

25. Check the dial indicator reading and compare the reading with the values listed in Table 1-10 to determine the correct indicator reading.

Engine	DDEC Version	Model	Camshaft Part No.	Model Year	Low Injector Cam Roller Lift at TDC	High Injector Cam Roller Lift at TDC
12.7 L	III	GK	23521680	1998	5.36 mm (0.211 in.)	6.76 mm (0.266 in.)
12.7 L	IV	PK, TK	23521680	1998	5.36 mm (0.211 in.)	6.76 mm (0.266 in.)
11.1 L	IV	EK	23522199	1998	5.46 mm (0.215 in.)	6.71 mm (0.264 in.)
11.1 L	III	SK	23518717	1993-1997	4.95 mm (0.195 in.)	6.53 mm (0.257 in.)
12.7 L	III	GK	23513565	1993-1997	4.95 mm (0.195 in.)	6.53 mm (0.257 in.)
11.1 L	III	WK	23513563	1993-1997	4.95 mm (0.195 in.)	6.53 mm (0.257 in.)
11.1 L	II	WU	8929484	1986-1993	4.39 mm (0.173 in.)	5.46 mm (0.215 in.)
12.7 L	II	GU	23505194	1986-1993	4.39 mm (0.173 in.)	5.46 mm (0.215 in.)
11.1 L	IV	LK	23524655	1999	5.21 mm (0.205 in.)	6.27 mm (0.247 in.)
11.1 L	IV	LK	23524914	1999	5.21 mm (0.205 in.)	6.27 mm (0.247 in.)
12.7 L	IV	BK, MK	23524292	1999	5.03 mm (0.198 in.)	6.10 mm (0.240 in.)
12.7 L	IV	MK, BK	23524912	1999-2000	5.03 mm (0.198 in.)	6.10 mm (0.240 in.)
12.7 L	IV	MK, BK	23528309	2000-2001	6.527 mm (0.257 in.)	7.594 mm (0.299in.)
12.7 L	IV	MK	23528606	2001	5.893 mm (0.232 in.)	6.960 mm (0.274 in.)
14.0 L	IV	HK	23524912	1999-2000	5.03 mm (0.198 in.)	6.10 mm (0.240 in.)
14.0 L	IV	HK	23528309	2000-2001	6.527 mm (0.257 in.)	7.594 mm (0.299in.)
12.7 L	IV	MK_E	23531130	2002-2003	6.452 mm (0.254 in.)	7.214 mm (0.284in.)
14.0 L	IV	HK_E	23531130	2002-2003	6.452 mm (0.254 in.)	7.214 mm (0.284in.)
12.7 L	V	MV_E	23532935	2004	6.655 mm (0.262 in.)	7.214 mm (0.284in.)
14.0 L	V	HV_E	23532935	2004	6.655 mm (0.262 in.)	7.214 mm (0.284in.)

Table 1-10 Camshaft Timing Setting Dimensions

- 26. If the camshaft lift is incorrect, re-time the engine. Refer to section 1.22.2.1.
- 27. Refer to section 11.8 for verification of proper camshaft and camshaft bearing installation.

1.24.6.2 Testing of Camshaft Timing for Natural Gas Engines

Check the camshaft timing as follows:

NOTICE:

The camshaft must be in time with the crankshaft. An engine which is "out of time" may result in pre-ignition, uneven running or a loss of power.

1. Remove the valve cover. Refer to section 1.6.2 for one-piece rocker cover. Refer to section 1.6.3 for two-piece rocker cover. Refer to section 1.6.5 for three-piece rocker cover.
2. Select any cylinder for the timing check.
3. Remove the rocker arm assembly for the cylinder selected. Refer to section 1.3.2.
4. Remove the spark plug for that cylinder.
5. Carefully slide a rod, approximately 304.8 mm (12 in.) long, through the spark plug hole until the end of the rod rests on top of the piston.
6. Using the 3/4 in. square drive hole in the center of the crankshaft pulley and a 3/4 in. drive breaker bar, turn the crankshaft slowly in the direction of engine rotation. See Figure 1-407. Stop when the rod reaches the end of its upward travel.

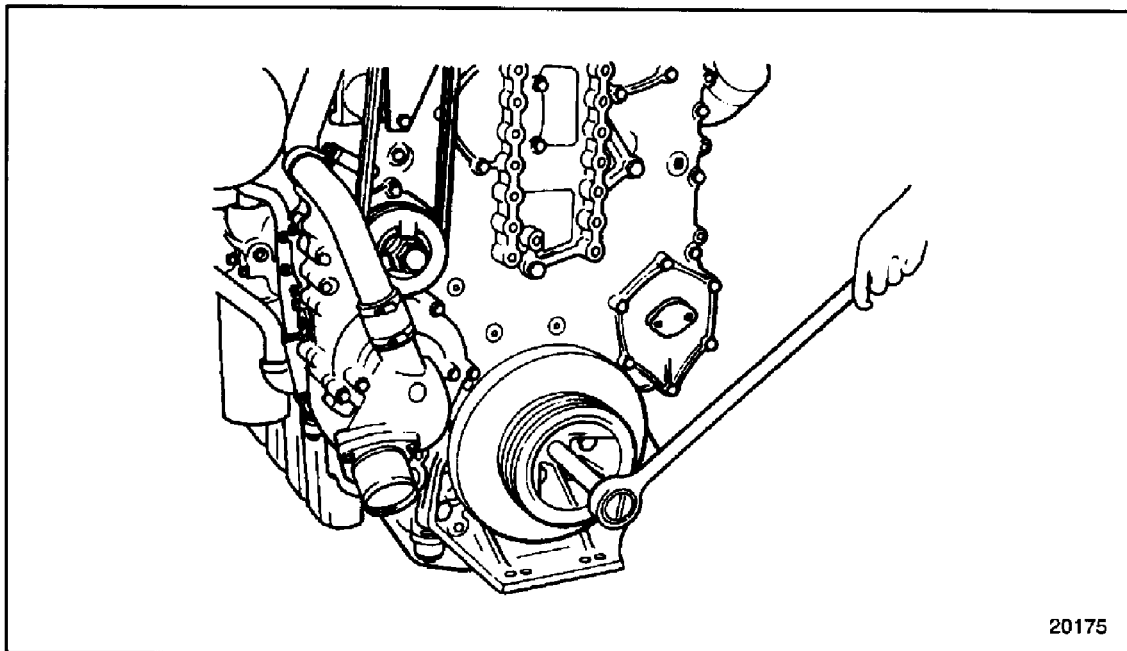


Figure 1-407 Barring Engine Over

NOTE:

The cylinder selected must be on the compression stroke when performing this check.

7. Remove the rod and turn the crankshaft, opposite the direction of rotation, between 1/16 and 1/8 of a turn.
8. Select a dial indicator with 0.0254 mm (0.001 in.) graduations and a spindle movement of at least 25.4 mm (1 in.). Provide an extension for the indicator spindle. The extension must be long enough to contact the piston just before it reaches the end of its upward stroke.
9. Install a magnetic dial indicator base in a suitable place on the cylinder head and position the dial indicator over the spark plug hole.
10. Attach a suitable pointer to the gear case cover. The outer end of the pointer should extend over the vibration damper.
11. Turn the crankshaft slowly in the direction of engine rotation until the indicator hand just stops moving. Continue turning the crankshaft until the indicator hand starts to move again.
12. Reset the dial to zero.
13. Turn the crankshaft until the indicator reading is 0.254 mm (0.010 in.).
14. Scribe a line on the vibration damper in line with the end of the pointer.
15. Slowly turn the crankshaft opposite the direction of engine rotation until the indicator hand just stops moving. Continue turning the crankshaft until the indicator hand starts to move again.
16. Reset the dial to zero. Then turn the crankshaft in the same direction until the indicator reading is 0.254 mm (0.010 in.).
17. Scribe a second line on the vibration damper in line with the end of the pointer.
18. Scribe a third line half way between the first two lines. This is top dead center for the cylinder selected when the pointer is lined up with it.
19. Remove the dial indicator and base from the engine.
20. Install the spark plug that was removed.
21. Install the rocker arm assemblies. Refer to section 1.3.3.
22. Turn the crankshaft opposite the direction of engine rotation while watching the intake rocker arm cam follower for the cylinder selected. Turn the crankshaft until the cam follower is on the base circle of that intake lobe of the cam.
23. Install a magnetic dial indicator base on the cylinder head. Install a dial indicator so that the spindle rests directly on the intake cam follower roller for the cylinder selected.

NOTE:

The spindle should be on the center line of the intake cam follower roller pin in order to get an accurate measurement of cam lift.

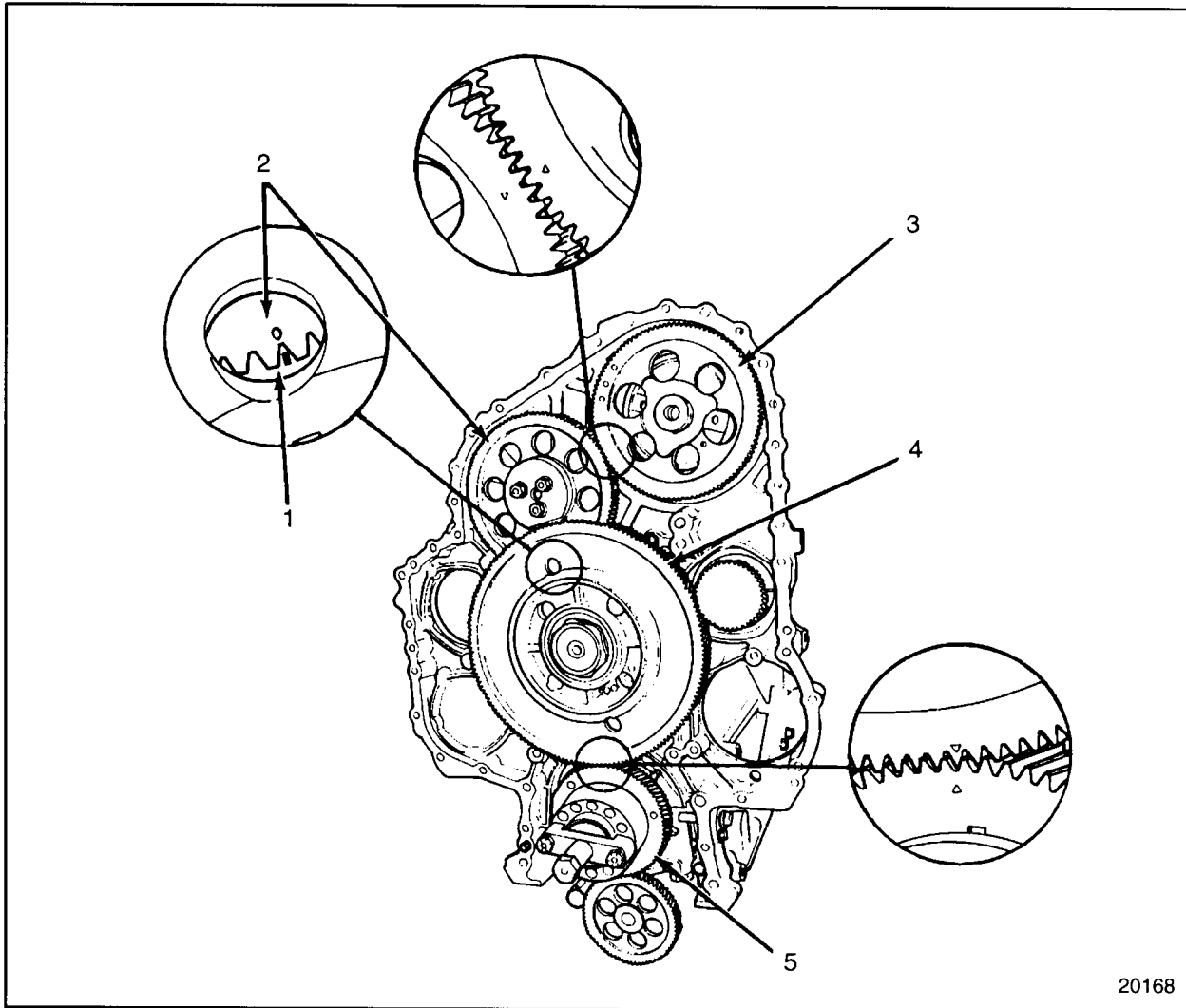
24. Turn the crankshaft slowly, in the direction of engine rotation, until the center mark on the vibration damper lines up with the pointer.
25. Check the dial indicator reading:

- [a] The dial indicator reading for gas engines is 6.47 mm-7.54 mm (0.255 in. -0.297 in.).
26. If the camshaft lift is incorrect, re-time the engine. Refer to section 1.22.2.1.
 27. Refer to section 11.8 for verification of proper camshaft and camshaft bearing installation.

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1.25 CAMSHAFT DRIVE GEAR

The camshaft drive gear, located at the front of the engine, under the gear case cover, is driven by the crankshaft through a series of intermediate gears. See Figure 1-408.



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|---------------------------|----------------------------|
| 1. Idler Gear, Camshaft | 4. Bull Gear |
| 2. Idler Gear, Adjustable | 5. Timing Gear, Crankshaft |
| 3. Drive Gear, Camshaft | |

Figure 1-408 Engine Gear Train and Timing Marks