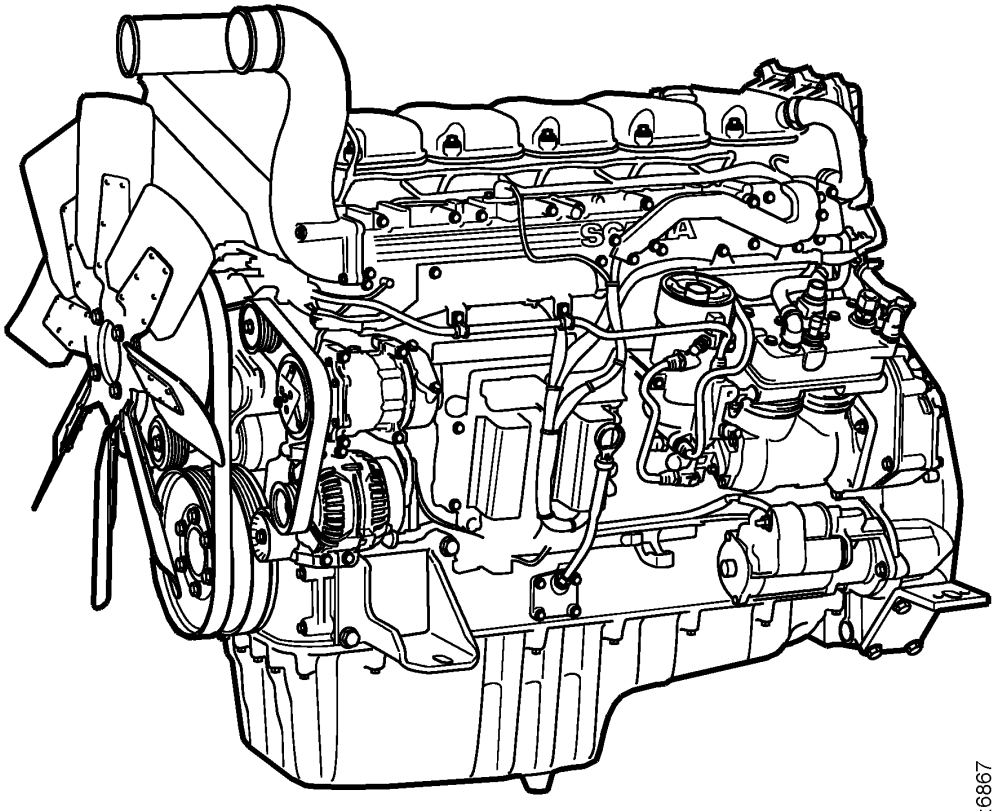
01:07-02

Edition 1 **en**

SCANIA
Scania Engines

Work description-
9 litre engine with 5 cylinders

Industrial Engine



1:6867

Part No.
1 715 049

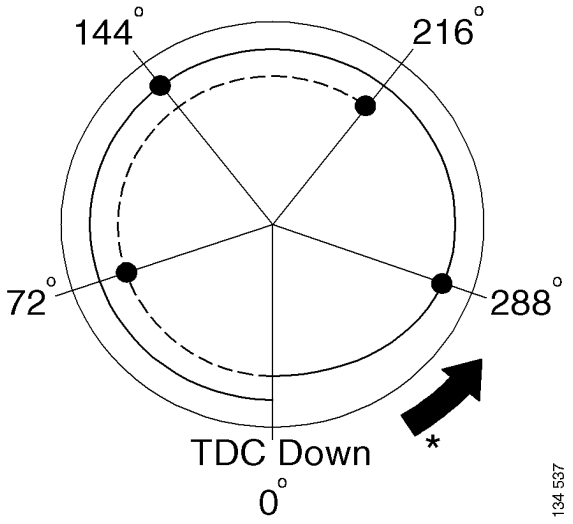
Order of adjustment

In order for the adjusting to be carried out on the correct revolution, proceed as follows:

1. Rotate the flywheel so that the 72° mark on the flywheel can be seen in the **lower** window of the flywheel housing whilst valve overlap occurs on cylinder 5.
2. Then turn the flywheel **clockwise** so that it passes TDC Down (0°) by about 20° and then turn it **anticlockwise** until TDC Down (0°) is visible in the **lower** window on the flywheel housing. The reason for turning past TDC down (0°) and then back is to counteract any backlash.

You are now on the first revolution and can adjust the valves and unit injectors according to the following table.

3. Rotate the flywheel **anti-clockwise** using tool 99 309 so that the mark on the flywheel is visible in the **lower** window of the flywheel housing.



Flywheel seen from the rear of the engine.

** Direction of rotation when adjusting.*

The solid line shows the order to take the angles on the first round and the broken line the order for round 2.

Revolution	Mark on flywheel (degrees)	Adjust unit injector rocker arm on cylinder	Adjust intake and exhaust valves on cylinder	Valve change on cylinder
1	TDC Down 0	2	1	
1	72			5
1	144	4	2	
1	216			3
1	288	5	4	
2	TDC Down 0			1
2	72 (432)	3	5	
2	144 (504)			2
2	216 (576)	1	3	
2	288 (648)			4

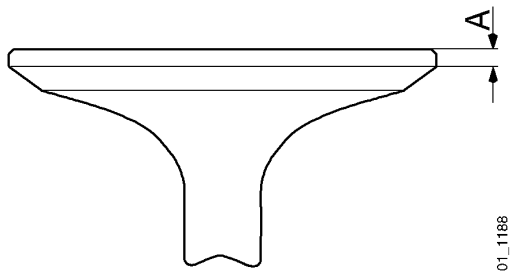
Checking and machining of valves

Specifications

Intake valve	
Head angle	19,5 °
Minimum dimension A for ground valve	2,6 mm

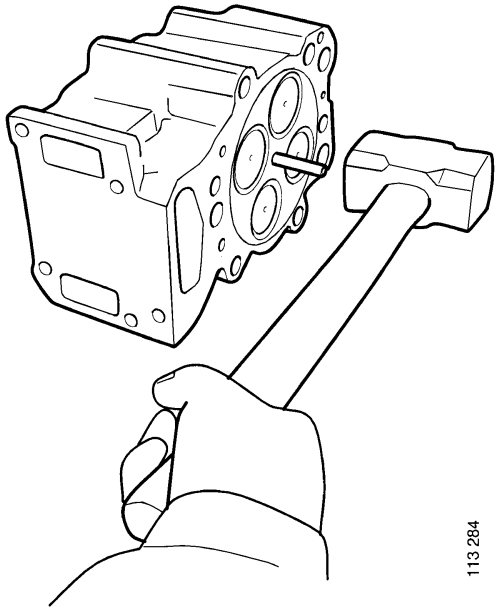
Exhaust valve	
Head angle	44,5 °
Minimum dimension A for ground valve	1,8 mm

- Check dimension A on all valves.
- Grind the valves in a valve grinding machine

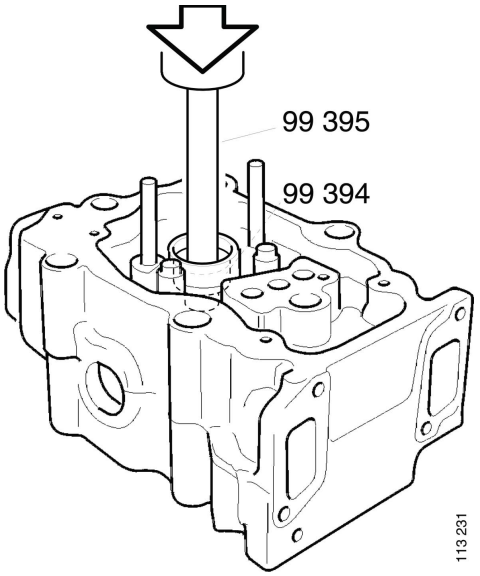


Minimum dimension A for ground valve, see table

2. Knock out the pilot tap and sleeve from underneath. Use a 100 mm long metal rod with diameter 9 mm.

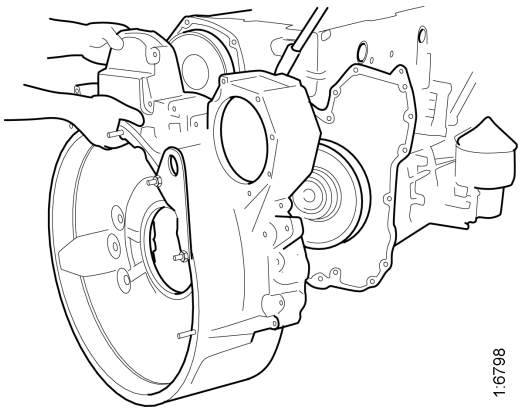


3. Degrease and check the contact surfaces of the sleeve and cylinder head. Smooth off any burrs and irregularities that may score the sleeve.
4. Degrease the new injector sleeve and apply a thin film of sealing agent 561 200 on the sleeve and cylinder head contact surfaces.
5. Press in the sleeve with drift 99 395 and guide 99 394.



Removal of flywheel housing

1. Remove the flywheel as described in *Removal of flywheel*.
2. Remove the starter motor.
3. Detach and remove any pumps in the power take-off location.
4. Remove the flywheel housing.



Fitting the flywheel housing

Specifications

Tightening torque

Screws for flywheel housing	M10 : 50 Nm M12 : 90 Nm

Sealing agent

Sealing agent for flywheel housing	816 064

Special tools

Number	Description	Illustration	Tool board
588 189	Air-operated gun	-	-
584 117	Adapter for cartridge	-	-
584 118	Nozzle	-	-

Renewing a piston

Specifications

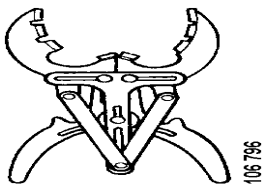
Piston rings	
Number of compression rings	2
Gap:	
1st ring	0,35 - 0,60 mm
2nd ring	0,45 - 0,65 mm
Maximum play in groove, 2nd ring	0,25 mm
Number of oil scraper rings	1
Gap	0,40 - 0,65 mm
Maximum play in groove	0,25 mm

Important ***Turn the rings marked "TOP" with the mark face up.***

Special tools

Number	Description	Illustration	Tool board
87 362	Drift		D3

Other tools

Number	Description	Illustration	Tool board
587 309	Piston ring expander		D3

Support bearing

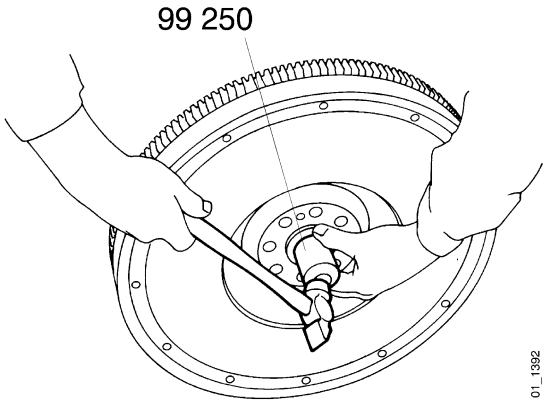
Renewal

Special tools

Number	Description	Illustration	Tool board
99 250	Drift		D3, C4

The following job operations on the flywheel are done with the flywheel removed.

1. Remove the retaining rings on both sides of the support bearing.
2. Knock out the support bearing from the flywheel using drift 99 250.
3. Fit the inner retaining ring and a new support bearing using drift 99 250.
4. Fit the outer retaining ring.

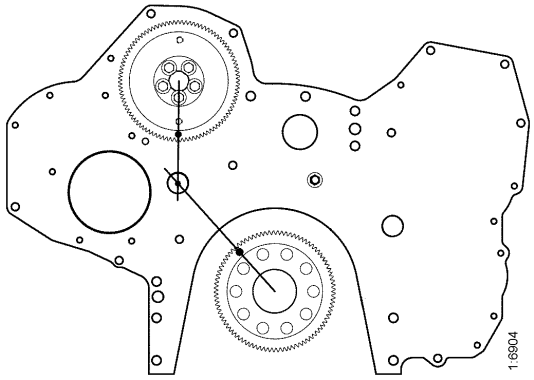


Fitting the intermediate gear

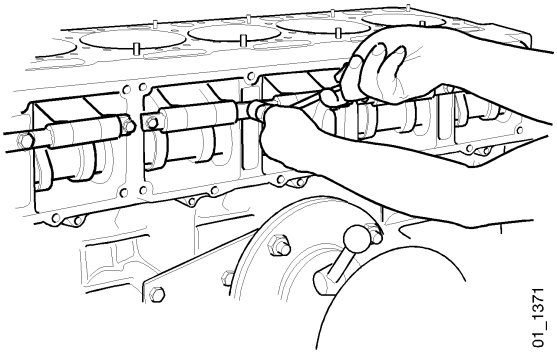
Tightening torque

Bolts for intermediate gear	50 Nm + 60°

1. Check that cylinder number 1 is close to TDC. The markings on the camshaft gear and crankshaft gear must point towards the centre of the intermediate gear.
2. Lubricate the bearing surfaces



1. Lubricate camshaft bearings with engine oil and fit the camshaft. Take care not to damage the cams and bearings.
2. Lubricate with engine oil and fit the valve tappets in the same places as they were before removal. Tighten the banjo bolts to 32 Nm.
3. Fit the camshaft covers. Tighten the bolts to 32 Nm.
4. Fit the guide flange bolts.



Now the camshaft axial clearance can be checked:

- Fit the camshaft gear temporarily.
- Measure the camshaft axial clearance using a dial gauge. The axial clearance should be between 0.05 - 0.35 mm.
- If the clearance is outside the permitted range, renew the thrust washer.
- Remove the camshaft gear.

Dismantling of the balance shaft unit can be facilitated by loosening the bearing cap screws before removing the balance shaft unit from the engine. The bearing cap screws must not be totally undone.

Removal

	Action	Remarks
1	Remove the oil sump.	
2	Remove the oil strainer.	
3	Remove the oil pump	
3	Remove the balance shaft unit.	There is no need to loosen the bearing cap screws if no work is to be carried out on the balance shaft unit. The balance shaft unit may get jammed on the guide pins. Tap lightly with a rubber mallet to release the balance shaft unit.

WARNING!

Remember that the balance shaft unit is heavy.

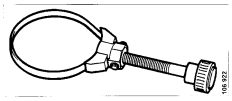
Dismantling

	Action	Remarks
1	Remove the bearing caps and bearings.	If the bearings will be reused, they must be refitted in the same place.
2	Remove the balance shafts.	Mark the balance shafts so that they can be refitted in their original positions.

Oil filter

Only use original Scania filters.

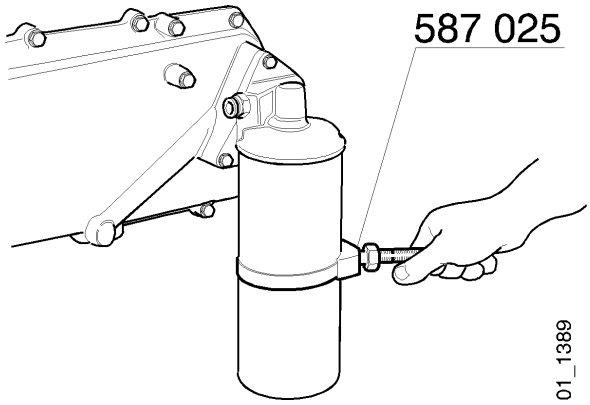
Tools

Number	Description	Illustration	Tool board
587 025	Filter wrench		M1

Only use original Scania filters and renew the oil filter according to our maintenance instructions.

Use filter wrench 587 025 when removing the oil filter.

Oil the gasket and tighten the new filter by hand.



Removing the oil filter

Important ***When renewing the oil filter the oil cleaner should be cleaned in accordance with instructions in page***

If the oil cleaner is not cleaned, the oil filter will quickly block up, increasing flow resistance in the filter. If this happens, an overflow valve in the filter retainer will open to let the oil bypass the filter without being cleaned.

The oil lubricates and cools such components as the turbocharger. The turbocharger's rotation speed is high, in some instances over 100,000 rpm. It is vital that the lubrication functions properly.

There is no separate turbo filter; the oil is cleaned by the engine oil filter. If the turbocharger receives contaminated oil, the bearings become severely worn.

Foreign bodies

Foreign bodies in the turbine or compressor, such as a grain of sand or metal shavings, will destroy the vanes. This will lead to imbalance and bearing wear.

The power output of the engine will decrease, and if the engine continues running the reduced air supply may cause the engine to overheat, resulting in damage. This type of overheating is not visible on the coolant temperature gauge.

Important ***Never attempt to straighten a damaged vane. It will break off when running and the turbocharger will break down completely, causing damage to the engine.***

Air and exhaust leaks

Even small leaks in the line between the air filter and the turbocharger will cause dirt to be deposited on the compressor wheel. The charge pressure will be reduced, resulting in increased exhaust temperature and smoke, which will reduce the service life of the engine.

Leaks in the exhaust line between the cylinder head and the turbocharger will also result in loss of charging pressure.

Measuring the charging pressure

The charge air pressure can be measured using ECOM.

Cleaning

Low charging pressure could be caused by a dirty compressor wheel. This applies especially on engines with closed crankcase ventilation.

- Remove the air filter and the connection hose
- Remove the compressor cover.
- Clean the compressor wheel with white spirit and a brush.
- Fit the compressor cover and measure the charge air pressure again.