CMP15-20sD
CMP15-20sL

SERVICE MANUAL

RATED CAPACITY: 1500 - 2000KG

Book No. SM-710

CLARK Material Handling Company

GENERAL

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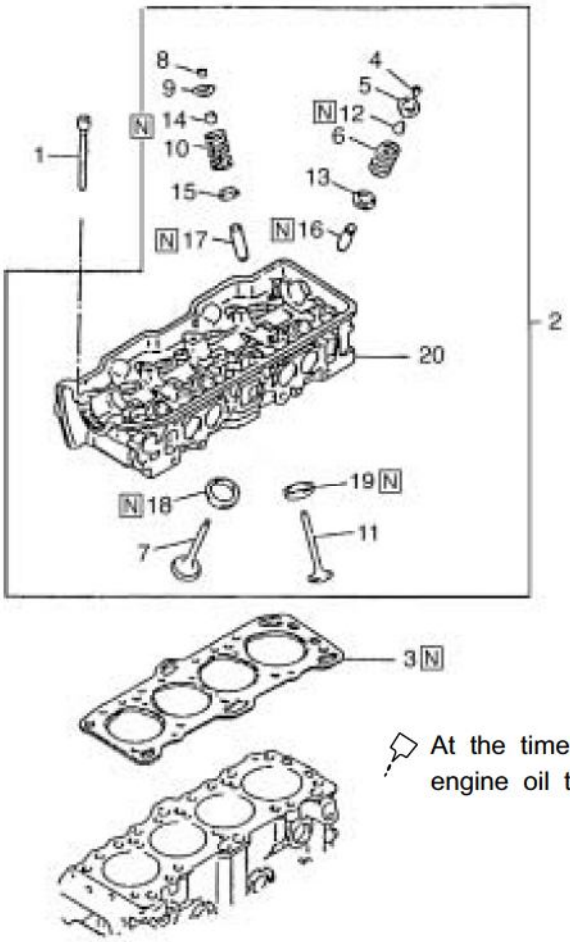
CYLINDER HEAD AND VALVES

CONSTRUCTION



At the time of installation, apply engine oil to all sliding surfaces.

1. Cylinder head bolt
2. Cylinder head assembly
3. Cylinder head gasket
4. Retainer lock
5. Valve spring retainer
6. Valve spring
7. Intake valve
8. Retainer lock
9. Valve spring retainer
10. Valve spring
11. Exhaust valve
12. Valve stem seal
13. Valve spring seat
14. Valve stem seal
15. Valve spring seat
16. Intake valve guide
17. Exhaust valve guide
18. Intake valve seat
19. Exhaust valve seat
20. Cylinder head

- Check the cylinder head gasket surface for flatness by using a straight–edge and feeler gauge. If the service limit is exceeded, correct to meet the specification.
  - Standard value : 0.03 mm (0.001in) or less
  - Limit : 0.2 mm (0.008in)
  - Grinding limit : 0.2 mm (0.008in)
  - Cylinder head height (when new) : 89.9~90.1mm (3.539~3.547in)

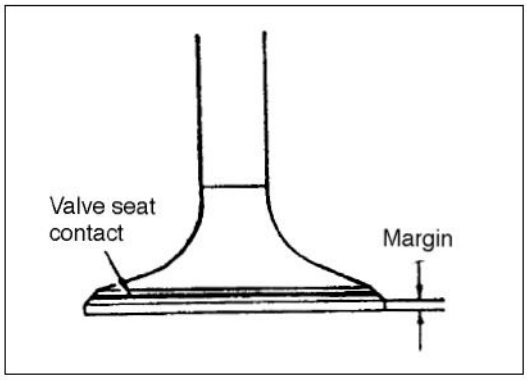
⚠ **Grinding the cylinder head is permitted as long as the total thickness of the metal removed from the cylinder head and the cylinder block does not exceed 0.2 mm (0.008in).**

VALVE

- Check the valve face for correct contact. If incorrect, reface.

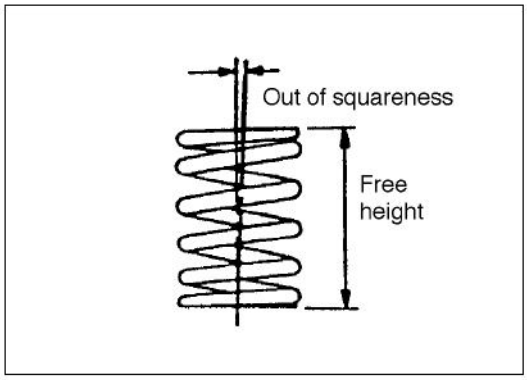
Valve seat contact should be maintained uniform at the center of valve face.

- If the margin exceeds the service limit, replace the valve.
- Standard value
  - Ⓐ Intake : 1.2 mm (0.047 in)
  - Ⓑ Exhaust : 2.0 mm (0.079 in)
- Limit
  - Ⓐ Intake : 0.7 mm (0.028 in)
  - Ⓑ Exhaust : 1.5 mm (0.059 in)



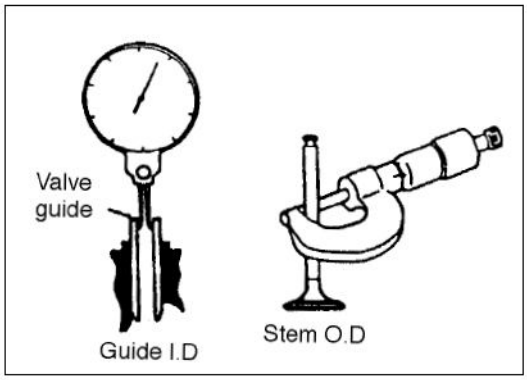
VALVE SPRING

- Measure the free height of spring and, if it is smaller than the limit, replace.
- Standard value : 49.8 mm (1.961 in)
- Limit : 48.8 mm (1.921 in)
- Measure the squareness of the spring and, if the limit is exceeded, replace.



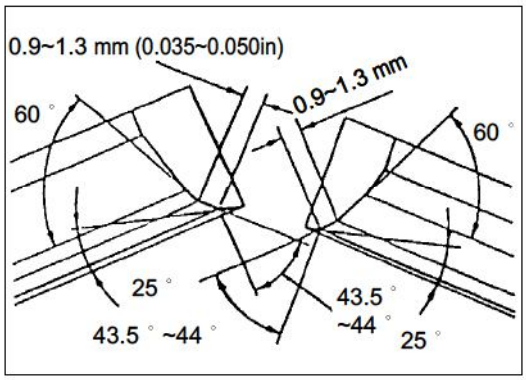
VALVE GUIDE

- Measure the clearance between the valve guide and valve stem. If the limit is exceeded, replace the valve guide or valve, or both



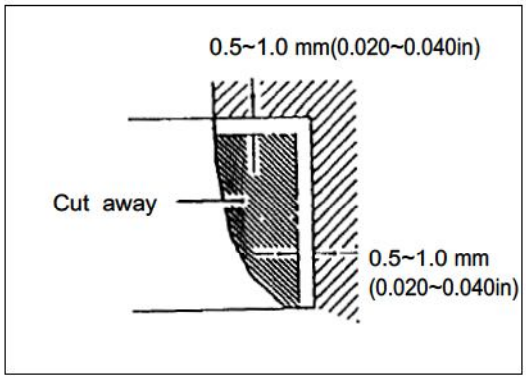
VALVE SEAT RECONDITIONING PROCEDURE

- Before correcting the valve seat, check for clearance between the valve guide and valve and, if necessary, replace the valve guide.
- Correct to obtain the specified seat width and angle.
- After correction, valve and valve seat should be lapped with a lapping compound.

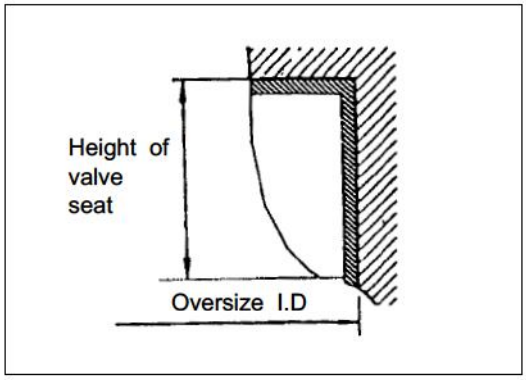


VALVE SEAT REPLACEMENT PROCEDURE

- Cut the valve seat to be replaced from the inside to thin the wall thickness. Then, remove the valve seat.



- Rebore the valve seat hole in the cylinder head to a selected oversize valve seat diameter.
- Before fitting the valve seat, cool the valve seat in liquid nitrogen, to prevent the cylinder head bore from galling.



- Using a valve seat cutter, correct the valve seat to the specified width and angle.

See “VALVE SEAT RECONDITIONING PROCEDURE”

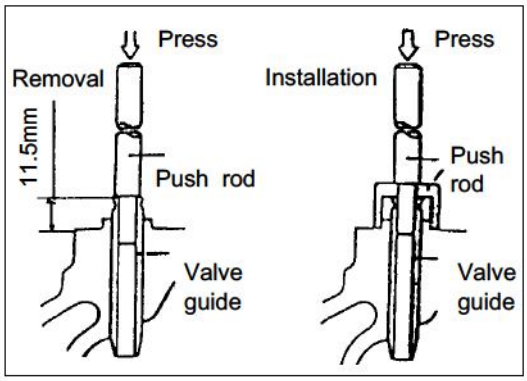
VALVE GUIDE REPLACEMENT PROCEDURE

- Using a press, remove the valve guide toward the cylinder block side.
- Rebore the valve guide hole to the new oversize valve guide outside diameter.

⚠ **Do not install a valve guide of the same size again.**

- Valve guide hole diameter :
  0.05 O.S. 13.05~13.07 mm (0.514~0.515 in)
  0.25 O.S. 13.25~13.27 mm (0.521~0.522 in)
  0.05 O.S. 13.50~13.52 mm (0.531~0.534 in)

- Press in the valve guide to the position shown in the illustration.
- Standard value : 11.5 mm (0.453 in)



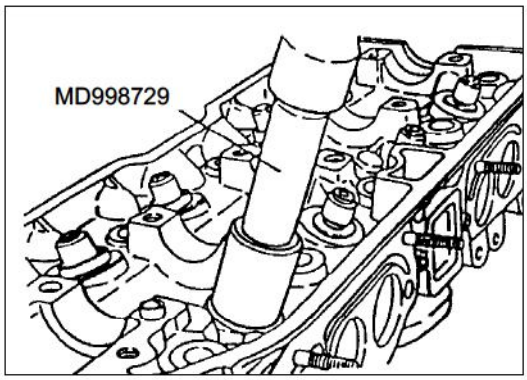
⚠ **• Press-fit the valve guide, working from the cylinder head top surface.**
• Note that the intake and exhaust side valve guides are different in length.
• After installing valve guides, insert new valve in them to check for sliding condition.

INSTALLATION

VALVE STEM SEAL

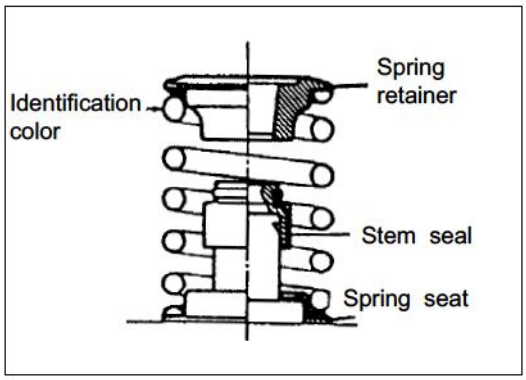
- Install the valve spring seat.
- Using special tool, install the new valve stem seal to the valve guide.

⚠ **CAUTION**
- Do not reuse removed valve stem seal.
- The special tool must be used to install the valve stem seal. Improper installation could result in oil leaking past the valve guide.

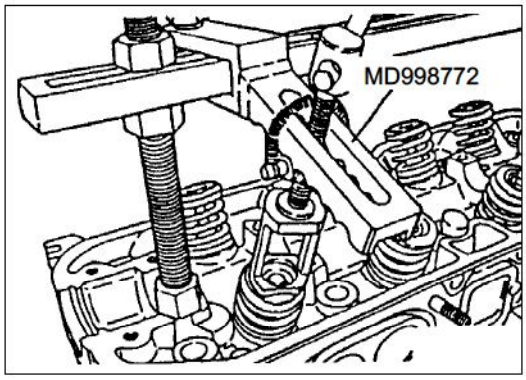


VALVE SPRING

- Direct the valve spring end with identification color toward the rocker arm.

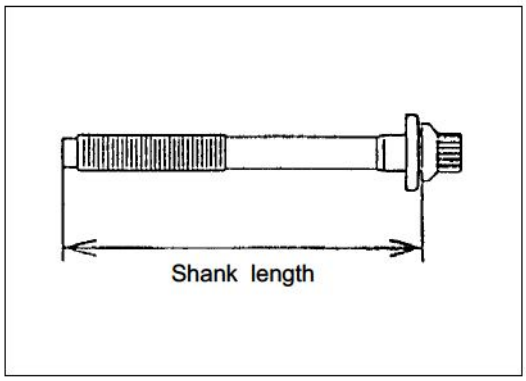


RETAINER LOCK

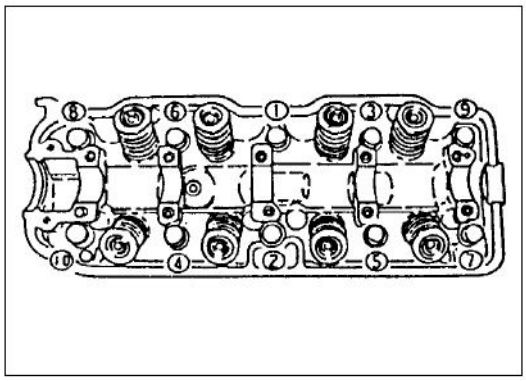


CYLINDER HEAD BOLT

- When installing the cylinder head bolts, check that the shank length of each bolt meets the limit. If the limit is exceeded, replace the bolt.
  Standard value : 120.4 mm (4.74 in)
- Apply engine oil to the bolt threads and washers.



- According to the tightening sequence, tighten the bolts to 8.0 kgf·m (58 lbf·ft), using a 12 mm~12point socket wrench.
- Loosen the bolts completely.
- Torque the bolts to 2.0 kgf·m (14.4 lbf·ft)
- Tighten the bolts 1/4 turns (90 °) more.
- Tighten the bolts 1/4 turns (90 °) additionally.



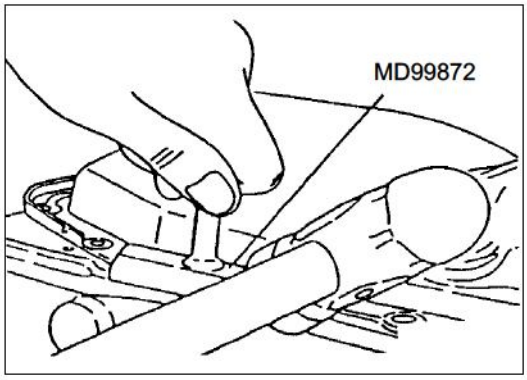
FRONT CASE AND OIL PAN

REMOVAL

OIL PAN

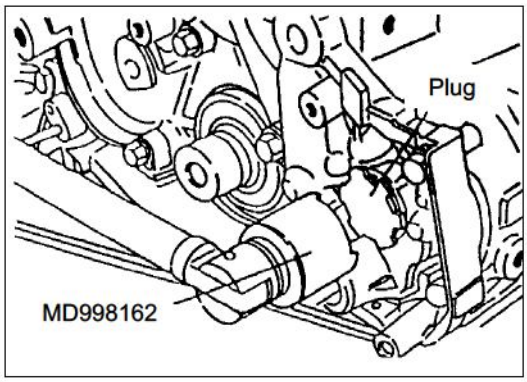
- Remove the all oil pan bolts.

  Tightening torque : 0.7 kgf·m (5.1 lbf·ft)
- Drive in the special tool between the cylinder block and oil pan.
- Slide the tool by striking the edge of the special tool to separate the oil pan from the cylinder block.



PLUG REMOVAL

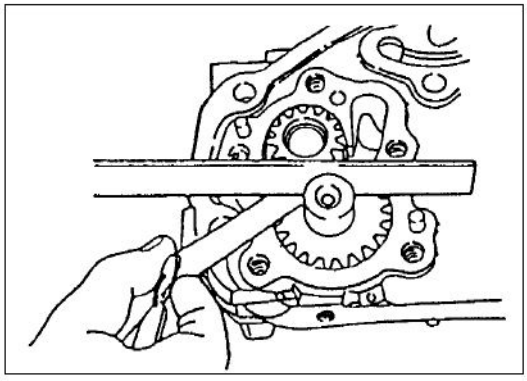
- If the plug is too tight, hit the plug head with a hammer two to three times, and the plug will be easily loosened.



INSPECTION

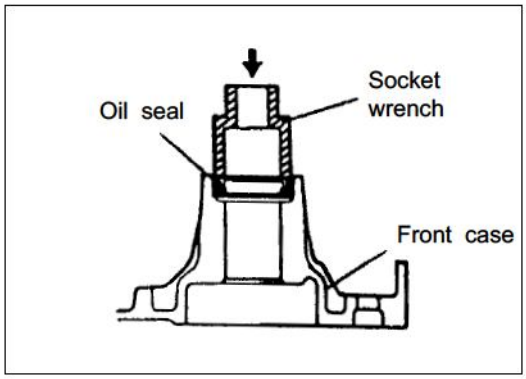
OIL PUMP

- Assemble the oil pump drive gear and driven gear to the front case.
- Check the side clearance using a feeler gauge.
- Standard value
  - Drive gear : 0.08~0.14mm (0.003~0.006 in)
  - Driven gear : 0.06~0.12mm (0.002~0.005 in)

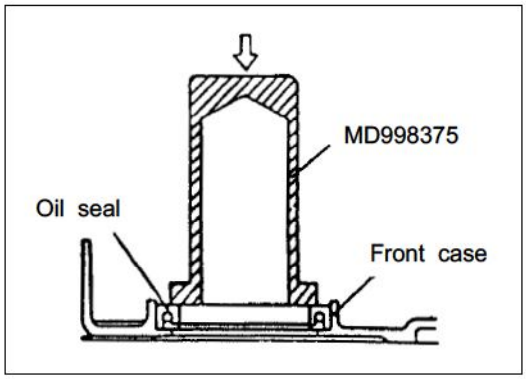


INSTALLATION

OIL PUMP OIL SEAL

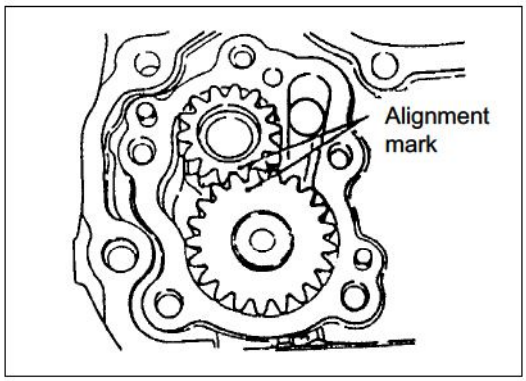


CRANKSHAFT FRONT OIL SEAL



OIL PUMP DRIVEN GEAR/OIL PUMP DRIVE GEAR

- Apply engine oil amply to the gears and line up the alignment marks.



FRONT CASE

- Set the special tool on the front end of the crankshaft and apply a thin coat of engine oil to the outer circumference of the special tool to install the front case.

When an oil seal is provided on the front case, the special tool must always be used.

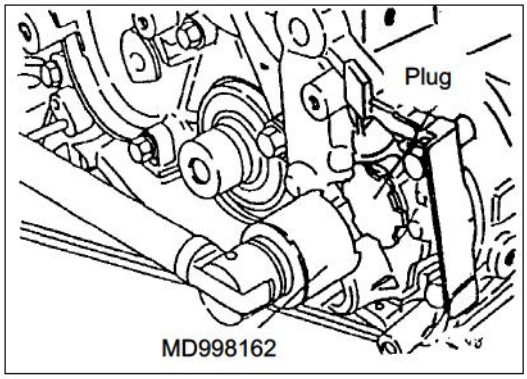
- Install the front case assembly through a new front case gasket and temporarily tighten the flange bolts (other than those for tightening the filter bracket).

- Mount the oil filter bracket with the oil filter bracket gasket in between, and partially tighten the 4 bolts, each with a washer.
- Tighten the bolts to the specified torque.

Tightening torque : 1.9 kgf·m (13.7 lbf·ft)

PLUG INSTALLATION

Tightening torque : 2.4 kgf·m (17.3 lbf·ft)



OIL PRESSURE SWITCH INSTALLATION

Tightening torque :1.0 kgf·m (7.2 lbf·ft)

Sealant : Threebond 1211 or equivalent

⚠ **• Keep the end of threaded portion clear of sealant.**
• Avoid overtightening.