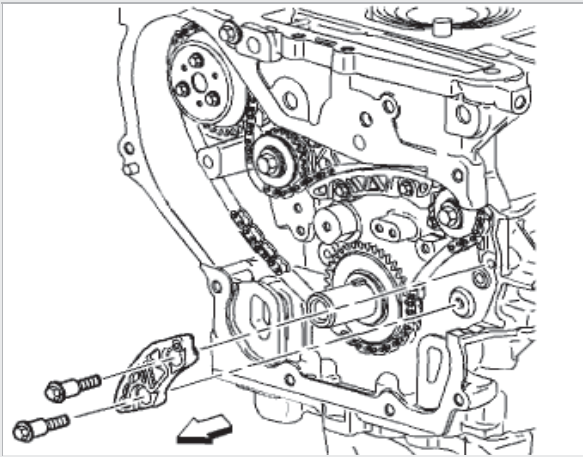


TIMING & BALANCE SHAFT KIT INSTALLATION GM & SATURN 2.2L

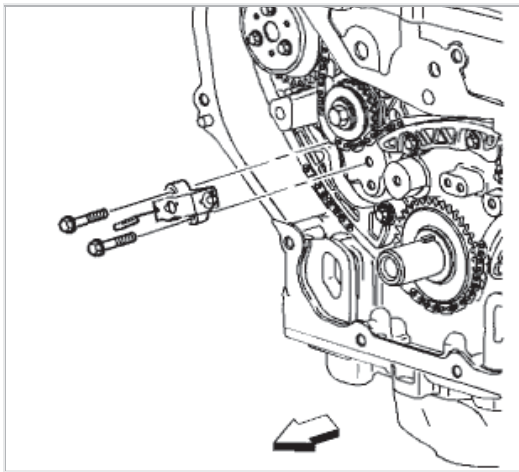
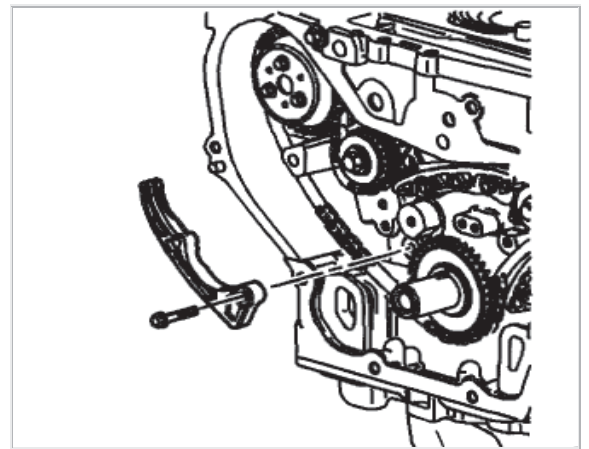


1. Install the upper balance shaft chain guide. Tighten the upper balance shaft chain guide bolts to **15 Nm (133 inch lbs.)**.

2. Install the small balance shaft chain guide.

3. Tighten the balance shaft chain guide bolts. Tighten the chain guide bolts to **10 Nm (89 inch lbs.)**.

4. Install the adjustable balance shaft drive chain guide. Tighten the chain guide bolts to **10 Nm (89 inch lbs.)**.



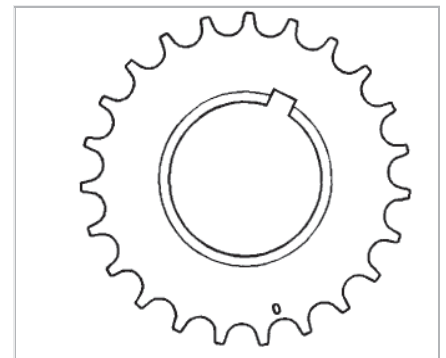
5. Install the timing chain tensioner.

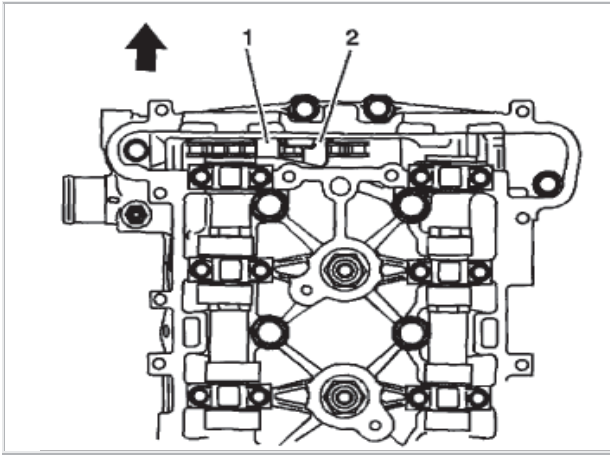
6. Tighten the chain tensioner bolts. Tighten the chain tensioner bolts to **10 Nm (89 inch lbs.)**.

7. Remove the pin from the balance shaft drive chain tensioner.

8. Install the oil nozzle and bolt. Tighten the oil nozzle bolt to **10 Nm (89 lb in.)**.

9. Install the crankshaft sprocket with timing mark at the 5 o'clock position.





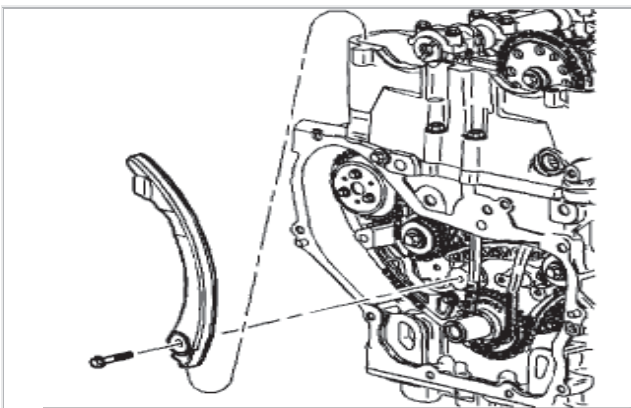
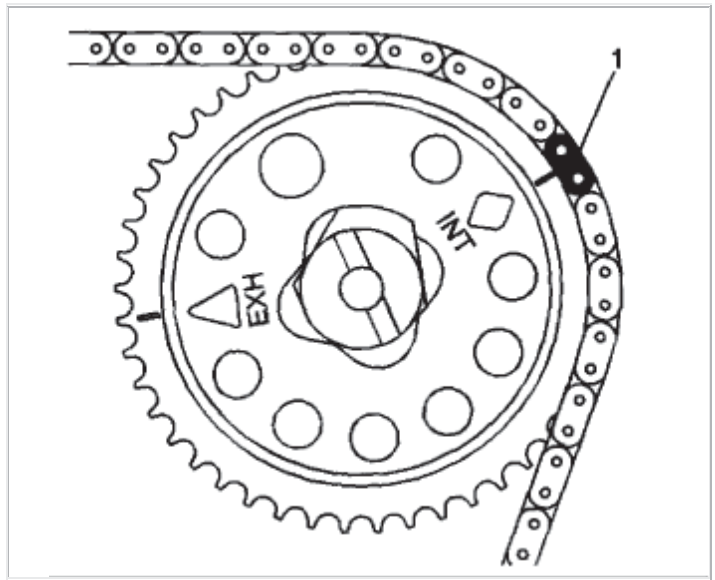
10. Lower the timing chain through the opening in the top of the cylinder head. Carefully ensure that the chain goes around both sides of the cylinder block bosses. (1,2)

11. Install the intake camshaft sprocket with the INT diamond at the 2 o'clock position.

12. Hand tighten a NEW intake camshaft sprocket bolt.

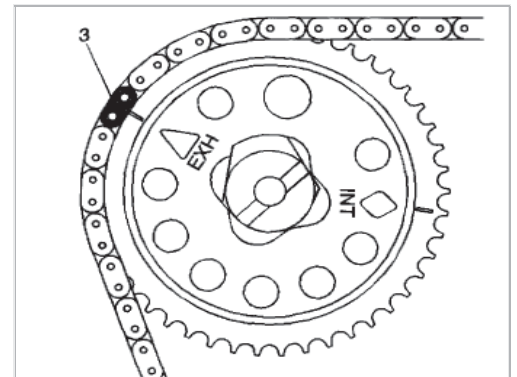
13. Route the timing chain around the crankshaft sprocket with the matching color link aligning with the timing mark.

14. Route the timing chain around the intake camshaft sprocket with the uniquely colored link (1) aligning with the INT diamond.



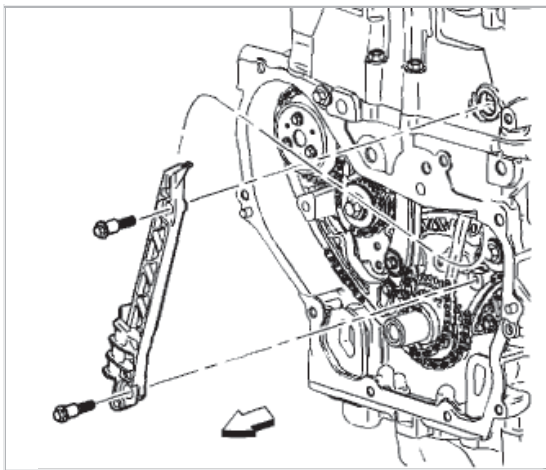
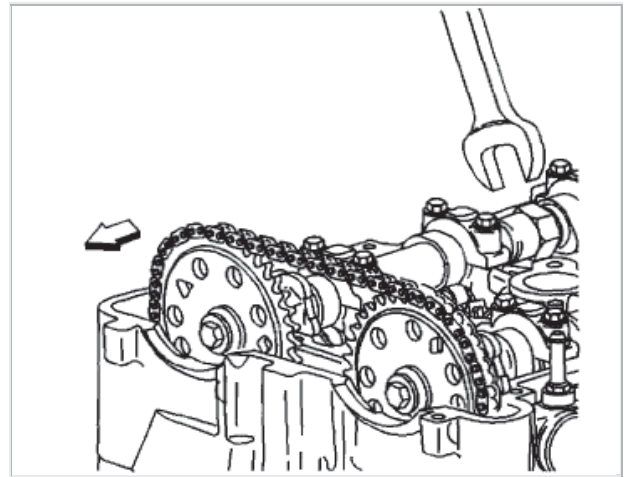
15. Install the timing chain tensioner guide through the opening in the top of the cylinder head. Tighten the timing chain tensioner guide bolt to **10 Nm (89 inch lbs.)**.

16. Install the exhaust camshaft sprocket with the timing chain silver link (3) at EXH triangle aligned at the 10 o'clock position.



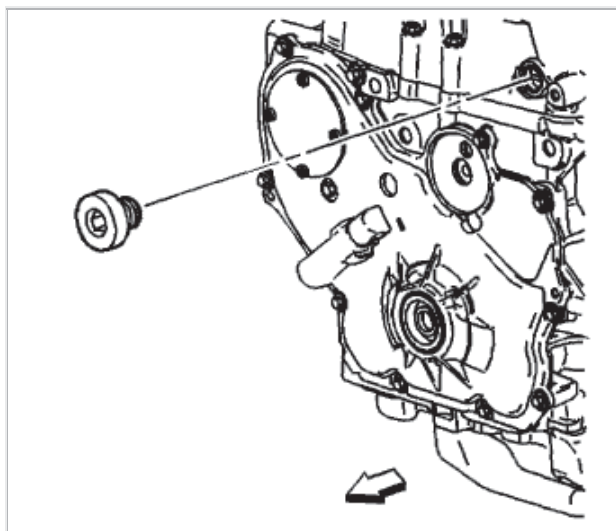
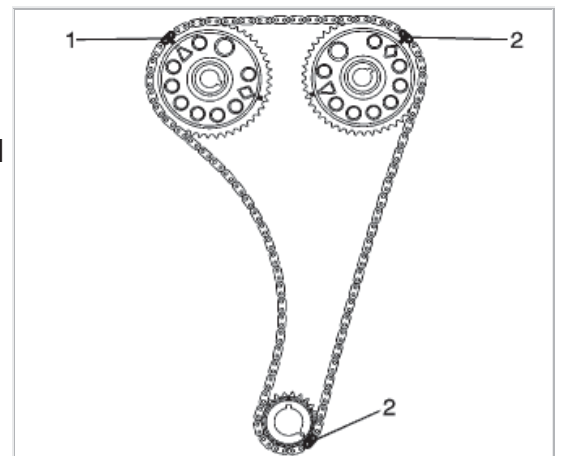
17. Use a 24 mm wrench to rotate the camshaft slightly, until exhaust sprocket aligns with the camshaft.

18. Hand tighten the NEW exhaust camshaft sprocket bolt.

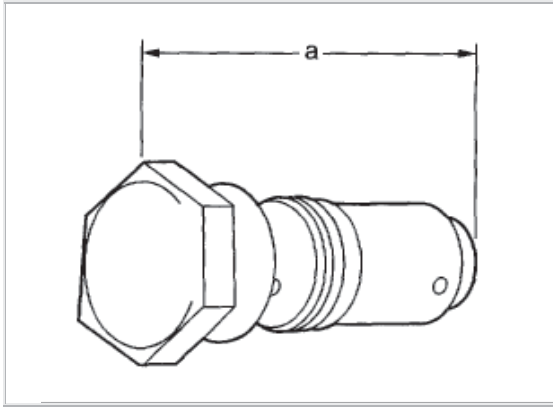


19. Install the fixed timing chain guide. Tighten the fixed timing chain bolts to **15 Nm (133 inch lbs.)**.

20. Verify that all the colored links are aligned with the appropriate exhaust (1), intake (2), and crankshaft marks (3).

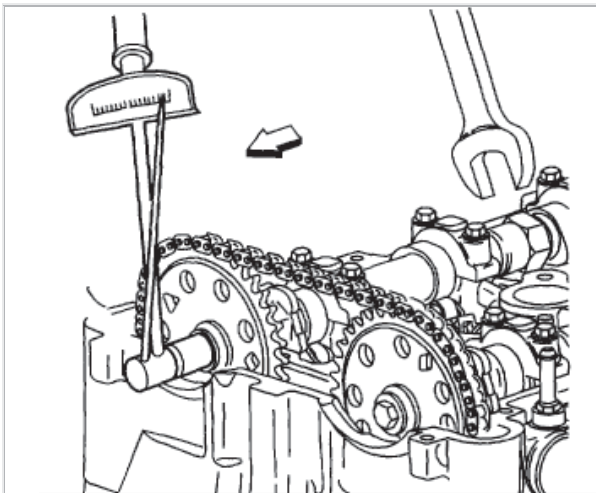
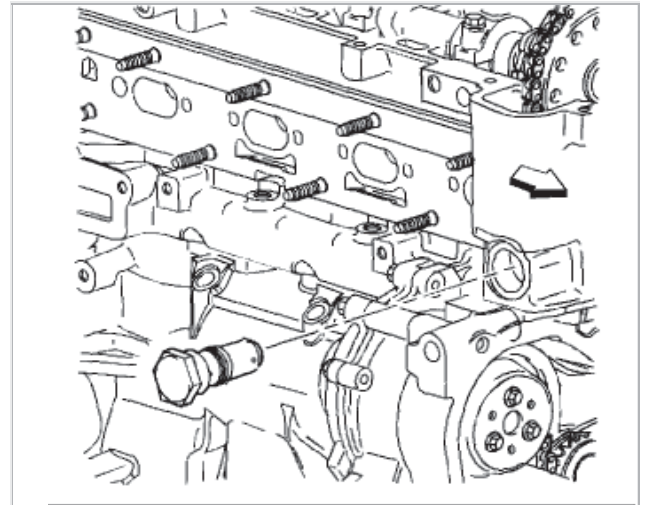


21. Apply sealant. GM P/N 12345382 (Canadian P/N 10953489) to thread and install the timing chain guide bolt access hole plug. Tighten the access hole plug to **90 Nm (66 foot lbs.)**.



22. Measure the timing chain tensioner assembly from end to end. A new tensioner should be supplied in the fully compressed non-active state. A tensioner in the compressed state will measure **72 mm (2.83 in.)** (a) from end to end. A tensioner in the active state will measure **85 mm (3.35 in.)** (a) from end to end.

23. Inspect to ensure all dirt and debris is removed from the timing chain tensioner threaded hole in the cylinder head. Install the new timing chain tensioner assembly. Tighten the timing chain tensioner to **75 Nm (55 ft. lbs.)**.



24. The timing chain tensioner is released by compressing it **2 mm (0.079 in.)** which will release the locking mechanism in the ratchet. To release the timing chain tensioner, use a suitable tool with a rubber tip on the end. Feed the tool down through the cam drive chest to rest on the cam chain. Then give a sharp jolt diagonally downwards to release the tensioner. Use a 24 mm wrench to hold the camshaft. Tighten the NEW camshaft bolt to **85 Nm (63 ft. lbs.)** plus 30 degrees.

25. Install the upper timing chain guide. Tighten the upper guide bolts to **10 Nm (89 lb in.)**.

