

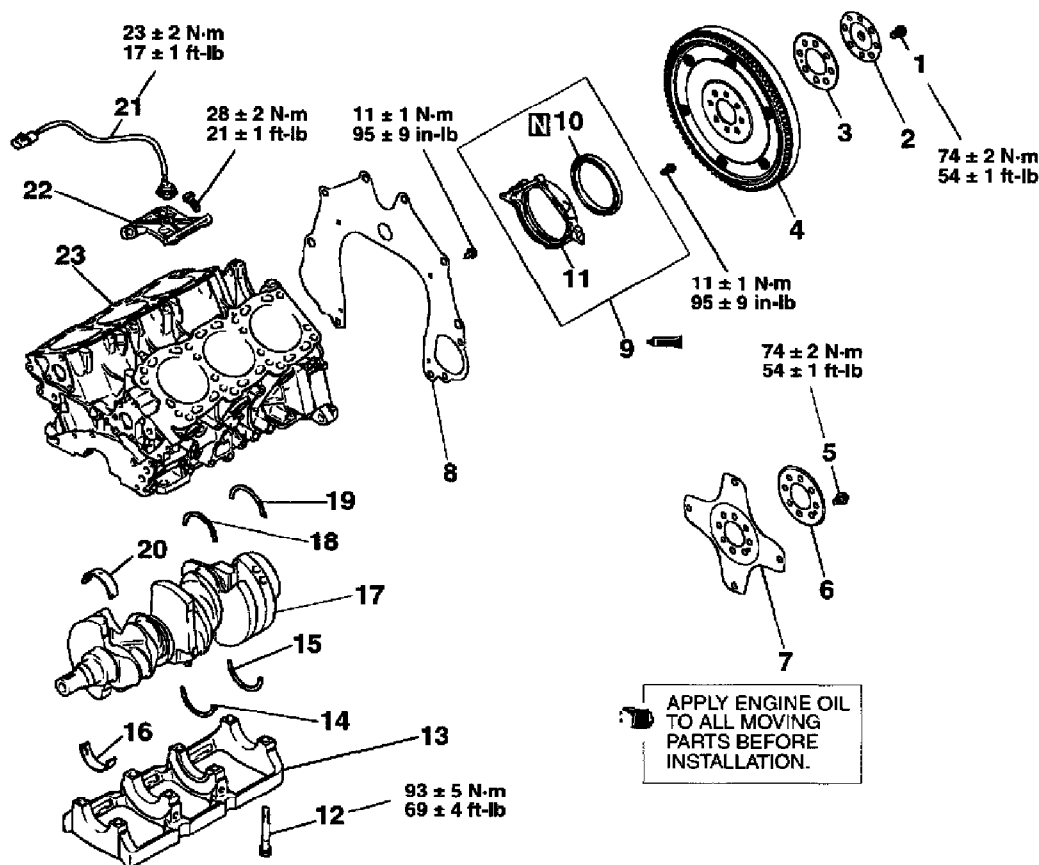
Engine: Service and Repair

Crankshaft and Cylinder Block

M1113008700046

CAUTION

On the flexible flywheel equipped engines, do not remove any of the bolts "A" of the flywheel shown in the illustration. The balance of the flexible flywheel is adjusted in an assembled condition. Removing the bolt, therefore, can cause the flexible flywheel to be out of balance and result in damage.



AKX00683AB

REMOVAL STEPS

1. FLYWHEEL BOLT <M/T>
2. ADAPTER PLATE <M/T>
3. PLATE <M/T>
4. FLYWHEEL <M/T>
5. DRIVE PLATE BOLT <A/T>
6. ADAPTOR PLATE <A/T>
7. DRIVE PLATE <A/T>
8. REAR PLATE
- >>F<< 9. OIL SEAL CASE ASSEMBLY
- >>E<< 10. CRANKSHAFT REAR OIL SEAL
11. OIL SEAL CASE

REMOVAL STEPS (Continued)

- >>D<< 12. BEARING CAP BOLT
- >>D<< 13. BEARING CAP
- >>C<< 14. THRUST BEARING A
- >>C<< 15. THRUST BEARING B
- >>B<< 16. CRANKSHAFT BEARING, LOWER
- >>C<< 17. CRANKSHAFT
- >>C<< 18. THRUST BEARING B
- >>C<< 19. THRUST BEARING A
- >>B<< 20. CRANKSHAFT BEARING, UPPER
21. KNOCK SENSOR

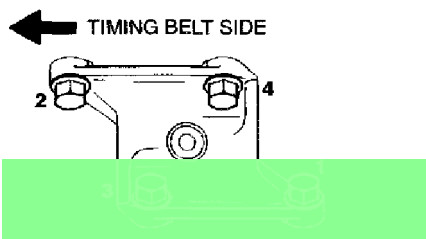
REMOVAL STEPS (Continued)

- >>A<< 22. KNOCK SENSOR BRACKET
23. CYLINDER BLOCK

REMOVAL AND INSTALLATION

INSTALLATION SERVICE POINTS

- >>A<< KNOCK SENSOR BRACKET INSTALLATION

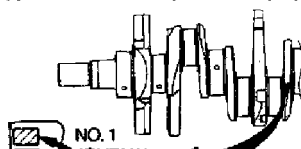


Check that the bracket is in proper contact with the cylinder block boss and tighten to the specified torque in the order shown.
Tightening torque: $28 \pm 2 \text{ Nm}$ ($21 \pm 1 \text{ ft. lbs.}$)

>>B<< CRANKSHAFT BEARING INSTALLATION

When bearing replacement is required, select and install the correct bearing by the following procedure.

LOCATION OF IDENTIFICATION COLOR



1. Measure the crankshaft journal diameter and confirm its classification from the following table. In the case of a crankshaft supplied as a service part, identification colors/marks of its journals are painted/stamped at the positions shown in the illustration.

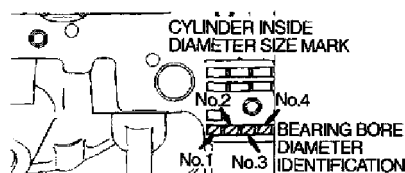
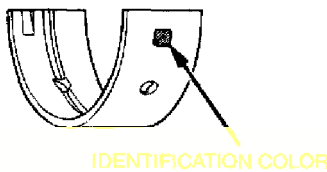


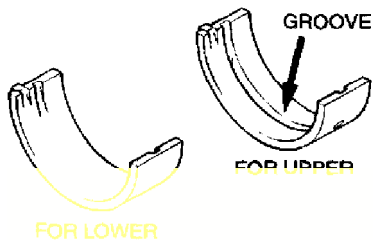
TABLE 1

CRANKSHAFT JOURNAL OUTSIDE DIAMETER		CYLINDER BLOCK BEARING BORE	CRANKSHAFT BEARING
IDENTIFICATION COLOR	SIZE mm (in)	IDENTIFICATION MARK	IDENTIFICATION COLOR
Yellow	59.990 – 59.996 (2.3618 – 2.3620)	I	Pink
		II	Red
		III	Green
None	59.984 – 59.990 (2.3616 – 2.3618)	I	Red
		II	Green
		III	Black
White	59.978 – 59.984 (2.3613 – 2.3616)	I	Green
		II	Black
		III	Brown

2. The cylinder block bearing bore diameter identification marks are stamped at the position shown in the illustration from left to right, bearing at No. 1.



3. For example, if the crankshaft journal outside diameter identification color is "Yellow" and the cylinder block bearing bore identification mark is "III," select a bearing whose identification color is "Green." If there is no identification color paint on the crankshaft, measure the journal outside diameter and select a bearing appropriate for the measured value.



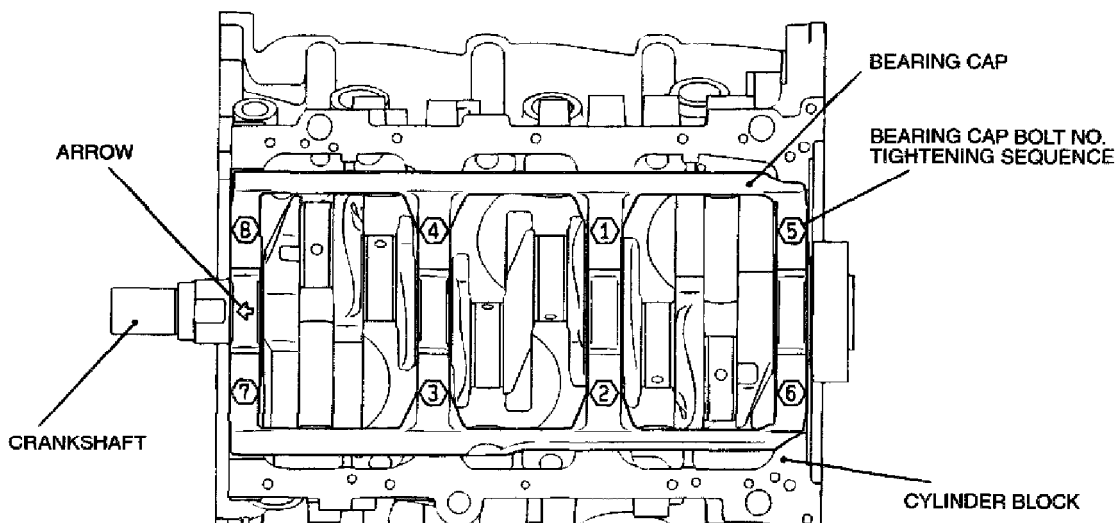
4. Install the bearings having a groove to the cylinder block.
5. Install the bearings having no groove to the bearing cap.

>>C<< CRANKSHAFT THRUST BEARING INSTALLATION

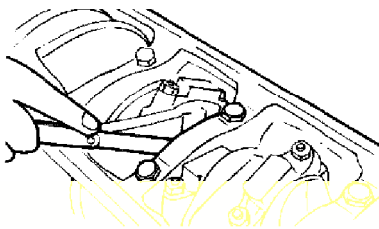


1. Install the thrust bearings in the number 3 bearing bore in the cylinder block and in the bearing cap. For easier installation, apply engine oil to the bearings; this will help hold them in position.
2. The thrust bearings must be installed with their groove toward the crankshaft web. The two thrust bearings are different from each other. One has a tab while the other has no tab. Be careful not to confuse them.

>>D<< BEARING CAP/BEARING CAP BOLT INSTALLATION

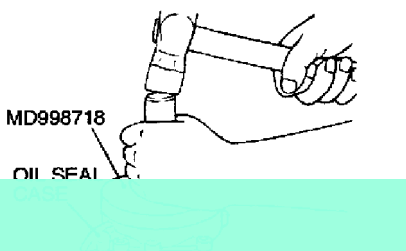


1. Install the bearing cap on the cylinder block, so that the arrow points to the timing belt side.
2. Tighten the bearing cap bolts to $93 \pm 5 \text{ Nm}$ ($69 \pm 4 \text{ ft. lbs.}$) in the specified tightening sequence.
3. Check that the crankshaft rotates smoothly.



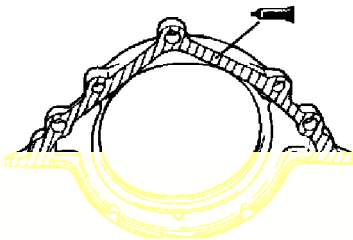
4. Check the end play. If it exceeds the limit value, replace the thrust bearing.
Standard value: $0.05 - 0.25 \text{ mm}$ ($0.002 - 0.009 \text{ inch}$)
Limit: 0.3 mm (0.01 inch)

>>E<< CRANKSHAFT REAR OIL SEAL INSTALLATION



Using special tool MD998718, press-fit a new crankshaft rear oil seal into the oil seal case.

>>F<< OIL SEAL CASE ASSEMBLY INSTALLATION



1. Apply sealant Mitsubishi Genuine Part number MD970389 or equivalent to the gasket surface of oil seal case.

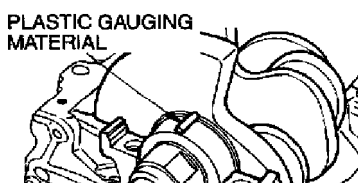
NOTE: Be sure to install the case quickly while the sealant is wet (**within 15 minutes**).

2. Apply engine oil to the lip of the oil seal, and then install the oil seal case onto the cylinder block.

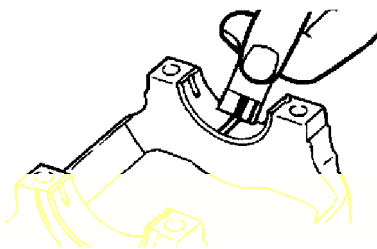
NOTE: After installation, keep the sealed area away from the oil for **approximately one hour**.

INSPECTION

CRANKSHAFT JOURNAL OIL CLEARANCE <PLASTIC GAUGING MATERIAL METHOD>

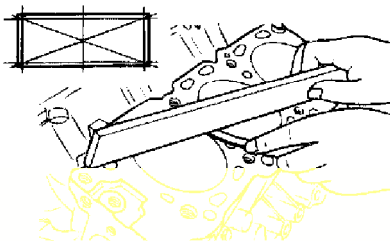


1. Remove oil from the crankshaft journal and crankshaft bearing.
2. Install the crankshaft.
3. Cut plastic gauging material to the same length as the width of the bearing and place it on the journal in parallel with its axis.

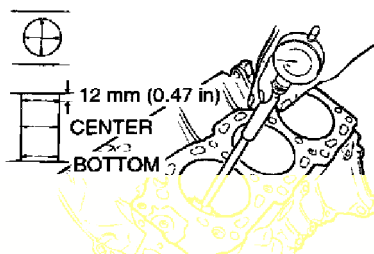


4. Install the crankshaft bearing cap carefully and tighten the bolts to the specified torque.
5. Carefully remove the crankshaft bearing cap.
6. Measure the width of the plastic gauging material at its widest part by using a scale printed on the plastic gauging material package.
Standard value: **0.02 - 0.04 mm (0.0008 - 0.0015 inch)**
Limit: **0.1 mm (0.003 inch)**

CYLINDER BLOCK

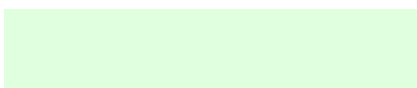


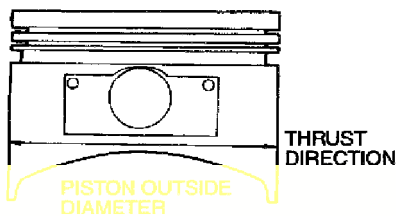
1. Visually check for scratches, rust, and corrosion. Use also a flaw detecting agent for the check. If defects are evident, correct, or replace.
2. Using a straightedge and feeler gauge, check the block top surface for warpage. Make sure that the surface is free from gasket chips and other foreign matter.
Standard value: **0.05 mm (0.002 inch)**
Limit: **0.1 mm (0.003 inch)**
3. If the distortion is excessive, correct within the allowable limit or replace.
Grinding limit: **0.2 mm (0.008 inch)**
*Includes/combined with cylinder head grinding.
Cylinder block height (when new): **210.5 mm (8.29 inches)**



4. Check the cylinder walls for scratches and seizure. If defects are evident, replace or bore to oversize and replace pistons and piston rings.
5. Using a cylinder gauge, measure the cylinder bore and cylindricity. If worn badly, correct by boring the cylinders to an oversize and replace pistons and piston rings. Measure at the points shown in the illustration.
Standard value:
Cylinder Inside Diameter: **91.1 mm (3.59 inches)**
Cylindricity: **0.01 mm (0.0003 inch)**

BORING CYLINDER





1. Oversize pistons to be used should be determined on the basis of the largest bore cylinder.

SIZE	IDENTIFICATION MARK

Piston size identification

NOTE: Size mark is stamped on the piston top.

2. Measure the outside diameter of the piston to be used. Measure it in the thrust direction as shown.
3. Based on the measured piston Outside Diameter (**OD**), calculate the boring finish dimension. Boring finish dimension = Piston OD + (clearance between piston OD and cylinder) **0.02 mm (0.0008 inch)** (honing margin)

CAUTION: To prevent distortion that may result from temperature rise during honing, bore cylinders in the order of number 2, number 4, number 6, number 1, number 3 and number 5.

4. Bore all cylinders to the calculated boring finish dimension.
5. Hone to the final finish dimension (piston OD + clearance between piston OD and cylinder).
6. Check the clearance between the piston and cylinder.

Clearance between piston and cylinder: **0.02 - 0.04 mm (0.0008 - 0015 inch)**

NOTE: When boring cylinders, finish all of six cylinders to the same oversize. Do not bore only one cylinder to an oversize.