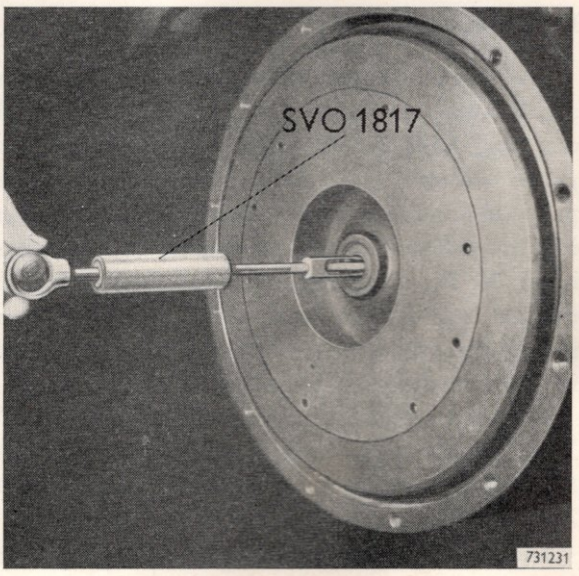


Fig. 43.

Replacing the copper sleeve and sealing ring for injector

Insert puller SVO 2182 in the copper sleeve and place the yoke in position, see fig. 44. Turn the spindle clockwise so that the tool grips the sleeve and then pull out the sleeve by tightening the nut. Clean the sleeve bed thoroughly before fitting the new sleeve and sealing ring. Fitting is done as follows. Place the new sealing ring in the groove in the cylinder head, lubricated with soft soap or brake oil. Drift SVO 2187 is then placed in the sleeve which should be lubricated as above, and then inserted into the cylinder head at the same time being turned, see fig. 45. When the small part of the sleeve enters the lower hole in the cylinder head, it is driven home with the drift and a hammer, see fig. 46. Lubricate the former of the expanding tool SVO 2186 with oil, place it in the copper sleeve and screw on two nuts. Screw down the former until it enters the small part of the sleeve and then tighten both the nuts to the same extent, fig. 47. The former is then screwed down until it stops, fig. 48. Then remove the tool and cut off the copper sleeve level with the underside of the cylinder head. The cylinder head should then be pressure tested and this is done as shown in fig. 49.

Cylinder head nut tightening sequence is shown in fig. 50. Tightening torque is 125 lb/ft (17.3 kgm).

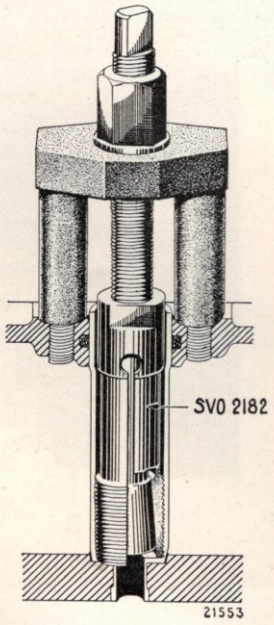


Fig. 44.

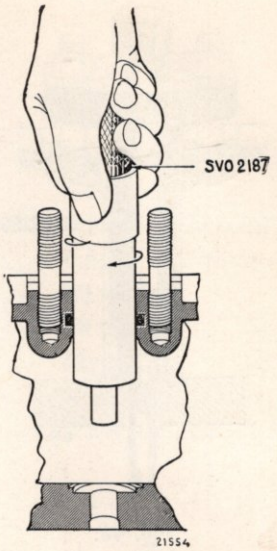


Fig. 45.

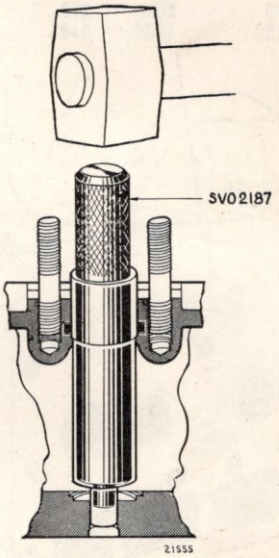


Fig. 46.

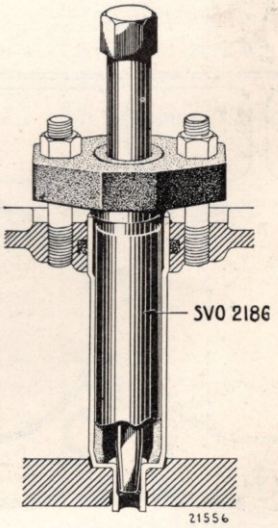


Fig. 47.

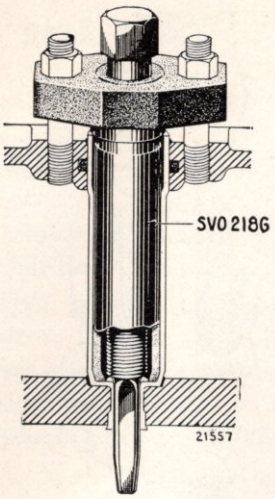


Fig. 48.

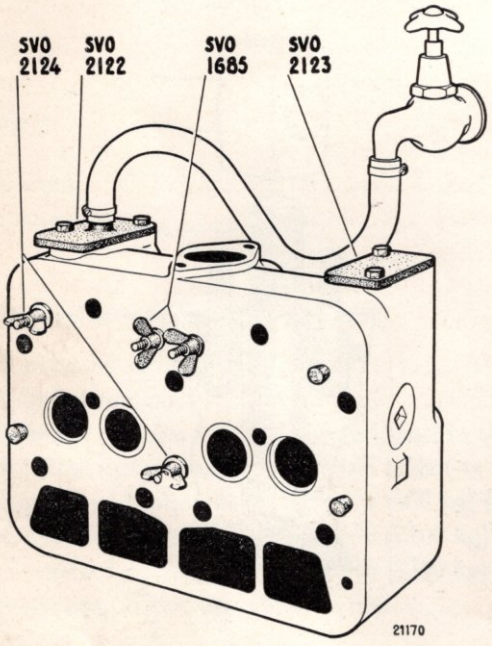


Fig. 49.

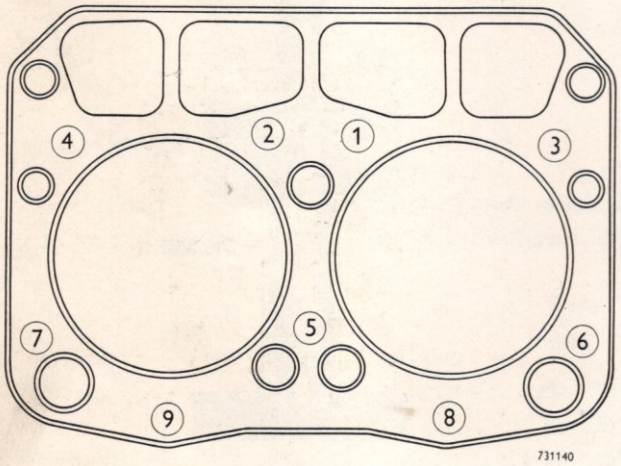
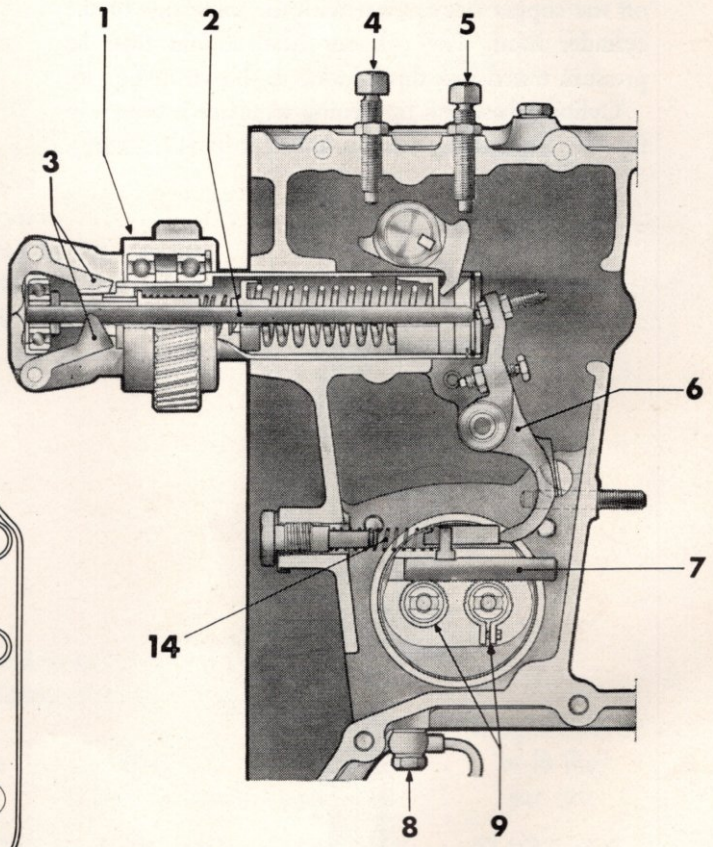


Fig. 50.

Fuel pump bracket with fuel pump and governor

The fuel pump and governor can be removed from the tractor separately. The pump is removed as follows:

Remove the cover above the pump and unscrew all fuel pipes. Do not forget to put on the protective caps. The lever 6, fig. 51, is removed by pulling out the stud on which it is fitted. The spring 14, fig. 51, is removed with the help of a thin piece of iron wire which is placed round the spring before this is released. This is done to prevent the spring from falling down into the engine. The four pump attaching bolts are removed, after which the pump can be pulled out. If the pump should show a tendency to stick on the way out, this is probably due to the control rod and after this has been moved one way or the other, the pump should come out easily. Preserve carefully the shims between the pump and pump bracket.



1. Governor
2. Governor rod
3. Governor weights
4. Adjusting screw for maximum speed
5. Adjusting screw for idling speed
6. Lever
7. Control rod
8. Leak-off oil pipe
9. Pump element
10. Speed conttol
11. Cold-starting device
12. Stopping device
13. Injection pump
14. Spring

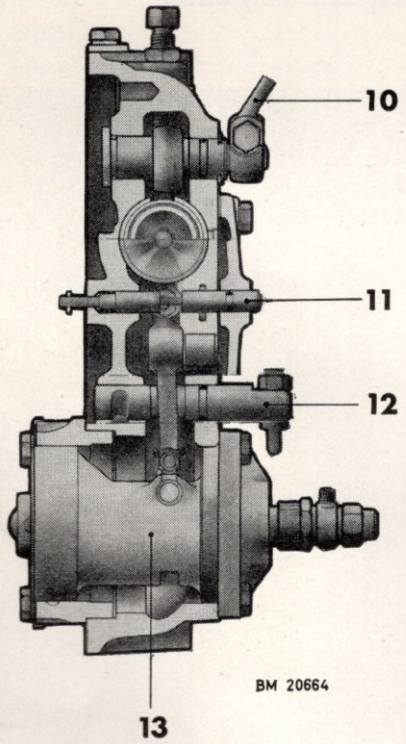


Fig. 51.

Removing the governor

Unscrew the cover above the fuel pump. Slacken the screws A and B, fig. 52 and pull the lever C as far forward as it will go. After the timing gear casing cover has been removed, the governor can be taken out this way.

If, for any reason, the governor has to be dismantled, this is done as follows:

The locking ring, 23, fig. 53, in the governor sleeve is removed after which the stop bearing, spring sleeve, governor spring, spring retainer, helper spring and intermediate piece, see fig.53, can be taken out. The stop screws, 11, fig. 53 are unscrewed and the governor weight pins driven out, after which the control rod with bearing can be removed. When the locking rings 7 and 8, for the governor sleeve and ball bearings, have been removed, these can be pressed out.

Fitting is done in the reverse sequence, when the following points should be observed. Use new locking rings. Ensure that the spacing ring 6 between the ball bearings is correctly located when the governor sleeve is pressed in and that the control rod moves easily. Secure the governor weight pin locking screws with a centre punch. Note. Always observe the utmost care in carrying out work on the engine governor. The satisfactory running of the engine depends on this.

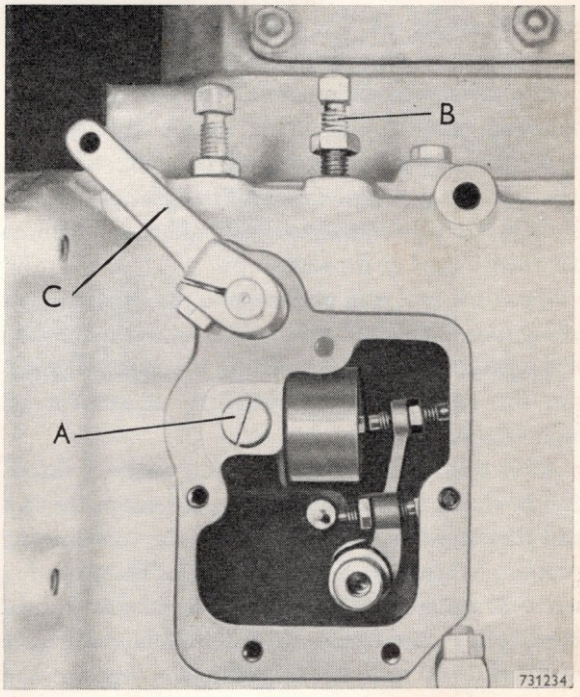


Fig. 52.

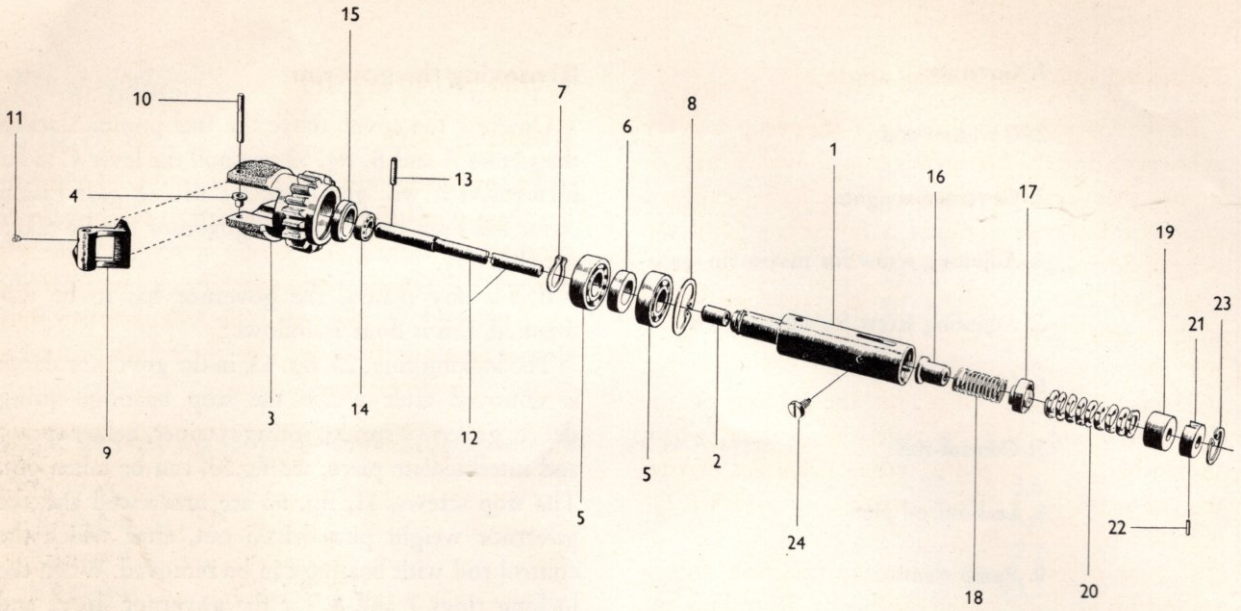


Fig. 53.

1. Governor sleeve
2. Bushing
3. Governor gear wheel
4. Bushing
5. Ball bearing
6. Spacing ring
7. Locking ring
8. Locking ring
9. Governor weight
10. Pin for governor weight
11. Stop screw
12. Governor rod
13. Cylindrical pin
14. Ball bearing
15. Thrust bearing seating
16. Intermediate piece
17. Spring retainer
18. Helper spring
19. Spring sleeve
20. Governor spring
21. Stop bearing
22. Slotted pin
23. Locking ring for stop bearing
24. Stop screw for governor

Adjusting maximum injection

To carry out this work a tool, SVO 3011 is required, see fig. 54. The tool is placed on the stud as shown in the figure. In the case of early production pumps with type designation PFR 2A 80/58/8, the adjusting screw A (the lower screw), should come opposite the thicker portion of the tool, while on late production pumps with type designation PFR 2A 80/84/8, the adjusting screw A should come opposite the smaller part of the tool.

When the tool is in position and the engine run at idling speed, it should gradually slow down and stop if the maximum injection setting is correct. If this is not the case, make the necessary adjustment on adjusting screw A.

After this check the cold-starting quantity should also be checked. Stop the engine and remove the tool and then move in the stud so that the cold-starting position is assumed by the lever C. The adjusting screw A should then rest against the smaller, turned portion of the stud when there should be a clearance of 0.004″ (0.10 mm) between the governor rod and the adjusting screw B. If this is not the case, adjust the screw B.

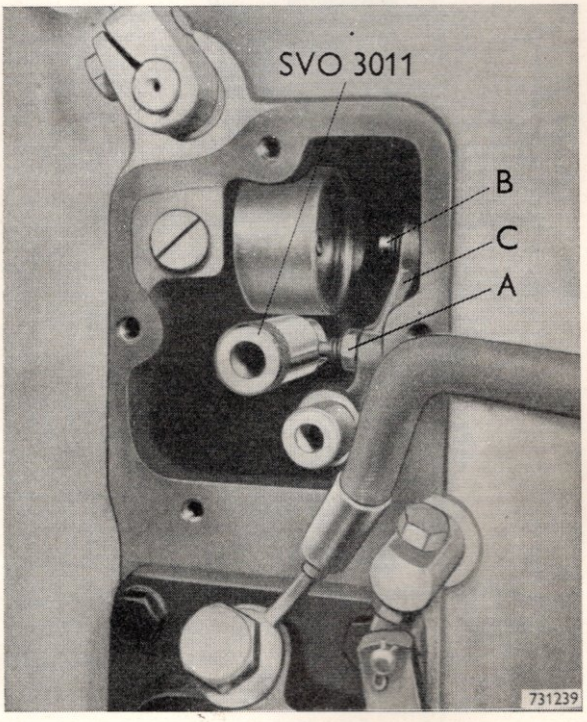


Fig. 54.

Adjusting injection setting angle

Fit the control device directly on the pump delivery connection for the first cylinder as shown in fig. 55. Ensure that the cold-starting device is not engaged and turn the engine round a few times until the control device is filled with fuel. Turn back the hand wheel and let out fuel from the graduated glass tube so that a small portion of the fuel pillar is visible. Then turn the engine *slowly* round until the fuel in the glass tube begins to rise. Then note the reading on the flywheel graduations opposite the pointer which should be 28° if the pump setting is correct. Repeat the test a couple of times to make quite sure that the correct value is obtained.

If it is necessary to adjust the injection setting angle, this is done by increasing or decreasing the number of shims between the injection pump and the pump bracket. By decreasing the number, the injection angle is increased and by increasing the number, the injection angle is decreased. A 0.004″ (0.10 mm) thick shim alters the angle by 1°.

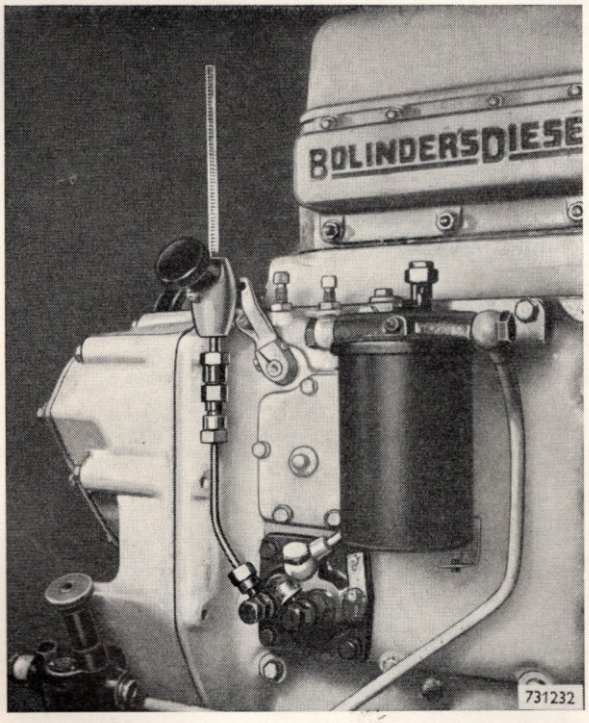


Fig. 55.

Lubricating system

Reducing valve

The reducing valve is located inside the timing gear casing just above the camshaft. It can be reached through the timing gear casing cover with the help of the 1 1/8″ (28 mm) hexagon box spanner (sparking plug spanner), see fig. 56. The locking plate must first be bent out of the way. Washers must be used to increase or decrease the pressure.

Fig. 56.

Cooling system

Water pump

Drive out the slotted pin 3 fig. 10 which locks the hub, with a drift, remove the hub bolts and pull off the hub using puller SVO 2265, fig. 57. Remove the key and press the shaft to the rear out of the housing with drift SVO 2268. Pull off the belt pulley, fig. 58 and press the ball bearing out of same.

When fitting, start with the rear ball bearing which should be fitted with the sealing washer towards the impeller wheel. The deflector ring is placed on the bearing with the flange towards the impeller wheel after which the seal is pressed in with SVO 2270, fig. 59. The shaft with impeller wheel is pressed in from the rear until the wheel comes level with the end of the housing. Press on the belt pulley with front bearing, with SVO 2267, fig. 60. The sealing washer on the bearing should face rearwards. Fit in the key and then fit on the belt pulley hub, bolt on and drive in the slotted pin. The pump should then be lubricated with heat-resisting grease.

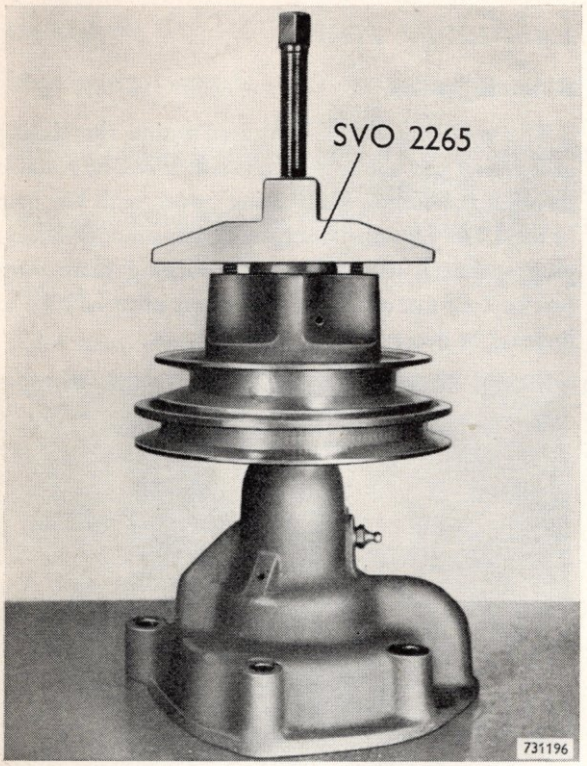


Fig. 57.

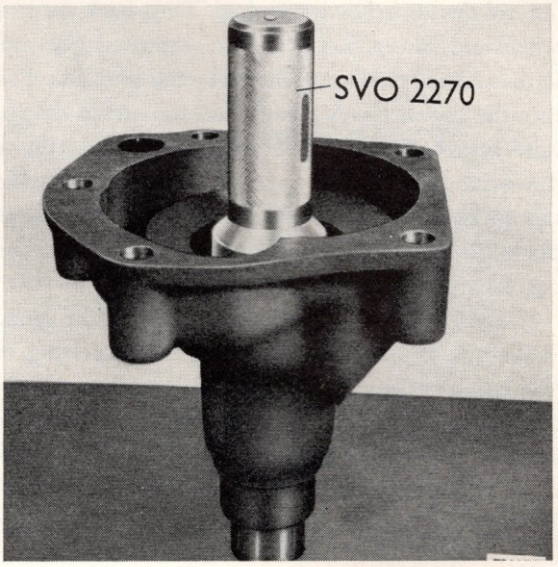


Fig. 59.

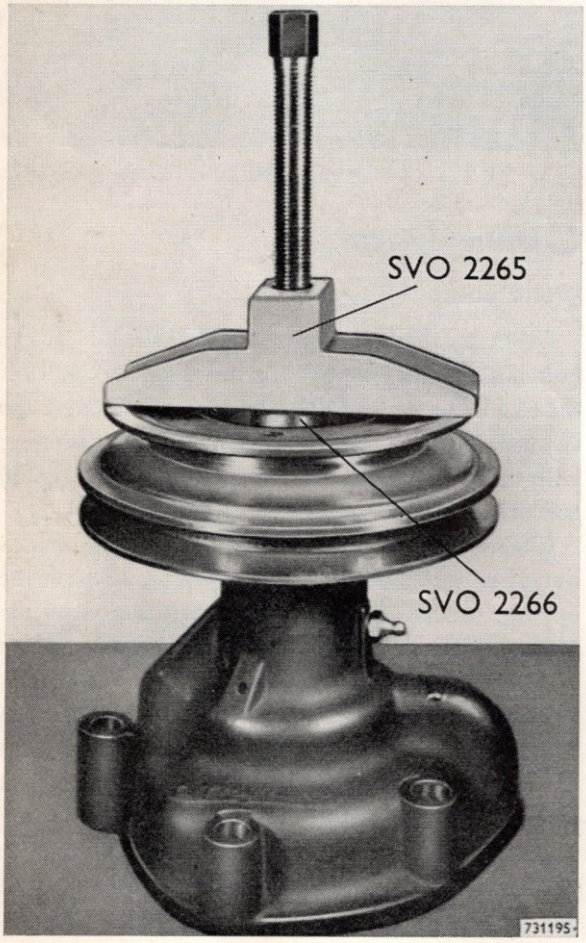


Fig. 58.

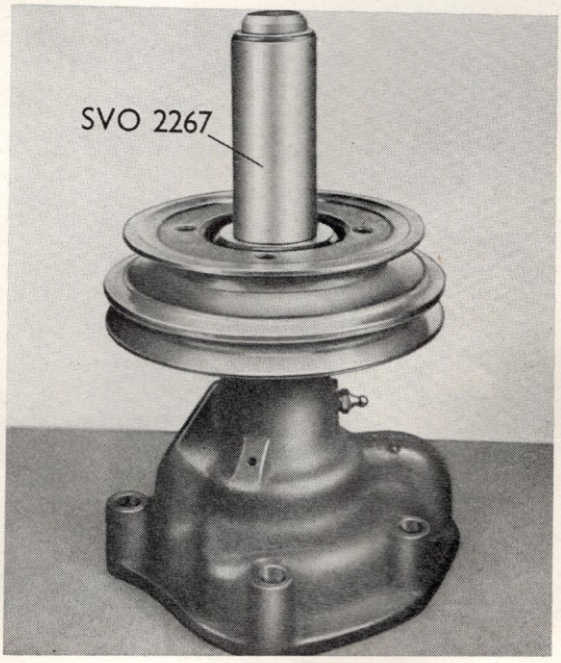


Fig. 60.

Fuel system

The utmost cleanliness must be observed in all work involving the injection and fuel system. Always clean externally round any part before slackening or removing it. Impurities in the injection pump can cause very expensive repairs to be necessary and result in the avoidable loss of much valuable time. Always use protective caps.

Fig. 61.

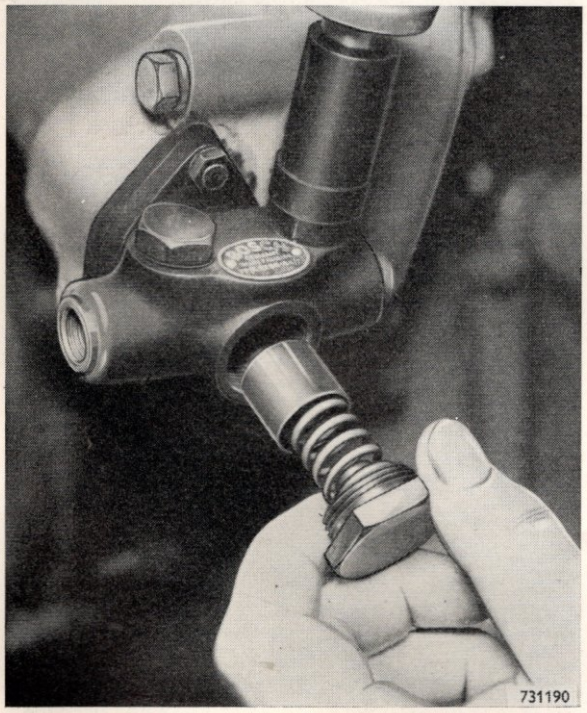


Fig. 62.

Plunger feed pump

Most work can be carried out with the pump fitted. Figs. 61 and 62 show the replacement of valves and plunger with spring.

Injectors

The injectors should be checked in a special nozzle tester, see fig. 63. With this apparatus the injector opening pressure is checked which, when correct should be 1920—1991 lb/sq. in. (135—140 kg/cm²), that the injector does not leak and that it has the correct spray pattern. Opening pressure can be adjusted by tightening or slackening the screw, fig. 64.

If the injector leaks or if the spray pattern is faulty, the injector must be dismantled and cleaned and the nozzle must be replaced if it is found impossible to put in perfect order.

If the nozzle needle has become stuck in the body, it can be removed with the help of a tool as shown in fig. 65. Cleaning is carried out as shown in figs. 66, 67, 68, 69 and 70 with the help of the tools illustrated and spirit and clean fuel oil. If the nozzle needle, in spite of cleaning, still does not move sufficiently easily in the body, it can be lapped with special grinding paste. Flush very thoroughly after lapping.

After fitting, the injector should be tested again and set to the correct value.

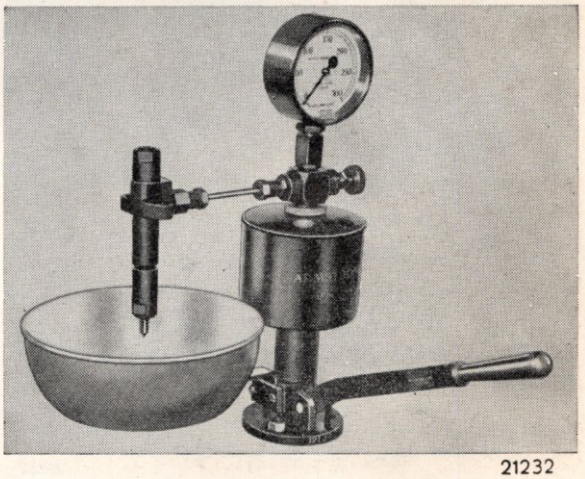


Fig. 63.

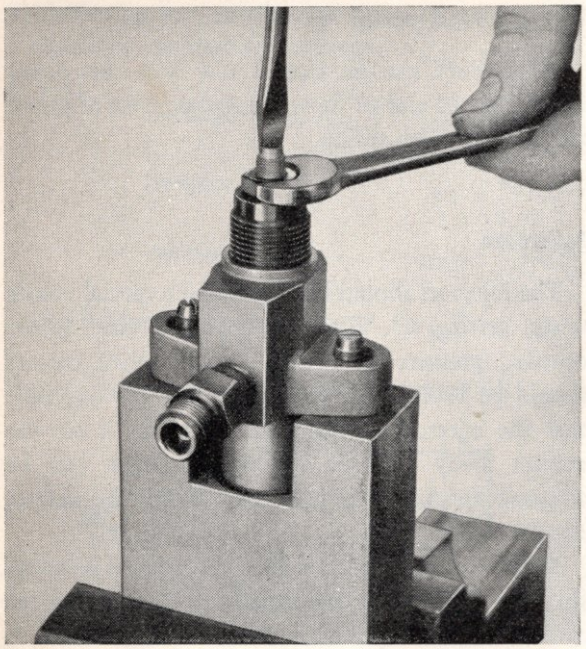


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Fig. 64.

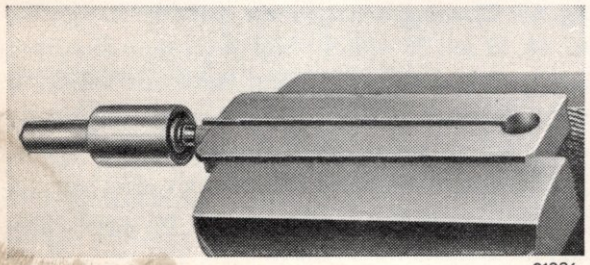

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Fig. 65.

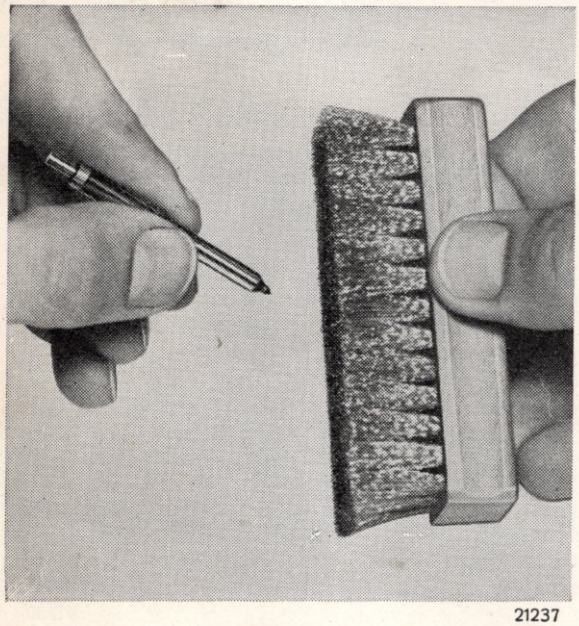

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Fig. 66.

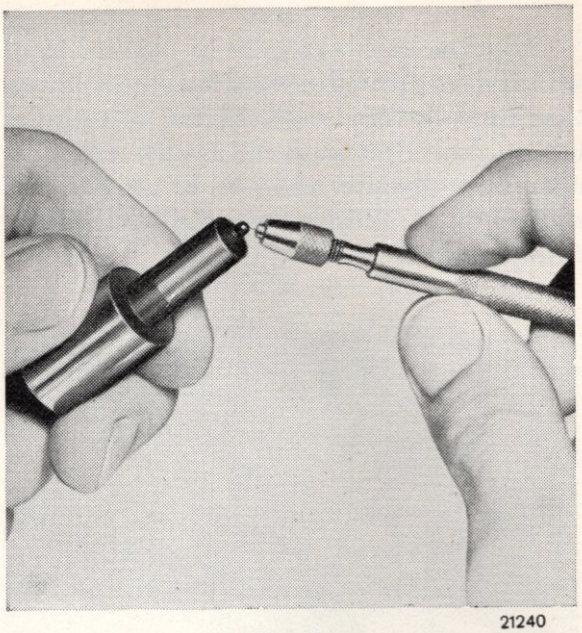

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Fig. 67.

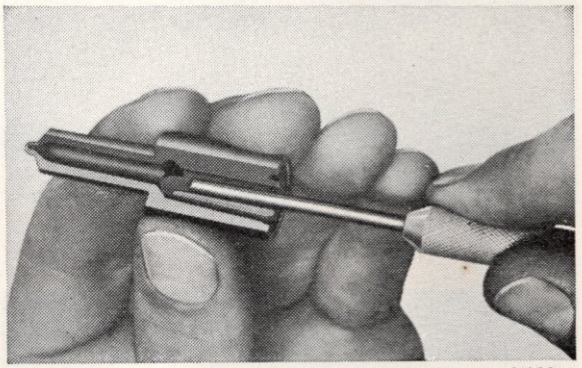

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Fig. 68.

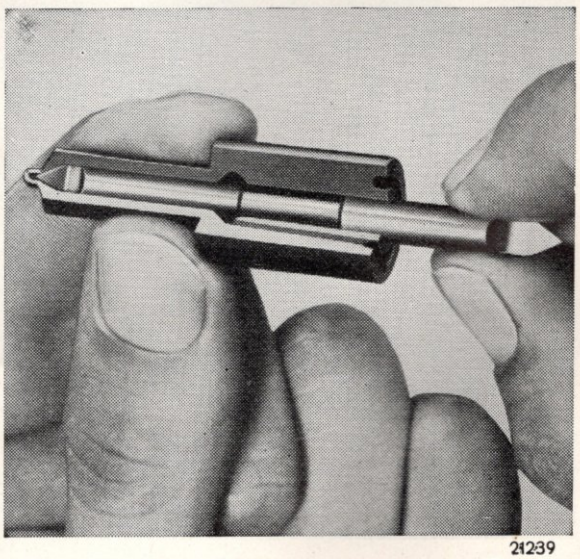

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Fig. 69.

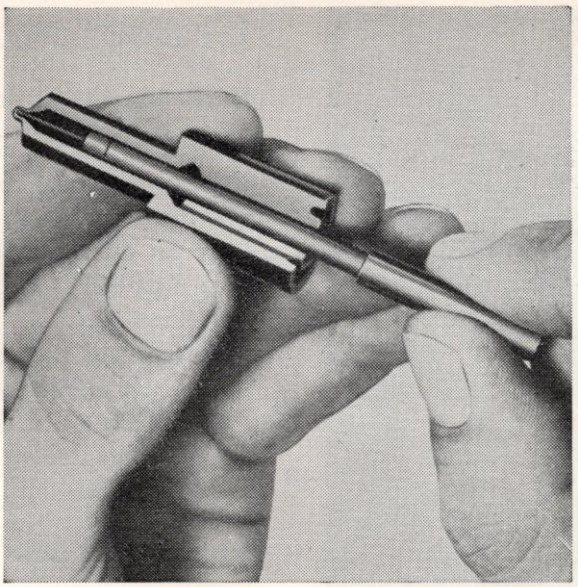


Fig. 70.

Clutch

The clutch is of the self-adjusting, single plate dry-disc type. The levers are adjusted with the help of adjusting jig SVO 2066, fig. 71. The levers should lie 5/32″ (4 mm) lower than the adjusting jig hub.

Steering gear

When adjusting the clearance between the worm and sector in the steering gear box, ensure that the sector is always in the centre of the worm. This is because the sector studs move in an arc and reach the apex of the arc in the central position. If adjustment is carried out with the studs in any other position in relation to the worm, these will move very stiffly when passing the central position, which can lead to seizing.

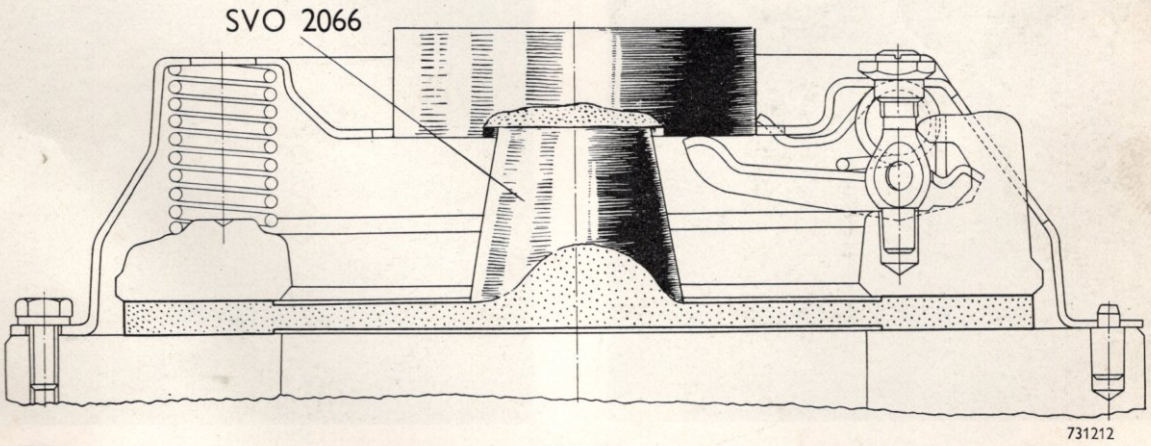


Fig. 71.

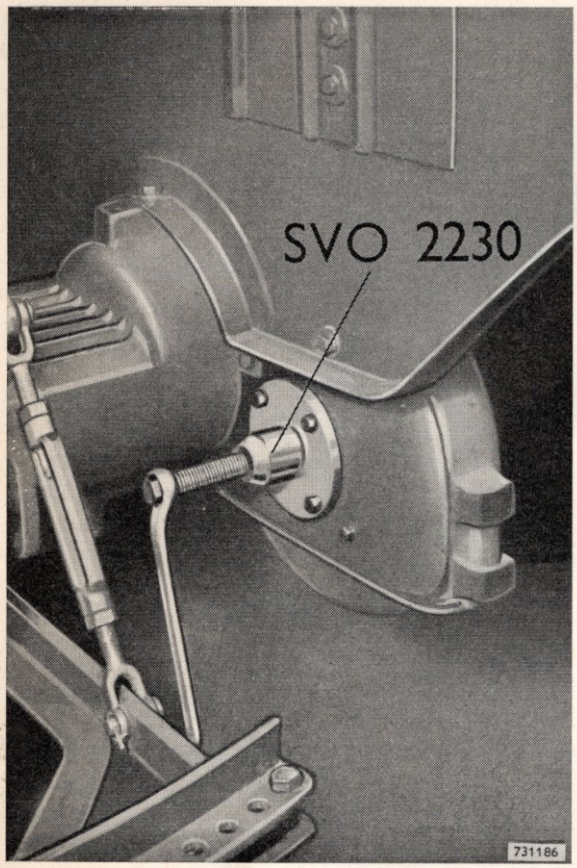


Fig. 72.

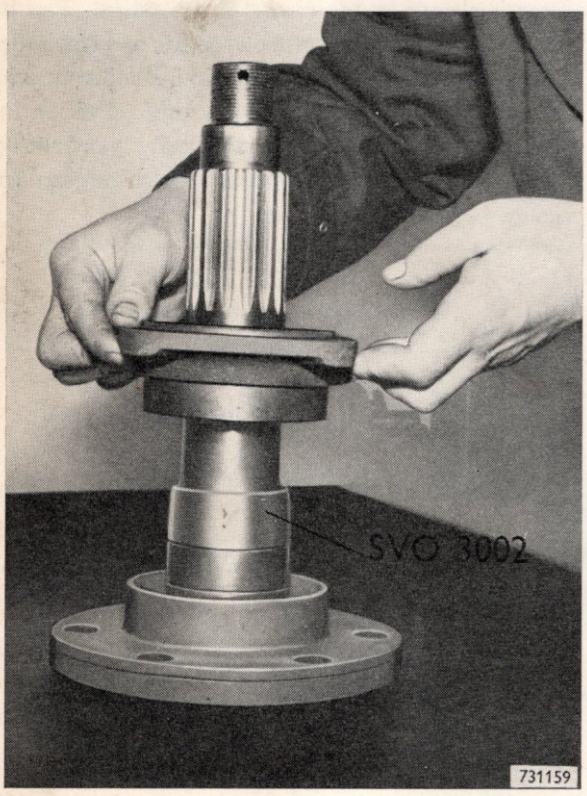


Fig. 73.

Gearbox and final drive

Replacing sealing rings and wheel shaft

Block up the tractor and remove the rear wheel. Remove the bearing cover on the inside of the wheel gear together with the castle nut and spacing washer. Press out the shaft with SVO 2230, fig. 72. Then slacken the bolts for the outer bearing cover, which is then removed.

When fitting, the outer bearing cover is first placed on the shaft with the help of fitting sleeve SVO 3002, fig. 73. Ensure that the spacing sleeve is correctly placed on the shaft (it is tapered and the larger end should be outwards).

Replacing the drive shaft and sealing rings

The rear wheel is removed after which the whole of the rear axle gear is taken out. The inner sealing rings are pulled out with SVO 2196, fig. 74. The brake drum is pulled off with SVO 1582, fig. 75. When the key for the brake drum has been taken out, the guide flange can also be removed.

See further on Plate 3.

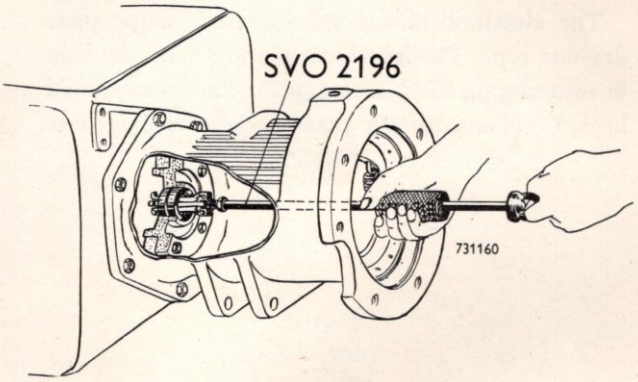


Fig. 74.

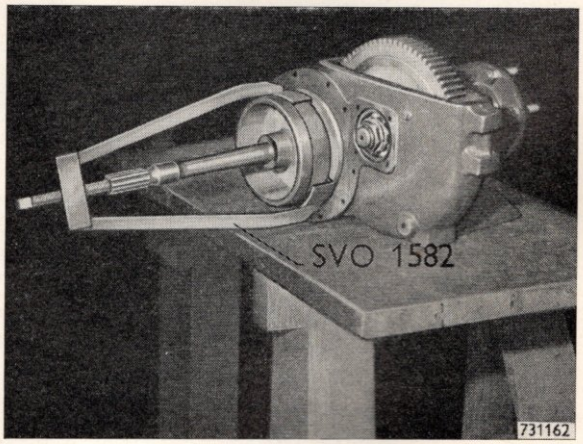


Fig. 75.

If the drive shaft is to be replaced, the wheel shaft with gear must first be removed after which the drive shaft can be pressed out when the bearing cover has been removed.

Fitting is done in the reverse sequence. When fitting the guide flange on the drive shaft, use fitting sleeve SVO 1194, fig. 76. Before fitting the brake drum, this should be warmed up to about 212° F (100° C).

The drive shaft inner sealing rings are fitted using SVO 2198, fig. 77.

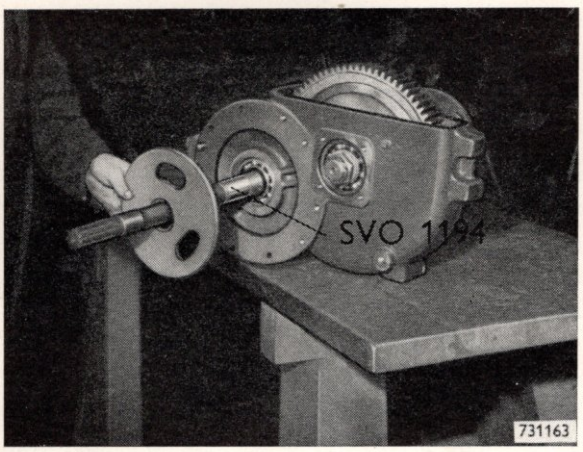


Fig. 76.

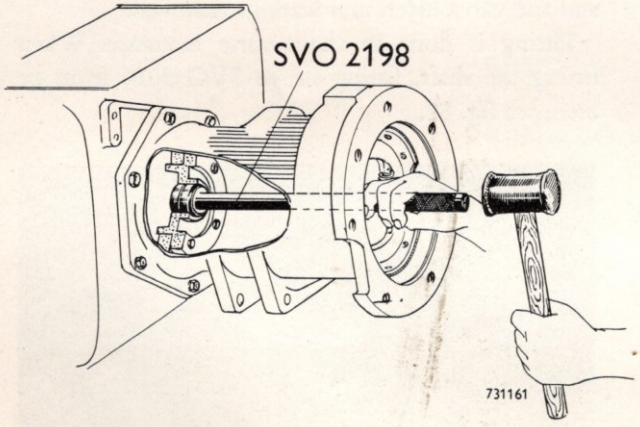


Fig. 77.

Dismantling the gearbox

Place the gearbox on a suitable bench. Block up under the differential and remove its bearing housing The differential right-hand bearing is pulled off with SVO 1247, fig. 78, after which the differential can be taken out to the rear.

The gearbox cover, selector rails and selector forks with reverse gear shaft, are removed. The locking ring for the upper shaft rear bearing is removed after which tool SVO 1252 is placed as shown in fig. 79, with the help of which the rear drive gear and bearing can be removed.

The upper shaft locknut and bearing housing studs are removed and the bearing housing pressed out. Take off the spacing ring and bushing for 5th speed gear. Move the 5th speed gear and engaging sleeve forwards so that the engaging hub can be driven off. Remove the key and then lay the shaft as shown in fig. 80 so that the gears and shaft can be taken out.

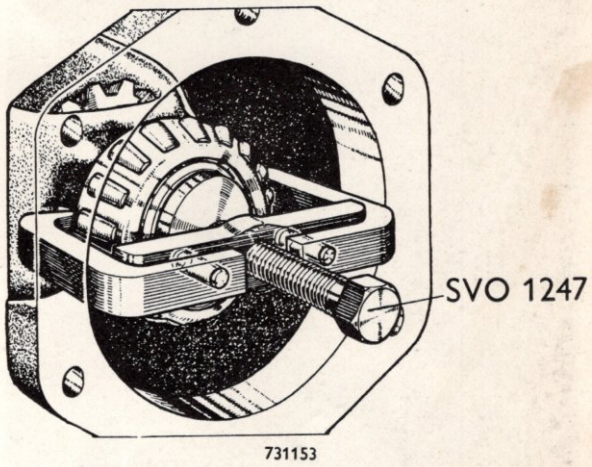


Fig. 78.

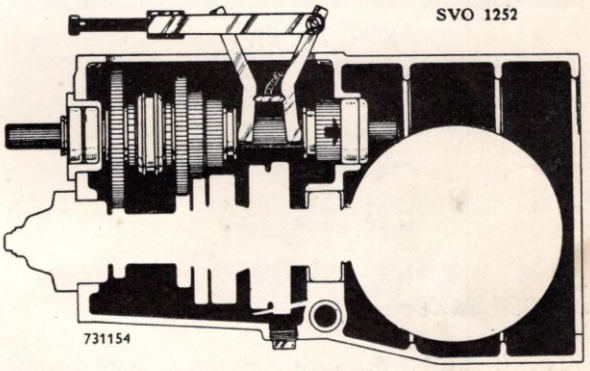


Fig. 79.

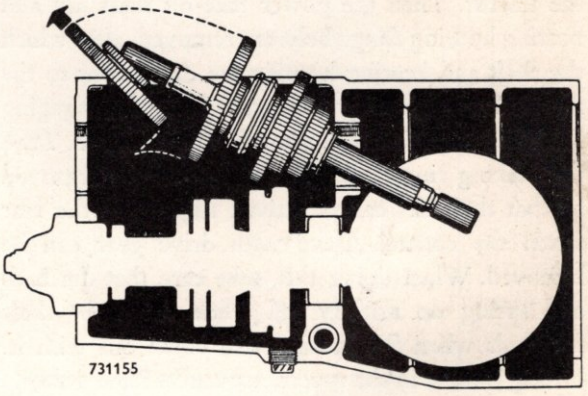


Fig. 80.

The lower shaft bearing cover and shims together with the castle nut and spacing washer are removed. The shaft is pressed out with SVO 2230, fig. 81, after which the gear wheels, spacing sleeves and shaft can be removed.

Fitting is done in the reverse sequence.

See further on Plate 2.

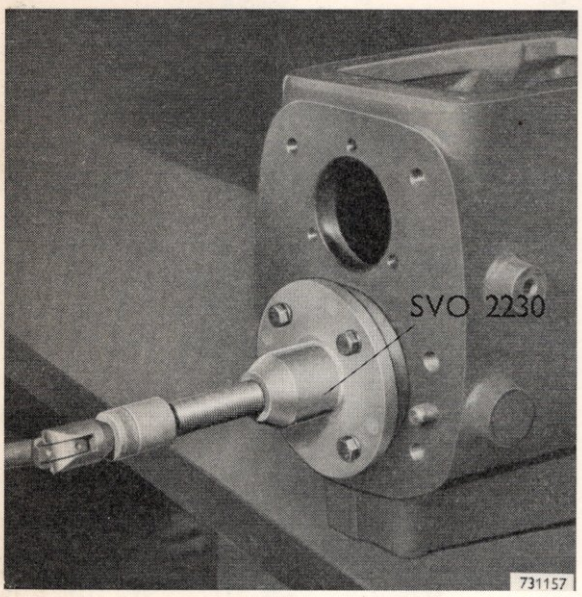


Fig. 81.

Power take-off

For all repair work involving the power take-off, the power take-off housing must be removed from the tractor. Then the power take-off shaft nut and bearing housing flange bolts are removed, after which the shaft and bearing housing are driven out to the rear. When removing the upper shaft, the engaging lever and engaging fork must first be removed. Then the locking rings and guide plate must be removed so that the shaft can be driven slightly to the rear when the control sleeve with drive gear can be removed. When doing this, take care that the balls and spring do not fly off. Then drive the shaft forwards when the bearing will come out with it. Fitting is done in the reverse sequence. Plate 4 shows a cut-away illustration of the power take-off.

Hydraulic lift

The cylinder (1, Plate 4) is removed from the lift when the plunger (2) comes out with it, after which the plunger can be taken out of the cylinder and the rings replaced.

The inner and outer levers (3 and 4 respectively) and lifting shaft (5) are removed after the outer levers have been taken off, after which the shaft can be driven off. The bushing on the side towards which the shaft is driven out also comes out with it.

Whenever the bushings have been removed, the sealing rings (6 and 7) should be replaced.

Control valve

The first check which should be made when there is any fault with the control valve, is to ensure that all balls are intact and in the correct position. See the cut-away illustration of the valve on Plate 4. There are three balls and these should be located as shown in the drawing.

The valve is removed as follows. Remove the safety valve and locking ring with spacing washer and take care of the balls. Slacken the by-pass valve screw and take out the spring and ball. Shake the valve so that the valve lifters go into the seatings after which the shaft can be pulled out and the valve lifters and seatings removed.

Fitting is done in the reverse sequence. When fitting the shaft, fitting sleeve SVO 3014 must be used, see fig. 82.

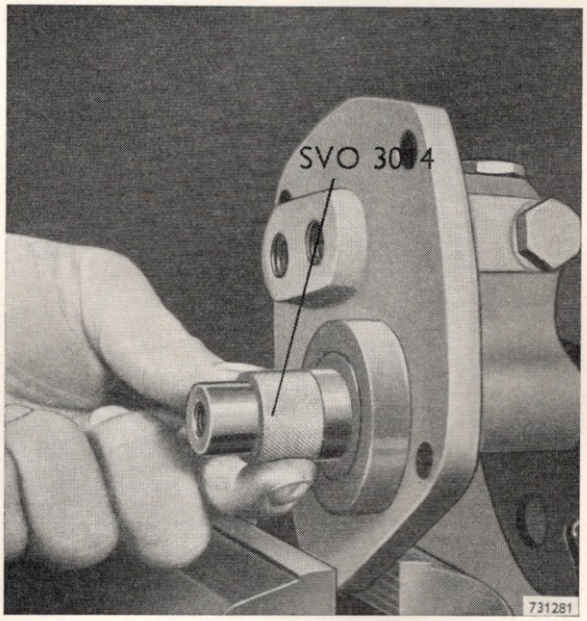


Fig. 82.

Pump

Replacing the pump sealing ring and O-rings

Slacken and lift off the cover but be careful to ensure that the priming spring and ball do not fly off. Replace the sealing ring and O-ring. When fitting, use fitting sleeve SVO 3004 for the sealing ring, fig. 83. The early production pump has two O-rings and a gasket between the cover and pump.

Fig. 83.

SPECIFICATIONS

General information

Weights:	
Tractor, standard, with rubber tyres	3638 lb (1650 kg)
Tractor, with ballast weights (4 on rear wheels)	4233 lb (1920 kg)
Tractor, with 75 % liquid ballast in rear tyres	4299 lb (1950 kg)
Tractor, with 100 % liquid ballast in rear tyres	4519 lb (2050 kg)
Tractor, with ballast weights and 75% liquid ballast in rear tyres	4894 lb (2220 kg)
Tractor, with ballast weights and 100% liquid ballast in rear tyres	5114 lb (2320 kg)
With 75% liquid ballast in front tyres, add	106 lb (48 kg)
With 100% liquid ballast in front tyres, add	141 lb (64 kg)
For tractors with belt pulley and power take-off, add	165 lb (75 kg)
For tractors with hydraulic lift, add	275 lb (125 kg)
Ballast weights, rear each	110 lb (50 kg)
Ballast weights, front, each	77 lb (35 kg)
Weight distribution:	
Standard, front	1521 lb (690 kg)
rear	2116 lb (960 kg)
Maximum permissible axle pressure, front	1764 lb (800 kg)
(temporarily)	2315 lb (1050 kg)
Maximum permissible axle pressure, rear	5401 lb (2450 kg)
(temporarily)	6363 lb (2900 kg)
Wheelbase	72 3/4″ (1850 mm)
Trackwidths, front	47″, 54″ (1200, 1370 mm)
Trackwidths, front (to special order)	47, 51, 54, 55, 58, 59, 62, 63, 66 and 70″ (1200, 1300, 1370, 1400, 1470, 1500, 1570, 1600, 1670 and 1700 mm)
Trackwidths, rear	51, 55, 59, 63, 67, 71 and 75″ (1300, 1400, 1500, 1600, 1700, 1800 and 1900 mm)
Turning circle (with narrowest front trackwidth):	
Without using steering brakes	about 268″ (6800 mm)
Using steering brakes	about 236″ (6000 mm)
Overall length	112″ (2850 mm)
Overall width	66″ (1670 mm)
Overall height	85″ (2150 mm)
Height to radiator cap	58″ (1465 mm)
Height to top of steering wheel	65″ (1650 mm)
Ground clearance, front axle	16 1/2″ (420 mm)
engine	18 1/2″ (470 mm)
drawbar in horizontal position	17 1/2″ (445 mm)
Lateral movement of drawbar	20 1/2″ (520 mm)

Engine

General

Type designation	1052
Output at 1700 r. p. m.	31 h. p.
Output (maximum) at 2000 r. p. m.	33 h. p.
Torque (maximum) at 800 r. p. m.	105 lb/ft (14.5 kgm)
Number of cylinders	2
Bore	4.125″ (104.77 mm)
Stroke	5.118″ (130 mm)
Displacement, total	136.7 cu. ins. (2.24 litres)
Compression ratio	16.5:1
Compression pressure at 200 r. p. m.	about 398 lb/sq. in. (28 kg/cm²)
at 1700 r. p. m.	about 569 lb/sq. in. (40 kg/cm²)
Fast idling speed	2060 r. p. m.
Idling speed	450—500 r.p.m.

Cylinder block

Fitted with wet-type liners

Material	Cast iron

Cylinder liners

Replaceable wet-type liners

Material	Special-alloy cast iron
Sealing, lower end	Rubber rings
Number per cylinder	2
Diameter	4.52—4.56″ (114.9—115.7 mm)
Thickness	0.15—0.17″ (3.9—4.2 mm)

Cylinder liners are classed as regards bore in accordance with the following table:

Class	Bore	Colour
A	4.1248—4.1252″ (104.770—104.781 mm)	Brown
B	4.1252—4.1257″ (104.781—104.793 mm)	Green
C	4.1257—4.1262″ (104.793—104.805 mm)	Blue

Pistons

Material	Light-alloy
Weight, Mahle	46 oz. (1300 grammes)
Specialloid	52 oz. (1480 grammes)
Overall height	5.83″ (148 mm)
Height from centre of gudgeon pin to top of piston	3.36—3.37″ (85.4—85.5 mm)
Piston clearance, Mahle	0.004—0.005″ (0.10—0.12 mm)
Specialloid	0.0043—0.0051″ (0.11—0.13 mm)

The pistons are classed as regards diameter in accordance with the following table:

Class	Diameter (Mahle)	Colour
A	4.1197—4.1201″ (104.640—104.651 mm)	Brown
B	4.1201—4.1207″ (104.651—104.663 mm)	Green
C	4.1207—4.1211″ (104.663—104.675 mm)	Blue
	Diameter (Specialloid)	
A	4.1201—4.1205″ (104.65—104.66 mm)	Brown
B	4.1205—4.1209″ (104.66—104.67 mm)	Green
C	4.1209—4.1213″ (104.67—104.68 mm)	Blue

Piston rings

Segments de étanchéité

Compression rings

Upper piston ring chromium plated

1 (chromium plated, inner chamfer to face upwards), height	0.0930—0.0935″ (2.362—2.375 mm)
Ring clearance in groove	0.0035—0.0050″ (0.089—0.127 mm)
2 (marked "Top", which faces upwards) height	0.1235—0.1240″ (3.137—3.149 mm)
Ring clearance in groove	0.0025—0.0040″ (0.064—0.102 mm)
Piston ring gap measured in ring opening	0.0130—0.0230″ (0.33—0.584 mm)

Segments d'étanchéité

Oil control rings

2, height	0.1860—0.1865″ (4.725—4.737 mm)
Ring clearance in groove	0.0015—0.0030″ (0.038—0.076 mm)
Piston ring gap measured in ring opening	0.0130—0.0230″ (0.330—0.584 mm)

Gudgeon pins

Axe de piston

Fully-floating in both piston and connecting rod, circlips in piston at gudgeon pin ends

Material	Case-hardened steel
Fit in connecting rod (room temperature 64° F = 18° C)	Push fit
Fit in piston (piston heated to 176—212° F = 80—100° C)	Push fit

The gudgeon pins are classed as regards diameter in accordance with the following table:

Class	Diameter	Colour
A	1.5746—1.5748″ (39.996—40.000 mm)	Yellow
B	1.5748—1.5750″ (40.000—40.004 mm)	White
C	1.5750—1.5751″ (40.004—40.008 mm)	Black

Cylinder head

Material	Alloy cast iron
Height	4.2″ (109 mm)
Tightening torque	125 lb/ft (17.3 kgm)

Crankshaft

Replaceable bearing shells in main and big-end bearings

Main bearings, number	3
Crankshaft end play	0.0040—0.0110″ (0.11—0.29 mm)

Main bearing journals

Diameter, front and rear bearings, standard	3.3739—3.3748″ (85.698—85.720 mm)
undersize 0.010″	3.3639—3.3648″ (85.444—85.466 mm)
undersize 0.020″	3.3539—3.3548″ (85.190—85.212 mm)
0.030″	3.3439—3.3448″ (84.936—84.958 mm)
0.040″	3.3339—3.3348″ (84.682—84.704 mm)
0.050″	3.3239—3.3248″ (84.428—84.450 mm)
Diameter, centre bearing, standard	3.9991—4.0000″ (101.578—101.600 mm)
undersize 0.010″	3.9891—3.9900″ (101.324—101.346 mm)
0.020″	3.9791—3.9800″ (101.070—101.092 mm)
0.030″	3.9691—3.9700″ (100.816—100.838 mm)
0.040″	3.9591—3.9600″ (100.562—100.584 mm)
0.050″	3.9491—3.9500″ (100.308—100.330 mm)

Front main bearing journal width (distance between webs)

Standard	2.2374—2.2390″ (56.830—56.870 mm)
Oversize 0.002″ (0.05 mm)	2.2394—2.2409″ (56.880—56.920 mm)
0.004″ (0.10 mm)	2.2413—2.2429″ (56.930—56.970 mm)
0.006″ (0.15 mm)	2.2433—2.2449″ (56.980—57.020 mm)
0.008″ (0.20 mm)	2.2453—2.2469″ (57.030—57.070 mm)
0.010″ (0.25 mm)	2.2472—2.2488″ (57.080—57.120 mm)

Porte des Bielles

Big-end bearing journals

Diameter, standard	2.7493—2.7500″ (69.831—69.850 mm)
undersize 0.010″	2.7393—2.7400″ (69.577—69.596 mm)
0.020″	2.7293—2.7300″ (69.323—69.342 mm)
0.030″	2.7193—2.7200″ (69.069—69.088 mm)
0.040″	2.7093—2.7100″ (68.815—68.834 mm)
0.050″	2.6993—2.7000″ (68.561—68.580 mm)

Flywheel

Permissible axial throw at a measuring radius of 6.3″ (160 mm)	Max. 0.013″ (0.32 mm)
Permissible radial throw	Max. 0.008″ (0.20 mm)
Ring gear for starter motor	145 teeth

Flywheel housing

Permissible axial throw at a measuring radius of 9.44″ (240 mm)	Max. 0.009″ (0.24 mm)
Permissible radial throw	Max. 0.002″ (0.05 mm)

Connecting rods

Fitted with replaceable bearing shells

Material	Special steel

Main and big-end bearings

Main bearing shells (front and rear main bearings)

Material	Steel shells with lead/bronze lining
Thickness, standard	0.0919—0.0921″ (2.334—2.340 mm)
undersize 0.010″	0.0969—0.0971″ (2.461—2.467 mm)
0.020″	0.1019—0.1021″ (2.588—2.594 mm)
0.030″	0.1069—0.1071″ (2.715—2.721 mm)
0.040″	0.1119—0.1121″ (2.842—2.848 mm)
0.050″	0.1169—0.1171″ (2.969—2.975 mm)
Radial clearance	0.0032—0.0054″ (0.08—0.136 mm)

Main bearing shells (centre main bearing)

Material	Steel shells with lead/bronze lining
Thickness, standard	0.1019—0.1022″ (2.589—2.595 mm)
undersize 0.010″	0.1069—0.1072″ (2.716—2.722 mm)
0.020″	0.1119—0.1122″ (2.843—2.849 mm)
0.030″	0.1169—0.1172″ (2.970—2.976 mm)
0.040″	0.1219—0.1222″ (3.097—3.103 mm)
0.050″	0.1269—0.1272″ (3.224—3.230 mm)
Radial clearance	0.0035—0.0057″ (0.09—0.146 mm)

End thrust bearings

Material	Steel with babbit-metal lining
Thickness, standard	0.0906—0.0929″ (2.300—2.360 mm)
oversize 0.002″ (0.05 mm)	0.0925—0.0949″ (2.350—2.410 mm)
0.004″ (0.10 mm)	0.0945—0.0969″ (2.400—2.460 mm)
0.006″ (0.15 mm)	0.0965—0.0988″ (2.450—2.510 mm)
0.008″ (0.20 mm)	0.0984—0.1008″ (2.500—2.560 mm)
0.010″ (0.25 mm)	0.1004—0.1028″ (2.550—2.610 mm)

After the crankshaft has been ground, 1 standard bearing and 1 oversize bearing should be fitted. The standard bearing should be fitted furthest forwards.

Big-end bearing shells

Material	Steel shells with lead-bronze lining
Thickness, standard	0.7496—0.7535″ (1.904—1.914 mm)
undersize 0.010″	0.7996—0.8035″ (2.031—2.041 mm)
0.020″	0.8496—0.8535″ (2.158—2.168 mm)
0.030″	0.8996—0.9035″ (2.285—2.295 mm)
0.040″	0.9496—0.9535″ (2.412—2.422 mm)
0.050″	0.9996—1.0035″ (2.539—2.549 mm)
Big-end bearing axial clearance	0.0060—0.0140″ (0.15—0.35 mm)
radial clearance	0.0022—0.0040″ (0.055—0.104 mm)

Camshaft

Material	Drop-forged special steel
Drive	Gear drive
Number of bearings	3
Front bearing journal, diameter	1.9976—1.9988″ (50.740—50.770 mm)
Centre bearing journal, diameter	2.3780—2.3791″ (60.400—60.430 mm)
Rear bearing journal, diameter	1.9976—1.9988″ (50.740—50.770 mm)
Axial clearance	0.0040—0.0080″ (0.1—0.2 mm)
Radial clearance, front bearing	0.0012—0.0035″ (0.030—0.090 mm)
centre bearing	0.0024—0.0047″ (0.060—0.120 mm)
rear bearing	0.0012—0.0035″ (0.030—0.090 mm)

Camshaft bearings

The bearings are replaceable. To be reamed to the measurements given below when fitting

Material	Steel with babbit-metal lining
Front bearing, diameter	2.0000—2.0012″ (50.800—50.830 mm)
Centre bearing, diameter	2.3815—2.3827″ (60.490—60.520 mm)
Rear bearing, diameter	2.000—2.0012″ (50.800—5.830 mm)

Timing gears

Crankshaft gear wheel	32 teeth
Camshaft gear wheel	64 teeth
Drive gear, lubricating oil pump	26 teeth
Drive gear, governor	21 teeth
Tooth flank clearance:	
Crankshaft gear—lubricating oil pump gear	0.0040—0.140″ (0.09—0.36 mm)
Crankshaft gear—camshaft gear	0.0050—0.0120″ (0.12—0.31 mm)
Camshaft gear—drive gear, governor	0.0030—0.0190″ (0.07—0.49 mm)

Valve system

Valves

Clearance between valve disc and cylinder head contact surface	0.0200—0.0400″ (0.6—0.9 mm)

Inlet valves

Material	Special steel
Disc diameter	1.6″ (41 mm)
Stem diameter	0.4320—0.4330″ (10.973—11.000 mm)
Valve seat angle	44.5°
Valve seating angle in cylinder head	45°
Valve seating width in cylinder head	0.06″ (1.5 mm)
Clearance, valve stem—valve guide	0.0013—0.0034″ (0.032—0.086 mm)
Inlet valve should open B.T.D.C. at a check clearance of	10°/0.0280″ (0.7 mm)
Valve clearance, warm engine	0.016″ (0.40 mm)

Exhaust valves

Material	Special steel with stellite-lined seat and stem end
Disc diameter	1.46″ (37 mm)
Stem diameter	0.4321—0.4324″ (10.975—10.984 mm)
Valve seat angle	44.5°
Valve seating angle in cylinder head	45°
Valve seating width in cylinder head	0.06″ (1.5 mm)
Clearance, valve stem—valve guide	0.0019—0.0040″ (0.048—0.102 mm)
Valve clearance, warm engine	0.018″ (0.45 mm)

Valve seatings

Valve seating for inlet valve:	
Diameter, standard (measurement A)	1.7348—1.7358″ (44.063—44.089 mm)
oversize 0.010″	1.7448—1.7458″ (44.317—44.343 mm)
Height (measurement B)	0.2320—0.2360″ (5.90—6.00 mm)
Valve seating bed, inlet valve:	
Diameter, standard (measurement C)	1.7318—1.7328″ (43.987—44.013 mm)
oversize 0.010″	1.7418—1.7428″ (44.241—44.267 mm)
Height (measurement D)	0.33—0.34″ (8.5—8.6 mm)
Valve seating for exhaust valve:	
Diameter, standard (measurement A)	1.7348—1.7358″ (44.063—44.089 mm)
oversize 0.010″	1.7448—1.7458″ (44.317—44.343 mm)
oversize 0.020″	1.7548—1.7558″ (44.571—44.597 mm)
oversize 0.030″	1.7648—1.7658″ (44.825—44.851 mm)
Height (measurement B)	1.7748—1.7758″ (12.025—12.152 mm)

Valve seating bed, exhaust valve:	
Diameter, standard (measurement C)	1.7318—1.7328″ (43.987—44.013 mm)
oversize 0.010″	1.7418—1.7428″ (44.241—44.267 mm)
oversize 0.020″	1.7518—1.7528″ (44.495—44.521 mm)
oversize 0.030″	1.7622—1.7628″ (44.759—44.775 mm)
Height (measurement D)	0.4783—0.4823″ (12.15—12.25 mm)
Bottom radius of bed, max. (measurement R)	0.03″ (0.8 mm)

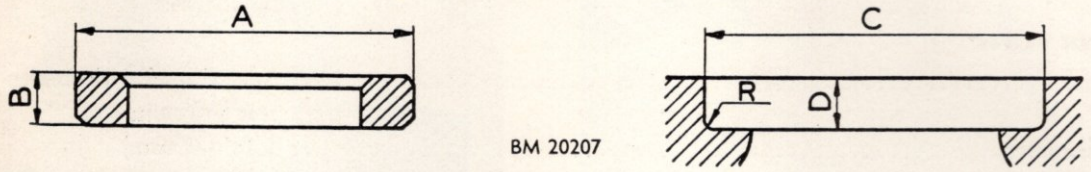


Fig. 84. Diagram of valve seating and seating bed.

Valve guides

Length, inlet valve guide	3.3 (84 mm)
Length, exhaust valve guide	3.6″ (92 mm)
Internal diameter	0.4343—0.4353″ (11.032—11.059 mm)
Height over cylinder head spring level	1.22″ (31 mm)

Valve springs

Tightly coiled at one end. This end to face downwards	
Length unloaded	about 2.83″ (72 mm)
Length with 97±5 1/2 lb (44 ± 2.5 kg) loading	2.24″ (57 mm)
Length with 187 ± 9.9 lb (85 ± 4.5 kg) loading	1.85″ (47 mm)
Rocker arm shaft, diameter	0.8606—0.8639″ (21.858—21.942 mm)
Rocker arm bushings to be reamed to	Push fit
Push rods should be straight within	0.016″ (0.4 mm)

Lubricating system

Type	Pressure lubrication
Lubricating oil pump, type (driven by crankshaft)	Gear pump
tooth flank clearance	0.0020—0.0070″ (0.05—0.17 mm)
number of teeth on drive gear	26 teeth
Relief valve spring:	
Length, unloaded	about 1.42″ (36 mm)
Length, loaded with 4.4 ± 0.4 lb (2 ± 0.2 kg)	1.26″ (32 mm)
Oil pressure	42.7—57 lb/sq.in. (3—4 kg/cm²)
Lubricating oil, type	Diesel engine oil "For Service DG"
viscosity at temperatures above 32° F (0° C)	SAE 20 or 20 W
viscosity at temperatures below 32° F (0° C)	SAE 10 or 10 W
Lubricating oil filter	Mann, OP 25—09
Total oil capacity, including oil filter	15 Imp. pints (8.5 litres)

Fuel system

Fuel tank, capacity	11 Imp. galls (50 litres)

Injection equipment

Fuel injection pump	Bosch PFR 2A 80/84/8
Setting	28° B.T.D.C.
Pump element, diameter	0.31″ (8 mm)
Injected quantity at 1000 r.p.m. and full loading (torque)	62—64 mm^3 per stroke
Governor, type	Centrifugal
Feed pump	Bosch FP/K 22BC 191/2
Feed pressure	8.5—17 lb/sq.in. (0.6—1.2 kg/cm^2)
Overflow valve	Bosch EPVE 176 1 Z
Opening pressure	8.5—17 lb/sq.in. (0.6—1.2 kg/cm^2)
Fine-filter	Bosch FJ/DN 5/3
Nozzle holder	Bosch KBL 103S 15/13
Nozzles	Bosch DLLA 150 S 40
Nozzle hole diameter (4 holes)	0.011″ (0.27 mm)
Injector opening pressure	1920—1991 lb/sq.in. (135—140 kg/cm^2)
Permissible fall in pressure when testing (1778—1422 lb/sq.in. = 125—100 kg/cm^2)	356 lb/sq.in. (25 kg/cm^2) in 3—25 seconds

Cooling system

Type	Over-pressure
Capacity	about 2 Imp. galls (9 litres)
Radiator cap begins to open at	5 1/4—61/2 lb/sq.in. (0.38—0.45 kg/cm^2)
Thermostat marked	"V 55 FS 165"
type	Balanced (does not open through water pump pressure)
begins to open at	165° F (74° C)
fully open at	185° F (85° C)
Radiator hose, upper	Curved tube of oil-resisting rubber, diam. 1.26″ (32 mm)
lower	Curved tube of oil-resisting rubber, diam. 1.26″ (32 mm)

Wear tolerances

Cylinders

Cylinder liners and pistons with piston rings should be replaced when wear amounts to 0.014—0.016″ (0.35—0.40 mm) or when out-of-round 0.003″ (0.08 mm)

Crankshaft

Main bearing journals, permissible out-of-roundness	0.0030″ (0.075 mm)
permissible taper	0.0020″ (0.05 mm)
Big-end bearing journals, permissible out-of-roundness	0.0030″ (0.075 mm)
permissible taper	0.0020″ (0.05 mm)
Maximum crankshaft end play	0.0150″ (0.38 mm)

Valves

Valve stem, permissible wear	0.0008″ (0.02 mm)
Permissible clearance between valve stem and valve guide:	
Inlet valve	0.0060″ (0.15 mm)
Exhaust valve	0.0070″ (0.17 mm)
Valve disc edge should be at least	0.0400″ (1.0 mm)

Camshaft

Bearing journals, permissible out-of-roundness with new bushings	0.0010″ (0.03 mm)
Bushings, permissible wear	0.0020″ (0.05 mm)

Tightening torques

Centre main bearing bracket	123 lb/ft (17 kgm)
Counterweights	62 lb/ft (8.5 kgm)
Big-end bearings	94 lb/ft (13 kgm)
Flywheel	145 lb/ft (20 kgm)
Cylinder head	125 lb/ft (17.3 kgm)
Delivery valves (fuel injection pump)	36 lb/ft (5 kgm)

Clutch

Type	Borg & Beck 10-a-7 (single-plate dry disc)
Number of clutch springs	12 (6 coloured green and 6 coloured yellow)
Length of clutch springs (green):	
Unloaded	2.6″ (65 mm)
Loaded with 110 ± 6 1/2 lb (50 ± 3 kg)	1.7″ (43 mm)
Length of clutch springs (yellow):	
Unloaded	2.7″ (68 mm)
Loaded with 126 ± 6 1/2 lb (57 ± 3 kg)	1.7″ (43 mm)
Clutch pedal free travel	1—1 3/16″ (25—30 mm)
Clutch disc external diameter	10″
Clutch disc friction surface, total	about 95 sq.in. (610 cm²)
Clutch disc thickness when fitted	0.35″ (9 mm)
Rivets for clutch facings:	
Number	20
Size	9/64″ × 1/4″ (3.57 × 6.35 mm)

The levers should be adjusted to 0.16″ (4 mm) under the hub with adjusting jig SVO 2066

Gearbox with rear axle and final drive

Gearbox

Type	5-speed and reverse
Ratios:	
1st speed	2.88:1
2nd speed	1.87:1
3rd speed	1.36:1
4th speed	0.78:1
5th speed	0.54:1
Reverse	2.88:1
Number of teeth on the various gears:	
Countershaft:	
Gear for 1st speed	17 teeth
2nd speed	23 teeth
3rd speed	28 teeth
4th speed	37 teeth
5th speed	43 teeth
Main shaft:	
Gear for 1st speed	49 teeth
2nd speed	43 teeth
3rd speed	38 teeth
4th speed	29 teeth
5th speed	23 teeth
Reverse shaft:	
Gear for reverse	22 teeth
Lubricant, type,	Hypoid oil
viscosity, summer and winter	SAE 90
Oil capacity, including rear axle	about 12 1/4 Imp. pints (7 litres)

Rear axle

Type	Crown wheel and pinion. Pinion level with centre of crown wheel
Number of teeth, pinion	10 teeth
crown wheel	51 teeth
Reduction	5.1:1 (51:10)
Tooth flank clearance, pinion-crown wheel	0.004—0.008″ (0.10—0.20 mm)
Adjustings shims for bearing sleeve, thickness	0.004, 0.014 and 0.040″ (0.10, 0.35 and 1.0 mm)

Final drive

Type	Spur gears
Reduction	7.0:1 (84:12)
Tooth flank clearance	0.0080—0.010″ (0.20—0.25 mm)
Lubricant, type	Hypoid oil
viscosity, summer and winter	SAE 90
Oil capacity per side	2 5/8 Imp. pints (1.5 litres)

Total reduction

1st speed	102.8:1
2nd speed	66.8:1
3rd speed	48.7:1
4th speed	28.0:1
5th speed	19.1:1
Reverse	102.8:1

Speeds

Speed at 1700 r.p.m. (full hand throttle) with 11—28″ rear tyres	m.p.h.	km.p.h.
1st speed	2.27	3.6
2nd speed	3.47	5.6
3rd speed	4.84	7.7
4th speed	8.29	13.3
5th speed	12.11	19.5
Reverse	2.27	3.6

Speed at 2000 r.p.m. (full foot throttle) with 11—28″ rear tyres		
1st speed	2.62	4.2
2nd speed	4.01	6.5
3rd speed	5.60	9.0
4th speed	9.67	15.6
5th speed	14.26	22.9
Reverse	2.62	4.2

Hydraulic lift (extra equipment)

Overflow valve opening pressure	1635—1706 lb/sq.in. (115—120 kg/cm²)
Safety valve opening pressure	2418—2560 lb/sq.in. (170—180 kg/cm²)
Oil, type and viscosity	Hydraulic oil or engine oil SAE 10
Oil capacity of system (with power take-off fitted)	about 10 1/2 Imp. pints (6 litres)
Oil capacity of system (without power take-off fitted)	about 8 3/4 Imp. pints (5 litres)
Lifting capacity	about 1874 lb (850 kg)

Power take-off (extra equipment)

Shaft diameter	1 3/8″, 6 splines
Speed at 1700 r.p.m. engine speed (full hand throttle)	540 r.p.m.
Reduction	3.14:1 (44:14)
Height above ground level	26 3/4″ (680 mm)
Distance, power take-off — towing hook	13 1/2″ (345 mm) (With hydraulic lift, 7″ = 175 mm)
Distance, power take-off — towing hook (with hydraulic lift and extra combine hitch)	14″ (360 mm)
Distance, power take-off — rear wheel	16 1/2″ (415 mm) (with hydraulic lift, 9 3/4″ = 245 mm)

Belt pulley gear (extra equipment)

Belt pulley output at 1700 r.p.m. engine speed (full hand throttle)	29 h.p.
Belt pulley speed at 1700 r.p.m. engine speed	1215 r.p.m.
Belt speed at 1700 r.p.m. engine speed	45 ft.per sec. (14.0 metres per sec.)
Belt pulley diameter	8 11/16″ (220 mm)
Belt pulley face	6 5/16″ (160 mm)
Number of teeth, drive shaft	20 teeth
belt pulley shaft	28 teeth
Lubricant, type	Hypoid oil
viscosity, summer and winter	SAE 90
Oil capacity	2 5/8 Imp.pints (1.5 litres)

Towing hook

Output at towing hook	about 21 h.p.

Front axle and steering gear

Front axle

Type	Tubular
Wheel alignment:	
Caster	0°
Camber	3°
King pin inclination	7°
Toe-in	0—0.20″ (0—5 mm)

Steering gear

Steering gear, type	Cam and levers
Number of steering wheel turns from stop to stop	3.1
Reduction, central position	1:18
outer positions	1:20
Adjusting shims for steering box bearing, thickness	0.002, 0.003 and 0.010″ (0.05, 0.08 and 0.25 mm)
Lubricant, type	Hypoid or gear oil
viscosity, summer and winter	SAE 90
Oil capacity	7/8 Imp.pint (0.5 litre)

Brakes

Mechanical, with two pedals for steering brakes

Brake drum, diameter	7.28″ (185 mm)
Brake linings:	
Type	Pressed
Size	1/4 × 2 1/4″ × 193 mm
Brake lining rivets:	
Number	32
Size	5/32″ × 13.7 mm
Pedal free travel	0.39—0.47″ (10—12 mm)

The handbrake operates on the left-hand steering brake

Wheels and tyres

Wheels

Front wheels, type	Disc wheels
size	4.00E × 16″
out-of-roundness, max	0.093″ (2.36 mm)
side throw, max	0.093″ (2.36 mm)
Rear wheels, type	Disc wheels
size	W9 × 28″
out-of-roundness, max	0.186″ (4.75 mm)
side throw, max	0.186″ (4.75 mm)
wheel turns per mile (km) (rolling radius, 22.8″ = 580 mm)	about 461 (288)

Tyres

Size, front	5.50—16″, 4-ply
rear	11—28″, 6-ply

Tyre pressures in lb/sq.in. (kg/cm²)	Front	Rear
With standard equipment	30 (2.1)	13 (0.9)
With ballast weights	30 (2.1)	13 (0.9)
With ballast weights and 75% liquid ballast in the tyres	32.7 (2.3)	14 (1.0)
With ballast weights and 100% liquid ballast in the tyres	32.7 (2.3)	14 (1.0)
With standard equipment and 1984 lb (900 kg) loading on the rear axle	30 (2.1)	14 (1.0)
With standard equipment and 2425 lb (1100 kg) loading on the rear axle	30 (2.1)	17 (1.2)
With standard equipment and 2866 lb (1300 kg) loading on the rear axle	30 (2.1)	20 (1.4)
With maximum loading front and rear	32.7 (2.3)	23 (1.6)

Anti-freeze liquid

The quantity of water and calcium chloride required to maintain a non-freezing mixture down to — 29° F (—34° C) at different filling contents:

	Tyre size	Water Imp. galls (litres)	Calcium chloride lb (kg)	Weight increase in lb (kg) per tyre
75% filling	5.50—16″	3 5/8 (16.7)	15.6 (7.1)	52 1/2 (23.8)
	11—28″	23 1/2 (106)	98.1 (44.5)	331 (150.5)
100% filling	5.50—16″	5 (22.3)	20.7 (9.4)	70 (31.7)
	11—28″	31 (141.2)	131 (59.4)	442 (200.6)

Electrical system

Voltage	12 Volt

Battery

Type	Boliden 12C114, Tudor 6E6S or corresponding
Number	1
Negative terminal	Earthed
Voltage	12 Volt
Battery capacity, standard	114 Amp.hr.
Electrolyte specific gravity, fully charged battery	1.275—1.285
Electrolyte specific gravity, when recharging is required	1.230

Dynamo

Negative earthed

Type	Bosch LJ/GJM130/12—1500 R20
Voltage	12 Volt
Output	130 Watt ≒ 0.19 PS
Brush, positive, designation	WSK 35 L 4
number	1
Brush, negative, designation	WSK 35 L 2
number	1

Mechanical test values

Rotor axial clearance	0.0020—0.0080″ (0.05—0.20 mm)
Commutator radial throw	Max. 0.0012″ (0.03 mm)
Rotor cage radial throw	Max. 0.0020″ (0.05 mm)
Minimum diameter of commutator	1.56″ (39.5 mm)
Dynamo brush contact pressure	1.0—1.3 lb/sq.in. (0.45—0.6 kg/cm²)

Electrical test values

Zero output speed	1150 r.p.m.
Cut-in loading	130 Watt
Rated speed, cold dynamo	1450 r.p.m.
warm dynamo	1550 r.p.m.
Field coil resistance	4.7—5.7 Ohm

Charging control

Type	Bosch RS/UA 130/12/22

Electrical test values

Cut-in voltage	12.4—13.1 Volt
Reverse current	1—6 Amp.
Control voltage when idling	13.5—14.3 Volt
Control current values when the dynamo is loaded at twice the rated speed:	
Cold dynamo	16.5—19.5 Amp.
Warm dynamo	14.5—17.5 Amp.

Starter motor

Type	Bosch BNG 4/12 CR 236 (clockwise rotation)
Voltage	12 Volt
Output	4 h.p.
Number of teeth on drive pinion	13 teeth
Brushes, designation	WSK 32 L 1 Z
number	4

Mechanical test values

Drive pinion axial clearance	0.02—0.10″ (0.5—2.5 mm)
Drive pinion idling torque	6.5—9.1 lb/in (7.5—10.5 kgcm)
Overload protection	87—101 lb/ft (12—14 kgm)
Armature displacement	0.96—1.02″ (24.5—26 mm)
Armature displacement before release of yoke lever	0.445—0.504″ (11.3—12.8 mm)
Tension of armature return spring	8 lb (3.5 kg)
Distance between drive pinion and ring gear	0.118—0.157″ (3—4 mm)
Starter motor brush contact pressure	2.65—3.3 lb (1.2—1.5 kg)

Electrical test values

Starter motor idling:	
Voltage	11.5 Volt
Current	70—85 Amp.
Speed	2200—2500 r.p.m.
Starter motor loaded:	
Voltage	9 Volt
Current	460—490 Amp.
Speed	850—950 r.p.m.
Starter motor short-circuited (locked armature):	
Voltage	6.5 Volt
Current	920—960 Amp.

Fuses

Fuse box fitted on control panel	
Fuses, number	5
rated	8 Amp.

Bulbs

	Watt	Socket
Headlight bulbs	35/35	BA 20 d
Rear lamp	5	S 8
Charging control lamp	1.5	BA 9 s
Instrument lighting lamp	1.5	BA 9 s
Rear illumination lamp (extra equipment)	25	BA 15 s

Headlight alignment

Alignment at a distance of 32ft 10″ (10 metres) from a wall:

Vertical	27 9/16″ (70 cm) below the headlight horizontal centre line
Horizontal	6 7/8″ (17.5 cm) outwards from the headlight vertical centre line

Lubrication

Engine

Lubricant, type	Diesel engine lubricating oil "For Service DG"
Viscosity, at temperatures above 32° F (0° C)	SAE 20 or 20W
at temperatures below 32° F (0° C)	SAE 10 or 10W
Oil capacity, including oil filter	15 Imp.pints (8.5 litres)
Air cleaner	Used egine oil

Gearbox and rear axle, final drive and belt pulley gear

Lubricant, type	Hypoid oil
viscosity, summer and winter	SAE 90
Oil capacity, gearbox	about 12 1/4 Imp.pints (7 litres)
final drive, per side	2 5/8 Imp.pints (1.5 litres)
belt pulley gear	2 5/8 Imp.pints (1.5 litres)

Steering gear

Lubricant, type	Hypoid or gear oil
viscosity, summer and winter	SAE 90
Oil capacity	about 7/8 Imp.pint (0.5 litre)

Other lubricating points

Lubricant, type	Universal grease

References to Service Bulletins

Group	No.	Date	Concerning

Notes

Notes

Notes

Eskilstuna 1959
AB J. O. ÖBERG & SON
Printed in Sweden

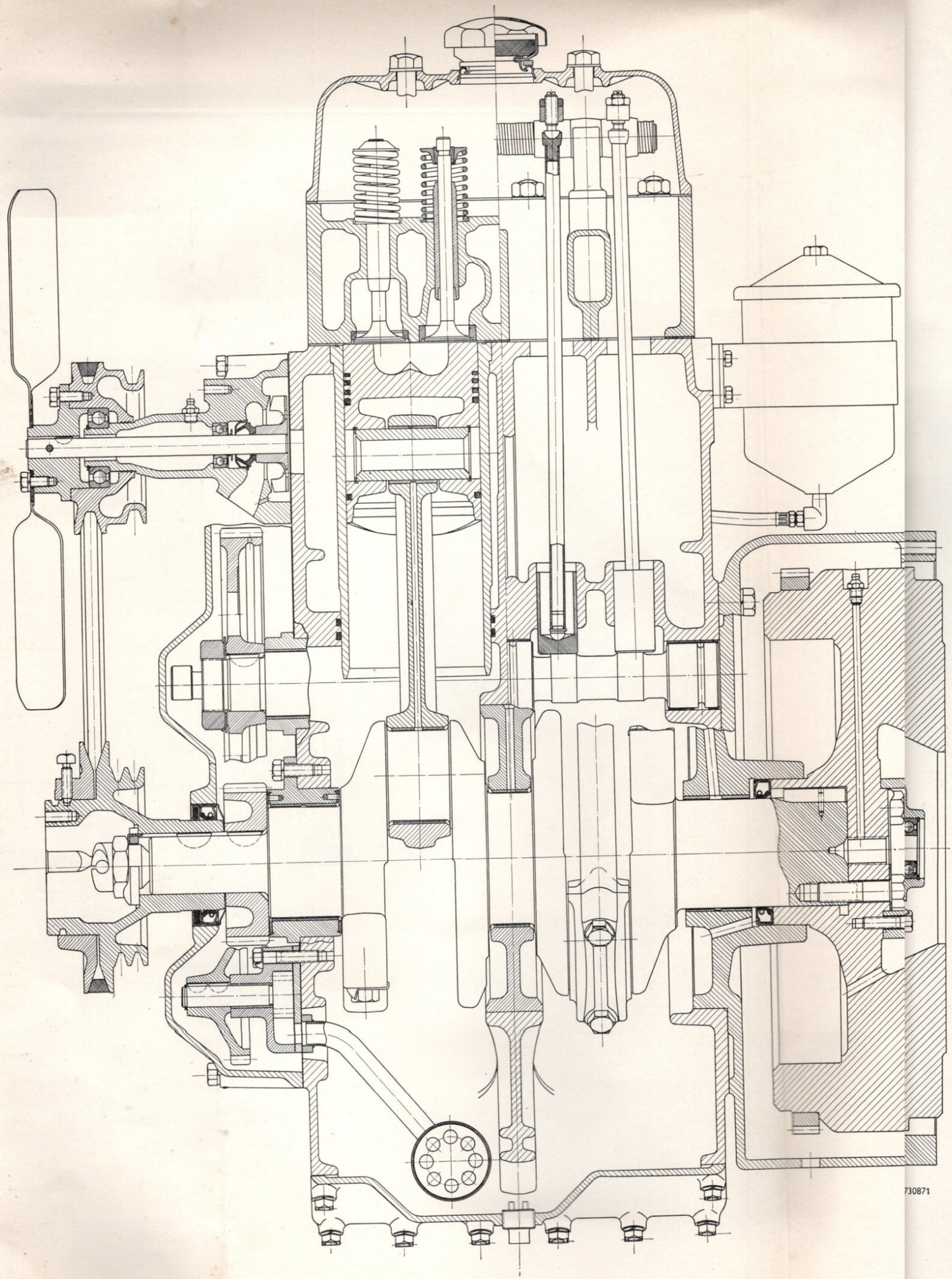
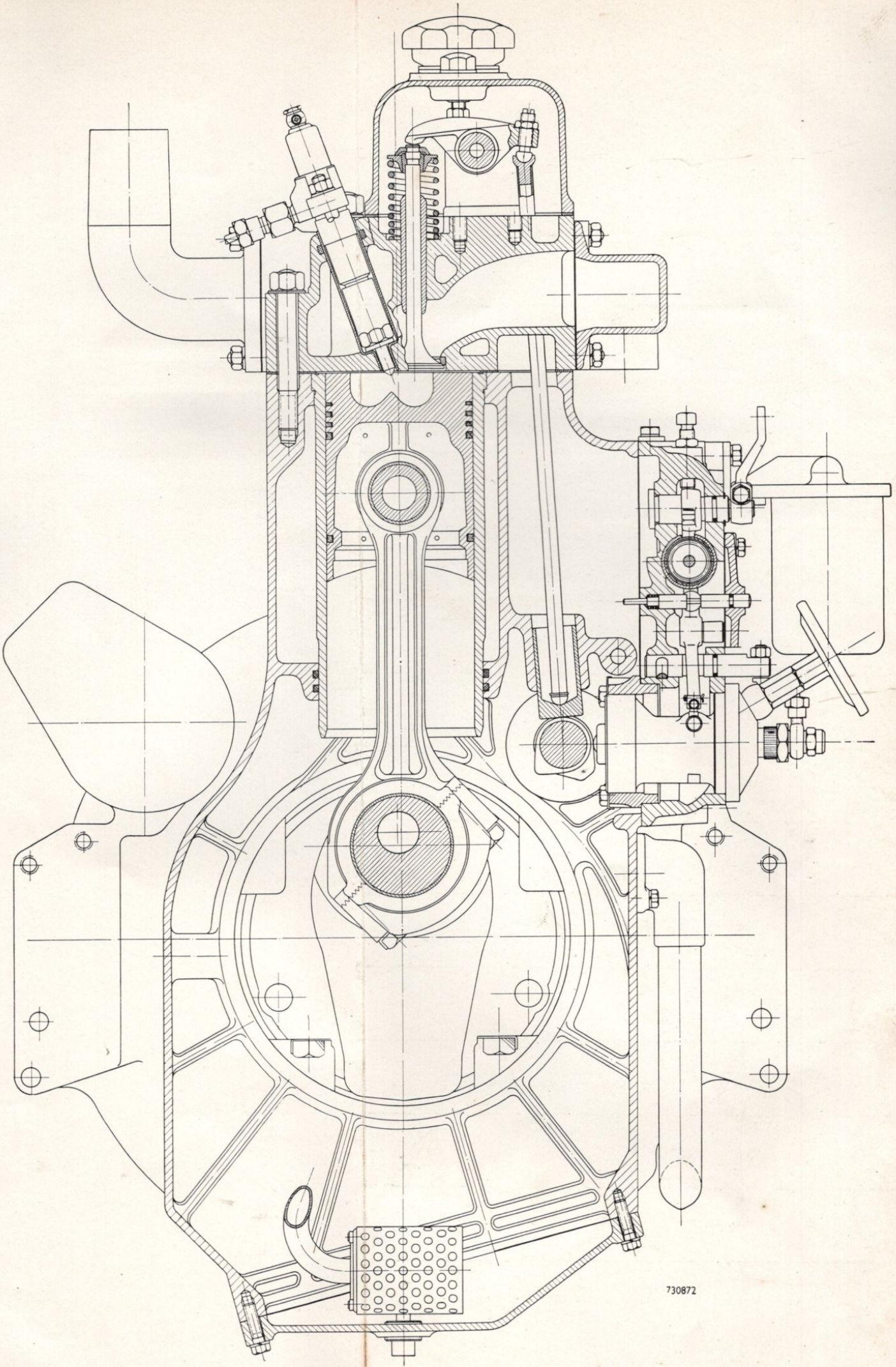


Plate 1 Engine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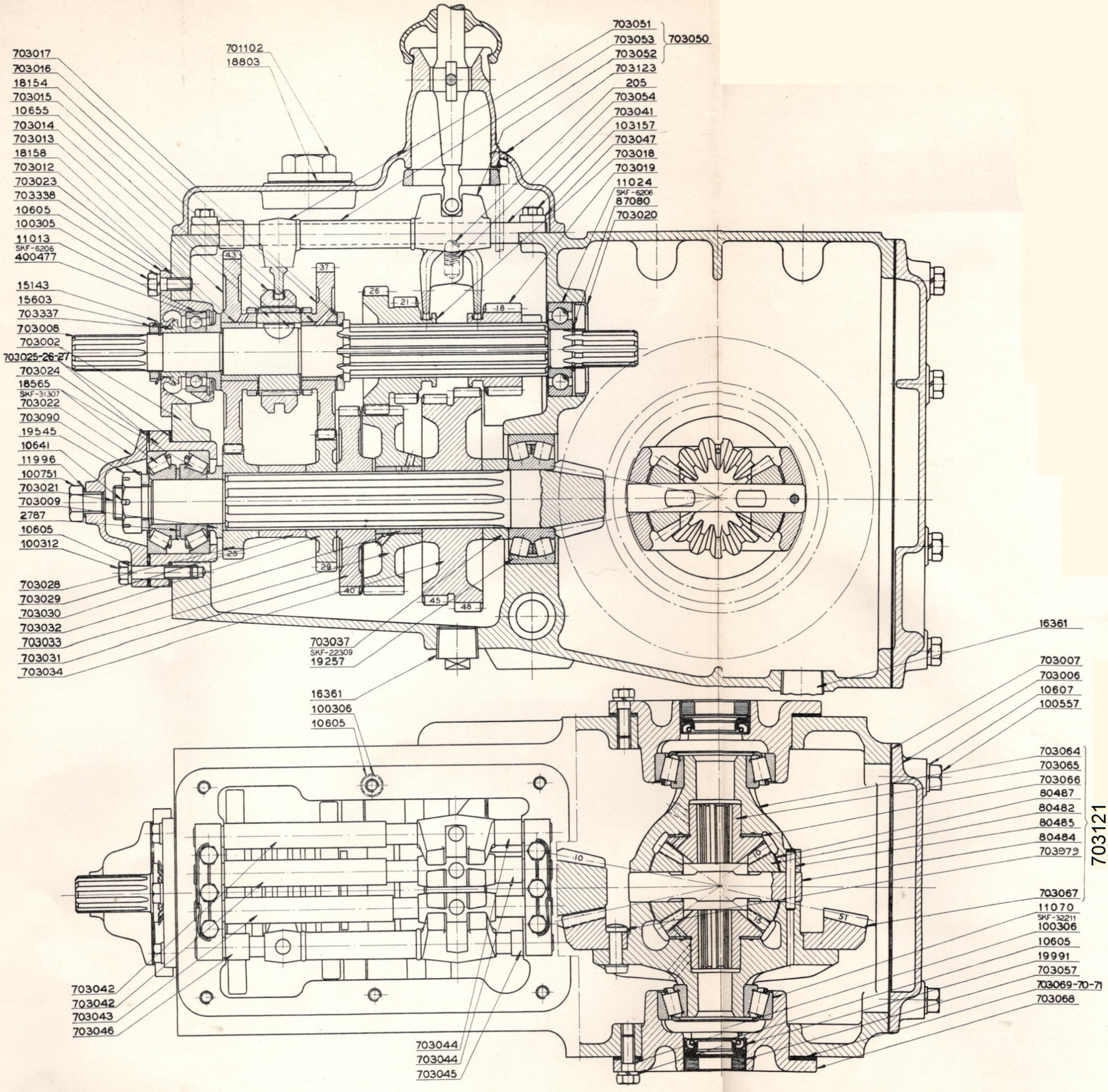
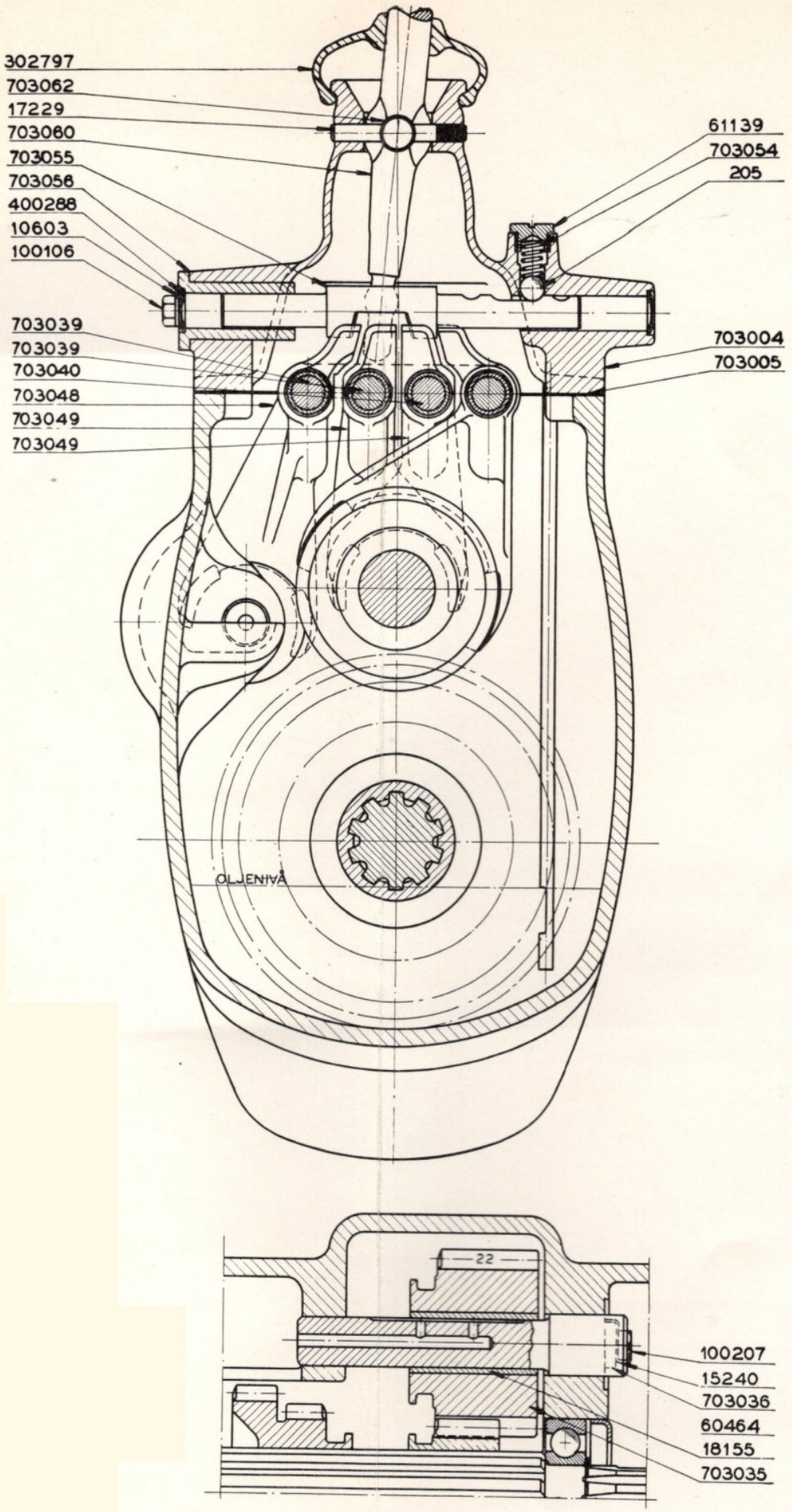


Notice! Do not order spare parts from the part numbers on this illustration.
Use the spare parts catalogue.

Plate 2 Gearbox with differential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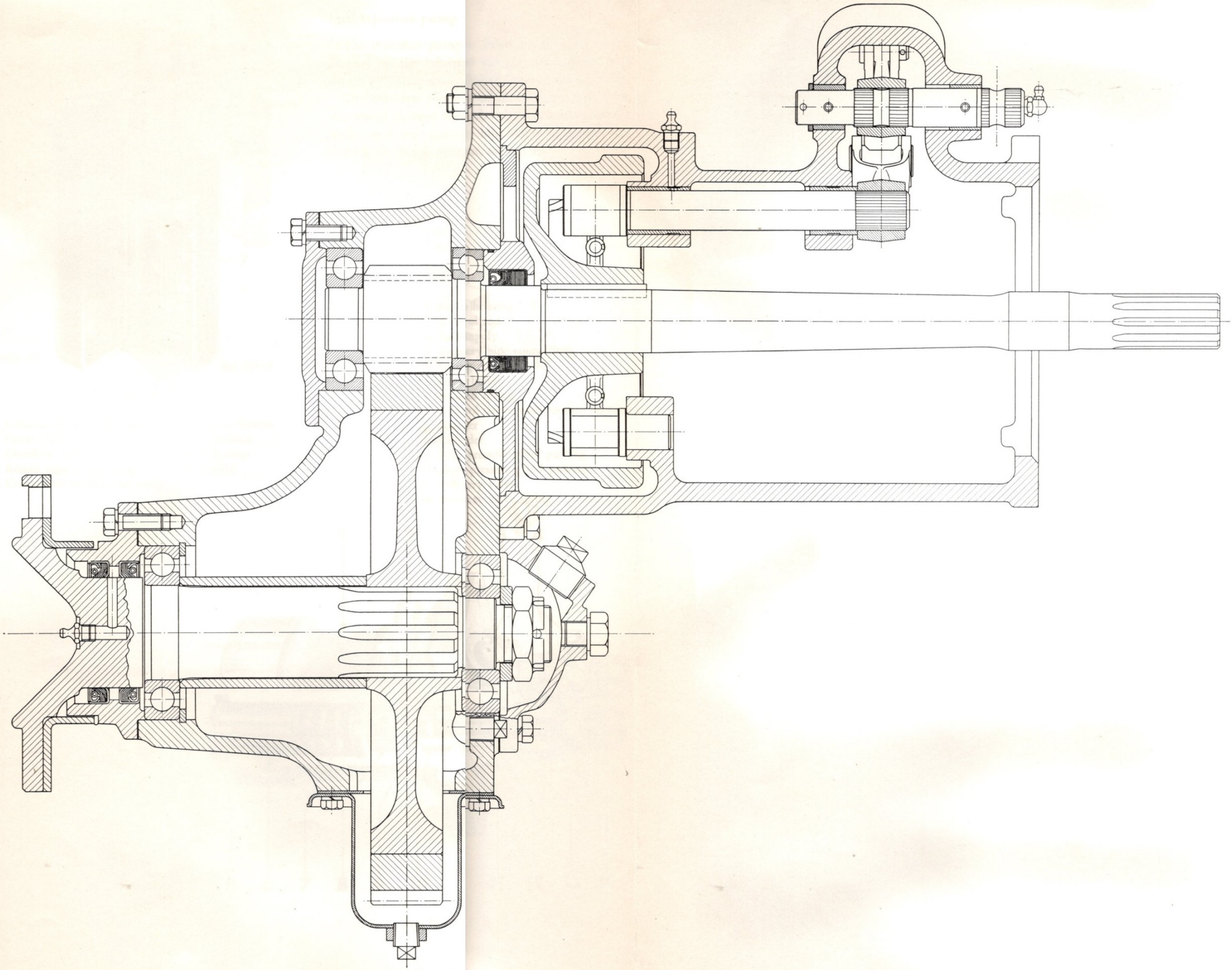
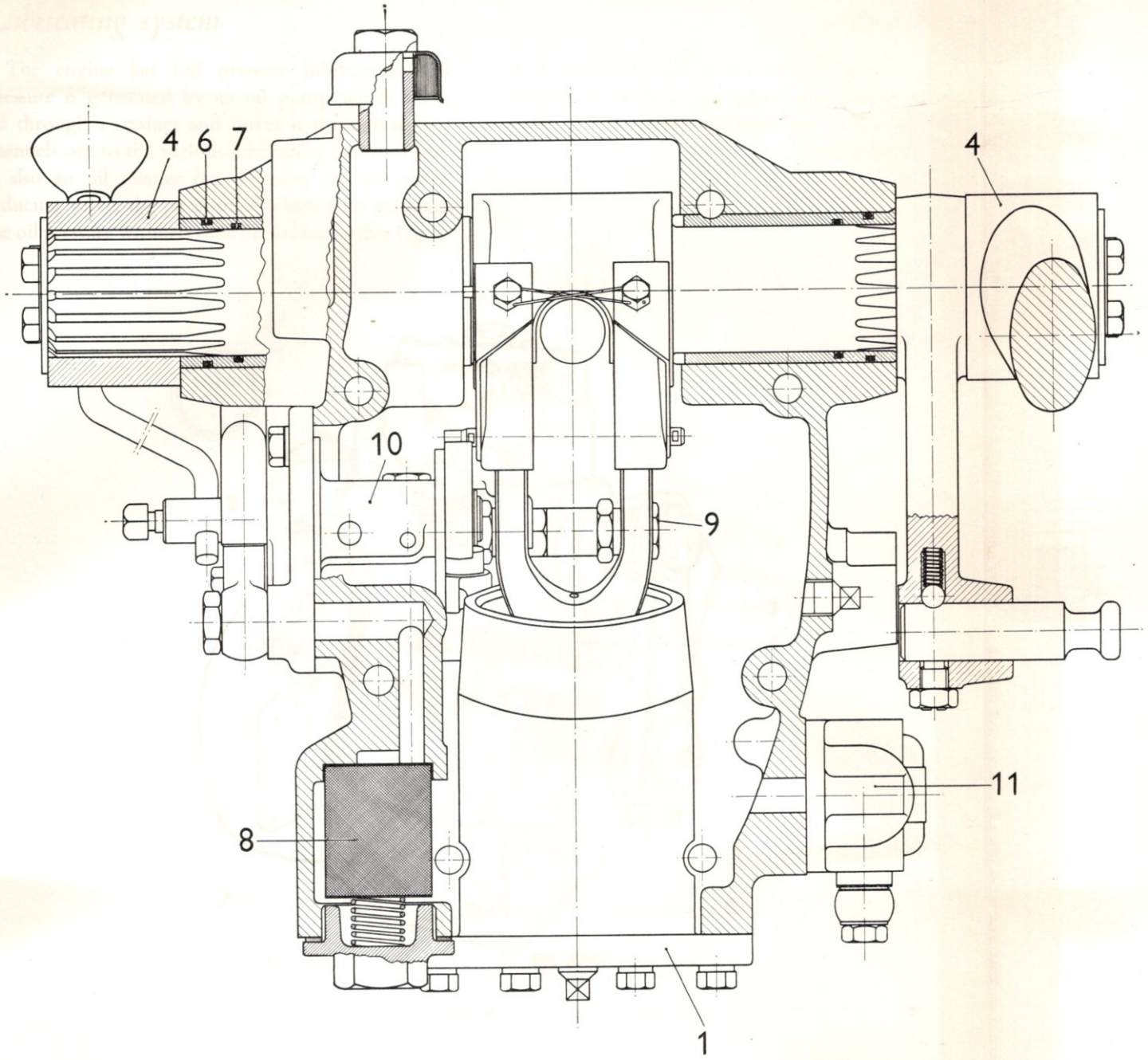


Plate 3 Rear axle with final drive



1. Cylinder
2. Plunger
3. Inner lever
4. Outer lever
5. Lifting shaft
6. Sealing ring
7. Sealing ring
8. Strainer
9. Safety valve
10. Control valve
11. Overflow valve
12. Sealing rings
13. Ball for by-pass valve
14. Ball for non-return valve
15. Ball for lowering valve
16. Sealing ring
17. Valve lifters

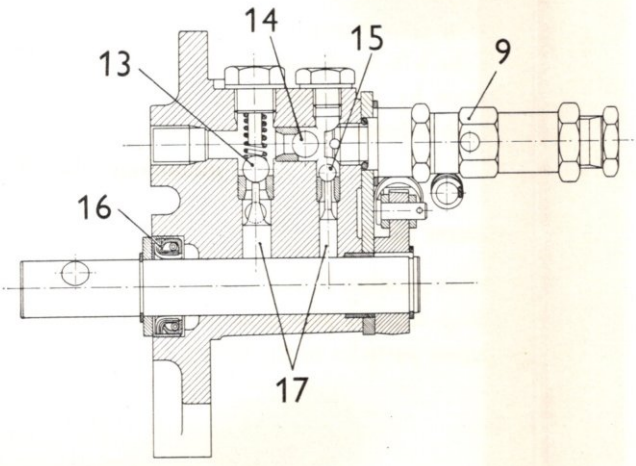
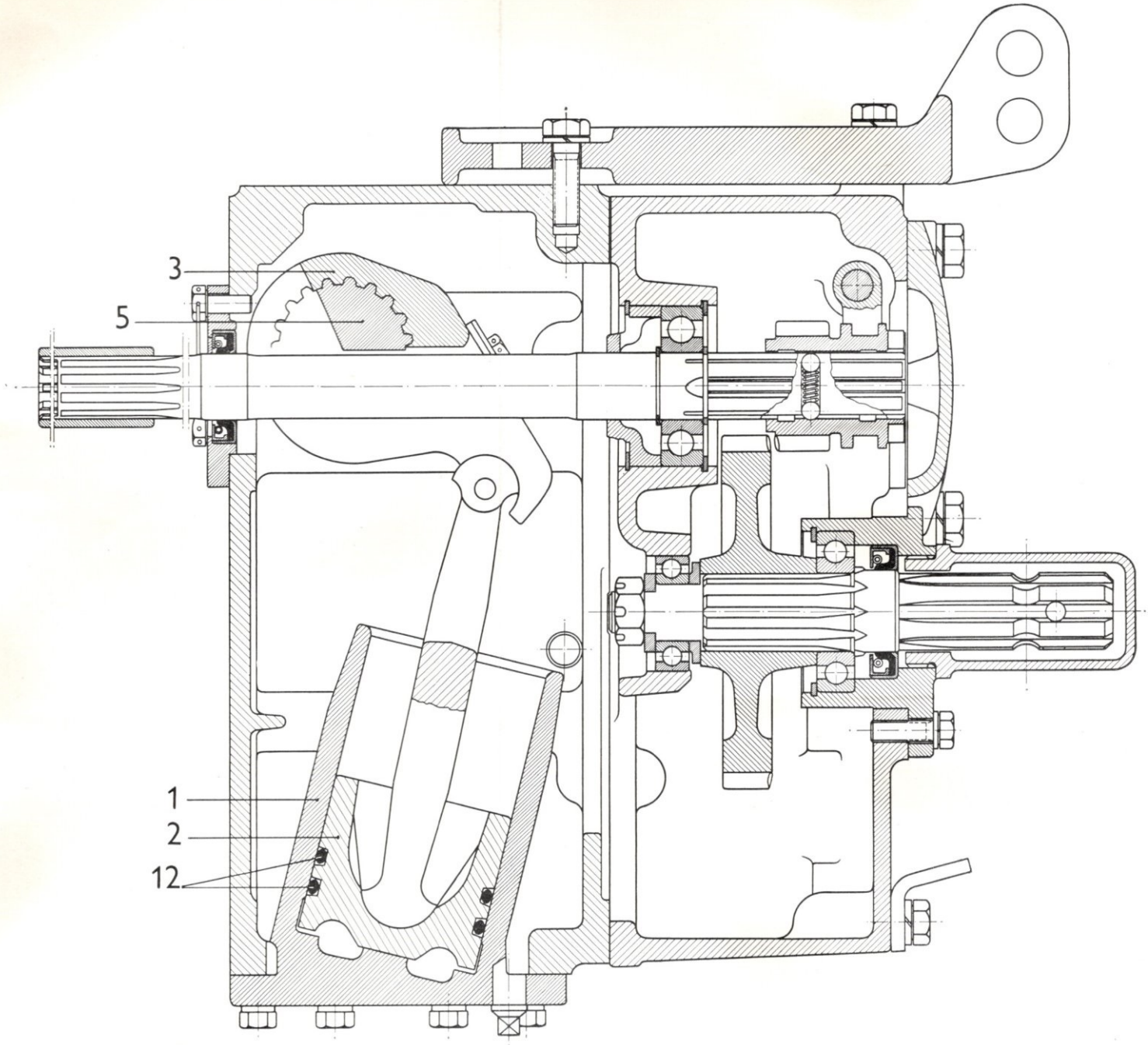
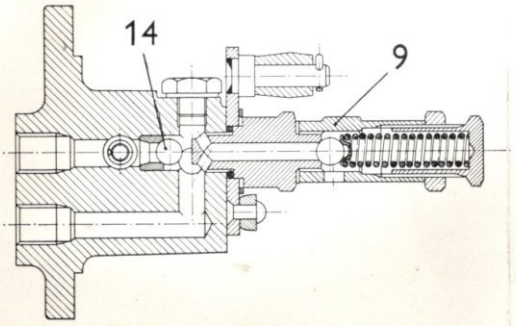
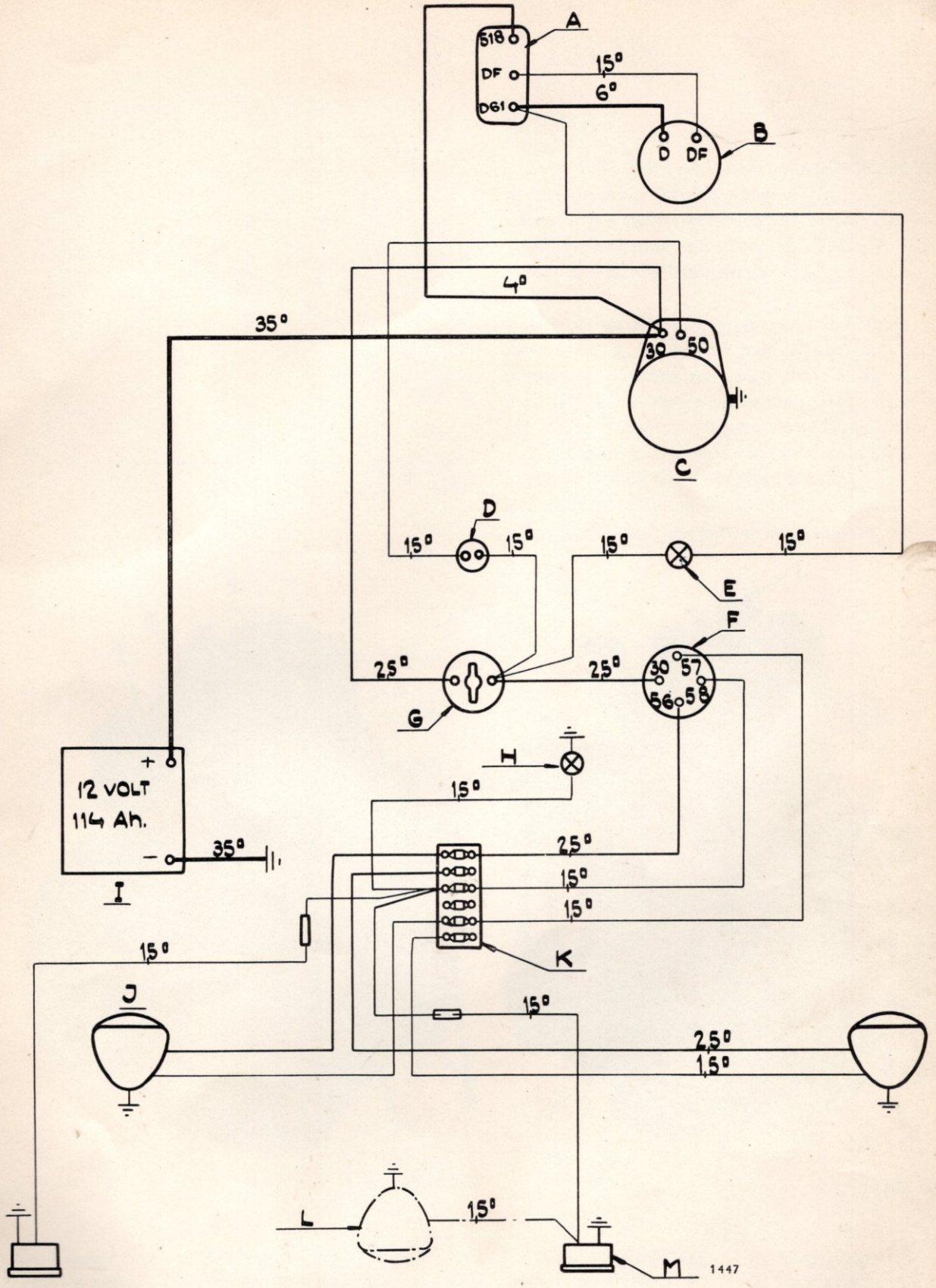


Plate 4 Hydraulic lift





Hydraulic Lift



A = Charging relay
B = Dynamo
C = Starter motor
D = Starter switch
E = Charging control lamp
F = Lighting switch
G = Starter switch
H = Instrument lighting
I = Battery
J = Head lights
K = Fuse board
L = Extra head light
M = Rear light

Plate 5 Wiring diagram

AKTIEBOLAGET

BOLINDER-MUNKTELL

ESKILSTUNA

SWEDEN

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