

GROUP 11C

**ENGINE  
MECHANICAL  
<4G69>**

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# GENERAL INFORMATION

The 4G69-SOHC-MIVEC engine employs the new Mitsubishi Innovative Valve timing & lifting Electronic Control system (MIVEC). The following are main design changes:

- The cylinder head is designed to reexamine the port profile and to improve the coolant flow.
- The rocker cover is designed to reduce noise by using aluminum die-casting.

- The cylinder block is designed to be lightweight.
- The piston diameter is larger and has molybdenum coating.
- The connecting rod is designed to be lightweight.
- The crankshaft is designed to be lightweight.
- The counter balancer shaft is designed to be lightweight.
- The crankshaft pulley hub is made aluminum.

M2112000100512

## MAJOR SPECIFICATIONS

Item	4G69-SOHC	
Total displacement mL	2,378	
Bore × Stroke mm	87.0 × 100.0	
Compression ratio	9.5	
Combustion chamber	Pentroof type	
Camshaft arrangement	SOHC	
Valve timing	Intake Open	10° BTDC <Low speed cam A>
		12° BTDC <Low speed cam B>
		24° BTDC <High speed cam>
	Intake Close	42° ABDC <Low speed cam A>
		44° ABDC <Low speed cam B>
		68° ABDC <High speed cam>
	Exhaust Open	58° BBDC
	Exhaust Close	18° ATDC
Maximum output kW(PS)/rpm	118(160)/5750	
Maximum torque N·m(kg·m)/rrpm	216(22.0)/4000	
Fuel system	Electronic-controlled multiport fuel injection	
Ignition system	Electronic-controlled 4-coil	

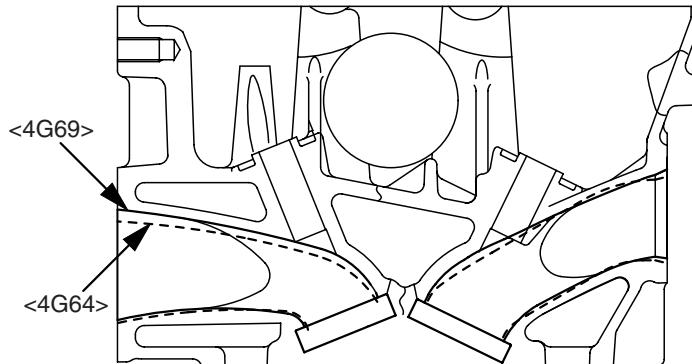
## BASE ENGINE

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## GENERAL DESCRIPTION

The following changes are applied based on the previous 4G64-SOHC engine.

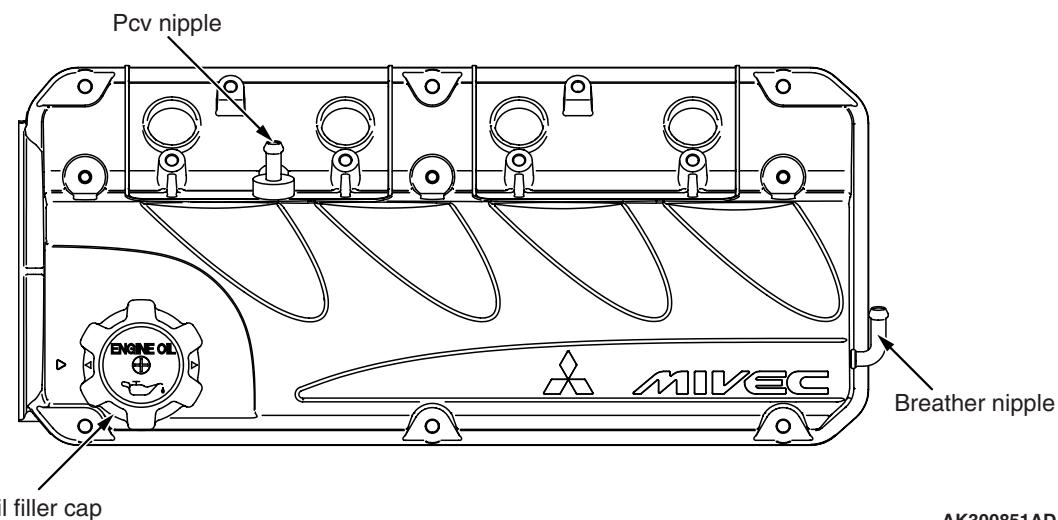
## CYLINDER HEAD



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The cylinder head optimizes the port profile with increasing the diameter of the intake and exhaust valve. The location of the breathing hole is changed to reduce the oil intake amount.

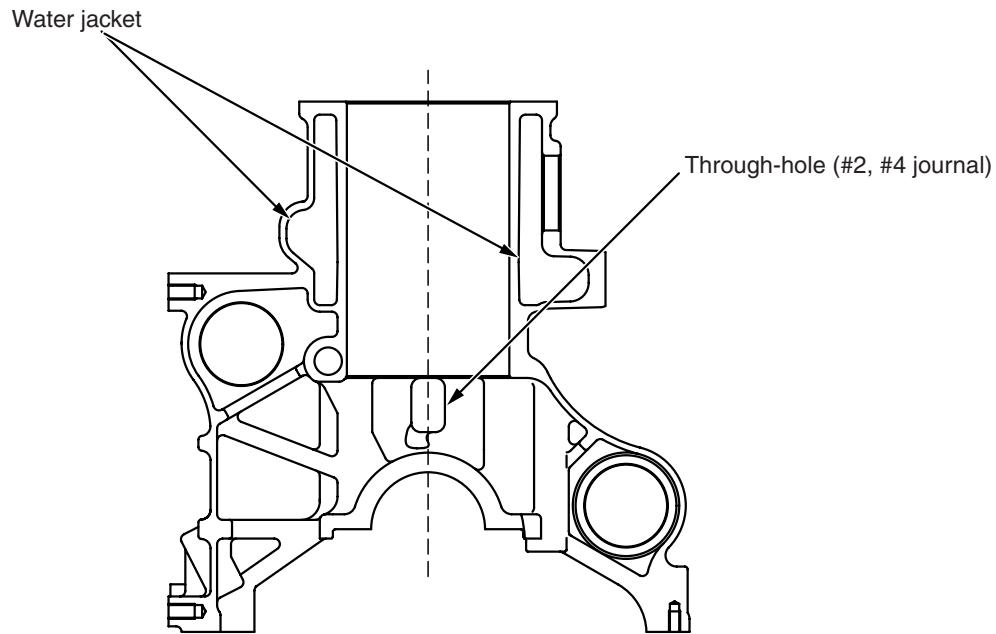
## ROCKER COVER



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The rocker cover is designed to reduce noise by using aluminium die-casting.

## CYLINDER BLOCK

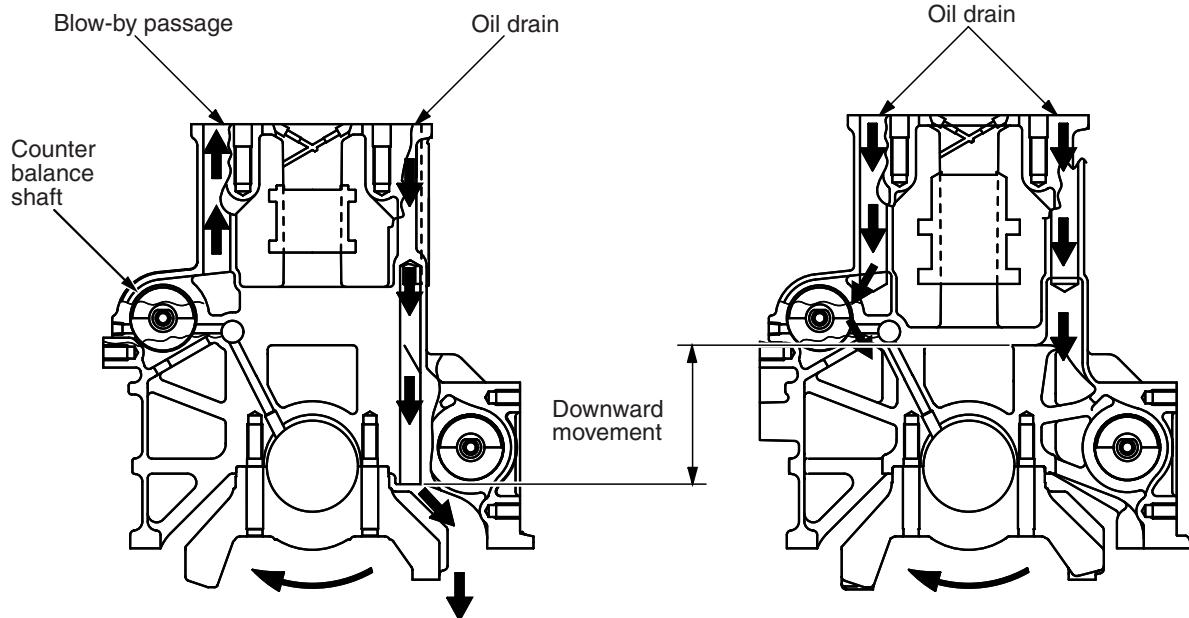


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To reduce the weight, the cylinder block height is reduced.

The water jacket is designed to improve fuel economy and to achieve quicker warm up of the engine by raising the bottom.

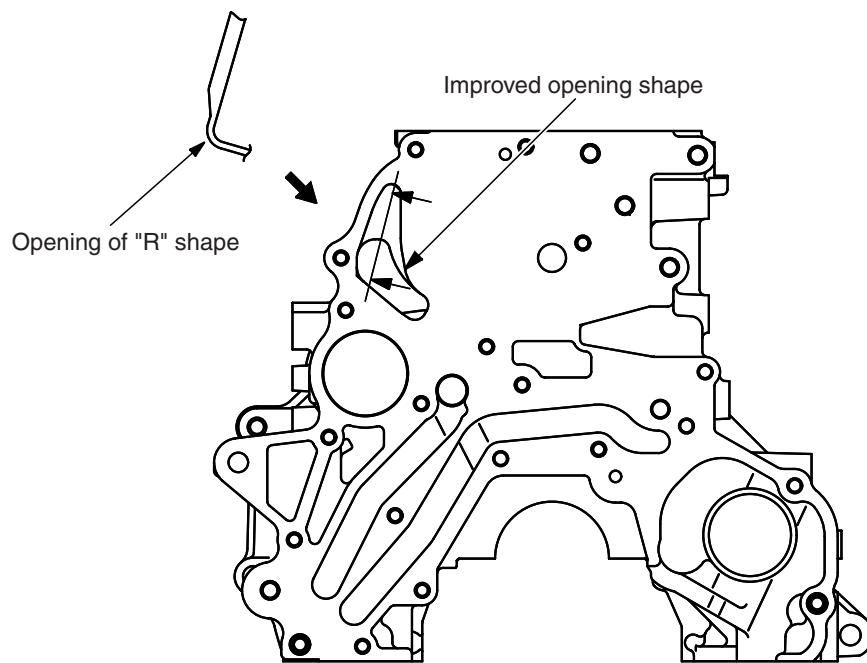
The through-hole is added on the bulkhead of the journal between No.1 and No.2 cylinders, also between No.3 and No.4 cylinders so that the pressure pulsation within the crankcase due to the piston vertical motion can be eliminated and friction can be reduced.



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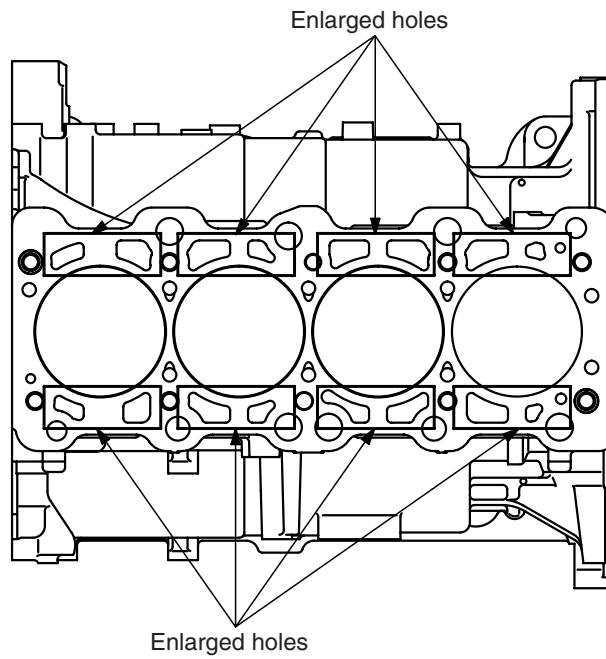
Oil dropping into the cylinder block from the cylinder head affects the crankshaft or the connecting rod and then produces rotational resistance. To prevent

this, the location of the oil drain hole and the profile of the passage are changed.



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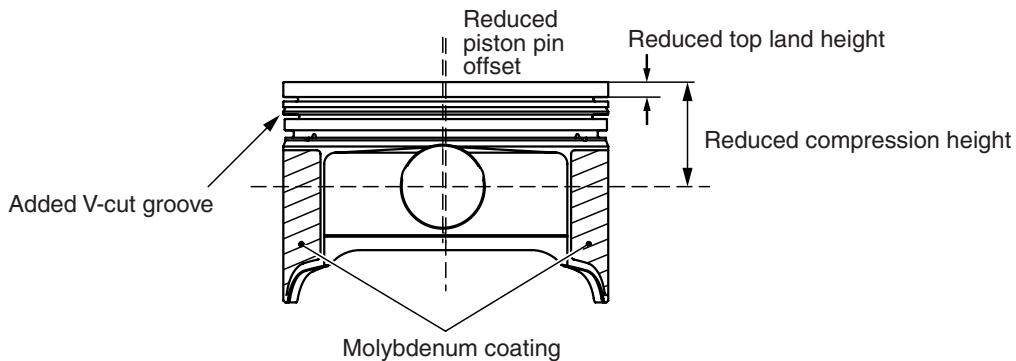
The inlet profile for the coolant fed from the water pump is modified to increase the amount of coolant being circulated.



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While maintaining the current deformation amount for the cylinder bore, expanding the profiles of the water holes on the cylinder block reduces residual sand within the water jacket.

## PISTON

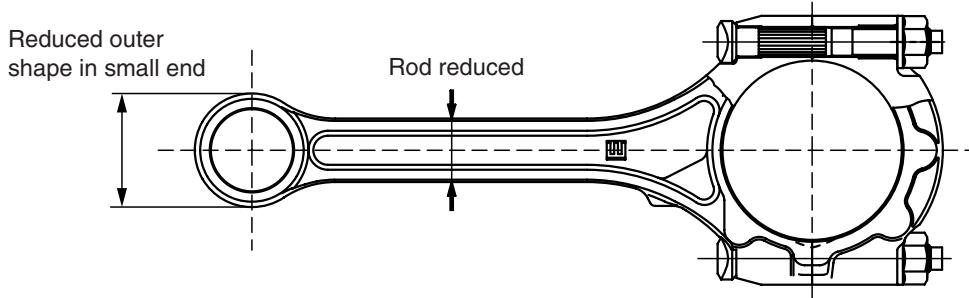


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The piston is designed to be lightweight by reducing the compression height and reducing the unburned gas less by reducing the top land height. Application of Molybdenum coating to the skirt reduces friction.

Addition of V-cut groove on the second land reduces oil consumption. The piston pin offset is changed to improve the knock control performance.

## CONNECTING ROD

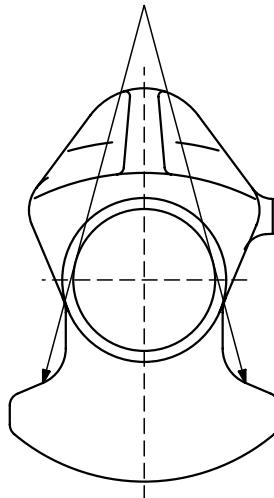


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The connecting rod is designed to be lightweight by changing the profiles of the small end and the connecting rod.

## CRANKSHAFT

Removed shoulder wall thickness

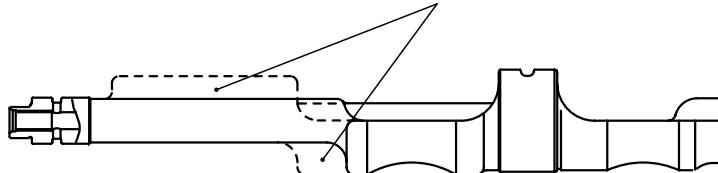


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The crankshaft is designed to be lightweight by changing the profile of the balance weight.

## BALANCER SHAFT

Reduced balancer masses

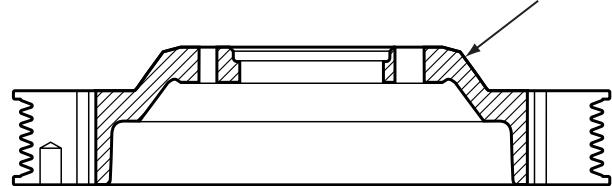


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In accordance with the more lightweight piston and connecting rod, the balancer shaft is designed to be lightweight by changing the unbalance mass of the balancer shaft.

## CRANKSHAFT PULLEY

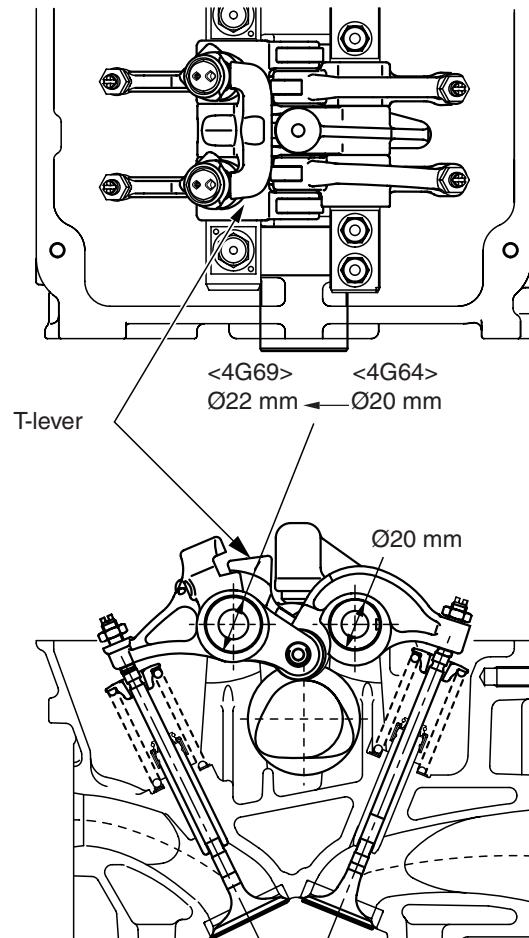
Aluminum hub



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The crankshaft pulley increases the pulley diameter of the auxiliary drive belt. The hub is made of aluminium to reduce its weight.

## MITSUBISHI INNOVATIVE VALVE TIMING &amp; LIFTING ELECTRONIC CONTROL SYSTEM (MIVEC)



MIVEC adopts an additional switching system on the two intake valves compared to the conventional SOHC 4 valve engine. This switching system has two cams. One of them has a difference between the valve lifts for the low mode, and another one keeps both valve lifts high for the high mode.

In the range of the low engine speed, the flow within the valves is enhanced by the difference between the valve lifts. Also the stabilization of the combustion is designed to achieve fuel economy, low exhaust gas and high torque. In the range of the high engine speed, expanding the open valve period and the lift completes the high output due to the increase in the intake air amount.

The structure has the T-lever that moves following the high lift cam and is arranged between the high lift cam and the lift cams of low & middle, in addition to the low & middle lift cams and the rocker arms that drive the two intake valves respectively.

In the range of the low engine speed, each valve is lifted rocker arm by the low lift cam and the middle lift cam respectively because the wing of T-lever does not reach the piston. In the range of the high engine speed, the oil pressure moves the piston within the rocker arm. T-lever pushes the rocker arm forward and then the high lift cam lifts the both valves.

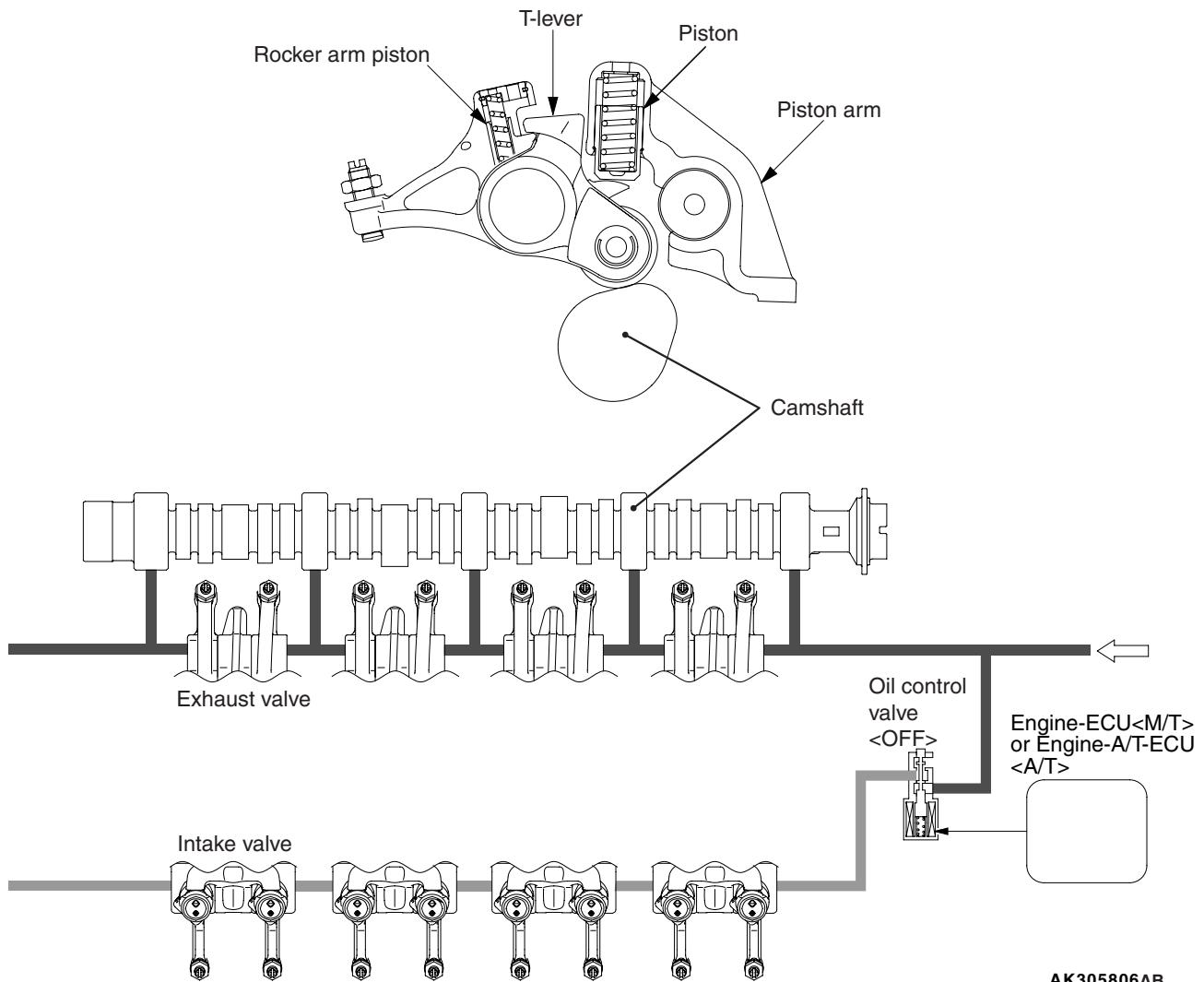
The cam switching is carried out when the torque to be produced in the low speed mode and the high speed mode respectively cross each other at an engine speed of 3600 r/min.

An accumulator ensures oil pressure at the instant of switching and prevents switching mistakes.

The oil passage is divided into two, just in front of the oil control valve (OCV). Oil is always supplied to the exhaust rocker shaft for lubrication.

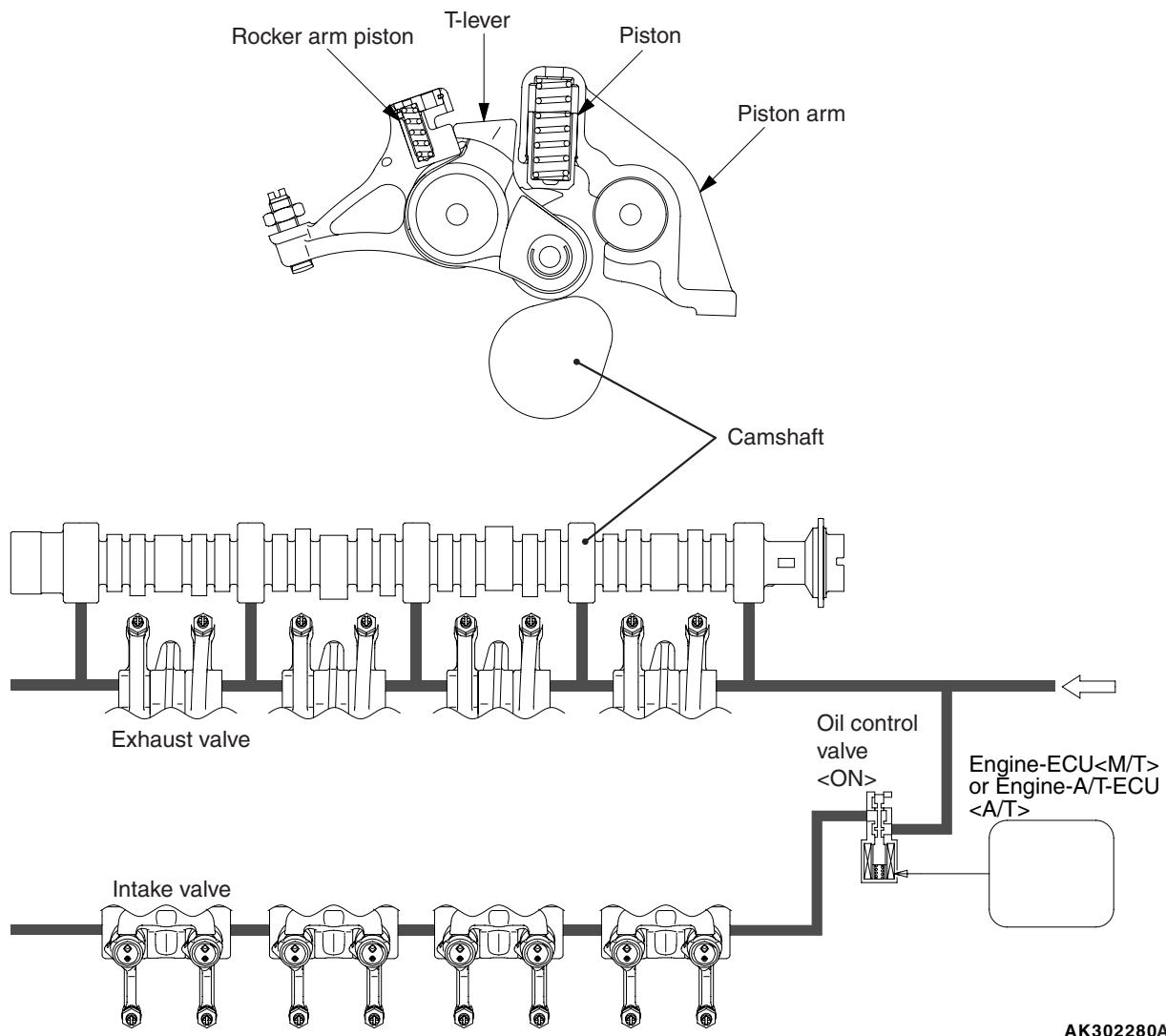
Oil supply to the intake rocker shaft is controlled by ON/OFF of the oil control valve (OCV) and carries out the switching for the low, middle and high lift cams.

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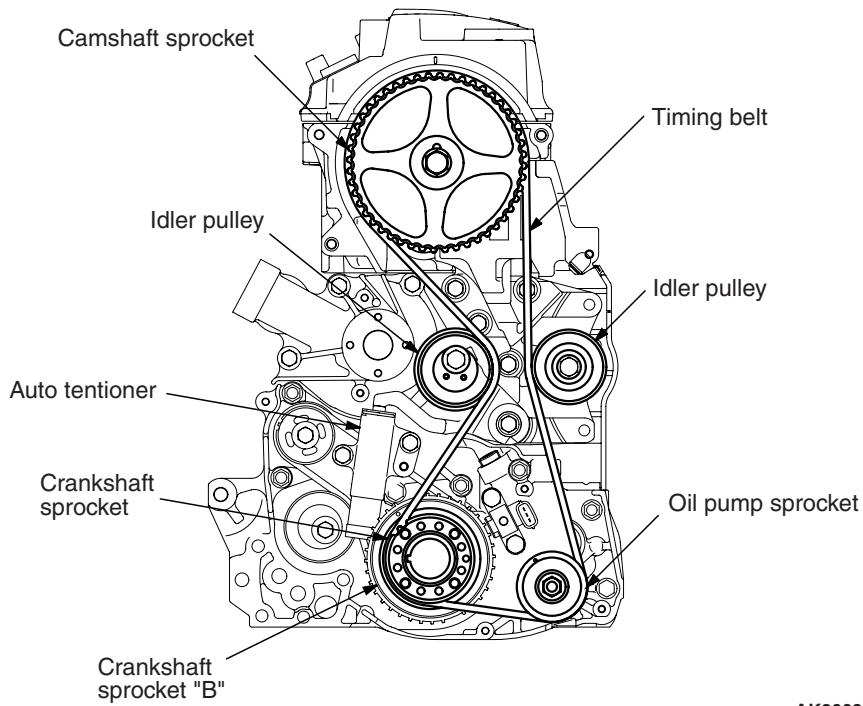
When the OCV is in the OFF position, the rocker arm piston does not operate because the switching oil pressure within the intake rocker shaft is below the specified pressure, and so the wing of the high speed rocker arm does not reach the switching piston. Accordingly, the intake valve is driven by the low speed rocker arm.



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When the OCV is in the ON position, the rocker arm piston is increased by the oil pressure because the switching oil pressure within the intake rocker shaft is above the specified pressure, and so the wing of the high speed rocker arm reaches the switching piston. Accordingly, the intake valve is driven by the high speed rocker arm.

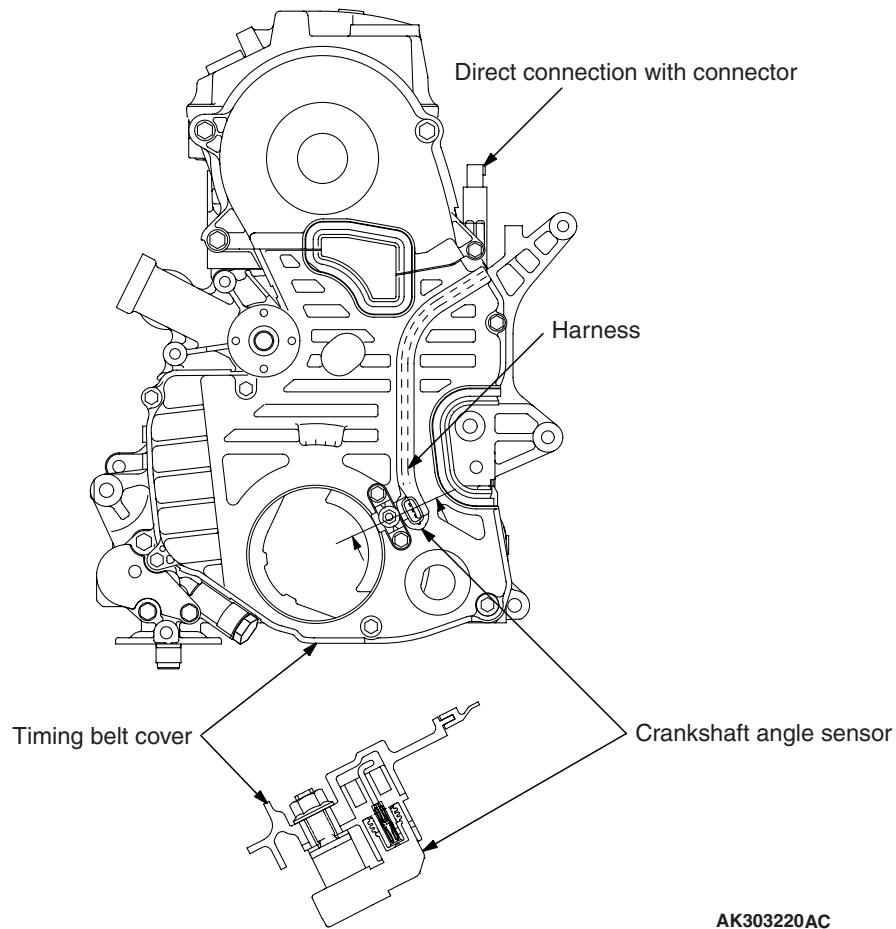
## TIMING BELT



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The timing belt is designed to reduce friction and the weight by narrower width of the timing belt. The weight reduction is designed by the profile change of the each component related to the timing belt.

## TIMING BELT COVER



Uniting the crank angle sensor harness with the timing belt cover reduces installation time and prevents interference with the drive belt or timing belt.