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Fig. 122 TIMING CHAIN ALIGNMENT MARKS - PRIMARY

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|-----------------------------|-------------------------------|
| 1 - CAMSHAFT TIMING MARKS | 6 - CHAIN TENSIONER |
| 2 - CHAIN GUIDE | 7 - CAMSHAFT TIMING MARK |
| 3 - CRANKSHAFT TIMING MARKS | 8 - INTAKE CAMSHAFT SPROCKETS |
| 4 - CRANKSHAFT SPROCKET | 9 - CHAIN GUIDES |
| 5 - CHAIN TENSIONER ARM | 10 - WATER PUMP SPROCKET |

4. Align crankshaft sprocket timing mark to the mark on oil pump housing (Fig. 122).

NOTE: Lubricate timing chain and guides with engine oil before installation.

5. Place left side primary chain sprocket onto the chain so that the timing mark is located in-between the two (plated) timing links (Fig. 122).

6. Lower the primary chain with left side sprocket through the left cylinder head opening.

NOTE: The camshaft sprockets can be allowed to float on the camshaft hub during installation.

7. Loosely position left side camshaft sprocket over camshaft hub.
8. Align timing (plated) link to the crankshaft sprocket timing mark (Fig. 122).
9. Position primary chain onto water pump drive sprocket.
10. Align right camshaft sprocket timing mark to the timing (plated) link on the timing chain (Fig. 122) and loosely position over camshaft hub.
11. Verify that all chain timing (plated) links are properly aligned to the timing marks on all sprockets (Fig. 122).
12. Install left side lower chain guide and tensioner arm (Fig. 120). Tighten attaching bolts to 28 Nm (250 in. lbs.).

NOTE: Inspect oil ring on chain guide access plug before installing. Replace O-ring as necessary.

13. Install chain guide access plug to left side cylinder head (Fig. 120). Tighten plug to 20 Nm (15 ft. lbs.).

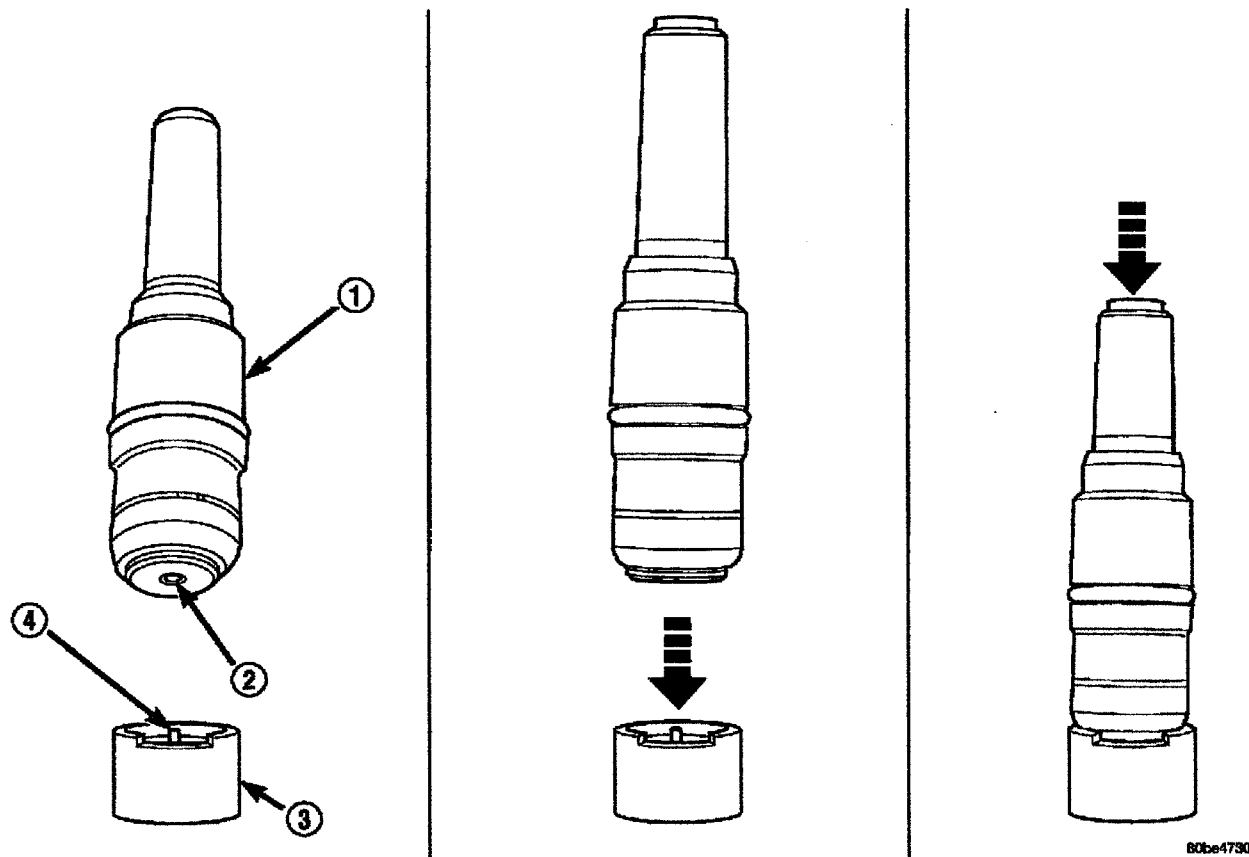


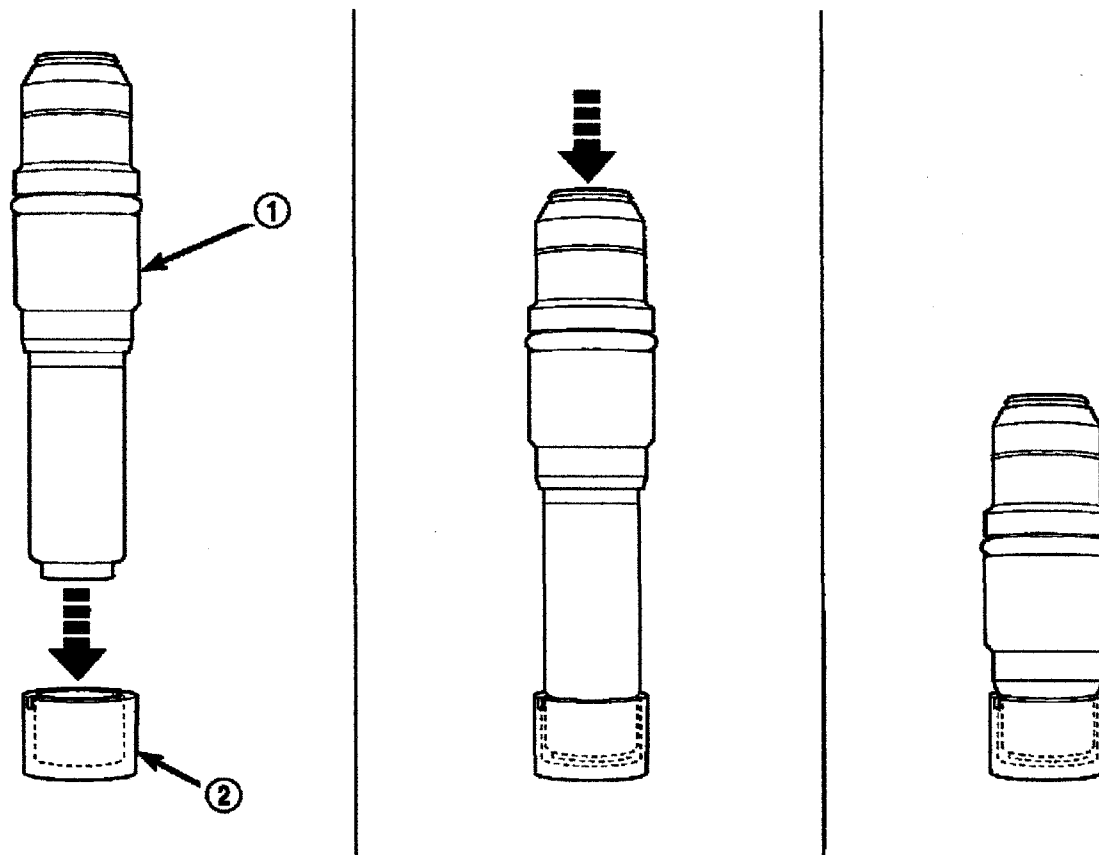
Fig. 123 TIMING CHAIN TENSIONER - OIL PURGING

1 - TENSIONER
2 - CHECK BALL

3 - SPECIAL TOOL 8186
4 - PIN

NOTE: To reset the primary timing chain tensioner, engine oil will first need to be purged from the tensioner (Fig. 123).

14. Purge oil from timing chain tensioner using the following procedure:
 - a. Place the check ball end of tensioner into the shallow end of Special Tool 8186 (Fig. 123).
 - b. Using hand pressure, slowly depress tensioner until oil is purged from tensioner (Fig. 123).
15. Reset timing chain tensioner using the following procedure:



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Fig. 124 TIMING CHAIN TENSIONER - RESETTING

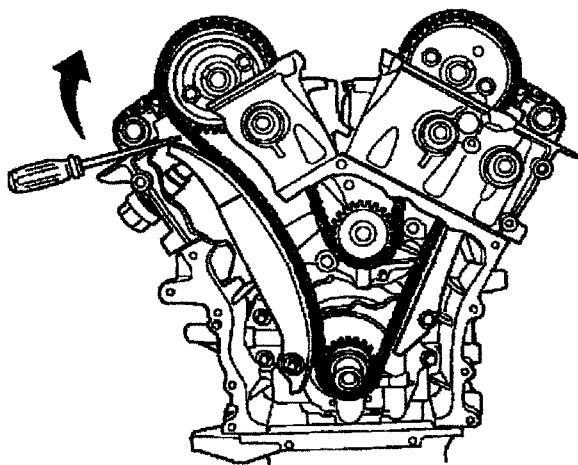
- 1 - TENSIONER
2 - SPECIAL TOOL 8186

- a. Position cylinder plunger into the deeper end of Special Tool 8186 (Fig. 124).
- b. Apply a downward force until tensioner is reset (Fig. 124).

NOTE: If oil was not first purged from the tensioner, use slight finger pressure to assist the center arm pin of Special Tool 8186 to unseat the tensioner's check ball.

CAUTION: Ensure the tensioner is properly reset. The tensioner body must bottom against the top edge of Special Tool 8186. Failure to properly perform the resetting procedure may cause tensioner jamming.

16. Install the reset chain tensioner into the right cylinder head (Fig. 119).
17. Position tensioner retaining plate and tighten bolts to 12 Nm (105 in. lbs.) (Fig. 119).
18. Starting at the right cylinder bank, first position the camshaft damper (if equipped) on camshaft hub, then insert a 3/8" square drive extension with a breaker bar into intake camshaft drive hub. Rotate camshaft until the camshaft hub aligns to the camshaft sprocket and damper attaching holes. Install the sprocket attaching bolts and tighten to 28 Nm (250 in. lbs.) (Fig. 120).
19. Turn the left side camshaft by inserting a 3/8" square drive extension with a breaker bar into intake camshaft drive hub and rotate camshaft until the sprocket attaching bolts can be installed. Tighten sprocket bolts to 28 Nm (250 in. lbs.) (Fig. 120).
20. Rotate engine slightly clockwise to remove timing chain slack, if necessary.



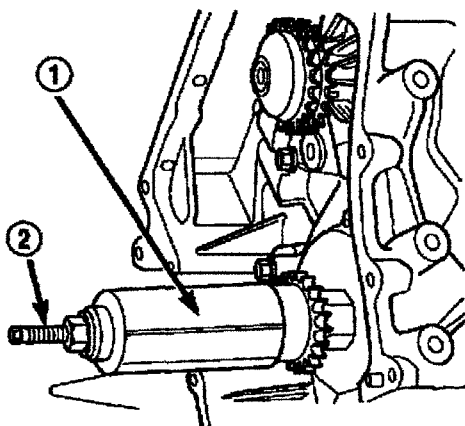
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Fig. 125 TIMING CHAIN TENSIONER ACTIVATING

21. Activate the timing chain tensioner by using a flat bladed pry tool to gently pry tensioner arm towards the tensioner slightly (Fig. 125). Then release the tensioner arm. Verify the tensioner is activated (extends).
22. Install the timing chain cover, crankshaft vibration damper, and cylinder head covers.
23. Install camshaft position sensor and connect electrical connector.
24. Install upper intake manifold.

NOTE: After installation of a reset tensioner, engine noise will occur after initial start-up. This noise will normally disappear within 5-10 seconds.

INSTALLATION - CRANKSHAFT SPROCKET



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Fig. 126 Crankshaft Sprocket - Installation

- 1 - SPECIAL TOOL 6780-1
- 2 - SPECIAL TOOL 8179

1. Install crankshaft sprocket using Special Tools 6780-1 and 8179 (Fig. 126) until sprocket bottoms against crankshaft step flange. Use care not to rotate crankshaft.

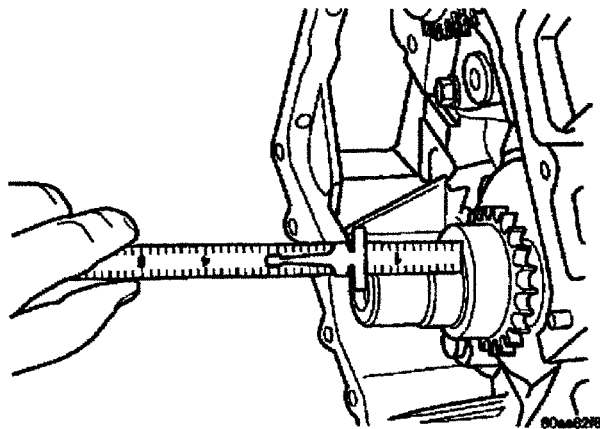


Fig. 127 Crankshaft Sprocket Depth Measurement

2. Verify that crankshaft sprocket is installed to proper depth by measuring from sprocket outer face to end of crankshaft (Fig. 127). Measurement should read: 39.05 ± 0.50 mm (1.5374 ± 0.020 inch).
3. Install primary timing chain.