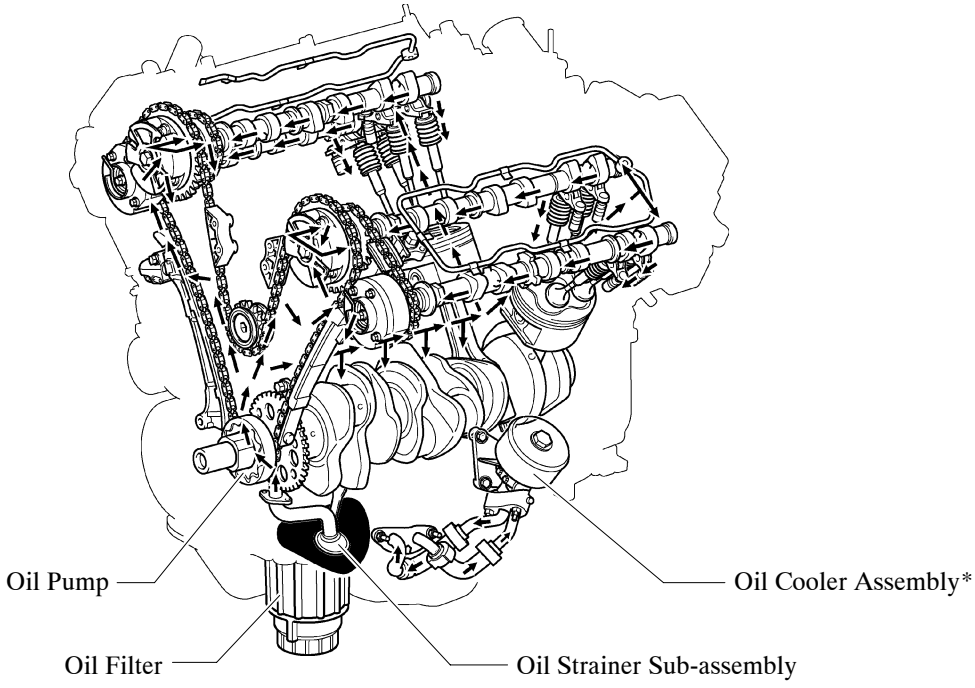
■LUBRICATION SYSTEM

1. General

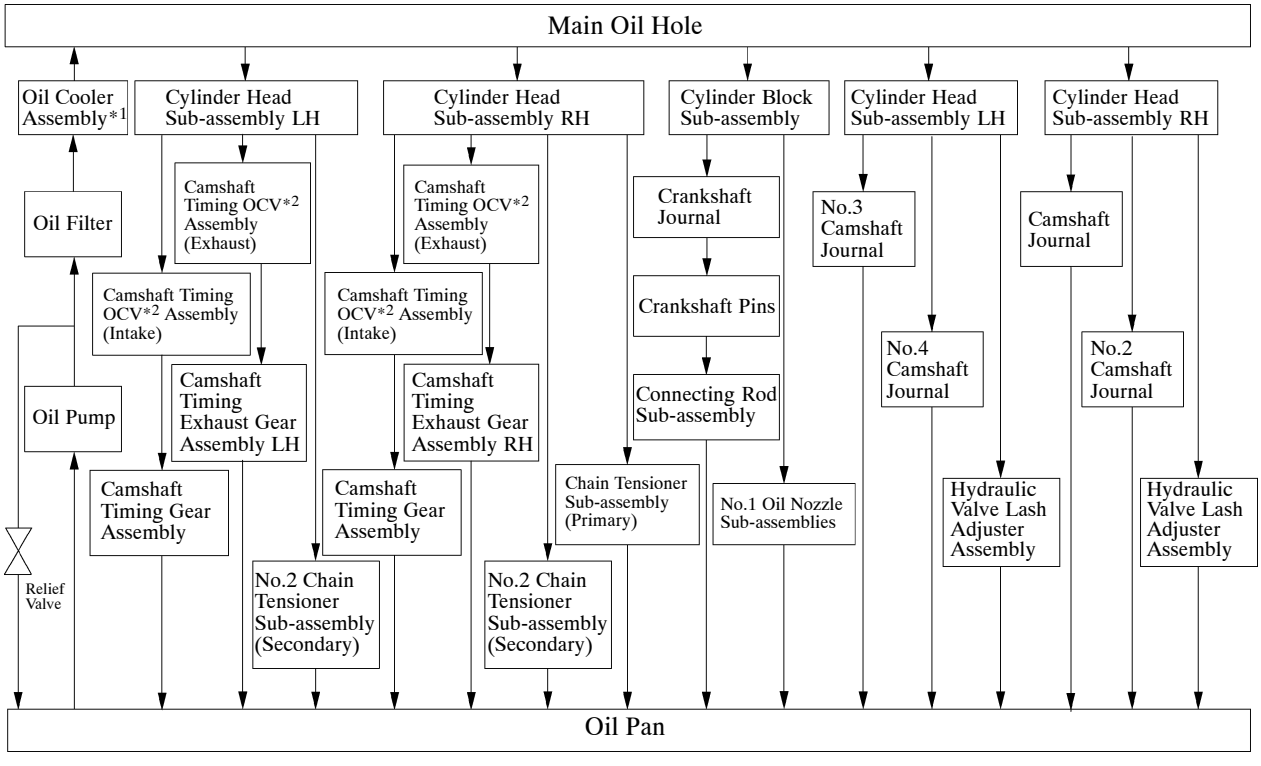
- The lubrication circuit is fully pressurized and all oil passes through an oil filter.
- A cycloid rotor type oil pump is used.



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*: Models for Australia Only

2. Oil Circuit

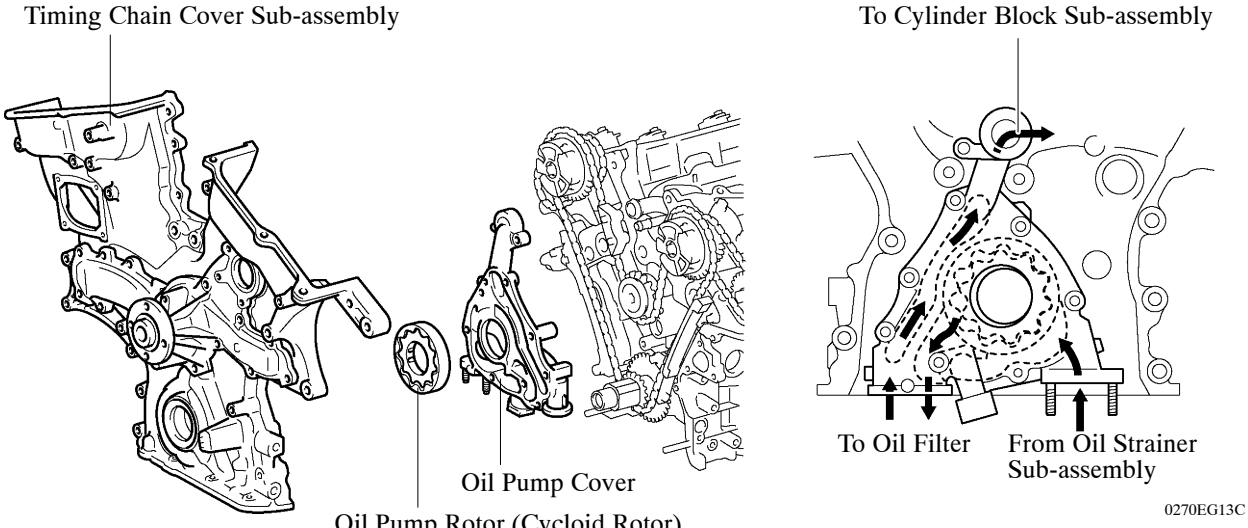


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*1: Models for Australia Only *2: OCV (Oil Control Valve)

3. Oil Pump

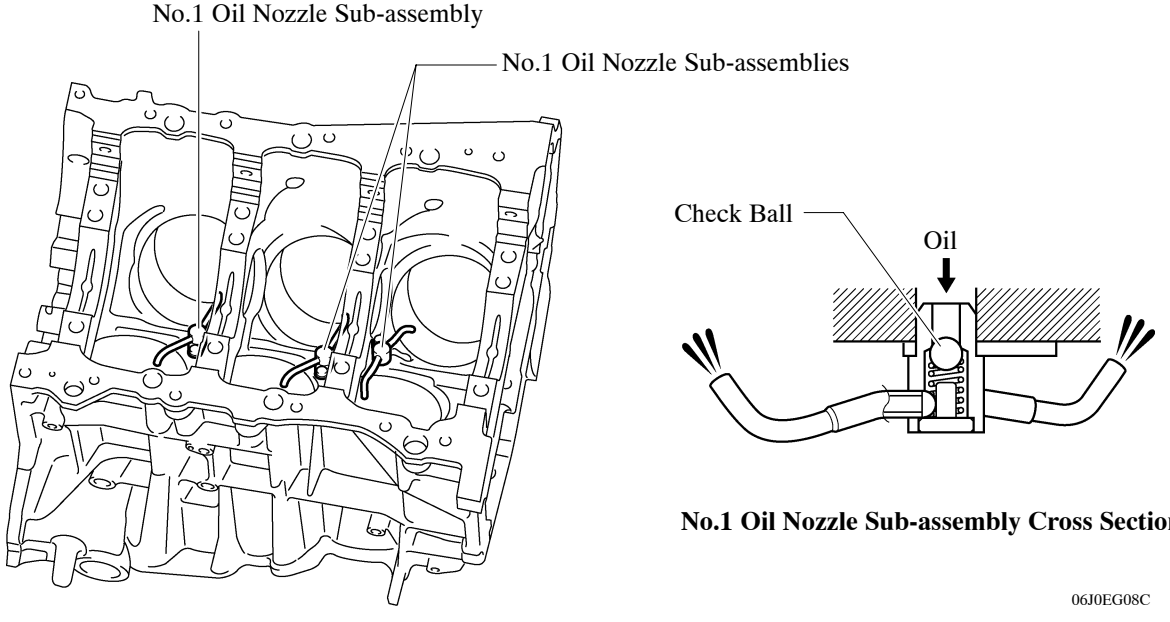
- A compact cycloid rotor type oil pump directly driven by the crankshaft is used.
- This oil pump uses an internal relief method which circulates relief oil to the suction passage in the oil pump. This aims to minimize oil level change in the oil pan, reduce friction, and reduce the air mixing rate in the oil.



Oil Passage in the oil pump

4. No.1 Oil Nozzle Sub-assembly

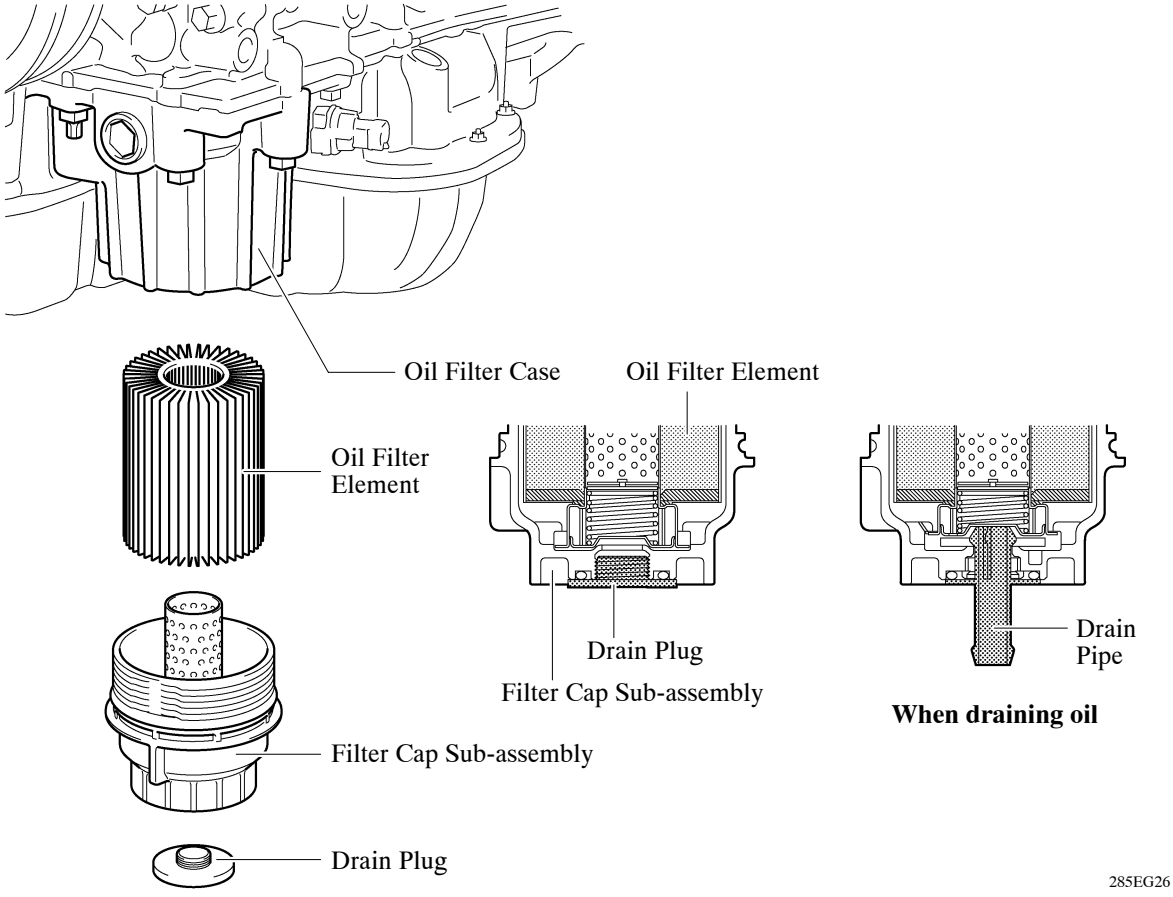
- No.1 oil nozzle sub-assemblies for cooling and lubricating the pistons are provided in the cylinder block sub-assembly, in the center of the right and left banks.
- These No.1 oil nozzle sub-assemblies contain a check valve to prevent oil from being fed when the oil pressure is low. This prevents the overall oil pressure in the engine from dropping.



No.1 Oil Nozzle Sub-assembly Cross Section

5. Oil Filter

- An oil filter with a replaceable oil filter element is used. The oil filter element uses a high-performance filter paper to improve filtration performance. It is also combustible for environmental protection.
- An aluminum alloy filter cap sub-assembly is used to extend its life.
- This oil filter has a structure which can allow the draining of the oil remaining in the oil filter. This prevents oil from spattering when replacing the oil filter element and allows the technician to work without touching hot oil.



Service Tip

- The oil in the oil filter can be drained by removing the drain plug and inserting the drain pipe supplied with the oil filter element into the oil filter. For details, refer to the HIGHLANDER Repair Manual (Pub. No. RM06K0E).
- The engine oil maintenance interval for a model that has an oil filter with a replaceable oil filter element is the same as that for a conventional model.