To remove the Cylinder Head

The T6.3543 cylinder head is not interchangeable with any other 6.354 or T6.354 engine type cylinder heads because of different cooling passages inside the head.

Drain the cooling system.

Disconnect battery terminals.

Remove air cleaner and trunking.

Disconnect and remove all connections to the turbocharger and remove the turbocharger, see Fig. E.1.

Remove electrical connections to the cylinder head and induction manifold. Remove fuel pipe to thermostart in the manifold.

Remove the water outlet connection.

Remove the induction and exhaust manifolds.

The fuel pipe from lift pump to fuel filters should be removed, releasing the clip from the back of the cylinder head. The fuel filters may also be removed.

All high pressure pipes between fuel injection pump and the atomisers should be removed together with the atomiser leak-off pipe assembly.

Remove atomisers, see Fig. E.2.

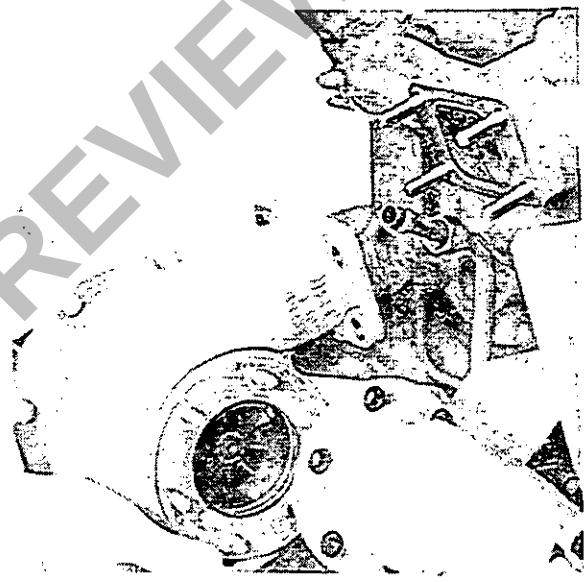
The bores in the cylinder head to accommodate atomisers are sealed with copper sleeves, see Fig. E.3. They are machine rolled and should be renewed if necessary as detailed on Page E.7.

Disconnect the breather pipe from the rocker cover and cylinder block. Remove the breather pipe.

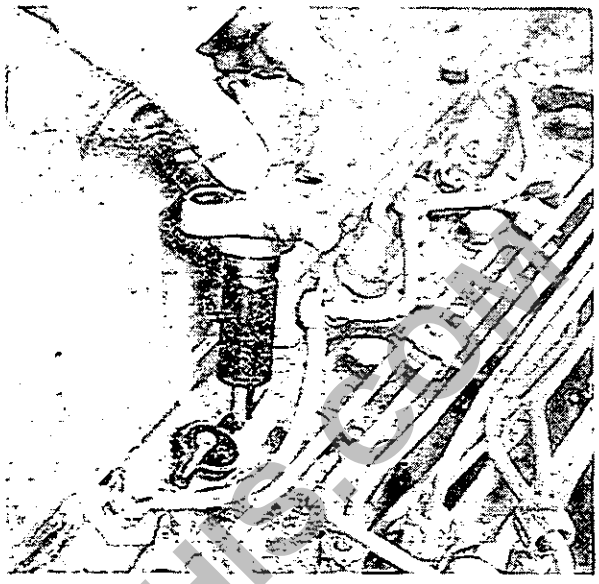
Remove rocker cover and gasket.

Release rocker assembly bracket securing setscrews and lift off rocker assembly. Remove the push rods.

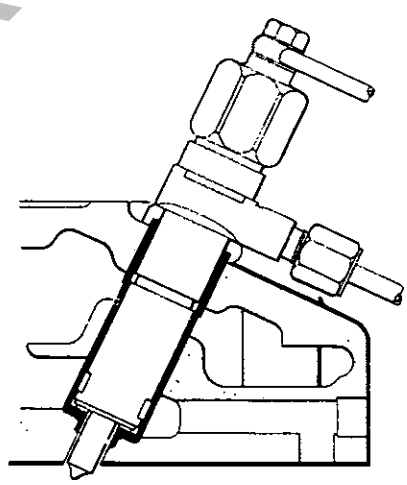
Remove cylinder head nuts and setscrews in reverse order of tightening sequence, see Fig. E.6.



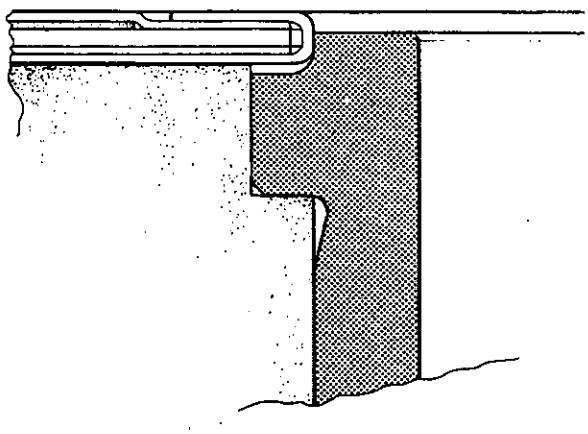
E1



E2



E3



E4

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Engine Data

Type	Six cylinder, four stroke, direct injection
Bore	3.877/3.878 in (98.48/98.50 mm)
Siroke	5.0 in (127 mm)
Compression Ratio	16:1
Cubic Capacity	353.8 in³ (5.8 litre)
Firing Order	1, 5, 3, 6, 2, 4
Lubricating Oil Pressure	30 lbf/in² (2,1 kgf/cm²) -207 kN/m² minimum, at maximum engine speed and normal operating temperature.
Valve Tip Clearance (prior to Engine No. 3543U10342TL)	0.012 in (0,30 mm) COLD
Valve Tip Clearance (commencing Engine No. 3543U10342TL) ....Inlet	0.008 in (0,20 mm) COLD
....Exhaust	0.018 in (0,46 mm) COLD

Rating Details

Standard Vehicle with Air Charge Cooler	
Gross Rated Output	155 b.h.p. (116 kW) at 2600 rev/min.
Maximum Torque	376 lbf ft (520 kgf m) at 1600 rev/min.
Combine Harvester with Air Charge Cooler	
Gross Rated Output	153 b.h.p. (114 kW) at 2500 rev/min.
Maximum Torque	376 lbf ft (520 kgf m) at 1600 rev/min.

The above ratings are "new engine" maximum and can vary according to application. For further details apply to the equipment manufacturer or the Service Department of Perkins Engines, Peterborough, England.

Recommended Torque Tensions

The following figures will apply with the components lightly oiled.

Component	Screw Size UNF	lbfft	kgfm	Nm
Cylinder Head Nuts	½	95	13,1	129
Cylinder Head Setscrews	½	95	13,1	129
Cylinder Head Nuts with preformed integral washers				
Cold Torque	½	115	15,9	156
Hot Torque		105	14,5	142
Cylinder Head Setscrews with preformed integral washers				
Cold Torque	½	115	15,9	156
Hot Torque		105	14,5	142
Connecting Rod Nuts prior to Engine Number 3543U1384T	½	70	9,7	95
Connecting Rod Nuts (current)	½	75	10,4	102
Main Bearing Setscrews	⅝	180	24,9	244
Main Bearing Setscrews prior to Engine Number 3543U435T	⅜	150	20,7	203
Idler Gear Hub Nuts	⅜	36	5,0	49
Crankshaft Damper Setscrews (where fitted)	5/16	19	2,6	26
Sump to Cylinder Block, Setscrews	5/16	15	2,1	20
Flywheel Securing Setscrews	½	80	11,1	108
Camshaft Gear Retaining Setscrew	½	50	6,9	68
Crankshaft Pulley Setscrews	7/16	65	9,0	88
Piston Cooling Jet Banjo Bolt	⅜	20	2,7	27
Oil Cooler to Cylinder Block, Setscrews	7/16	50	6,9	68
Lub. Oil Filter to Oil Cooler, Setscrews	7/16	32	4,4	43
Atomiser Securing Nuts	5/16	12	1,7	16
Aux. Drive Shaft Gear to Shaft, Screws	5/16	22	3,0	30
Alternator Pulley Retaining Nut	7/16	30	4,1	41
Fuel Oil Lift Pump to Cylinder Block (to be re-torqued when hot)	5/16	20	2,7	27
Induction Manifold Setscrews (re-torque after 10 minutes see Page E.3)	⅜	24	3,3	32
High Pressure Fuel Pipe Nuts	12 x 1,5 mm	15	2,1	20
Thermostart		10	1,4	14
Thermostart Adaptor (where fitted)		10	1,4	14

Engine Weights

Bare engine, alternator, fuel and lubricating oil filters, compressor and lubricating oil cooler. Approx. dry weight = 960 lbs (435 kg)

Bare engine, alternator, fuel and lubricating oil filters, compressor, lubricating oil cooler, flywheel, flywheel housing, air charge cooler, starter motor and fan.

Not including radiator and clutch = 1180 lbs (536 kg)

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As the following preventive maintenance attentions are general in application, they should be compared with the schedules specified by the manufacturer of the application to which the engine is fitted and where necessary, the shorter periods adopted.

The periods are given in Miles, Hours and Months and the maintenance work should be carried out at the period that comes first in the normal operation of the vehicle or machine. On stop-start low mileage work, the hours run are more applicable than the mileage covered.

Every Day or 8 Hours whichever occurs first

Check coolant level in radiator.

Check lub. oil level in sump with vehicle or machine standing level.

Check oil pressures (where gauge is fitted).

Ensure alternator cooling fan and slots are clear of chaff.

*In extreme dust conditions, empty dust bowl of dry type air filter or clean oil bath type air filter.

Every 5,000 Miles (7,500 Km), 250 Hours or 4 Months whichever occurs first

†Drain and renew engine lubricating oil.

Renew lubricating oil filter element or canister.

Check drive belt tension

*Empty dust bowl of dry type air filter or clean oil bath type air filter.

Clean fuel water trap (where fitted).

Check for oil, water or fuel leaks.

Check that alternator slots, fan and air spaces are clear and unobstructed.

Lubricate dynamo rear bush (where fitted).

Clean compressor air filter (where fitted).

Every 10,000 Miles (15,000 Km), 500 Hours or 12 Months whichever occurs first

Clean lift pump gauze strainer.

Renew final fuel filter elements, agricultural and industrial applications only.

Check hoses and clips.

*Clean element of dry type air filter or renew unless indicated earlier.

Every 20,000 Miles (30,000 Km), or 1,000 Hours whichever occurs first

Renew final fuel filter elements, vehicle applications.

Decarbonise compressor cylinder head, and delivery line.

Clean turbocharger impeller and oil drain pipe.

Every 60,000 Miles (90,000 Km), or 2,500 Hours whichever occurs first

Arrange for examination and service of proprietary equipment, i.e. compressor/exhauster, starter motor, generator, turbocharger etc.

Service atomisers.

Check and adjust valve tip clearances (see Page E.4).

Operators of engines are reminded that the above preventive maintenance periods are general in application. They should be compared with the schedules specified by the manufacturer of the application to which the engine is fitted and where necessary, the shorter periods should be adopted.

Whilst we have given specific periods for preventive maintenance, you should have due regard for the local regulations concerning your vehicle or machine and ensure that the engine is operating within those regulations.

*The time limits for servicing air filters depend upon operating conditions and if dusty or similar adverse conditions prevail, the time limits given should be reduced. In extremely dusty conditions it may be necessary to service the filter more than once a day. Under such conditions, the correct maintenance will greatly assist in extending the life of the engine.

Where a *depression indicator* is fitted, this will give a positive indication that the element needs servicing and the periods given for servicing can be disregarded.

†The lubricating oil change period quoted is for this turbocharged engine using MIL-L-2104C oils. This period should be reduced if operating under dusty or adverse conditions.

Air Charge Cooler

To maintain maximum efficiency, the cooler radiator fins should be checked periodically to ensure that no foreign matter is obstructing the flow of air.

Under no circumstances should the radiator be "muffed" or "blanked-off" in an attempt to raise the temperature in the driver's cab because this will impede the flow of air through the charge cooler.

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Fault Finding Chart

Fault	Possible Cause
Low cranking speed	1, 2, 3, 4.
Will not start	5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 31, 32, 33.
Difficult starting	5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 24, 29, 31, 32, 33.
Lack of power	8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 60, 62, 63.
Misfiring	8, 9, 10, 12, 13, 14, 16, 18, 19, 20, 25, 26, 28, 29, 30, 32.
Excessive fuel consumption	11, 13, 14, 16, 18, 19, 20, 22, 23, 24, 25, 27, 28, 29, 31, 32, 33, 63.
Black exhaust	11, 13, 14, 16, 18, 19, 20, 22, 24, 25, 27, 28, 29, 31, 32, 33, 60.
Blue/white exhaust	4, 16, 18, 19, 20, 25, 27, 31, 33, 34, 35, 45, 56, 61.
Low oil pressure	4, 36, 37, 38, 39, 40, 42, 43, 44, 58.
Knocking	9, 14, 16, 18, 19, 22, 26, 28, 29, 31, 33, 35, 36, 45, 46, 59.
Erratic running	7, 8, 9, 10, 11, 12, 13, 14, 16, 20, 21, 23, 26, 28, 29, 30, 33, 35, 45, 59.
Vibration	13, 14, 20, 23, 25, 26, 29, 30, 33, 45, 47, 48, 49.
High oil pressure	4, 38, 41.
Overheating	11, 13, 14, 16, 18, 19, 24, 25, 45, 50, 51, 52, 53, 54, 57.
Excessive crankcase pressure	25, 31, 33, 34, 45, 55.
Poor compression	11, 19, 25, 28, 29, 31, 32, 33, 34, 46, 59.
Starts and stops	10, 11, 12.

Key to Fault Finding Chart

1. Battery capacity low.
2. Bad electrical connections.
3. Faulty starter motor.
4. Incorrect grade of lubricating oil.
5. Low cranking speed.
6. Fuel tank empty.
7. Faulty stop control operation.
8. Blocked fuel feed pipe.
9. Faulty fuel lift pump.
10. Choked fuel filter.
11. Restriction in air cleaner or induction system.
12. Air in fuel system.
13. Faulty fuel injection pump.
14. Faulty atomisers or incorrect type.
15. Incorrect use of cold start equipment.
16. Faulty cold starting equipment.
17. Broken fuel injection pump drive.
18. Incorrect fuel pump timing.
19. Incorrect valve timing.
20. Poor compression.
21. Blocked fuel tank vent.
22. Incorrect type or grade of fuel.
23. Sticking throttle or restricted movement.
24. Exhaust pipe restriction.
25. Cylinder head gasket leaking.
26. Overheating.
27. Cold running.
28. Incorrect tappet adjustment.
29. Sticking valves.
30. Incorrect high pressure pipes.
31. Worn cylinder bores.
32. Pitted valves and seats.
33. Broken, worn or sticking piston ring/s.
34. Worn valve stems and guides.
35. Overfull air cleaner or use of incorrect grade of oil.
36. Worn or damaged bearings.
37. Insufficient oil in sump.
38. Inaccurate gauge.
39. Oil pump worn.
40. Pressure relief valve sticking open.
41. Pressure relief valve sticking closed.
42. Broken relief valve spring.
43. Faulty suction pipe.
44. Choked oil filter.
45. Piston seizure/pick up.
46. Incorrect piston height.
47. Damaged fan.
48. Faulty engine mounting (Housing).
49. Incorrect aligned flywheel housing or flywheel.
50. Faulty thermostat.
51. Restriction in water jacket.
52. Loose fan belt.
53. Choked radiator.
54. Faulty water pump.
55. Choked breather pipe.
56. Damaged valve stem oil deflectors (if fitted).
57. Coolant level too low.
58. Blocked sump strainer.
59. Broken valve spring.
60. Damaged or dirty turbocharger impeller.
61. Leaking turbocharger oil seals.
62. Leaking boost control pipe.
63. Leaking induction system.

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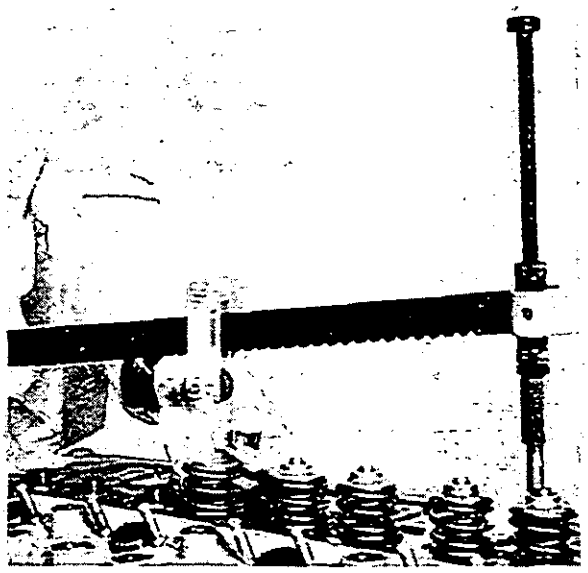
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E11

Valve Assembly

Two springs are fitted to each valve, the outer springs are left hand coiled and the inner springs right hand coiled.

A sectional view of a fitted valve assembly is shown in Fig. E.12 and E.13.

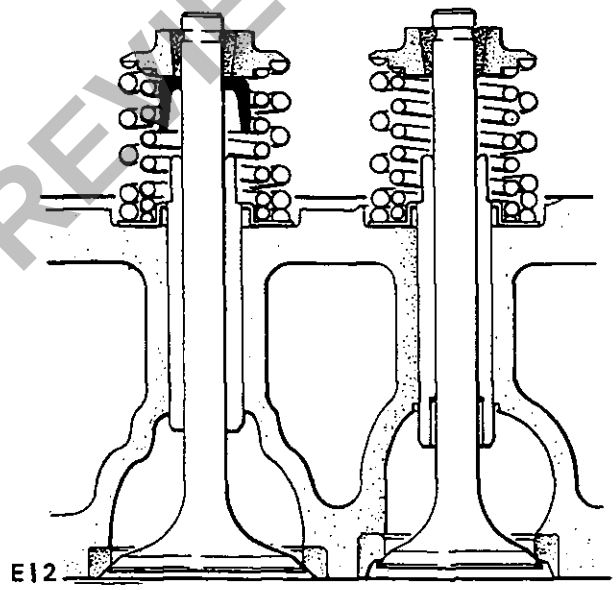
Two types of valve sealing arrangement can be found. Earlier arrangement is shown in Fig. E.12 whilst the later arrangement is shown in Fig. E.13.

To Fit Valves

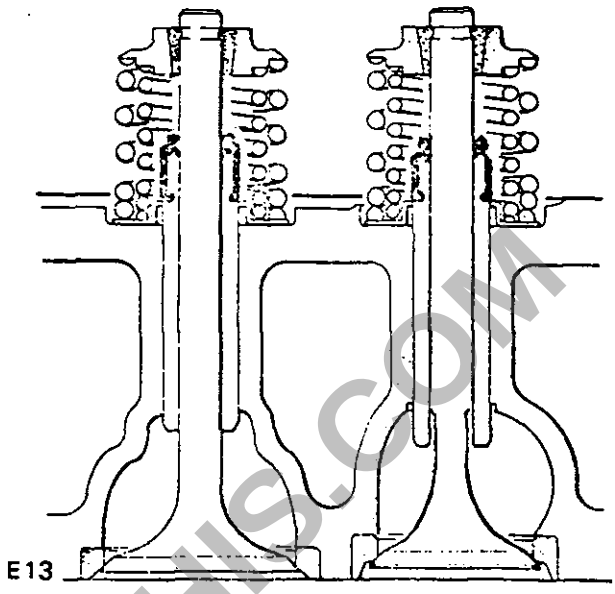
Lightly oil valve stems, and position the valves in their respective guides.

Later engines have chrome flashed valve stems with seals fitted to the valve guides. The exhaust valve guides for chrome flashed valves have no carbon brake counter bore: the carbon brake is a relief on the valve stem. Valves and guides are not individually interchangeable with the earlier types.

Position spring seating washers and fit oil deflectors onto the inlet valve stems with open end towards cylinder head.



E12



E13

Place inner and outer springs on seating washers with the damper coils towards the cylinder head, see Figs. E.12 or E.13.

Position the valve spring retaining caps and with a suitable compressor, depress the springs and fit the split collets.

Valve Guides

Examine valve guides for wear. The maximum permissible worn clearance of inlet valve stem in guide is 0.005 in (0,13 mm), and exhaust valve stem in guide is 0.006 in (0,15 mm) and if the clearance with new valve fitted exceeds this figure the guide should be replaced.

To fit new guides, press or drive out the worn guides, see Fig. E.14.

Smear the outer surface of the new guides with clean oil and using tool No. PD1C, see Fig. E.15, pull guide into the cylinder head using stop No. PD1C — 6 until 0.594in (5,08mm) of the guide is protruding from the valve spring recess.

Cylinder Head Overhaul

If water jacket of cylinder head shows sign of scale, a proprietary descaling solution should be used in accordance with the manufacturer's instructions.

After cleaning head, check for cracks or other damage.

Maximum permissible longitudinal bow of cylinder head is 0.010 in (0,25 mm) and transverse bow is 0.005 in (0,13 mm).

The cylinder head can be skimmed by a maximum of 0.012 in (0,3 mm) provided that nozzle protrusion does not exceed 0.224in (5,69mm), see Fig. E.16. This figure must not be obtained by the use of additional atomiser sealing washers.

When grinding in valves, it is essential that no signs of pitting are left on the seatings.

Care should be taken to avoid unnecessary grinding away of the seat.

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DATA AND DIMENSIONS FOR CYLINDER BLOCK AND LINERS

All threads used are Unified Series or American Pipe Series. The following figures are based mainly upon those used in the factory for production.

Cylinder Block

Height between Top and Bottom Faces	17.367/17.375 in (441,12/441,32 mm)
Parent Bore Diameter for Flanged Cylinder Liner	4.0625/4.0635 in (103,19/103,21 mm)
Parent Bore diameter for Flangeless Cylinder Liner	4.0615/4.0625 in (103,16/103,19 mm)
Recess Depth for Cylinder Liner Flange	0.150/0.154 in (3,81/3,91 mm)
Recess Diameter for Cylinder Liner Flange	4.205/4.210 in (106,81/106,94 mm)
Main Bearing Parent Bore	3.166/3.167 in (80,42/80,44 mm)
Camshaft Parent Bore Diameter No. 1	2.000/2.001 in (50,8/50,83 mm)
Camshaft Parent Bore Diameter No. 2	1.990/1.992 in (50,55/50,6 mm)
Camshaft Parent Bore Diameter No. 3	1.980/1.982 in (50,29/50,34 mm)
Camshaft Parent Bore Diameter No. 4	1.970/1.972 in (50,04/50,09 mm)
Cylinder Block Dowel Bore Diameter	0.8125/0.8135 in (20,64/20,66 mm)

Cylinder Liners (Cast Iron—Flanged)

Type	Dry—Interference Fit Production Dry—Transition Fit Service
Outside Diameter of Production Liner	4.0645/4.0655 in (103,24/103,26 mm)
Interference Fit of Production Liner	0.001/0.003 in (0,025/0,076 mm)
Inside Diameter of Production Liner after Finish Honing	3,877/3.878 in (98,48/98,50 mm)
Transition Fit of Service Liner	-0.001/+0.001 in (-0,025/+0,025 mm)
Inside Diameter of Service Liner after Fitting	3.877/3.8795 in (98,48/98,54 mm)
Flange Thickness (Production and early Service Liner Pt. No. 31358341)	0.144/0.146 in (3,66/3,71 mm)
Flange Thickness (current Service Liner Pt. No. 31358441)	0.150/0.152 in (3,81/3,86 mm)
Height of Liner above Cylinder Block Top Face	0.028/0.035 in (0,71/0,89 mm)
Depth of Liner Flange below Top Face of Cylinder Block (Production and early Service)	0.004/0.010 in (0,10/0,25 mm)
Relation of Liner Flange with Top Face of Cylinder Block (current Service)	+0.002/-0.004 in (0,05/0,10 mm)
Overall Length of Liner	8.941/8.954 in (227,1/227,43 mm)
Maximum Bore Wear (new liners are necessary)	0.008 in (0,2 mm)

Cylinder Liners (Cast Iron — Flangeless)

Type	Dry – Interference Fit
Outside Diameter of Liner	4.0655/4.0665 in (103,26/103,29 mm)
Interference Fit of Liner	0.003/0.005 in (0,08/0,13 mm)
Inside Diameter of Liner after Finish Honing	3.877/3.878 in (98,48/98,50 mm)
Maximum Oversize (Rebore)	+0.030 in (0,76 mm)
Height of Liner above Top Face of Cylinder Block	0.028/0.035 in (0,71/0,89 mm)
Overall Length of Liner	9.905/9.915 in (251,58/251,84 mm)
Maximum Bore Wear (new Liners or rebore as necessary)	0.008 in (0,20 mm)

Approved Tools for Cylinder Block and Liners

Available from V. L. Churchill & Co. Ltd., Daventry, Northamptonshire, England.

Cylinder Liner Remover/Replacer	PD 150
Cylinder Liner Remover/Replacer Adaptor Pads	PD 150-1B

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Check the backlash between the timing gears using a clock gauge or feeler gauges.

The backlash should be 0.003 in (0,08 mm) minimum.

If not, replace the gears affected.

Checking Valve Timing

Turn the crankshaft until the valves on No. 6 cylinder are rocking and set the clearance on No. 1 inlet valve to 0.047 in (1,19 mm) for engines prior to Engine No. 3543U10342TL or 0.051 in (1,30 mm) for engines commencing at Engine No. 3543U10342TL.

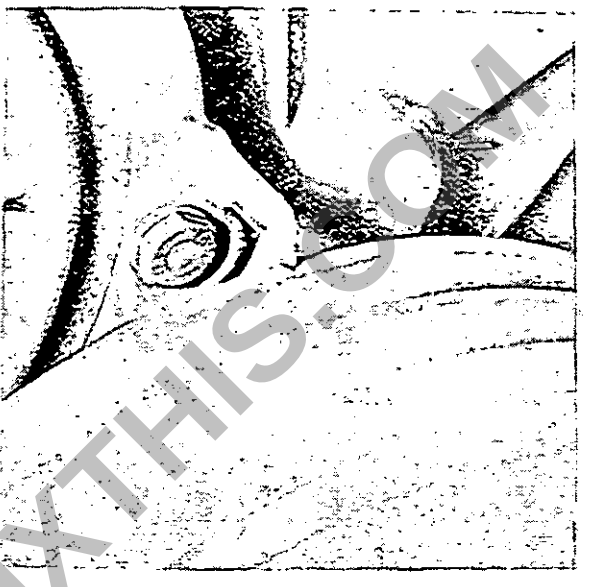
Turn the crankshaft in the normal direction of rotation until the pushrod of No. 1 inlet valve just tightens.

Check that Nos. 1 and 6 pistons are at T.D.C. by seeing if the timing pointer situated on the timing case is lined up with the notches on the crankshaft pulley periphery, see Fig. J.17. The valve timing tolerance is plus or minus 2½°.

With later engines, the timing pointer and crankshaft pulley mark has been deleted and to establish true T.D.C., the valve drop method (see page M5/6) should be adopted and suitable reference marks made.

The only error possible is in the fitting of the timing gears.

When the valve timing is found to be correct, reset the No. 1 inlet valve to 0.012 in (0,30 mm) or 0.008 in (0,20 mm) cold, see Page E.4.



J17

DATA AND DIMENSIONS FOR TIMING CASE AND DRIVE

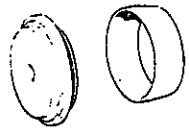
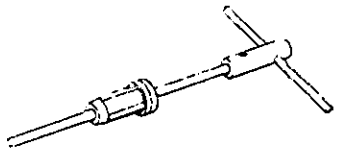
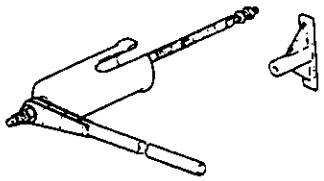
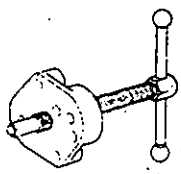
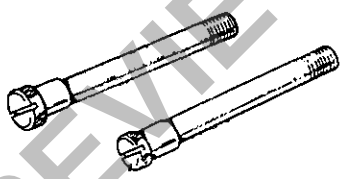
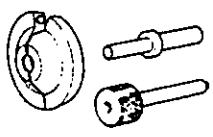
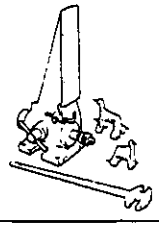
All threads used are Unified Series. The following figures are based mainly upon those used in the factory for production.

Camshaft

No. 1 Journal Length	1.148 in (29,16 mm)
No. 1 Journal Diameter	1.9965/1.9975 in (50,71/50,74 mm)
No. 1 Journal Running Clearance	0.0025/0.0045 in (0,064/0,11 mm)
No. 2 Journal Length	1.375 in (34,93 mm)
No. 2 Journal Diameter	1.9865/1.9875 in (50,46/50,48 mm)
No. 2 Journal Running Clearance	0.0025/0.0055 in (0,064/0,14 mm)
No. 3 Journal Length	1.375 in (34,93 mm)
No. 3 Journal Diameter	1.9765/1.9775 in (50,20/50,23 mm)
No. 3 Journal Running Clearance	0.0025/0.0055 in (0,064/0,14 mm)
No. 4 Journal Length	1.125 in (28,58 mm)
No. 4 Journal Diameter	1.9665/1.9675 in (49,95/49,97 mm)
No. 4 Journal Running Clearance	0.0025/0.0055 in (0,065/0,14 mm)
Maximum Permissible Wear all Journals	0.002 in (0,05 mm)
Cam Lift (prior to Engine No. 3543U10342TL) Inlet and Exhaust	0.3003/0.3033 in (7,63/7,70 mm)
Cam Lift (commencing Engine No. 3543U10342TL)	
Inlet	0.3033/0.3063 in (7,70/7,78 mm)
Exhaust	0.3073/0.3103 in (7,81/7,88 mm)
Camshaft End Float	0.004/0.016 in (0,1/0,41 mm)
Maximum Permissible Worn Camshaft End Float	0.020 in (0,51 mm)
Width of Spigot for Thrust Washer	0.222/0.232 in (5,64/5,89 mm)
Oilways for Rocker Shaft Lubrication	No. 1 Journal

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	Tool No.	Description
	PD.145	CRANKSHAFT REAR OIL SEAL REPLACER ADAPTOR (LIP TYPE SEAL)
	LC.173 (top) PD.146 (bottom)	INJECTION SLEEVE EXPANDER Expands the copper sleeve into the cast iron head to give watertight seal prior to injector fitting.
	PD.150A	CYLINDER LINER REMOVER/ REPLACER (MAIN TOOL) For Field Service replacement of single liners. Not advised for complete overhaul. For this work use adaptors with a hydraulic ram unit.
	PD.150-1B	ADAPTORS FOR PD.150 Suitable for cylinders of 3.6" dia. and 3.87" dia. Removal and replacement.
	15SB	BASIC PULLER The cruciform head with multiple holes at different centres is used with adaptors listed below.
	PD.155-1	ADAPTORS FOR PD.155A Used to remove water pump pulleys. Also suitable to remove Camshaft Gears.
	MF.200-26	WATER PUMP OVERHAUL KIT Used with 370 Taper Base and Press.
	355	CON ROD JIG & 336 MASTER ARBOR

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Reconnect the throttle and stop lever controls and attach the return springs (C.A.V. pumps).

Bleed the fuel system as detailed on Page M.8.

If necessary, adjust the maximum and idling speeds. Details will be found on Page M.7.

Fuel Injection Pump Timing

With No. 1 piston at T.D.C. on compression and with the fuel pump removed, the slot in the fuel pump drive hub should be aligned with the slot in the fuel pump adaptor plate, see Fig. M.10.

If these slots do not align, remove the auxiliary drive gear cover plate from the front of the timing case and release the three securing screws and turn the auxiliary drive shaft by means of the screws until the slots do align.

In the case of early engines fitted with Bosch pumps, the slot in the fuel pump adaptor plate has been omitted.

In such an instance, to time the pump to the engine when the auxiliary drive gear has been removed, proceed as follows:

1. Set the engine to T.D.C. compression stroke on No. 1 cylinder observing that both rocker levers of No. 6 cylinder are rocking (i.e. overlap). In this position, remove the collets, spring cap and springs from No. 1 inlet valve and allow the valve to rest on top of the piston. With the aid of a dial indicator, obtain true T.D.C.
2. Position the fuel pump drive hub as shown in Fig. M.11.
3. Refit the auxiliary drive gear.

Refit the fuel pump, ensuring that the scribed lines on the pump mounting flange and adaptor plate align.

To check the commencement of injection, remove the inspection cover on the side of the mechanically governed fuel pump.

Note. The removal of the inspection plate will necessitate the breaking of the manufacturer's seal. This seal should be removed only by authorised personnel who must reseal when the cover is replaced, otherwise the guarantee may become void.

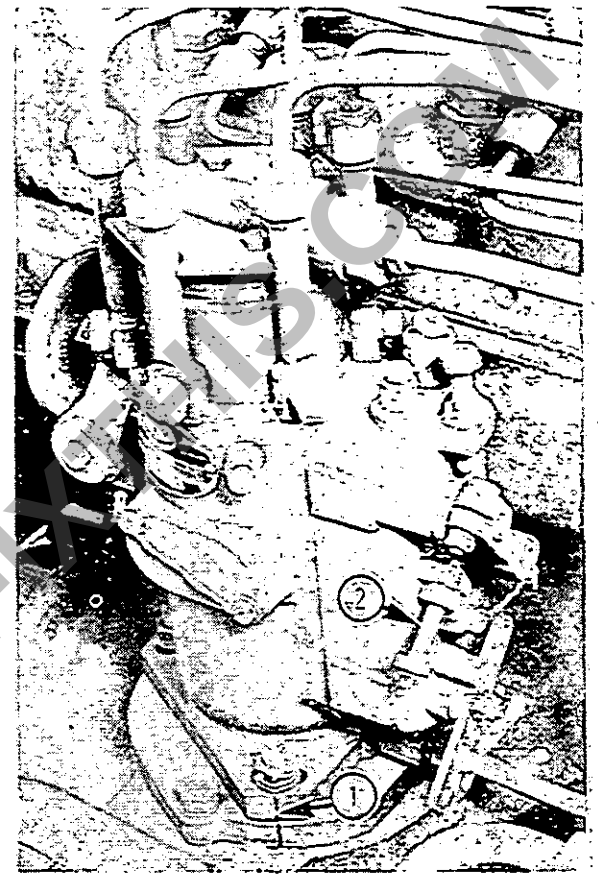
The removal of the inspection plate on C.A.V. pumps will reveal a rotor with scribed lines, each line bearing a letter.

Also visible is the open end of the circlip. The commencement of injection is indicated when the letter "F" on the rotor is aligned with the straight edge of the circlip, see Fig. M.12.

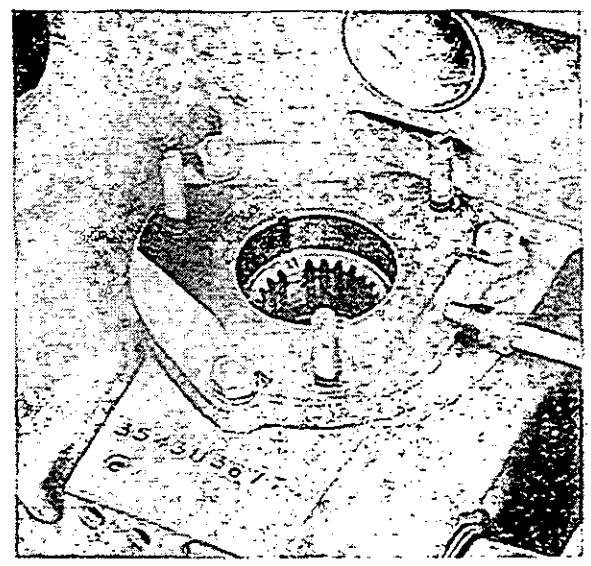
Removal of the inspection plate (A) — see Fig. M.22 — on Bosch pumps will reveal a scribed line (A) and a timing pointer (B) — see Fig. M.13. The commencement of injection is indicated when the scribed line is in alignment with the timing pointer.

Checking Fuel Injection Pump Timing

On C.A.V. pumps, it is necessary to set the position of the circlip by removing the pump from the engine and connecting No. 1 cylinder outlet connection on the pump to an atomiser tester and pump up to 30 atm (31 kgf/cm² or 440 lbf/in²). Turn the pump by hand in the normal direction of rotation until it "locks up". The squared end of the circlip should now be lined up with the letter F on the pump rotor.



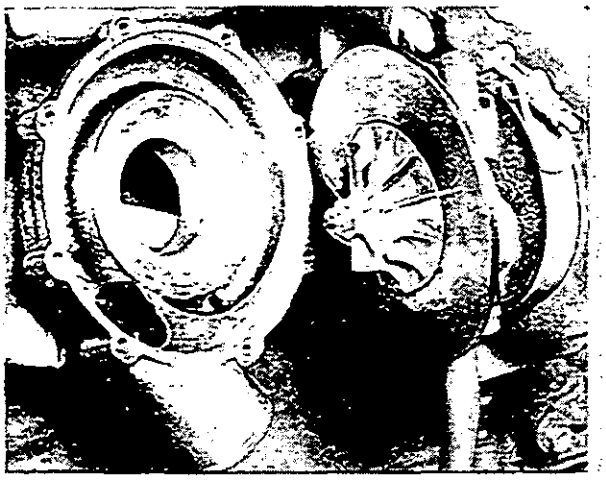
M9



M10

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P2

Holding the turbine at the hub, remove the impeller locknut (17).

Slide impeller (18) off the shaft, see Fig. P.4.

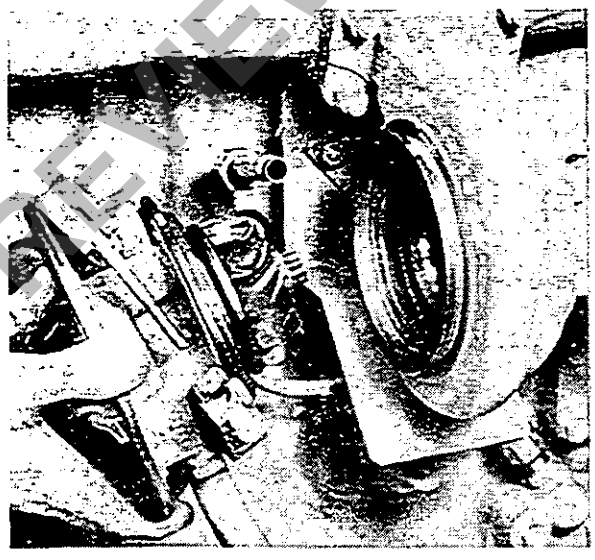
The impeller and cover may be washed in non-caustic cleaning fluid. A non-metallic brush or plastic scraper blade should be used to avoid scoring these parts.

Following cleaning, the parts removed should be examined and if found to be in a satisfactory condition, should be re-assembled in reverse order of the stripping sequence outlined above.

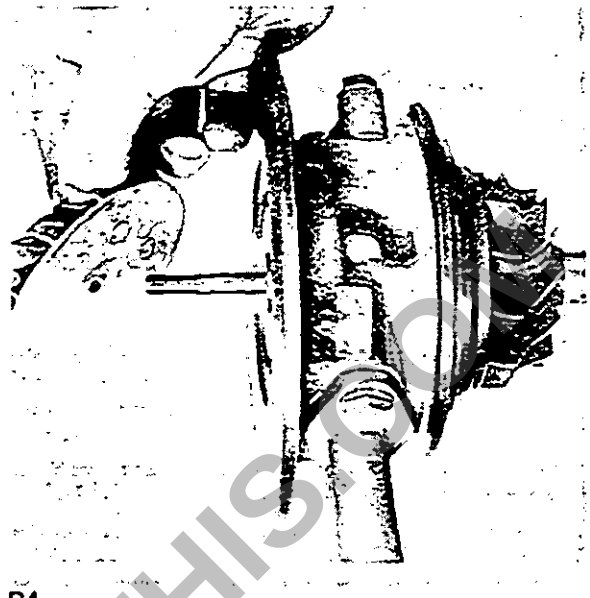
Refit oil pipes. Check for oil drain before firing the engine.

Fault Diagnosis

If the performance of the turbocharger is suspect, check the installation for the following faults:—



P3



P4

Excessive air inlet depression.
Low or high air delivery pressure.
Low oil pressure and/or low oil flow.
Restricted exhaust from turbine.
Fuel pump or injection faults.

Check and rectify in accordance with the following paragraphs:—

Excessive air inlet depression: The air depression at the entry to the compressor, that is in the ducting after the air filter and immediately before the compressor cover, should not exceed a 20 in (500 mm) head of water.

If the depression is excessive, the cause will be due to a restriction of inlet air by a dirty air filter.

Service the air filter.

Low or high air delivery pressure: The pressure will vary according to the engine rating, speed and load.

If the pressure is low, the probable cause is a dirty or damaged compressor, incorrect fuelling of the engine fuel pump, or leaking manifold joints.

Check that the injection pump fuelling has not been disturbed and if satisfactory, remove the turbocharger from the engine for inspection.

A higher reading may also indicate incorrect injection pump fuelling or damage to the turbine.

Action as for low pressure.

Low oil pressure and/or oil flow: The oil delivery pressure should not be less than 30 lbf/in² (2,1 kgf/cm²) -207 kN/m² under normal conditions of load.

If oil pressure is low, refer to Section K. Clean bores of the feed and return pipes and check the connections for obstruction.

Restricted exhaust from the turbine: A restriction of the exhaust from the turbine will affect engine performance. If the back pressure is more than 20 in (500 mm) head of water, check the exhaust system for obstruction and rectify as necessary.

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