Workshop Manual for V8.510, V8.540 & TV8.540 Diesel Engines

(For V8.510 engines, commencing engine number 510U2000)

Publication No. 601 TPD 06901215

CONTENTS

SAFETY PRECAUTIONS

THESE SAFETY PRECAUTIONS ARE MOST IMPORTANT. Reference must also be made to the local regulations in the country of operation.

Only use these engines in the type of application for which they have been designed.

Do not change the specification of the engine.

Do not smoke when you put fuel in the tank.

Clean away any fuel which has fallen and move material which has fuel contamination to a safe place.

Do not put fuel in the tank during engine operation (unless really necessary).

Never clean, lubricate or adjust the engine during operation (unless you have had the correct training when extreme caution must be used to prevent injury).

Do not make any adjustments you do not understand.

Ensure the engine is not in a position to cause a concentration of toxic emissions.

Persons in the area must be kept clear during engine and equipment or vehicle operation.

Do not permit loose clothing or long hair near parts which move.

Keep away from parts which turn during operation. Note that fans can not be seen clearly while the engine is run.

Do not run the engine with any safety guards removed.

Do not remove the filler cap of the cooling system while the engine is hot and the coolant is under pressure as dangerous hot coolant can be discharged.

Do not use salt water in the cooling system or any other coolant which can cause corrosion.

Keep sparks or fire away from batteries (especially while during charge) or combustion can occur. The battery fluid can burn and is also dangerous to the skin and especially the eyes.

Disconnect the battery terminals before you make a repair to the electrical system.

Only one person must be in control of the engine.

Ensure the engine is only operated from the control panel or operators position.

If your skin comes into contact with high pressure fuel, get medical assistance immediately.

Diesel fuel and lubricating oil (especially used oil) can cause skin damage to some persons. Use protection on the hands (gloves or special skin protection solutions).

Do not wear clothing which is contaminated by lubricating oil. Do not put material which is contaminated with oil into the pockets.

Discard used lubricating oil in a safe place to prevent contamination.

The combustible material of some components of the engine (for example certain seals) can become extremely dangerous if it is burned. Never allow this burnt material to come into contact with the skin or with the eyes.

Do not move equipment unless the brakes are in good condition.

Ensure that the transmission drive control is in "Out of Drive" position before the engine is started.

Read and use the instructions relevant to asbestos joints.

Fit only correct Perkins Parts.

POWERPART Consumable Products

To give assistance in the correct operation, service and maintenance of your engine and machine, Perkins Engines Ltd., have made available the products shown below.

The instructions for the use of each product are given on the outside of each container.

These products are available from your Perkins distributor.

POWERPART Antifreeze
Gives corrosion protection and also a more efficient coolant in hot conditions. See Page C.6.

POWERPART De-Icer
To remove frost.

POWERPART Easy Flush
Cleans the cooling system.

POWERPART Easy Seal
Stops leakages from the cooling system.

POWERPART Foam Action Gasket Remover
Allows easy and rapid removal of old gaskets and joints.

POWERPART Hylomar
Universal sealing compound to seal joints.

POWERPART Hylosil
Silicone rubber sealant to prevent leakage.

POWERPART Lay-Up 1
A diesel fuel additive for protection against corrosion. See Page C.5.

POWERPART Lay-Up 2
Gives inside protection to the engine and other closed systems. See Page C.5.

POWERPART Lay-Up 3
Gives outside protection to any metal parts. See Page C.5.

POWERPART Moisture Dispersant and Rust Penetrant
Dries damp equipment and gives protection against corrosion. Passes through dirt and corrosion to lubricate and to assist removal of components.

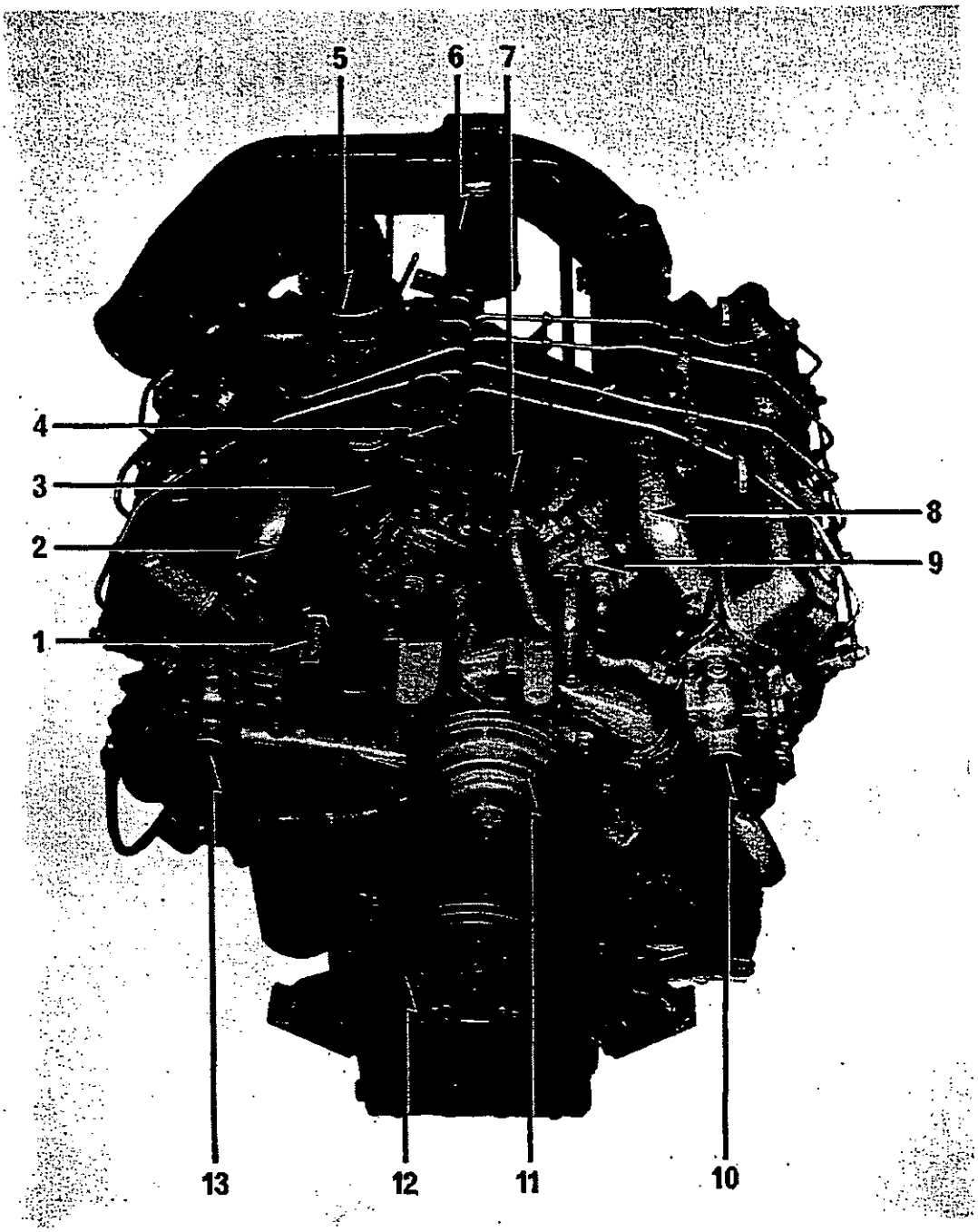
POWERPART Retaining Compound
Retains components which have a transition fit or an interference fit, for example, pulleys, bushes etc.

POWERPART Studlock
Secures threaded fasteners. Recommended for fasteners which, normally, are not removed.

POWERPART Threadseal
Seals threads and pipe connections. Low pressure systems can be used immediately.

SECTION A
Engine Views

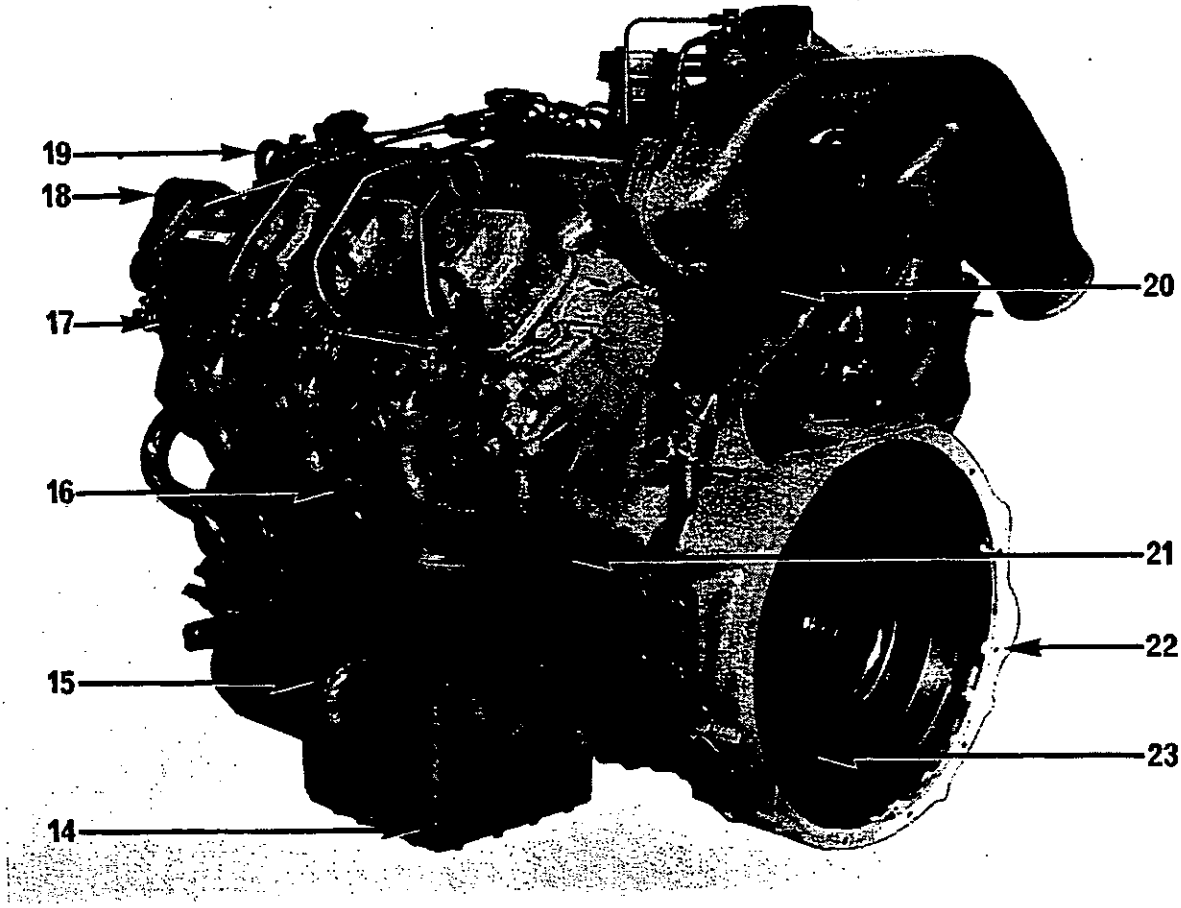
Perkins engines are built to individual requirements to suit the applications for which they are intended and the following engine views do not necessarily typify any particular specification.



A1

VIEW OF TOP FRONT OF NATURALLY ASPIRATED ENGINE

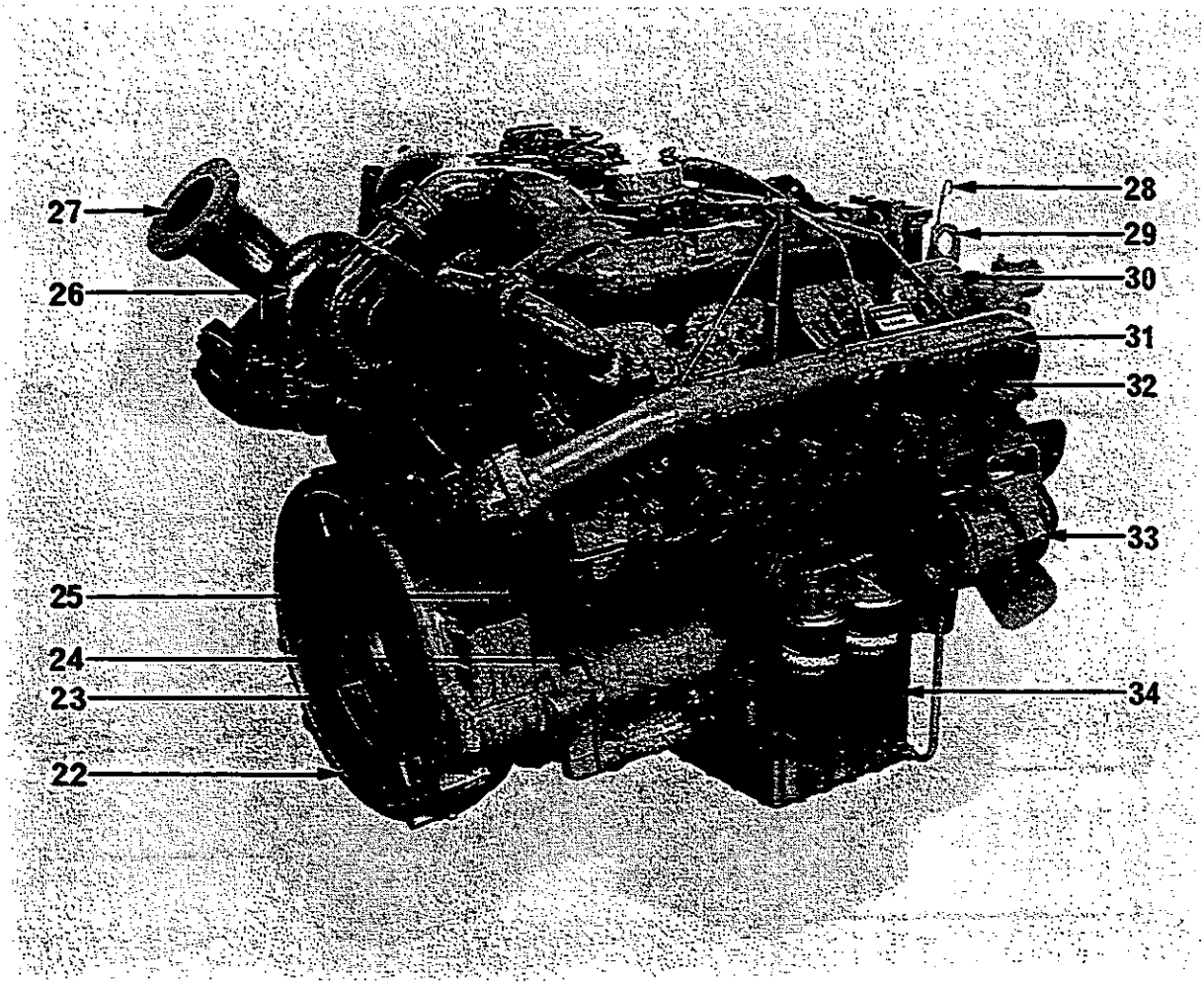
1 Engine Number Location
2 Inlet Manifold (Right Hand)
3 Lubricating Oil Filter
4 Fuel Injection Pump
5 Engine Breather
6 Fuel Filter
7 Fuel Lift Pump
8 Inlet Manifold (Left Hand)
9 Compressor
10 Water Outlet (Left Hand)
11 Water Pump Pulley
12 Crankshaft Pulley
13 Water Outlet (Right Hand)



A2

VIEW OF REAR LEFT HAND SIDE OF NATURALLY ASPIRATED ENGINE

14 Sump Drain Plug (Left Hand)
15 Oil Cooler
16 Exhaust Manifold (Left Hand)
17 Atomiser
18 Front Rocker Cover (Left Hand)
19 Front Lifting Bracket (Left Hand)
20 Fuel Injection Pump Anti-Stall Device
21 Cylinder Block Drain Tap (Left Hand)
22 Flywheel Housing
23 Flywheel



A3

VIEW OF REAR RIGHT HAND SIDE OF TURBOCHARGED ENGINE

22 Flywheel Housing
23 Flywheel
24 Starter Motor
25 Coolant Drain
26 Turbocharger
27 Exhaust Outlet
28 Lubricating Oil Dipstick
29 Front Lifting Bracket (Right Hand)
30 Rocker Cover
31 Exhaust Manifold (Right Hand)
32 Atomiser
33 Alternator
34 Lubricating Oil Filter

SECTION B
Technical Data

Engine Data

Type	Eight cylinder, four stroke, direct injection, 90°V
Induction System (V8.510/V8.540)	Naturally Aspirated
Induction System (TV8.540)	Turbocharged
Nominal Bore	4.25 in (108 mm)*
Stroke (V8.510)	4.5 in (114,3 mm)
Stroke (V8.540/TV8.540)	4.75 in (120,7 mm)
Compression Ratio (V8.510/V8.540)	16.5 : 1
Compression Ratio (TV8.540)	15 :1
Cubic Capacity (V8.510)	510.7 in^3 (8,36 litres)
Cubic Capacity (V8.540/TV8.540)	539.1 in^3 (8,84 litres)
Firing Order	1, 8, 7, 5, 4, 3, 6, 2.
Lubricating Oil Pressure	40 lbf/in^2(2,8 kgf/cm^2) or 279kN/m^2 minimum at maximum engine speed amd normal operating temperature.
Valve Tip Clearances (set cold)	
V8.510/V8.540	0.010 in (0,25 mm) inlet and exhaust
TV8.540	0.010 in (0,25 mm) inlet: 0.020 in (0,50 mm) exhaust
Lubricating Oil Sump Capacity (Standard Vehicle)	27 Imperial pints (15,3 litres)
Cooling Water Capacity (Engine Only)	40 Imperial pints (22,7 litres)
Direction of Rotation	Clockwise from front

*For actual bore size, see Page B.5.

Rating Details

V8.510

Rated Output (Gross)	134 kW (180 bhp) at 2,800 rev/min
Maximum Torque	398 lbf ft (540 Nm) 55,0 kgf m at 1,650 rev/min

V8.540

Rated Output (Gross)	134 kW (180 bhp) at 2,600 rev/min
Maximum Torque	410 lbf ft (556 Nm) 56,7 kgf m at 1,650 rev/min

TV8.540

Rated Output (Gross)	175 kW (235 bhp) at 2,600 rev/min
Maximum Torque	571 lbf ft (774 Nm) 79,0 kgf m at 1,700 rev/min

Note: The above ratings are maximum and can vary according to application. For details of individual ratings, apply to Technical Services Department, Perkins Power Sales and Service Ltd., Peterborough.

De-Rating for Altitude

If a V8.510 or V8.540 engine is to operate continuously at altitudes higher than 5000 ft (1500 m), the fuel delivery should be reduced to minimise exhaust smoke and fuel consumption.

The reduced fuel delivery rate for operating at a particular altitude can be obtained through your Perkins Distributor providing that the information specified below is submitted.

Engine number, fuel injection pump type number and application into which engine is fitted.

Site barometric pressure, ambient temperature and humidity. If these are not available, specify altitude and location.

Whether or not the machine is working at a constant altitude or moving from one altitude to another.

Whether conventional gearbox or torque converter is fitted. If using a torque converter, give stall speed of transmission.

If possible, horsepower requirements of machine operating at site conditions.

Information for TV8.540 engines is available from Perkins Power Sales and Service Ltd., Peterborough.

Any alterations to fuel pump settings must be made by an authorised fuel pump specialist or Perkins Distributor.

Engine Number

The engine number is stamped on the top of the inside forward end of the right bank of the cylinder block (see Engine Views, Item 1) and should be quoted when requesting information or ordering parts.

The number consists of a combination of figures and letters. A typical engine number in the current engine numbering system is XC22656U514424E and in the earlier numbering system is 540U12929L.

Other letters can be included in the combination denoting specific information and the full engine number should be quoted in all cases.

Recommended Torque Tensions

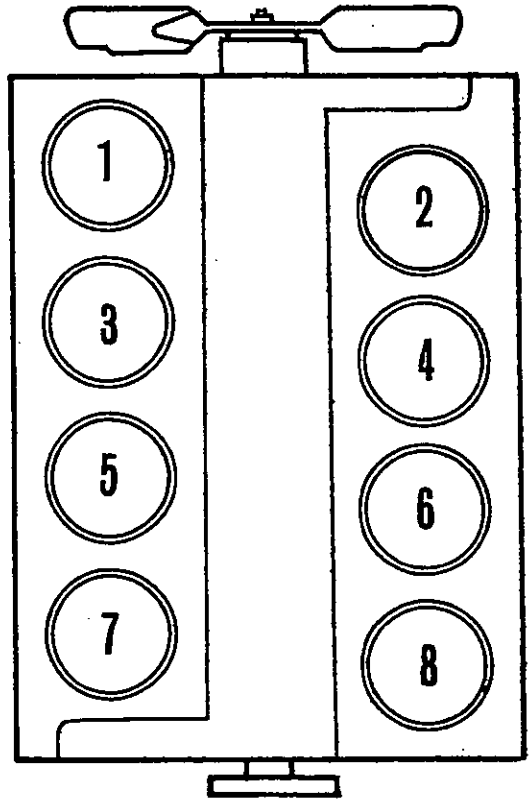
The securing arrangement for a component part may vary according to application or because of design alteration therefore, before fitment, determine the correct torque value for the particular size or type of securing arrangement used. The following figures will apply with the components lightly oiled before assembly.

Securing Items	Screw Size U.N.F.	lbf ft	Nm	kgf m
Cylinder Head Setscrews /Nuts (V8.510/V8.540) ...	7/16	125	169	17,3
Cylinder Head (Scant Shank) Setcrews/Nuts with gasket 3681H401 (V8.510/V8.540)	7/16	135	183	18,7
Cylinder Head (Straight Shank) Setscrews/Nuts with washers and gasket 3681H401 (V8.540) ...	7/16	155	210	21,4
Cylinder Head Setscrews/Nuts (TV8.540)	7/16	155	210	21,4
Rocker Shaft Bracket Setscrews/Nuts	3/8	36	49	5,0
Big End Setscrews (V8.510)	7/16	95	129	13,2
Big End Setscrews (V8.540/TV8.540)	7/16	105	142	14,5
Main Bearing Cap Setscrews	3/8	210	285	29,0
Main Bearing Cap Transverse Setscrews ("S" range)	1/2	75	102	10,4
Main Bearing Cap Transverse Setscrews ("W" range)	1/2	100	136	13,8
Main Bearing Cap Transverse Setscrews	7/16	50	68	6,9
Crankshaft Balance Weight Setscrews	1/2	85	115	11,8
Crankshaft Balance Weight Studs	1/2	25	34	3,5
Crankshaft Balance Weight Nuts	1/2	80	108	11,1
Fuel Injection Pump Gear Setscrews	3/8	30	41	4,1
Fuel Injection Pump Gear Nuts	5/16	20	27	2,8
Fuel Injection Pump Gear Setscrews	5/16	16	22	2,2
*Fuel Injection Pump Gear Capscrews (With Washers)...	5/16	21	28	2,9
(With Plate) ...	5/16	28	38	3,9
Fuel Injection Pump Gear Capscrews (DP 15 Pump) ...	3/8	35	47	4,8
Fuel Injection Pump Gear Capscrews (MW Pump) ...	3/8	37	50	5,1
Fuel Pump Drive Shaft Thrustplate Setscrews (DP 15)...	1/4	7	9,5	1,0
Fuel Pump Adaptor Shaft Setscrews	5/16	15	20	2,1
Fuel Pump Adaptor Shaft Nuts	5/16	21	28	2,9
Camshaft Gear Setscrews (Part Threaded)	5/16	21	28	2,9
(Fully Threaded)	3/8	30	41	4,1
(Waisted)	3/8	40	54	5,5
Camshaft Thrust Plate Setscrews	1/4	12	16	1,7
Crankshaft/Camshaft Idler Gear Hub Setscrews ...	3/8	30	41	4,1
Crankshaft/Camshaft Idler Gear Hub Nuts (Nyloc) ...	3/8	30	41	4,1
Crankshaft/Camshaft Idler Gear Hub Nuts (Philidas) ...	3/8	24	33	3,3
Crankshaft/Oil Pump Idler Gear Hub Setscrews ...	5/16	19	26	2,6
Camshaft/Fuel Pump Drive Idler Gear Hub Nuts (Alternative Drive – CAV In-Line Pump) ...	3/8	24	33	3,3
Camshaft/Fuel Pump Idler Gear Hub Setscrews (DP15 or Bosch Fuel Pumps)	3/8	30	41	4,1
Piston Cooling Oil Control Valve (TV8.540)	7/8	15	20	2,1
Piston Cooling Jet Setscrews (TV8.540)	5/16	9	12	1,2
Crankshaft Pulley Retaining Setscrew	7/8	300	407	41,5
Crankshaft Pulley Retaining Setscrews (3) (Cadmium Plated)	7/16	65	88	9,0
Crankshaft Pulley Retaining Setscrews (3) (Phosphated)	7/16	92	125	12,7
Flywheel Setscrews	1/2	80	108	11,1
Water Pump Pulley Retaining Setscrew	1/2	40	54	5,5
Water Pump Pulley Retaining Nut	7/8	70	95	9,7
Atomiser Securing Nuts	5/16	12	16	1,7
Lubricating Oil Filter Bowl Securing Setscrew ..		10	14	1,4
High Pressure Fuel Pipe Nuts	12 x 1,5 mm	15	20	2,1

*A hardened plate is fitted under the fuel pump gear retaining capscrews of later V8 510 engines which replaces the plain and spring washers formerly fitted. New type capscrews are also fitted and the torque loading on the capscrews has been increased. Where a tachometer drive adaptor is fitted to the V8.510 fuel pump gear, the adaptor, washers and capscrews have been replaced by a hardened adaptor with new capscrews without washers and the higher torque loading should be used for this later arrangement. On no account should the washers be removed or the higher torque used on the earlier V8.510 gear securing arrangement.

Cylinder Numbering

The cylinders are numbered from front to rear, No. 1 cylinder is at the front of the left bank, No. 2 is at the front of the right bank (see Fig. B.1).



B1

Engine Weights (Vehicle Application)

Approximate Dry Weight :—

Bare Engine (V8.510/V8.540)	1415 lb (642 kg)
Bare Engine (TV8.540)	1465 lb (665 kg)
V8.540 Engine With Accessories	1650 lb (748 kg)
V8.510 Engine With Accessories	1660 lb (753 kg)
TV8.540 Engine With Accessories	1700 lb (771 kg)

Note: Four lifting brackets are provided at the ends of the cylinder heads and these must all be used, preferably with a horizontal spreader bar. On no account should attempts be made to lift the engine using only two lifting brackets.

If, when lifting the engine, the lifting brackets are subjected to any shock loading, e.g. if the engine is allowed to fall several inches before being arrested by the lifting tackle, the brackets and bracket securing setscrews must be checked and renewed, if damaged in any way.

DATA AND DIMENSIONS

All threads used, except perhaps on proprietary equipment, are Unified Series and American Pipe Series. The crankshaft and pulley retaining setscrew are threaded $\frac{7}{8}$ in U.N.F. of 14 T.P.I.

The following data of clearances and tolerances are given as a guide for personnel engaged upon major overhauls and the figures are mainly based upon those used in the factory for production. Unless specified otherwise, the information applies to both V8.540 and V8.510 engines.

Cylinder Block

Height Between Top Face of Cylinder Banks and Periphery of Main Bearing Parent Bore	11.967/11.972 in (303,96/304,09 mm)
Depth of Recess for Cylinder Liner	0.102/0.104 in (2,59/2,64 mm)
Diameter of Recess for Cylinder Liner	4.612/4.616 in (117,14/117,25 mm)
Parent Bore Diameter for Cylinder Liner	4.4565/4.4575 in (113,195/113,221 mm)
Main Bearing Parent Bore Diameter	4.185/4.186 in (106,30/106,325 mm)
Camshaft Bush Parent Bore Diameter, No. 1 ...	2.500/2.501 in (63,50/63,53 mm)
Camshaft Bearing Bush Internal Diameter	2.375/2.377 in (60,32/60,38 mm)
Max. Permissible Worn Bush Internal Diameter ...	2.3795 in (60,44 mm)
Camshaft Bearing Bore Diameter — No. 2	2.245/2.247 in (57,02/57,07 mm)
Max. Permissible Worn Bore Diameter — No. 2 ...	2.2493 in (57,13 mm)
Camshaft Bearing Bore Diameter — No. 3	2.235/2.237 in (56,77/56,82 mm)
Max. Permissible Worn Bore Diameter — No. 3 ...	2.2393 in (56,88 mm)
Camshaft Bearing Bore Diameter — No. 4	2.225/2.227 in (56,52/56,57 mm)
Max. Permissible Worn Bore Diameter — No. 4 ...	2.2293 in (56,62 mm)
Camshaft Bearing Bore Diameter — No. 5	2.215/2.217 in (56,26/56,31 mm)
Max. Permissible Worn Bore Diameter — No. 5 ...	2.2193 in (56,37 mm)

Cylinder Liners

Type	Dry — Interference Fit (Production) — Slip Fit (Service)
Outside Diameter of Production Liner	4.4585/4.4595 in (113,246/113,271 mm)
Outside Diameter of Service Liner (early)	4.4555/4.4565 in (113,17/113,20 mm)
Outside Diameter of Service Liner (current)	4.4565/4.4575 in (113,195/113,221 mm)
Interference Fit of Production Liner in Cylinder Block Parent Bore	0.001/0.003 in (0,025/0,076 mm)
Clearance Fit of Service Liner in Cylinder Block Parent Bore (early)	0.000/0.002 in (0,00/0,05 mm)
Transition Fit of Service Liner in Cylinder Block Parent Bore (current)	0.001/0.001 in (0,025/0,025 mm)
Flange Thickness	0.100/0.102 in (2,54/2,60 mm)
Outside Diameter of Flange	4.590/4.595 in (116,59/116,71 mm)
Relationship of Liner Flange to Top Face of Cylinder Block (includes out of squareness allowance)	0.002 in (0,05mm) above to 0.002 in (0,05 mm) below
Inside Diameter of Finished Production Liner in Cylinder Block	4.250/4.251 in (107,95/107,975 mm)
Inside Diameter of Pre-Finished Service Liner in Cylinder Block (early)	4.251/4.252 in (107,975/108,00 mm)
Inside Diameter of Pre-finished Service Liner in Cylinder Block (current)	4.252/4.253 in (108,000/108,026 mm)
Max. Permissible Worn Inside Diameter of Liner — New Rings Fitted	4.255 in (108,08 mm)
Max. Permissible Ovality of Worn Liner Bore	0.002 in (0,05 mm)
Overall Length of Liner	8.894/8.906 in (225,91/226,21 mm)

Pistons (V8.540)

Type	Toroidal Cavity in Crown, Recessed for Valves, Inserted Top Ring Groove
Piston Height in relation to Cylinder Block Top Face	0.000/0.0085 in (0,00/0,216 mm) BELOW
Bore Diameter for Gudgeon Pin	1.75012/1.75035 in (44,453/44,459 mm)
Top Compression Ring Groove Width	0.097/0.098 in (2,464/2,489 mm)
2nd Compression Ring Groove Width	0.0957/0.0967 in (2,431/2,456 mm)
Scraper Ring Groove Width	0.1895/0.1905 in (4,813/4,839 mm)

Pistons (TV8.540)

Type	Toroidal Cavity in Crown, Recessed for Valves, Inserted Top Ring Groove
Piston Height in relation to Cylinder Block Top Face	0.000/0.0085 in (0,000/0,216 mm) BELOW
Bore Diameter for Gudgeon Pin	1.75012/1.75035 in (44,453/44,459 mm)
Top Compression Ring Groove Width	Wedge Shaped
2nd Compression Ring Groove Width	0.0974/0.0982 in (2,475/2,495 mm)
Scraper Ring Groove Width	0.1406/0.1413 in (3,57/3,59 mm)

Pistons (V8.510)

Type	Toroidal Cavity in Crown, Recessed for Valves. Latest pistons have bonded insert for top ring groove
Piston Skirt Diameter — Across Thrust	4.244/4.245 in (107,80/107,82 mm)
Piston Height in relation to Cylinder Block Top Face	0.000/0.0085 in (0,00/0,216 mm) BELOW
Bore Diameter for Gudgeon Pin (Inserted Piston)	1.62512/1.62535 in (41,278/41,284 mm)
Bore Diameter for Gudgeon Pin (Plain Piston)	1.625/1.6253 in (41,275/41,283 mm)
Top Compression Ring Groove Width (Inserted)	0.0962/0.0972 in (2,444/2,469 mm)
Top Compression Ring Groove Width (Plain)	0.0977/0.0987 in (2,482/2,507 mm)
2nd and 3rd Compression Ring Groove Width	0.0957/0.0967 in (2,431/2,456 mm)
Scraper Ring Groove Width	0.252/0.253 in (6,40/6,425 mm)

Piston Rings (V8.540)

Top Compression	Chromium Plated, Copper Finished, Barrelled Faced
2nd Compression	Chromium Faced, Internally Stepped or Chamfered
3rd and 4th Scraper	Chromium Faced, Coil Spring Loaded, Oil Control
Compression Ring Width	0.0928/0.0938 in (2,357/2,383 mm)
Scraper Ring Width	0.1865/0.1875 in (4,737/4,763 mm)
Ring Clearance in Groove — Top	0.003/0.005 in (0,08/0,13 mm)
Max. Permissible Ring Clearance in Groove — Top	0.008 in (0,20 mm)
Ring Clearance in Groove — 2nd, 3rd and 4th	0.002/0.004 in (0,05/0,10 mm)
Ring Gap — Top Ring	0.008/0.030 in (0,20/0,76 mm)
Ring Gap — 2nd	0.013/0.036 in (0,33/0,91 mm)
Ring Gap — Scraper	0.017/0.036 in (0,43/0,91 mm)

Piston Rings (TV8.540)

Top Compression	Molybdenum Inserted, Barrel Faced, Wedge Shaped
2nd Compression	Chromium Taper Faced, Internally Chamfered
3rd Scraper	Chromium Faced, Coil Spring Loaded, Oil Control
2nd Compression Ring Width	0.0952/0.0957 in (2,418/2,430 mm)
Scraper Ring Width	0.1369/0.1374 in (3,478/3,490 mm)
Ring Clearance in Groove – 2nd	0.0017/0.0030 in (0,04/0,08 mm)
Ring Clearance in Groove – 3rd	0.0032/0.0044 in (0,08/0,11 mm)
Ring Gap – Top Ring	0.013/0.029 in (0,33/0,74 mm)
Ring Gap – 2nd Ring	0.033/0.049 in (0,84/1,24 mm)
Ring Gap – 3rd Ring	0.012/0.030 in (0,30/0,76 mm)

Piston Rings (V8.510)

Top Compression	Chromium Plated, Copper Finished, Barrelled Faced
Second Compression	Chromium Faced, Internally Stepped or Chamfered
Third Compression	Chromium Faced, Internally Stepped or Chamfered
Scraper	Chromium Faced, Coil Spring Loaded, Oil Control
Compression Ring Width	0.0928/0.0938 in (2,357/2,383 mm)
Scraper Ring Width	0.249/0.250 in (6,32/6,35 mm)
Top Ring Clearance in Groove (Inserted Piston)	0.002/0.004 in (0,05/0.10 mm)
Top Ring Clearance in Groove (Plain Piston)	0.004/0.006 in (0,10/0,15 mm)
Max. Permissible Ring Clearance in Groove — Top	0.008 in (0,20 mm)
Ring Clearance in Groove — 2nd. 3rd and Scraper	0.002/0.004 in (0,05/0.10 mm)
Ring Gap — Top Ring	0.008/0.030 in (0,20/0.76 mm)
Ring Gap – 2nd and 3rd	0.013/0.036 in (0,33/0,91 mm)
Ring Gap – Scraper	0.017/0.036 in (0,43/0,91 mm)

Gudgeon Pins (V8.540/TV8.540)

Type	Fully Floating
Outside Diameter	1.7498/1.7500 in (44,445/44,450 mm)
Clearance Fit in Piston Boss	0.00012/0.00055 in (0,003/0,014 mm)
Clearance Fit in Small End Bush	0.0007/0.0018 in (0,018/0,046 mm)

Gudgeon Pins (V8.510)

Type	Fully Floating
Outside Diameter	1.6248/1.625 in (41,270/41,275 mm)
Transition Fit in Piston Boss (Inserted Piston)	—0.00005/+0.00025 in (—0,001/+0,006 mm)
Clearance Fit in Piston Boss (Plain Piston)	0.000/0.0005 in (0,00/0,013 mm)
Clearance Fit in Small End Bush	0.0007/0.0018 in (0,018/0,046 mm)

Small End Bushes (V8.540/TV8.540)

Type	Steel Backed, Lead Bronze Lined
Outside Diameter	1.9405/1.9420 in (49,29/49,33 mm)
Length	1.261/1.271 in (32,03/32,28 mm)
Interference Fit in Connecting Rod	0.002/0.0045 in (0,05/0,11 mm)
Inside Diameter after Reaming	1.7507/1.7516 in (44,47/44,49 mm)

Small End Bushes (V8.510)

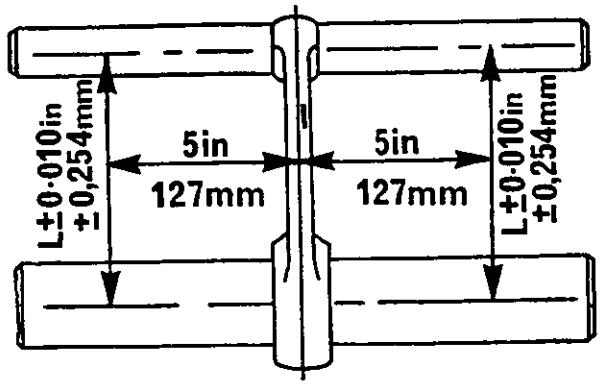
Type	Steel Backed, Lead Bronze Lined
Outside Diameter	1.785/1.7865 in (45,34/45,38 mm)
Length	1.477/1.487 in (37,52/37,77 mm)
Interference Fit in Connecting Rod	0.003/0.0055 in (0,08/0,13 mm)
Inside Diameter after Reaming	1.6257/1.6266 in (41,293/41,316 mm)

Connecting Rods

Type	'H' Section
Cap Location to Connecting Rod	Saw Tooth
Big End Parent Bore Diameter (V8.540/TV8.540)	3.166/3.167 in (80,42/80.44 mm)
Big End Parent Bore Diameter (V8.510)	3.416/3.417 in (86,77/86,79 mm)
Small End Parent Bore Diameter (V8.540/TV8.540)	1.9375/1.9385 in (49,21/49,24 mm)
Small End Parent Bore Diameter (V8.510)	1.781/1.782 in (45,24/45,27 mm)
Big End Width	1.443/1.445 in (36,65/36,70 mm)
Big End Side Clearance on Crankpin (Two Rods Fitted)	0.015/0.022 in (0,38/0,56 mm)
Length Between Bore Centres (V8.540/TV8.540)	8.999/9.001 in (228,57/228,63 mm)
Length Between Bore Centres (V8.510)	8.749/8.751 in (222,22/222,28 mm)

Connecting Rod Alignment

Large and small end bores must be square and parallel to each other within the limits of ±0.010 in (0.25 mm). measured 5 in (127 mm) each side of the axis of the rod on test mandrel as shown in Fig. B.2.
With the small end bush fitted, the limit of ±0.010 in (0,25 mm) is reduced to ±0.0025 in (0,064 mm).



B2

Connecting Rod Bearings (V8.540 TV8.540)

Type	Pre-Finished, Steel Backed, Tin/Lead or Indium/Lead Plated
Shell Thickness - at centre of bearing	0.08265/0.08300 in (2,099/2,108 mm)
Inside Diameter - across centre of bearing	3.0000/3.0017 in (76,20/76,24 mm)
Bearing Running Clearance	0.0015/0.0037 in (0,04/0,09 mm)

Connecting Rod Bearings (V8.510)

Type	Pre-Finished, Steel Backed, Aluminium Tin Faced
Shell Thickness	0.0824/0.0826 in (2,093/2,098 mm)
Inside Diameter	3.2508/3.2523 in (82,57/82,61 mm)
Bearing Running Clearance	0.0023/0.0043 in (0.058/0.109 mm)

Crankshaft

Main Journal Diameter	3.9967/3.9972 in (101,516/101,529 mm)
Min. Permissible Worn Main Journal Diameter ..	3.9942 in (101,45 mm)
Max. Permissible Ovality of Worn Journal	0.0015 in (0,04 mm)
Main Journal Width — No. 1	1.557/1.567 in (39,55/39,80 mm)
Main Journal Width — Nos. 2 and 4	1.931/1.935 in (49,05/49,15 mm)
Main Journal Width — No. 3	1.655/1.658 in (42,04/42,11 mm)
Main Journal Width — No. 5	1.675/1.679 in (42,55/42,65 mm)
Fillet Radii — Main Journals	0.125/0.140 in (3,18/3,56 mm)
Crankpin Diameter (V8.540/TV8.540)	2.9980/2.9985 in (76,149/76,162 mm)
Crankpin Diameter (V8.510)	3.248/3.2485 in (82,50/82,512 mm)
Min. Permissible Worn Crankpin Diameter (V8.540/TV8.540)	2.9955 in (76,09 mm)
Min. Permissible Worn Crankpin Diameter (V8.510) ...	3.2455 in (82,44 mm)
Max. Permissible Ovality of Worn Crankpin	0.0015 in (0,04 mm)
Crankpin Width	2.905/2.908 in (73,79/73,86 mm)
Fillet Radii — Crankpins	0.125/0.140 in (3,18/3,56 mm)
Surface Finish — All Pins and Journals	16 micro-inches (0.4 microns) Maximum
Oil Seal Helix Diameter (Rope Seal only)	3.374/3.375 in (85,70/85,73 mm)
Oil Seal Helix Depth (Rope Seal only)	0.004/0.008 in (0,10/0,20 mm)
Spigot Bearing Recess Depth	0.594 in (15,09 mm)
Spigot Bearing Recess Bore	2.046/2.0465 in (51,97/51,98 mm)
Crankshaft End Float	0.002/0.017 in (0,05/0,43 mm)
Max. Permissible Worn Crankshaft End Float ...	0.020 in (0,51 mm)
Regrind Undersizes — Main Journals and Pins ...	0.010 in (0,25 mm), 0.020 in (0,51 mm) and 0.030 in (0.76 mm)

Fillet radii and surface finish must be maintained during crankshaft regrinding. Length of No. 3 main journal must not

exceed 1.673 in (42,49 mm) after regrinding ; where necessary use oversize thrust washers to suit. Length of crankpins not to exceed 2.913 in (73,99 mm).

| The crankshaft fitted to TV8.540 engines and to some V8.540 engines is 20 hour nitride hardened and where facilities | are not available for re-nitriding after regrinding, a replacement crankshaft should be fitted. The nitrided crankshafts can be | recognised by the assembly part number 41111663, 41111684, 41111713, 41111715, 41111804 or 41111805, stamped | on the No. 1 web of the crankshaft.

When regrinding, only very light cuts should be used, especially around the fillet radii and adequate cooling should be ensured. After regrinding, the crankshaft should be crack detected and de-magnetised and the oil holes chamfered 0.020/0.060 in (0,51/1,52 mm) at 45°.

When the above operations have been carried out, nitrided V8.540/TV8.540 crankshafts should be re-hardened by the 20 hour nitriding process and then crack detected and de-magnetised. The plain machined diameter at the front end of the crankshaft, where the pulley clamping ring seats, should be left soft. Finally the crankpins and main journals should be lapped to remove the residue from the nitriding process.

Crankshaft Thrust Washers

Type	Steel Backed, Aluminium Tin Faced
Position in Engine	Cylinder Block, Centre Main Bearing Housing
Thrust Washer Thickness — Standard	0.122/0.125 in (3,10/3,18 mm)
Thrust Washer Thickness — Oversize	0.1295/0.1325 in (3,29/3,37 mm)

Main Bearings

Type	Pre-Finished, Steel Backed, Aluminium Tin Faced
Shell Width, Nos. 1, 3 and 5	1.370/1.380 in (34,80/35,05 mm)
Shell Width, Nos. 2 and 4	1.620/1.630 in (41,15/41,40 mm)
Shell Thickness (V8.510/V8.540)	0.0915/0.0919 in (2,324/2,334 mm)
Shell Thickness (TV8.540)	0.0922/0.0926 in (2,342/2,352 mm)
Inside Diameter (V8.510/V8.540)	4.0012/4.003 in (101,63/101,68 mm)
Inside Diameter (TV8.540)	3.9998/4.0016 in (101,59/101,64 mm)
Main Bearing Running Clearance (V8.510/V8.540)	0.004/0.0063 in (0,10/0,16 mm)
Main Bearing Running Clearance (TV8.540)	0.0026/0.0049 in (0,07/0,12 mm)

Camshaft

No. 1 Journal Diameter	2.371/2.373 in (60,24/60,26 mm)
Min. Permissible Worn Journal Dia. — No. 1	2.370 in (60,20 mm)
No. 2 Journal Diameter	2.241/2.243 in (56,93/56,96 mm)
Min. Permissible Worn Journal Dia. — No. 2	2.240 in (56,90 mm)
No. 3 Journal Diameter	2.231/2.233 in (56,68/56,71 mm)
Min. Permissible Worn Journal Dia. — No. 3	2.230 in (56,64 mm)
No. 4 Journal Diameter	2.221/2.223 in (56,43/56,45 mm)
Min. Permissible Worn Journal Dia. — No. 4	2.220 in (56,39 mm)
No. 5 Journal Diameter	2.211/2.213 in (56,17/56,20 mm)
Min. Permissible Worn Journal Dia. — No. 5	2.210 in (56,13 mm)
Running Clearance— All Journals	0.002/0.006 in (0,05/0,15 mm)
Max. Permissible Worn Clearance — All Journals	0.0095 in (0,24 mm)
Cam Lift	0.3325/0.3355 in (8,45/8,52 mm)
Camshaft End Float	0.0015/0.015 in (0,04/0,38 mm)
Max. Permissible Worn Camshaft End Float	0.020 in (0,51 mm)
Oilways for Rocker Shaft Lubrication	No. 3 Journal

Cylinder Heads

Cylinder Head Depth	3.985/4.015 in (101,22/101,98 mm)
Cylinder Head Skimming Allowance	0.015 in (0,38 mm) Max. providing nozzle protrusion does not exceed 0.143 in (3,63 mm) for V8.510/V8.540 or 0.181 in (4,60 mm) for TV8.540 engines and head depth is not less than 3.970 in (100,84 mm) after skimming. Nozzle holes must be radiused after skimming.
Leak Test Pressure	30 lbf/in² (207 kN/m²) 2,11 kgf/cm²
Valve Seat Angle	45°
Valve Guide Parent Bore Diameter	0.6247/0.6257 in (15,87/15,89 mm)

Valve Guides

Inside Diameter	0.03745/0.3765 in (9,51/9,56 mm)
Outside Diameter	0.626/0.6265 in (15,90/15,91 mm)
Interference Fit of Guide in Cylinder Head	0.0003/0.0018 in (0,008/0,046 mm)
Overall Length (Current)	2.594 in (65,89 mm)
Overall Length (Early)	2.688 in (68,28 mm)
Guide Protrusion above Spring Seating Face (Current)	0.783/0.800 in (19,89/20,32 mm)
Guide Protrusion above Spring Seating Face (Early)	0.879/0.896 in (22.33/22,76 mm)
Seal Diameter of Current Guide	0.555/0.569 in (14,10/14,45 mm)

Inlet Valves

Valve Stem Diameter	0.3725/0.3735 in (9,46/9,49 mm)
Clearance Fit of Valve in Guide	0.001/0.004 in (0,03/0,10 mm)
Max. Permissible Worn Clearance in Guide	0.0055 in (0,14 mm)
Valve Head Diameter	1.776/1.786 in (45,11/45,36 mm)
Valve Face Angle	45°
Valve Protrusion above Head Face (V8.510/V8.540)	0.042/0.052 in (1,07/1,32 mm)
*Min. Permissible Protrusion (V8.510/V8.540)	0.001 in (0,03 mm)
Valve Protrusion above Head Face (TV8.540)	0.062/0.072 in (1,57/1,83 mm)
*Min. Permissible Protrusion (TV8.540)	0.022 in (0,56 mm)
Overall Length (V8.510/V8.540)	5.484/5.500 in (139,29/139,70 mm)
Overall Length (TV8.540)	5.504/5.520 in (139,80/140,21 mm)
Sealing Arrangement (Current)	Spring Loaded Rubber Seal
Sealing Arrangement (Early)	Rubber 'O' Ring and Steel Deflector

*Note: Where vehicle engines have to conform to the smoke density regulation BSAU141a: 1971, then the valve head protrusion must not fall below the production limits.

Exhaust Valves

Valve Stem Diameter	0.372/0.373 in (9,45/9,47 mm)
Clearance Fit of Valve in Guide	0.0015/0.0045 in (0,04/0,11 mm)
Max. Permissible Worn Clearance in Guide	0.0055 in (0,14 mm)
Valve Head Diameter	1.526/1.536 in (38,76/39,01 mm)
Valve Face Angle	45°
Valve Protrusion above Head Face (V8.510/V8.540)	0.0485/0.0585 in (1,23/1,49 mm)
*Min. Permissible Protrusion (V8.510/V8.540)	0.0085 in (0,22 mm)
Valve Protrusion above Head Face (TV8.540)	0.062/0.072 in (1,57/1,83 mm)
*Min. Permissible Protrusion (TV8.540)	0.022 in (0,56 mm)
Overall Length (V8.510/V8.540)	5.497/5.513 in (139,61/140,03 mm)
Overall Length (TV8.540)	5.504/5.520 in (139,80/140,21 mm)
Sealing Arrangement (Current)	Spring Loaded Rubber Seal
Sealing Arrangement (Early)	Rubber 'O' Ring and Steel Deflector

*Note: Where vehicle engines have to conform to the smoke density regulation BSAU141a: 1971, then the valve head protrusion must not fall below the production limits.

Inner Valve Springs

Fitted Length	1.553 in (39,45 mm)
Load at Fitted Length	30.3/33.5 lbf (13,7/15,2 kgf)
No. of Active Coils	5.67
No. of Damper Coils	1
Coiled	Right Hand — Damper Coil to Cylinder Head

Outer Valve Springs

Fitted Length	1.833 in (46,56 mm)
Load at Fitted Length	69.2/76.4 lbf (31,4/34,7 kgf)
No. of Active Coils	5
No. of Damper Coils (Earlier Springs Only)	1
Coiled	Left Hand – Damper Coil to Cylinder Head (where applicable)

Tappets

Overall Length	2.97 in (75,44 mm)
Tappet Shank Diameter	0.7475/0.7485 in (18,99/19,01 mm)
Running Clearance in Tappet Block	0.006/0.0085 in (0,15/0.22 mm)

Tappet Blocks

Bore Diameter for Tappet	0.7545/0.756 in (19,16/19,20 mm)

Rocker Shafts

Outside Diameter	0.7485/0.7495 in (19,01/19,04 mm)
Clearance of Rocker Shaft to Bush	0.002/0.005 in (0,05/0,13 mm)

Rocker Levers and Bushes

Bore Diameter for Bush	0.875/0.876 in (22,23/22,26 mm)
Outside Diameter of Bush	0.877/0.878 in (22,28/22,30 mm)
Interference Fit of Bush in Lever	0.001/0.003 in (0,025/0,076 mm)
Inside Diameter of Bush	0.7515/0.7535 in (19,09/19,14 mm)

Push Rods

Overall Length	11.309/11.393 in (287,25/289,38 mm)
Shank Diameter	0.313 in (7,95 mm)

Camshaft Gear

No. of Teeth	54
Inside Diameter of Camshaft Flange Location	1.969/1.970 in (50,01/50,04 mm)
Outside Diameter of Camshaft Flange	1.968/1.969 in (49,98/50,01 mm)
Transition Fit of Gear to Flange	0.000/+0.002 in (0,00/+0,07 mm)

Crankshaft Gear

No. of Teeth	27
Diameter of Bore	1.875/1.876 in (47,63/47,65 mm)
Outside Diameter of Crankshaft	1.8741/1.8747 in (47,60/47,62 mm)
Transition Fit of Gear to Crankshaft	0.0003/0.0019 in (0,008/0,048 mm)

Crankshaft/Camshaft Idler Gear and Hub (Standard Drive — V8.510 and Earlier V8.540 Engines)

No. of Teeth	49
Parent Bore Diameter for Bush	2.438/2.439 in (61,92/61,95 mm)
Outside Diameter of Bush	2.441/2.443 in (62,00/62,05 mm)
Interference Fit of Bush in Gear	0.002/0.005 in (0,05/0,13 mm)
Inside Diameter of Bush — Fitted	2.250/2.252 in (57,15/57,21 mm)
Outside Diameter of Hub	2.248/2.249 in (57,10/57,12 mm)
Clearance Fit of Hub in Bush	0.001/0.004 in (0,03/0,10 mm)
Width of Gear	1.005/1.007 in (25,53/25,58 mm)
Bearing Length of Hub	1.019/1.028 in (25,88/26,11 mm)
Idler Gear End Float	0.012/0.023 in (0,30/0,58 mm)
Max. Permissible Worn Idler Gear End Float	0.030 in (0,76 mm)

Crankshaft/Camshaft Idler Gear and Hub (Alternative Drive — V8.510 and Earlier V8.540 Engines)

No. of Teeth	49
Parent Bore Dia. for Bushes	2.5625/2.5637 in (65,09/65,12 mm)
Outside Dia. of Bushes	2.5655/2.5662 in (65,16/65,18 mm)
Interference Fit of Bushes in Gear	0.0018/0.0037 in (0,05/0,09 mm)
Inside Dia. of Bushes, Finished in Situ	2.2502/2.2520 in (57,16/57,20 mm)
Outside Dia. of Hub	2.2483/2.2490 in (57,11/57,12 mm)
Clearance Fit of Bushes on Hub	0.0012/0.0037 in (0,03/0,09 mm)
Width of Gear Assembly, Bushes Machined After Fitting	1.008/1.010 in (25,60/25,65 mm)
Bearing Length of Hub	1.019/1.028 in (25,88/26,11 mm)
Idler Gear End Float	0.009/0.020 in (0,23/0,51 mm)
Max. Permissible Worn Idler Gear End Float	0.030 in (0,76 mm)

Crankshaft/Camshaft Idler Gear and Hub (TV8.540 and Later V8.540 Engines)

No. of Teeth	49
Parent Bore Dia. for Bush	2.4375/2.4387 in (61,91/61,94 mm)
Interference Fit of Bush in Gear	0.0026/0.0057 in (0,07/0,14 mm)
Inside Dia. of Bush — Fitted	2.2500/2.2522 in (57,15/57,21 mm)
Outside Dia. of Hub	2.2483/2490 in (57,11/57,12 mm)
Clearance Fit of Bush on Hub	0.0010/0.0039 in (0,03/0,10 mm)
Bearing Width of Gear	0.912/0.9135 in (23,16/23,20 mm)
Thrust Washer Thickness	0.110/0.115 in (2,79/2,92 mm)
Idler Gear End Float	0.0215/0.0250 in (0,55/0,64 mm)
Max. Permissible Worn Idler Gear End Float	0,035 in ((0,89 mm)

Camshaft/Fuel Pump Idler Gear and Hub (Alternative Drive — V8.510 Engines)

No. of Teeth	32
Parent Bore Dia. for Bush	2.3125/2.3143 in (58,74/58,78 mm)
Outside Dia. of Bush	2.3168/2.3188 in (58,85/58,90 mm)
Interference Fit of Bush in Gear	0.0025/0.0063 in (0,06/0,16 mm)
Inside Dia. of Bush, Fitted	2.125/2.1278 in (53,98/54,05 mm)
Outside Dia. of Hub	2.123/2.1238 in (53,92/53,94 mm)
Clearance Fit of Bush on Hub	0.0012/0.0048 in (0,03/0,12 mm)
Idler Gear End Float	0.014/0.020 in (0,36/0,51 mm)
Max. Permissible Worn End Float	0.030 in (0,76 mm)

Camshaft/Fuel Pump Idler Gear and Hub (Alternative Drive — V8.540 Engines)

No. of Teeth	40
Parent Bore Dia. for Bush	2.4375/2.4387 in (61,91/61,94 mm)
Interference Fit of Bush in Gear	0.0026/0.0057 in (0,07/0,14 mm)
Inside Dia. of Bush — Fitted	2.2500/2.2522 in (57,15/57,21 mm)
Outside Dia. of Hub	2.2483/2.2490 in (57,11/57,12 mm)
Clearance Fit of Bush on Hub	0.0010/0.0039 in (0,03/0,10 mm)
Bearing Width of Gear	0.9120/0.9135 in (23,16/23,20 mm)
Thrust Washer Thickness	0.110/0.115 in (2,79/2,92 mm)
Idler Gear End Float	0.0215/0.0250 in (0,55/0,64 mm)
Max. Permissible Worn Idler Gear End Float	0.035 in (0,89 mm)

Compressor/Auxiliary Drive Gear (Standard Drive)

No. of Teeth	36
Inside Locating Diameter	1.375/1.376 in (34,93/34,95 mm)
Outside Diameter of Shaft Spigot	1.375/1.3755 in (34,93/34,94 mm)
Transition Fit of Gear on Shaft	—0.0005/+0.001 in (—0,013/+0,025 mm)

Fuel Pump Drive Gear (Standard Drive)

No. of Teeth	24
Inside Locating Diameter	0.750/0.751 in (19,05/19,07 mm)
Shaft Spigot Diameter	0.750/0.7505 in (19,05/19,06 mm)
Transition Fit of Gear on Shaft	—0.0005/+0.001 in (—0,013/+0,025 mm)

Fuel Pump Gear (Standard Drive)

No. of Teeth	36
Inside Locating Diameter	2.0625/2.0635 in (52,39/52,41 mm)
Outside Diameter of Mounting Flange	2.0615/2.062 in (52,36/52,37 mm)
Clearance Fit of Gear on Flange	0.0005/0.002 in (0,01/0,06 mm)

Fuel Pump Drive Gear (Alternative Drive — CAV In-Line Pump)

No. of Teeth	54
Inside Locating Dia.	1.9687/1.9703 in (50,01/50,05 mm)
Shaft Spigot Dia.	1.9674/1.9684 in (49,97/50,00 mm)
Clearance Fit of Gear on Shaft	0.0003/0.0029 in (0,008/0,07 mm)

Fuel Pump Drive Gear (DP15 Pump)

No. of Teeth	54
Inside Locating Dia.	0.625/0.626 in (15,88/15,90 mm)
Shaft Spigot Dia.	0.6240/0.6247 in (15,85/15,87 mm)
Clearance Fit of Gear on Shaft	0.0003/0.0020 in (0,01/0,05 mm)

Fuel Pump Drive Gear (Bosch In-Line Pump)

No. of Teeth	54
Inside Locating Diameter	1.4961/1.4970 in (38,00/38,03 mm)
Shaft Spigot Diameter	1.4951/1.4957 in (37,98/37,99 mm)
Clearance fit of Gear on Shaft	0.0004/0.0019 in (0,01/0,05 mm)

Timing Gear Backlash

All Gears	0.003 in (0,08 mm) minimum

Fuel Pump Drive Housing and Shaft (Alternative Drive — In Line Pump)

Parent Bore Dia. for Front Bush	2.500/2.5018 in (63,50/63,55 mm)
Outside Dia. of Front Bush	2.5043/2.5063 in (63,61/63,66 mm)
Parent Bore Dia. for Rear Bush	2.5625/2.5643 in (65,09/65,13 mm)
Outside Dia. of Rear Bush	2.5668/2.5688 in (65,20/65,25 mm)
Interference Fit of Bushes in Housing	0.0025/0.0063 in (0,06/0,16 mm)
Inside Dia. of Front Bush, Finished in Situ	2.3125/2.3143 in (58,74/58,78 mm)
Front Journal Dia. of Shaft	2.3082/2.310 in (58,63/58,67 mm)
Min. Permissible Worn Journal Dia.	2.3072 in (58,60 mm)
Inside Dia. of Rear Bush, Finished in Situ	2.375/2.3768 in (60,33/60,37 mm)
Rear Journal Dia. of Shaft	2.3707/2.3725 in (60,22/60,26 mm)
Min. Permissible Worn Journal Dia.	2.3697 in (60,19 mm)
Running Clearance of Shaft in Bushes	0.0025/0.0061 in (0,06/0,15 mm)
Drive Shaft Thrust Plate Thickness	0.185/0.187 in (4,70/4,75 mm)
Drive Shaft End Float	0.004/0.014 in (0,10/0,36 mm)
Max. Permissible Worn End Float	0.020 in (0,51 mm)

Fuel Pump Drive Housing and Shaft (DP15 Pump)

Parent Bore Dia. for Bush	2.5625/2.5643 in (65,09/65,13 mm)
Interference Fit of Bush in Housing	0.0025/0.0063 in (0,06/0,16 mm)
Inside Dia. of Bush —Finished in Situ	2.3750/2.3768 in (60,33/60,37 mm)
Journal Dia. of Shaft	2.3722/2.3735 in (60,25/60,29 mm)
Running Clearance of Shaft in Bush	0.0015/0.0046 in (0,04/0,12 mm)
Drive Shaft Thrust Plate Thickness	0.185/0,187 in (4,70/4,75 mm)
Drive Shaft End Float	0.006/0.010 in (0,15/0,25 mm)

Crankshaft/Oil Pump Idler Gear and Hub

No. of Teeth	33
Parent Bore Diameter for Bush	2.188/2.189 in (55,56/55,59 mm)
Outside Diameter of Bush	2.191/2.193 in (55,66/55,71 mm)
Interference Fit of Bush in Gear	0.002/0.005 in (0,05/0,13 mm)
Inside Diameter of Bush — Fitted	2.000/2.002 in (50,80/50,86 mm)
Outside Diameter of Hub	1.998/1.999 in (50,75/50,77 mm)
Clearance Fit of Hub Inside Bush	0.001/0.004 in (0,03/0,10 mm)
Width of Gear	0.880/0.882 in (22,35/22,40 mm)
Bearing Length of Hub	0.897/0.902 in (22,78/22,91 mm)
Idler Gear End Float	0.015/0.022 in (0,38/0,56 mm)
Max. Permissible Worn Idler Gear End Float	0.030 in (0,76 mm)

Lubricating Oil Pump Drive Gear (Keyed)

No. of Teeth	24
Bore Diameter for Drive Shaft	0.622/0.6228 in (15,80/15,82 mm)
Drive Shaft Diameter	0.623/0.6235 in (15,82/15,84 mm)
Interference Fit of Gear on Shaft	0.0002/0.0015 in (0,005/0,04 mm)

Lubricating Oil Pump Drive Gear (Non Keyed)

No. of Teeth	24
Bore Diameter for Drive Shaft	0.7476/0.7484 in (18,99/19,01 mm)
Drive Shaft Diameter	0.749/0.7495 in (19,02/19,04 mm)
Interference Fit of Gear on Shaft	0.0006/0.0019 in (0,02/0,05 mm)

Lubricating Oil Pump

Type	Gear
No. of Drive Gears	1
No. of Driven Gears	2
Internal Diameter of Drive Shaft Bush — Small	0.6245/0.626 in (15,86/15,89 mm)
Drive Shaft Diameter — Small	0.623/0.6235 in (15,82/15,84 mm)
Running Clearance of Drive Shaft in Small Bush	0.001/0.003 in (0,03/0,08 mm)
Internal Diameter of Drive Shaft Bush — Large	0.7505/0.752 in (19,06/19,10 mm)
Drive Shaft Diameter — Large	0.749/0.7495 in (19,02/19,04 mm)
Running Clearance of Drive Shaft in Large Bush	0.001/0.003 in (0,03/0,08 mm)
Driven Shaft Diameter	0.686/0.6865 in (17,42/17,44 mm)
Internal Diameter of Driven Gear Bush	0.6875/0.6885 in (17,46/17,49 mm)
Running Clearance of Driven Gear Bushes on Driven Gear Shaft	0.001/0.0025 in (0,03/0,06 mm)

Lubricating Oil Pump — continued

Radial Clearance between Gears and Pump Body	0.002/0.008 in (0,05/0,20 mm)
Max. Permissible Worn Radial Clearance	0.010 in (0,25 mm)
End Float of Oil Pump Gears	0.002/0.006 in (0,05/0,15 mm)
Max. Permissible Worn End Float of Gears	0.010 in (0,25 mm)
Drive Gear to Driven Gear Backlash (9 tooth pump)	0.014/0.018 in (0,36/0,46 mm)
Drive Gear to Driven Gear Backlash (10 tooth pump)	0.024/0.039 in (0,61/0,99 mm)

Oil Pressure Relief Valve (Earlier Types)

Pressure Setting	60/65 lbf/in² (414/448 kN/m²) 4,2/4,6 kgf/cm²
Outside Diameter of Plunger	0.872/0.874 in (22,15/22,20 mm)
Bore Diameter of Valve Housing	0.875/0.876 in (22,23/22,25 mm)
Clearance of Plunger in Bore	0.001/0.004 in (0,03/0,10 mm)
Outside Diameter of Spring	0.783/0.798 in (19,89/20,27 mm)
Load at 2.605 in (66,17 mm) Spring Length	27.5 lbf ± 13 ozf (12,47 kgf ± 369 kgf)

Oil Pressure Relief Valve (Latest Type)

Pressure Setting	57/64 lbf/in²(393/441 kN/m²) 4,0/4,5 kgf/cm²
Outside Diameter of Plunger	0.903/0.905 in (22,94/22,99 mm)
Bore Diameter of Valve Housing	0.906/0.907 in (23,01/23,04 mm)
Clearance of Plunger in Bore	0.001/0.004 in (0,03/0,10 mm)
Outside Diameter of Spring	0.785/0.800 in (19,94/20,32 mm)
Load at 1.93 in (49,0 mm) Spring Length	37.44/30.76 lbf (16,98/18,04 kgf)

Piston Cooling Oil Control Valve

Pressure Setting	40 lbf/in² (276 kN/m²) 2,81 kgf/cm²
Plunger Dia.	0.3978/0.3988 in (10,10/10,13 mm)
Bore Dia. of Valve Housing	0.400/0.401 in (10,16/10,19 mm)
Clearance of Plunger in Bore	0.0012/0.0032 in (0,03/0,08 mm)
Load at 1.47 in (37,34 mm) Spring Length	4.58/4.88 lbf (20/22 N) 2,1/2,2 kgf

Lubricating Oil Sump

Capacity (Standard Vehicle Engines)	27 Imperial Pints (15,3 litres)

Lubricating Oil Filter

Type	Full Flow
Element Type	Paper or Renewable Canister
By-Pass Valve Setting	13/17 lbf/in² (89/117 kN/m²) 0,91/1,19 kgf/cm²

Oil Cooler

Make	Clayton Dewandre or Serck
By-Pass Valve Setting (Clayton Dewandre)	15/20 lbf/in² (103/138 kN/m²) 1,05/1,41 kgf/cm²
Leak Test Air Pressure — Oil Side	90/150 lbf/in² (620/1030 kN/m²) 6,33/10,55 kgf/cm² depending upon maximum air line pressure available.
Leak Test Air Pressure — Water Side	30 lbf/in² (207 kN/m²) 2,11 kgf/cm²

Cooling System

Type	Water Pump Circulation
Engine Water Capacity	40 Imperial Pints (22,7 litres)

Thermostats (Standard)

Type	Wax
Opening Temperature (V8.540)	177/183°F (80,5/84,9°C)
Opening Temperature (V8.510)	157/163°F (69,4/72,8°C)
Fully Open Temperature (V8.540)	208°F (97,7°C)
Fully Open Temperature (V8.510)	188°F (86,7°C)
Valve Lift	0.350 in (8.89 mm)

Thermostats (By-Pass Blanking)

Type	Wax Capsule
Opening Temperature	171/185°F (77/85°C)
Fully Open Temperature	198/208°F (92/98°C)
Valve Travel	0.358 in (9,1 mm) minimum

Water Pump — One-Piece Shaft

Type	Centrifugal
Outside Diameter of Shaft for Pulley	1.125/1.1255 in (28,58/28,59 mm)
Inside Diameter of Pulley Bore	1.125/1.126 in (28,58/28,60 mm)
Transition Fit of Pulley on Shaft	—0.0005/+0.001 in (—0,01/+0,03 mm)
Outside Diameter of Shaft for Impeller	0.626/0.6265 in (15,90/15,91 mm)
Inside Diameter of Impeller Bore	0.625/0.6255 in (15,88/15,89 mm)
Interference Fit of Impeller on Shaft	0.0005/0.0015 in (0,01/0,04 mm)
Impeller Protrusion above Water Pump Body Rear Face	0.021/0.026 in (0,53/0,66 mm)

Water Pump — Two-Piece Shaft

Type	Centrifugal
Outside Diameter of Main Shaft for Pulley	1.1242/1.1247 in (28,55/28,57 mm)
Diameter of Pulley Bore	1.1250/1.1258 in (28,58/28,60 mm)
Clearance Fit of Pulley on Shaft	0.0003/0.0016 in (0,01/0,04 mm)
Inside Diameter of Main Shaft	0.6250/0.6257 in (15,88/15,89 mm)
Diameter of Impeller Bore	0.6250/0.6257 in (15,88/15,89 mm)
Outside Diameter of Impeller Shaft	0.6260/0.6263 in (15,90/15,91 mm)
Interference Fit of Impeller Shaft in Main Shaft and Impeller	0.0003/0.0013 in (0,01/0,03 mm)
Impeller Protrusion above Water Pump Body Rear Face	0.015/0.020 in (0,38/0,51 mm)

Compressor

Make	Clayton Dewandre
Type	SC 12
Rating	12 ft³/min (0,34 m³/min) at 1250 rev/min
Cylinder Bore Diameter	3.3465/3.3475 in (85,00/85,026 mm)
Max. Permissible Worn Bore Diameter	3.3525 in (85,15 mm)
Clearance of Piston Skirt in Bore	0.0075/0.009 in (0,19/0,23 mm)
Clearance of Compression Rings in Piston Grooves	0.0013/0.0033 in (0,033/0,084 mm)
Clearance of Scraper Ring in Piston Groove	0.0005/0.0025 in (0,013/0,064 mm)
Compression Ring Gap in Cylinder	0.003/0.007 in (0,08/0,18 mm)
Scraper Ring Gap in Cylinder	0.010/0.015 in (0,25/0,38 mm)
Crankpin Diameter	1.2490/1.2495 in (31,725/31,737 mm)
Big End Bearing Running Clearance	0.0005/0.002 in (0,013/0,051 mm)
Max. Permissible Worn Big End Bearing Running Clearance	0.003 in (0,08 mm)
Main Journal Diameter	1.3740/1.3745 in (34,90/34,912 mm)
Main Bearing Running Clearance	0.0005/0.002 in (0,013/0,051 mm)
Max. Permissible Worn Main Bearing Running Clearance	0.003 in (0,08 mm)
Crankshaft End Float	0.001/0.011 (0,03/0,28 mm)

Fuel Lift Pump (For CAV In-Line Fuel Injection Pump)

Type	A.C. Delco V P. Series
Method of Drive	Eccentric on Fuel Injection Pump Shaft
Static Pressure (No Delivery)	
Green Spring	2.75/4.25 lbf/in² (19/29 kN/m²) 0,19/0,30 kgf/cm²
Blue Spring	5.0/8.0 lbf/in² (34/55 kN/m²) 0,35/0,56 kgf/cm²

Fuel Lift Pump (For DP15 Fuel Injection Pump)

Type	AC Delco 'Z' Type
Method of Drive	Eccentric on Fuel Pump Drive Shaft
Stall Pressure	26/36 lbf/in² (179/248 kN/m²) 1,83/2,53 kgf/cm²
Operating Pressure	10 lbf/in² (69 kN/m²) 0,7 kgf/cm²

Fuel Lift Pump Operating Rod ('Z' Type Pump)

Diameter	0.4362/0.4367 in (11,08/11,09 mm)
Length	1.249/1.251 in (31,72/31,78 mm)

Fuel Lift Pump (For Bosch In-Line Fuel Injection Pump)

Type	Plunger — mounted on side of fuel pump
Method of Drive	Eccentric on fuel injection pump camshaft
Operating Pressure	22 lbf/in² (1,5 kgf/cm²) 152 kN/m²— controlled by spring loaded valve.

Fuel Filter

Element Type ... ... Paper

In-Line Fuel Injection Pump

Make ... ... CAV or Bosch
Type ... ... Minimec or MW
Pump Rotation ... ... Clockwise (from drive end)

Spill Timing Position for CAV In-Line Pump

The Spill Timing Position can be ascertained by reference to the service setting code stamped on the data plate attached to the top right hand side of the fuel injection pump.

Service Setting Code			Spill Timing Position B.T.D.C.	Equivalent Piston Position B.T.D.C.
V8.510 and AV8.510 Engines				
LB60/800/11/2700	LB60/800/32/2160	LB63/800/32/2200	26°	0.284 in (7,21 mm)
LB60/800/11/2800	LB60/800/32/2200	LB63/800/32/2390		
LB60/800/11/3130	LB60/800/32/2260	MB60/800/B02/1800		
LB60/800/22/2100	LB60/800/32/2390	MB60/800/B02/1880		
LB60/800/22/2350	LB60/800/32/2430	MB60/800/C02/1560		
LB60/800/22/2430	LB60/800/22/2350	MB63/800/C02/1560		
LB60/800/22/2520	LB60/800/22/2520	MB63/800/C02/1575		
V8.510 and AV8.510 Engines				
LB51-53/800/11A/2700	LB60/800/11A/2735	LB63/800/11A/2735	28°	0.325 in (8,26 mm)
LB54/800/11A/2240	LB60/800/11A/2800	LB63/800/11A/2800		
LB54/800/11A/2800	LB60/800/11A/3130	LB63/800/11A/2900		
LB54/800/11A/2910	LB61/800/11A/2910	LB63/800/11A/3130		
LB60/800/11/2420	LB61/800/11A/2930	MB63/800/B02/2520		
LB60/800/11/2520	LB61/800/11A/3130	SB63/800/11A/2800		
LB60/800/11/2600	LB63/800/11/2520	SB63/800/11A/3130		
LB60/800/11A/2510	LB63/800/11/2600	SB64/800/11A/3130		
LB60/800/11A/2620	LB63/800/11A/2620	VB64/800/44A/2800		
AV8.510 Engines			30°	0.373 in (9,47 mm)
LB82/800/22/2480	LB82/800/22/2550			
V.8540 and AV8.540 Engines				
MB71/800/A02/1800	RB71/800/41A/2330	RB72/800/41A/2380	26°	0.300 in (7,62 mm)
MB71/800/A02/1880	RB71/800/41A/2350	RB72/800/41A/2530		
MB71/800/C02/1560	RB71/800/41A/2390	2642A210MB/C02/1575		
MB71/800/C02/1575	RB71/800/41A/2480	2642A211MB/A02/1890		
RB69/800/41A/2350	RB71/800/41A/2500	2642A215RB/41A/2500		
RB69/800/41A/2530	RB71/800/41A/2530	2642A215RB/41A/2530		
RB69/800/44A/2830	RB71/800/41A/2560	2642A228RB/41A/2330		
V8.540 and AV8.540 Engines				
LB71/800/12/2500	RB70/800/44A/2910	RB71/800/44A/2850*	28°	0.350 in (8,89 mm)
LB71/800/22/2500	RB71/800/41A/2550	2642A213MB/D01/2360		
MB71/800/D01/2340	RB71/800/41A/2660	2642A213MB/D01/2420		
MB71/800/D01/2360	RB71/800/41A/2680	2642A213MB/D01/2520		
MB71/800/D01/2380	RB71/800/41A/2730	2642A214RB/44A/2770		
MB71/800/D01/2400	RB71/800/44A/2630	2642A215RB/41A/2550		
MB71/800/D01/2420	RB71/800/44A/2770	2642A215RB/41A/2660		
MB71/800/D01/2520	RB71/800/44A/2830	2642A223MB/E01/2720		
MB71/800/E01/2720				
V8.540 Engines			29°	0.375 in (9,53 mm)
LG68E/800/44A/2960	RB71/800/44A/2960	2642A214RB/44A/2850		
RB71/800/44A/2850**	YB68E/800/44A/2960	2642A230LG/44A/2960		
RB71/800/44A/2910	2642A209RB/44A/2960			
V8.540 and AV8.540 Engines			31°	0.427 in (10,85mm)
PB73L/900/D01/2440	PB81E/1100/D01/2610	PB81E/1100/E01/2740		
PB81E/1100/D01/2520	PB81E/1100/D01/2620	2642A243PB/D01/2520		
PB81E/1100/D01/2600	PB81E/1100/E01/2650	2642A243PB/D01/2600		

*Non-Vehicle
**Vehicle