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**GROUP 11B**

**ENGINE  
MECHANICAL  
<4G69>**

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## GENERAL INFORMATION

M2112000100567

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.

## 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	6° BTDC <Low speed cam A>
		6° BTDC <Low speed cam B>
		20° BTDC <High speed cam>
	Intake Close	38° ABDC <Low speed cam A>
		38° ABDC <Low speed cam B>
		72° ABDC <High speed cam>
	Exhaust Open	60° BBDC
	Exhaust Close	16° ATDC
Maximum output	EEC-NET kW/rpm	121/6000
	SAE-GROSS HP/rpm	178/6000
Maximum torque	EEC-NET N· m/rpm	217/4000
	SAE-GROSS kgf· m/rpm	23.5/4000
Fuel system		Electronic-controlled multiport fuel injection
Ignition system		Electronic-controlled 4-coil

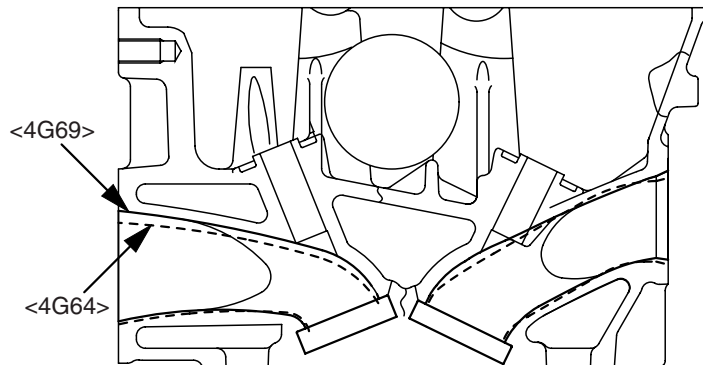
## BASE ENGINE

M2112001000648

### GENERAL DESCRIPTION

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

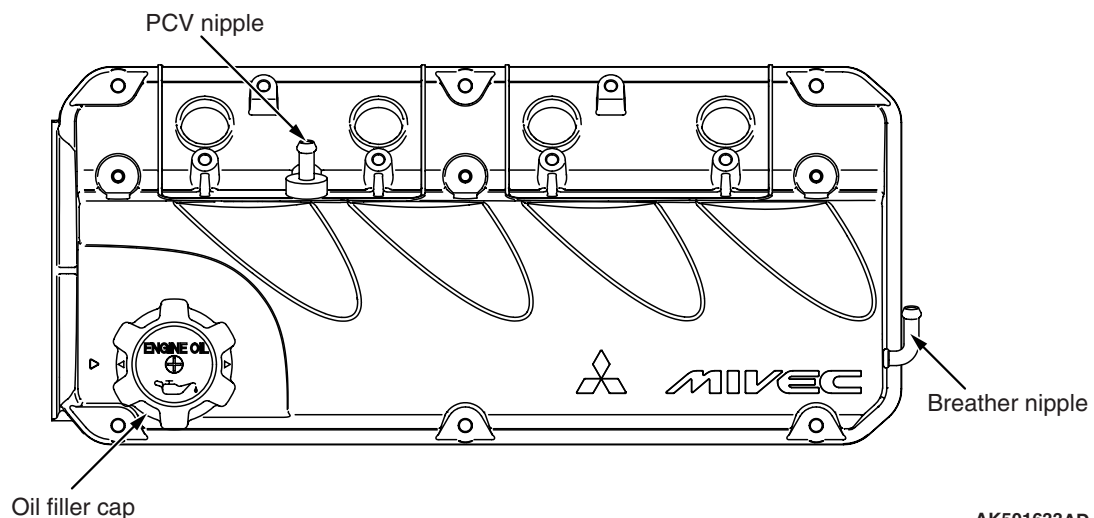
### CYLINDER HEAD



AK400862AB

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.

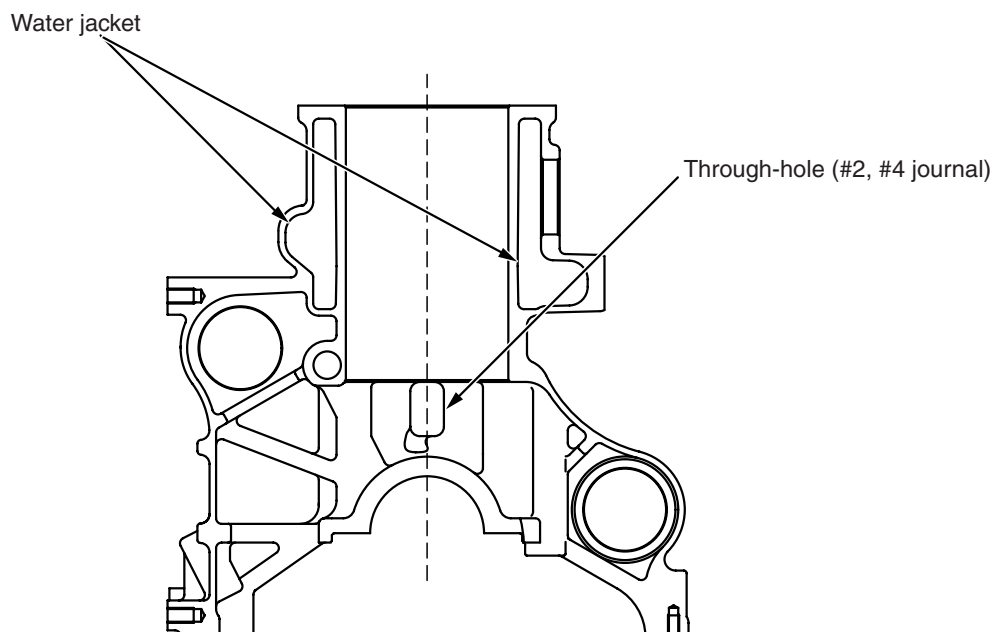
### ROCKER COVER



AK501633AD

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

## CYLINDER BLOCK

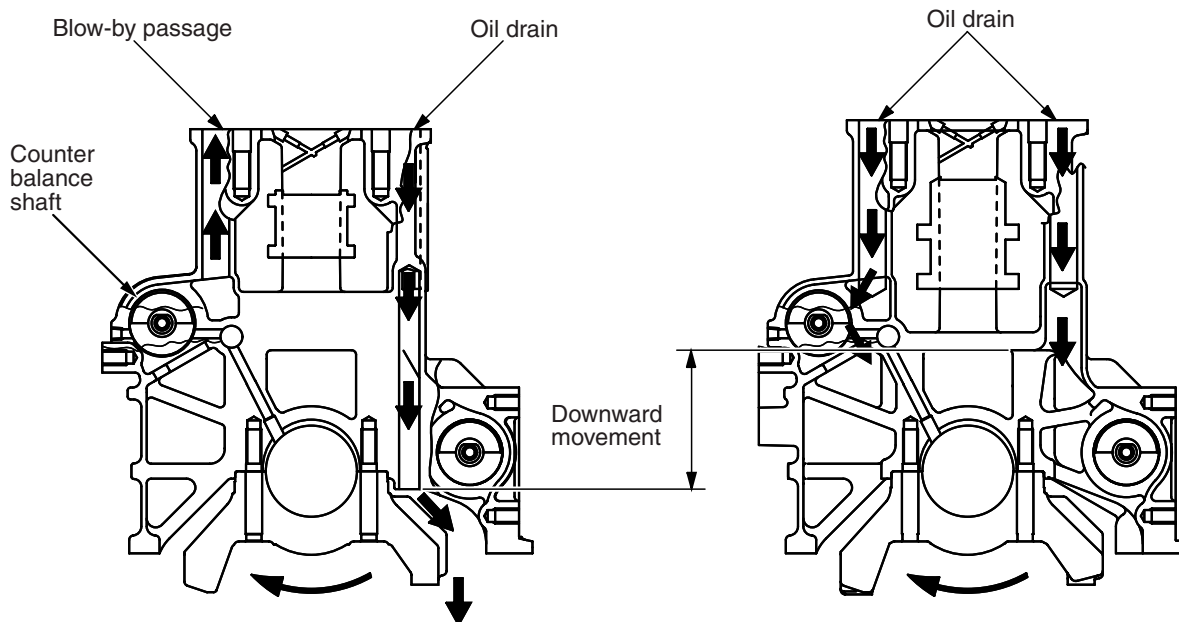


AK300819AG

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.

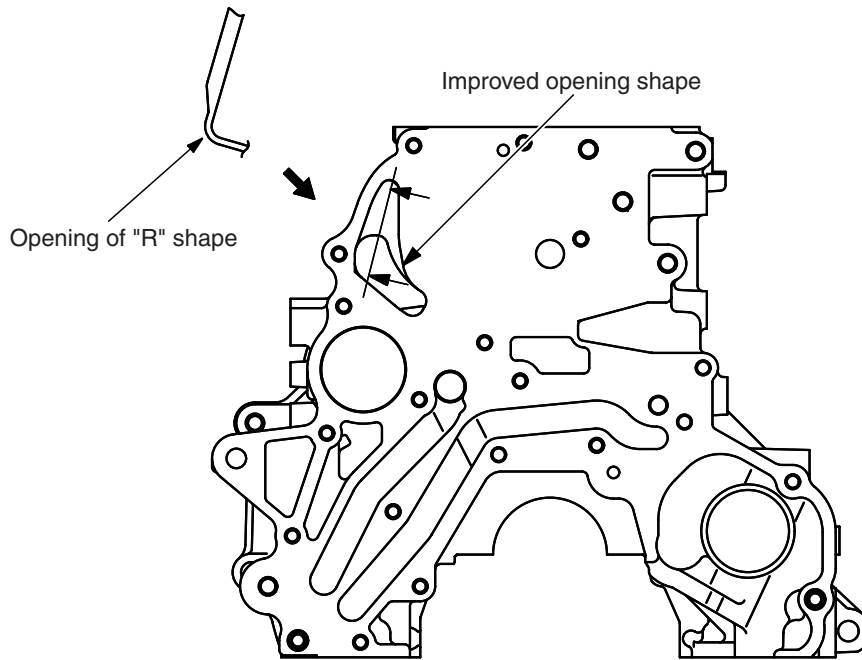
The through-hole is added on the bulkhead of the journal between No.1 and No.2 cylinders, also between No.3 and No.4 cylinders so that the pressure pulsation within the crankcase due to the piston vertical motion can be eliminated and friction can be reduced.



AK303221AC

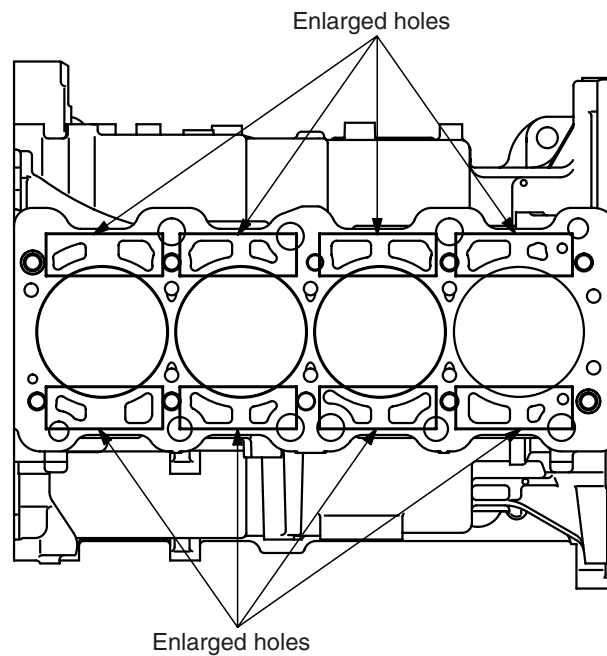
Oil dropping into the cylinder block from the cylinder head affects the crankshaft or the connecting rod and then produces rotational resistance. To prevent

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



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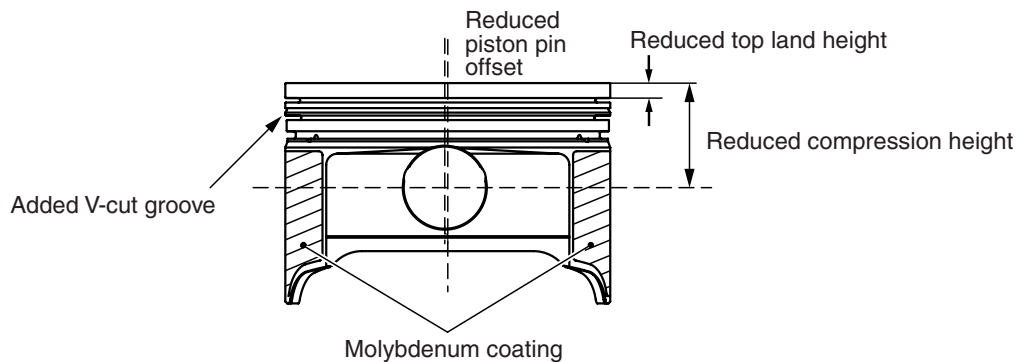
The inlet profile for the coolant fed from the water pump is modified to increase the amount of coolant being circulated.



AK300822AD

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

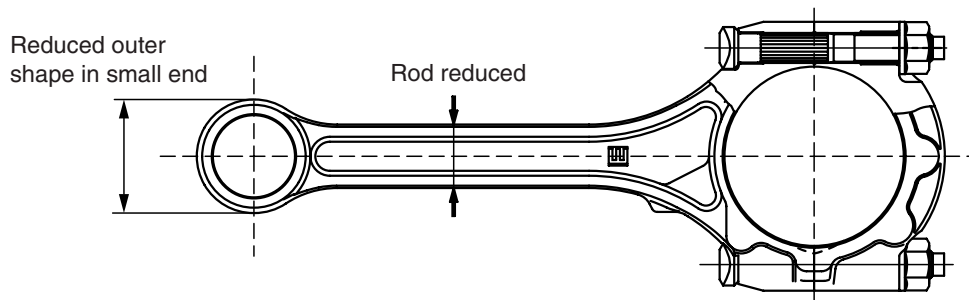


AK300824 AF

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

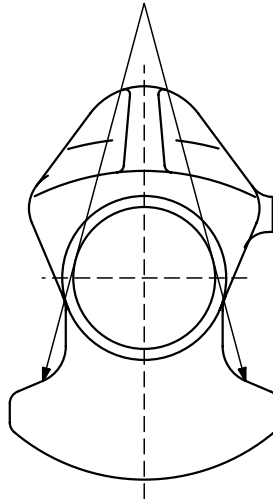


AK300828AE

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

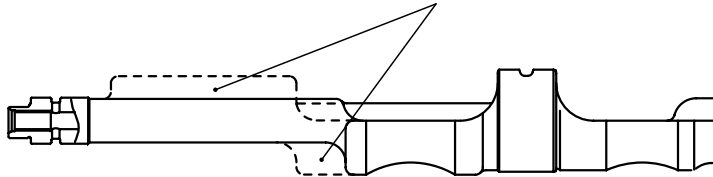


AK300825 AD

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

## BALANCER SHAFT

Reduced balancer masses

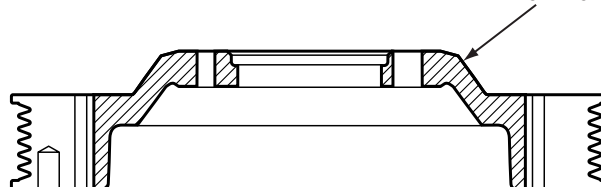


AK305807 AB

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

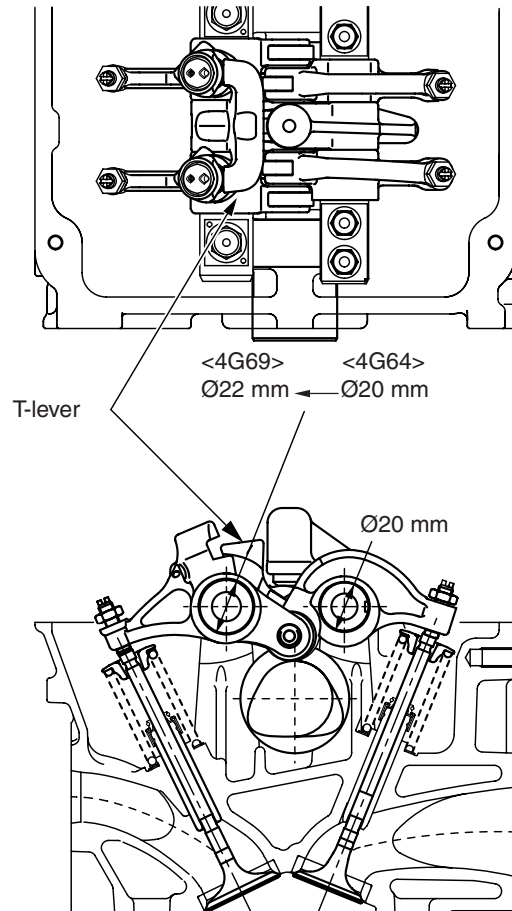
Aluminum hub



AK303978 AB

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

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



AK302889 AD

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.

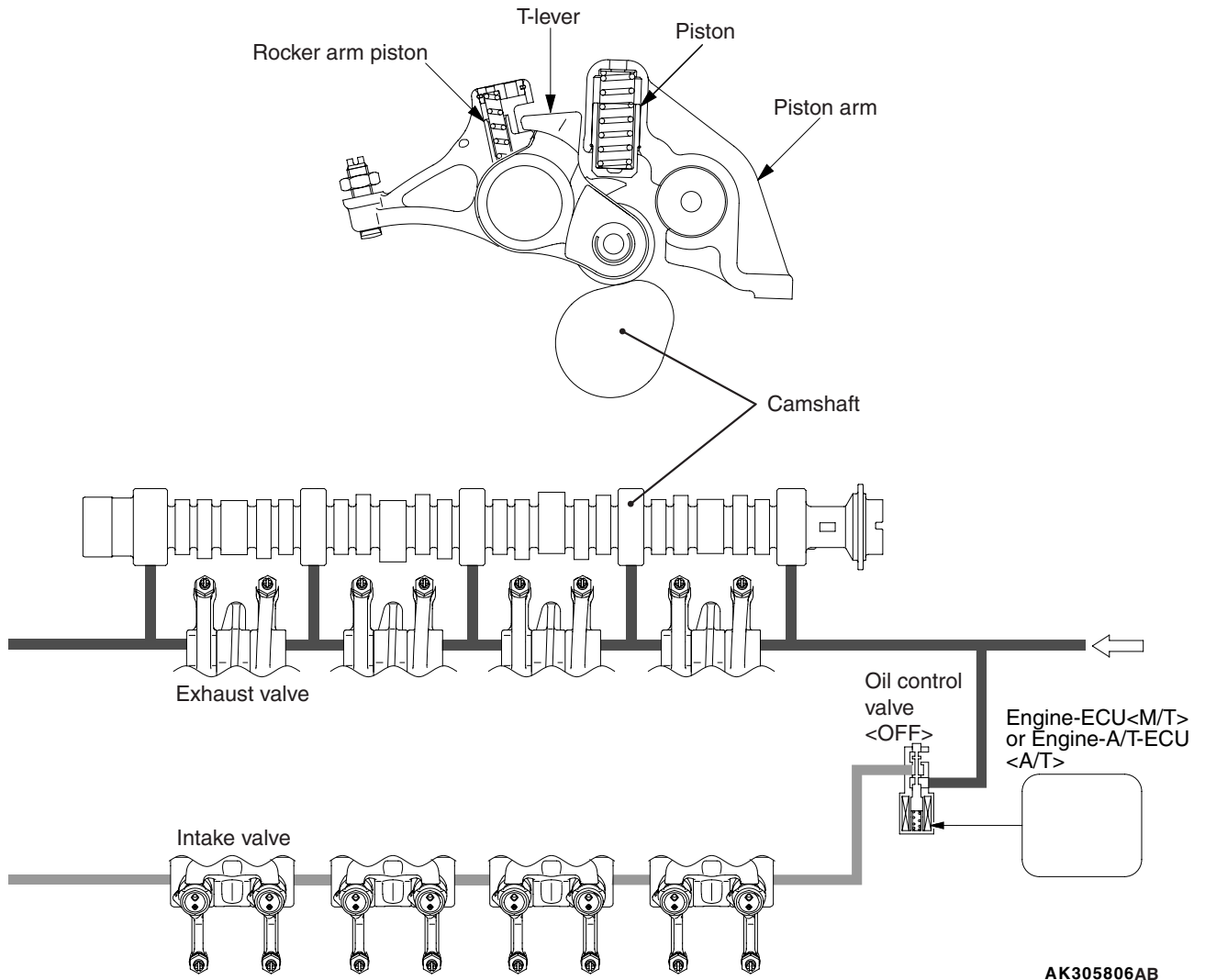
In the range of the low engine speed, each valve is lifted rocker arm by the low lift cam and the middle lift cam respectively because the wing of T-lever does not reach the piston. In the range of the high engine speed, the oil pressure moves the piston within the rocker arm. T-lever pushes the rocker 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 4300 r/min.

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

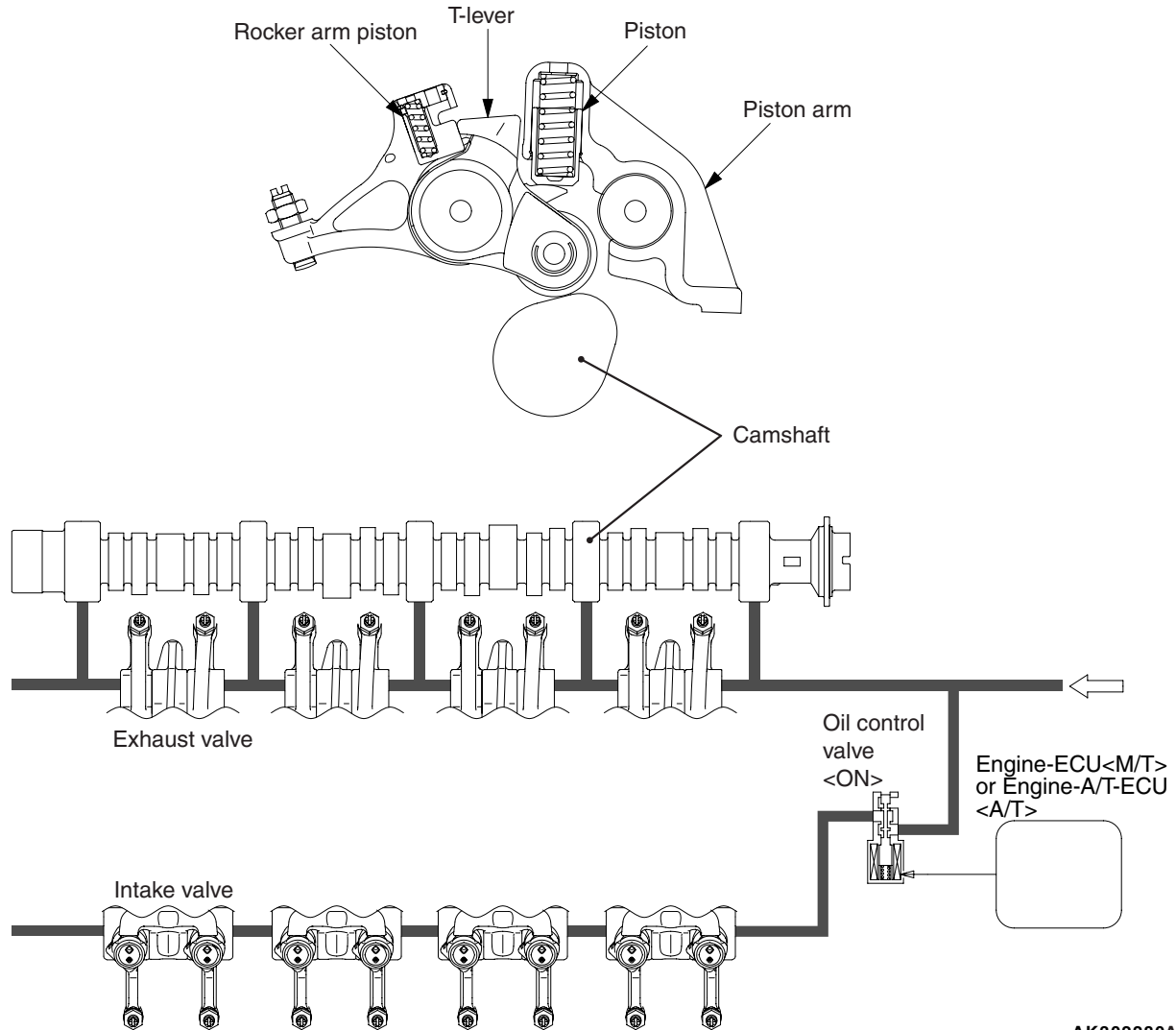
The oil passage is divided into two, just in front of the oil control valve (OCV). Oil is always supplied to the exhaust rocker shaft for lubrication.

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.





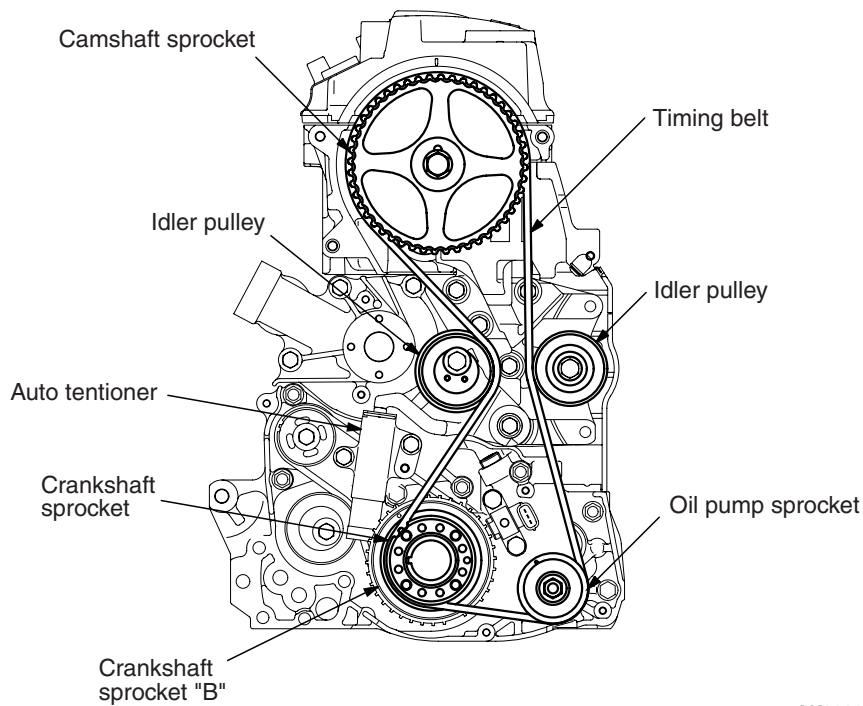
When the OCV is in the OFF position, the rocker arm piston does not operate because the switching oil pressure within the intake rocker shaft is below the specified pressure, and so the wing of the high speed rocker arm does not reach the switching piston. Accordingly, the intake valve is driven by the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



AK302280AD

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.

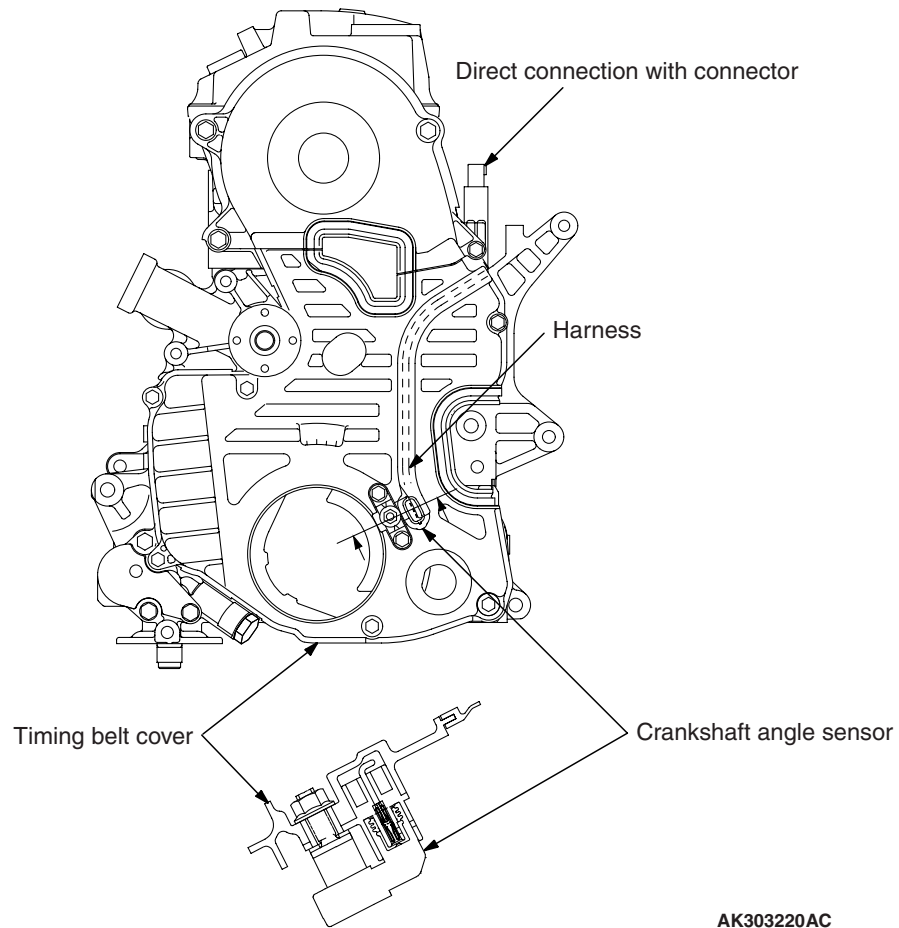
## TIMING BELT



AK300827AG

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



AK303220AC

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