REMOVAL

1. Remove the crankshaft pulley, engine coolant pump pulley and drive belt.

2. Remove the timing belt cover.

3. Turn the crankshaft clockwise and align the timing marks so as to bring the No. 1 cylinder to compression top-dead-center position. At this time the timing marks of the camshaft sprocket and the timing marks of the rocker cover should coincide, and the dowel pin of the camshaft sprocket should be at the upper side. Remove the auto tensioner.

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CAUTION: Rotate the crankshaft clockwise.
4. Remove the timing belt.

**NOTE:** If the timing belt is reused, make an arrow mark indicating the turning direction (of the front of the engine) to make sure that the belt is reinstalled in the same direction as before.

5. Remove the camshaft sprockets.
NOTE: Be careful not to damage the cylinder head with the wrench.

6. When the oil pump sprocket nut is removed, first remove the plug at left side of the cylinder block and insert a screwdriver to check the left counter balance shaft in position. Screwdriver used for this purpose should have a shaft 8 mm (0.3 in.) in diameter which can be inserted more than 60 mm (2.36 in.)
7. Remove the oil pump sprocket retaining nut and remove the oil pump sprocket.

8. Loosen the right counter balance shaft sprocket mounting bolt until it can be loosened by hand.

9. Next, remove tensioner "B" and remove timing belt "B".

⚠️ CAUTION: After timing belt "B" has been removed, do not attempt to loosen bolt while holding sprocket with pliers, etc.
10. Remove the crankshaft sprocket "B" from crankshaft.

INSPECTION

- Question: no mark on the crank sprocket

Sprockets, Tensioner Pulley, & Idler Pulley

1. Check the camshaft sprocket, crankshaft sprocket, tensioner pulley, and idler pulley for abnormal wear, cracks, or damage. Replace as necessary.

2. Inspect the tensioner pulley and the idler pulley for easy and smooth pulley rotation and check for play or noise. Replace as necessary.
Auto Tensioner

1. Check the auto tensioner for leak and replace as necessary.

2. Check the rod end for wear or damage and replace as necessary.
3. Measure the rod protrusion. If it is out of specification, replace the auto tensioner.

   Standard value: 14.5 mm (0.57 in.)
4. Using a soft-jawed vise push in the auto tensioner rod. If the rod can be easily retracted, replace the auto tensioner. You should feel a great deal of resistance when pushing the rod in.

⚠️ **CAUTION:** Clamp the auto tensioner in the vise so that it can be level. Use soft jaws in the vise to avoid damaging the auto tensioner.
TIMING BELT

1. Check the belt for oil or dust deposits. Replace if necessary. Small deposits should be wiped away with a dry cloth or paper. Do not clean with solvent.

2. When the engine is overhauled or belt tension adjusted, check the belt in detail. If the following flaws are evident, replace the belt with a new one.
<table>
<thead>
<tr>
<th>Description</th>
<th>Flaw conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardened back surface rubber</td>
<td>Back surface glossy. Non-elastic and so hard that when a finger nail is forced into it, no mark is produced.</td>
</tr>
<tr>
<td>Cracked back surface rubber</td>
<td></td>
</tr>
<tr>
<td>Cracked or separating canvas</td>
<td></td>
</tr>
<tr>
<td>Badly worn teeth (initial stage)</td>
<td>Canvas on load side tooth flank worn (Fluffy canvas fibers, rubber gone and color changed to white, and unclear canvas texture)</td>
</tr>
</tbody>
</table>

**Fig 9: Timing Belt Inspection Chart (1 Of 2)**

Courtesy of KIA MOTORS AMERICA, INC.
Question: no mark on the crank sprocket

1. Install crankshaft sprocket "B" into crankshaft.

⚠️ CAUTION: Pay special attention to the direction of the flange. If it is installed in the wrong direction, a broken belt could result.
2. Lightly apply engine oil to the outer surface of spacer, and then install the spacer to the right counter balance shaft. Be sure to install in the direction as shown in illustration.
3. Install the counter balance shaft sprocket onto the right counter balance shaft, and then tighten flange bolt finger tight.

4. Align the timing mark on each sprocket with the corresponding timing mark on the front case.
5. When the timing belt "B" is installed, make certain that tension side has no slack. Install tensioner "B" with center of pulley located on the left side of mounting bolt.
6. Lift tensioner "B" to tighten the timing belt "B" so that its tension side will be pulled tight. In this condition, tighten a bolt to secure tensioner "B". When a bolt is tightened, be careful to prevent from turning shaft. If the shaft is turned together, the belt will be overtightened.
7. Check to ensure that timing marks are in alignment.

8. Check to ensure that when the center of span on the tension side is depressed with index finger in direction of arrow, deflection of belt is within specification.

   Belt deflection: 5-7 mm (0.2-0.3 in.)
9. Install sensing blade and crankshaft sprocket onto crankshaft. Be sure to install in the direction as shown in illustration.

⚠️ **CAUTION:** Pay attention to direction of flange. If it is installed in wrong direction, a broken belt could result.
10. Install the special washer and sprocket bolt to crankshaft, and then tighten the sprocket bolt.

**Tightening torque**

**Crankshaft sprocket bolt:**

110-130 Nm (1100-1300 kg.cm, 80-94 lb.ft)

11. Insert a screwdriver through the plug hole in left side of cylinder block to keep shaft in position.
12. Install the oil pump sprocket, and tighten the nut to the specified torque.
13. Install the camshaft sprocket and tighten the bolt to the specified torque.

   Tightening torque

   Camshaft sprocket bolt:
   
   80-100 Nm (800-1000 kg.cm, 56-72 lb.ft)
Fig 20: Installing Camshaft Sprocket (1 Of 2)

Courtesy of KIA MOTORS AMERICA, INC.
14. Install the auto tensioner.

**CAUTION: Leave the set pin installed in the auto tensioner**

Tightening torque

Auto tensioner bolt:

19.6-26.5 Nm (2.0-2.7 kg.cm, 145-19.5 lb.ft)
NOTE: If the auto tensioner rod is in its fully extended position, reset it as follows.

1. Clamp it in the vise with soft jaws in a level position. Apply a plain washer if there is a plug at the bottom of the auto tensioner.

2. Push in the rod slowly with the vise until the set hole A in the rod is aligned with the set hole B in the cylinder.

3. Insert a wire to the set hole A and B.
15. Install the tensioner pulley onto the tensioner arm.

⚠️ **CAUTION:** Leave the wire installed in the auto tensioner.
16. Align the timing marks of the camshaft sprocket to the timing marks of the rocker cover. The dowel pin of the camshaft sprocket should be at the upper side.
NOTE:

1. The identification mark is on the camshaft sprocket.

2. Before installing timing belt, if the timing marks of camshaft sprocket and rocker cover do not coincide, do not rotate the camshaft sprocket more than 2 teeth of sprocket in any direction. Rotating sprocket more than 2 teeth allows valve and piston to touch each other.

3. In case of rotating the camshaft sprocket in avoidably more than 2 teeth, rotate the camshaft sprocket after rotating crankshaft sprocket counter clockwise on basis of timing mark.
17. Align the timing marks of each sprocket and install the timing belt in this order. Crankshaft sprocket-Oil pump sprocket-Idler pulley-Exhaust camshaft sprocket-Intake camshaft sprocket-Tensioner pulley.

NOTE:

1. In this step, No. 1 is in TDC (Compression stroke).

2. When the timing mark of oil pump sprocket is aligned, first remove the plug at left side of the cylinder block.
and insert a screwdriver to check the left counter balance shaft in position. Screwdriver used for this purpose should have a shaft 8 mm (0.3 in) in diameter which can be inserted more than 60 mm (2.36 in).

3. Install the plug at left side of the cylinder block after check timing.

Fig 27: Aligning Timing Marks

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Intake camshaft sprocket

Exhaust camshaft sprocket

Dowel pin

Rocker cover

Tensioner pulley

Idler pulley

Timing marks

Oil pump sprocket

Crankshaft sprocket

Timing mark

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Courtesy of KIA MOTORS AMERICA, INC.
18. Remove the wire from the auto tensioner.

19. Rotate the crankshaft two complete turns clockwise and leave it as is for about 5 minutes. Then, measure the auto tensioner protrusion "A" (distance between the tensioner arm and auto tensioner body) to ensure that it is up to specification. If the protrusion exceeds specification, repeat step 14-18.

Standard value: 5.5-9.0 mm (0.22-0.35 in.)
20. Install the timing belt lower cover and the timing belt upper cover.
Fig 30: Installing Timing Belt Upper & Lower Cover