



## REMOVAL & INSTALLATION

### VG30i Engine

1. Disconnect the negative battery cable.
2. Remove the upper and lower timing belt covers.
3. Turn the crankshaft so that the No. 1 cylinder is at TDC of the compression stroke.
4. Using chalk or paint, mark the relationship of the timing belt to the camshaft and crankshaft sprockets; also, mark the timing belt's direction of rotation.

Fig. 1: Loosen the timing belt tensioner bolt

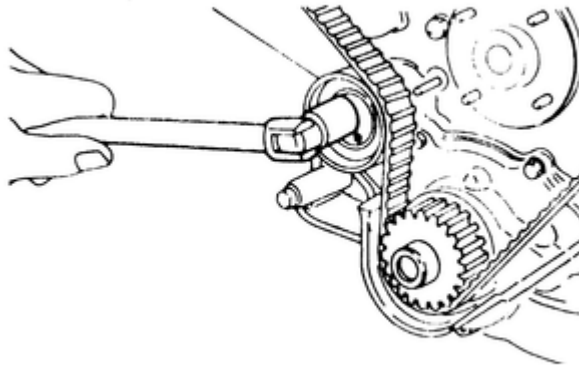


Fig. 2: Make sure that everything is properly aligned before removing the timing belt — 6-cylinder engines

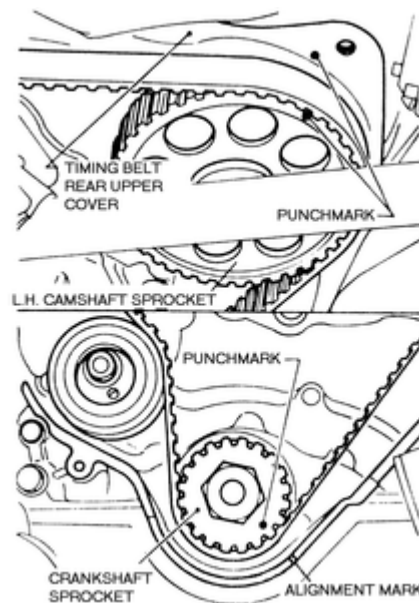


Fig. 3: Timing belt inspection





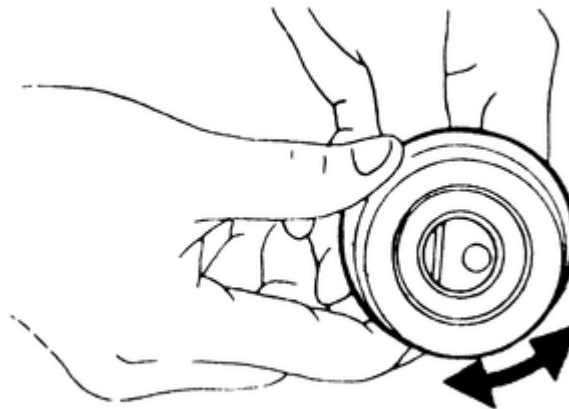
Item to check	Problem	Cause
Teeth is broken/ teeth root is cracked.		<ul style="list-style-type: none"> <li>Camshaft jamming</li> <li>Distributor jamming</li> <li>Damaged camshaft/crankshaft oil seal</li> </ul>
Back surface is cracked/bloom.		<ul style="list-style-type: none"> <li>Tensioner jamming</li> <li>Overheated engine</li> <li>Interference with belt cover</li> </ul>
Side surface is worn.	 <ul style="list-style-type: none"> <li>Belt corners are worn and round.</li> <li>Wicks are frayed and coming out.</li> </ul>	<ul style="list-style-type: none"> <li>Improper installation of belt</li> <li>Malfunctioning crankshaft pulley plate/ timing belt plate</li> </ul>
Teeth are worn.	 Rotating direction <ul style="list-style-type: none"> <li>Carves on tooth face is worn down.</li> <li>Carves on tooth is fluffly, rubber layer is worn down and faded white, or well is worn down and obsolete.</li> </ul>	<ul style="list-style-type: none"> <li>Poor belt cover sealing</li> <li>Coolant leakage at water pump</li> <li>Camshaft not functioning properly</li> <li>Distributor not functioning properly</li> <li>Excessive belt tension</li> </ul>
Oil/Coolant or water is stuck to belt:		<ul style="list-style-type: none"> <li>Poor oil sealing of each oil seal</li> <li>Coolant leakage at water pump</li> <li>Poor belt cover sealing</li> </ul>

Fig. 4: Check the condition of the timing belt tensioner spring



- Loosen the timing belt tensioner and return spring, then remove the timing belt.

**NOTE:** Before installing the timing belt, confirm that the No. 1 cylinder is set at TDC of the compression stroke.

**To install:**

- Remove both cylinder head covers and loosen all rocker arm shaft retaining bolts.

**NOTE:** The rocker arm shaft bolts **MUST** be loosened so that the correct belt tension can be obtained.

- Install the tensioner and the return spring. Using a hexagon wrench, turn the tensioner clockwise, then temporarily tighten the lock-nut.
- Make sure that the timing belt is clean and free from oil or water, before installation.
- Install the timing belt. Align the white lines on the belt with the punchmarks on the camshaft and crankshaft sprockets. Be sure to have the arrow on the timing belt pointing toward the front belt covers.

**NOTE:** A good way (although rather tedious) to check for proper timing belt installation is to

**count the number of belt teeth between the timing marks. There are 133 teeth on the belt; there should be 40 teeth between the timing marks on the left and right-side camshaft sprockets, and 43 teeth between the timing marks on the left-side camshaft sprocket and the crankshaft sprocket.**

10. While keeping the tensioner steady, loosen the lock-nut with a hexagon wrench.
11. Turn the tension approximately 70–80 degrees clockwise with the wrench, then tighten the lock-nut.
12. Turn the crankshaft in a clockwise direction several times, then slowly set the No. 1 piston to TDC of the compression stroke.
13. Apply 22 lbs. (10 kg) of pressure (push it in) to the center span of the timing belt between the right-side camshaft sprocket and the tensioner pulley, then loosen the tensioner lock-nut.
14. Using a 0.0138 in. (0.35mm) feeler gauge (the actual width of the blade must be 1/2 in. or 12.7mm thick), positioned as shown in the illustration, slowly turn the crankshaft clockwise. The timing belt should move approximately 2 1/2 teeth. Tighten the tensioner lock-nut, then turn the crankshaft slightly and remove the feeler gauge.
15. Slowly rotate the crankshaft clockwise several more times, then set the No. 1 piston to TDC of the compression stroke; recheck all alignment marks.
16. Install the upper and lower timing belt covers.
17. Connect the negative battery cable.

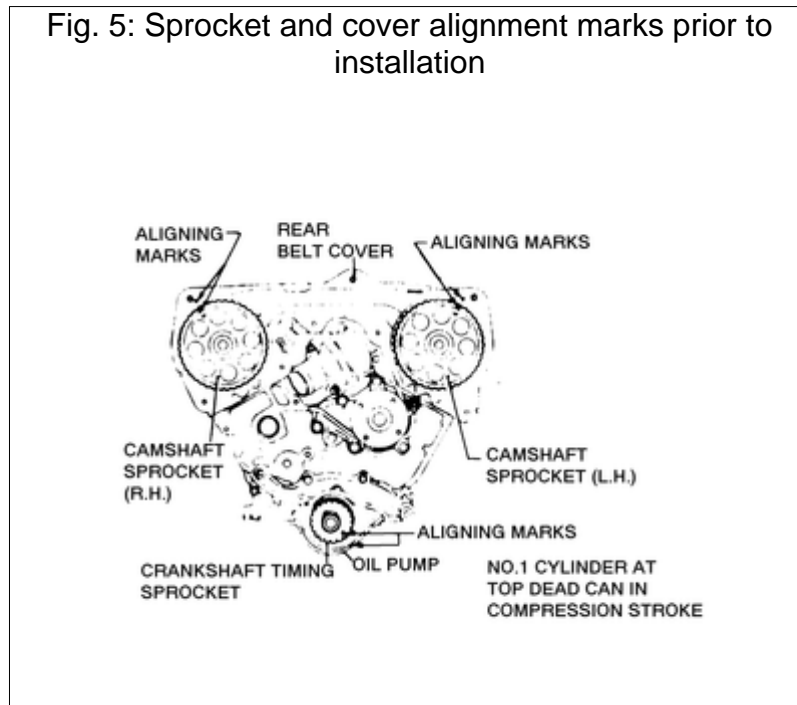


Fig. 6: Installing the timing belt tensioner and spring



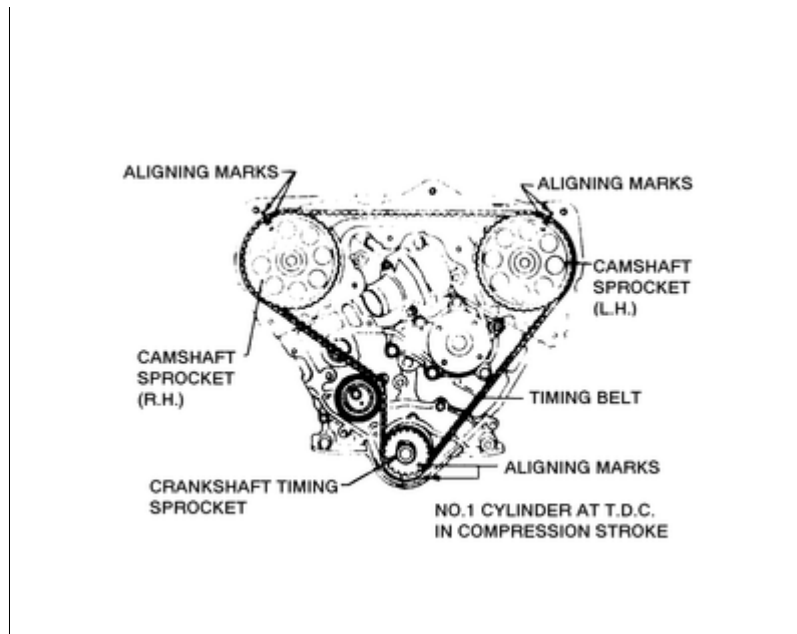


Fig. 9: Turn the tensioner 70–80° clockwise and then tighten it again

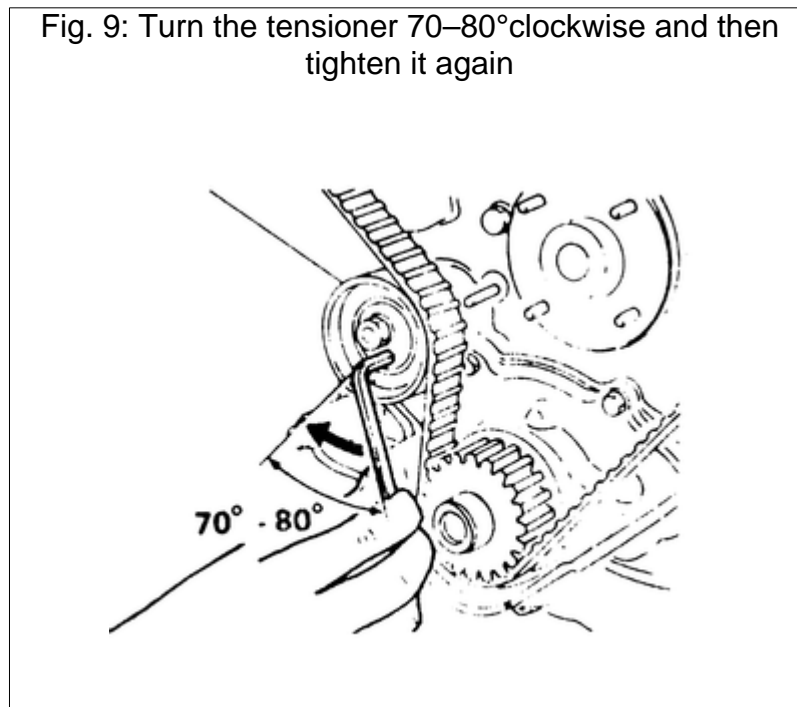


Fig. 10: Checking for proper tension on the timing belt span

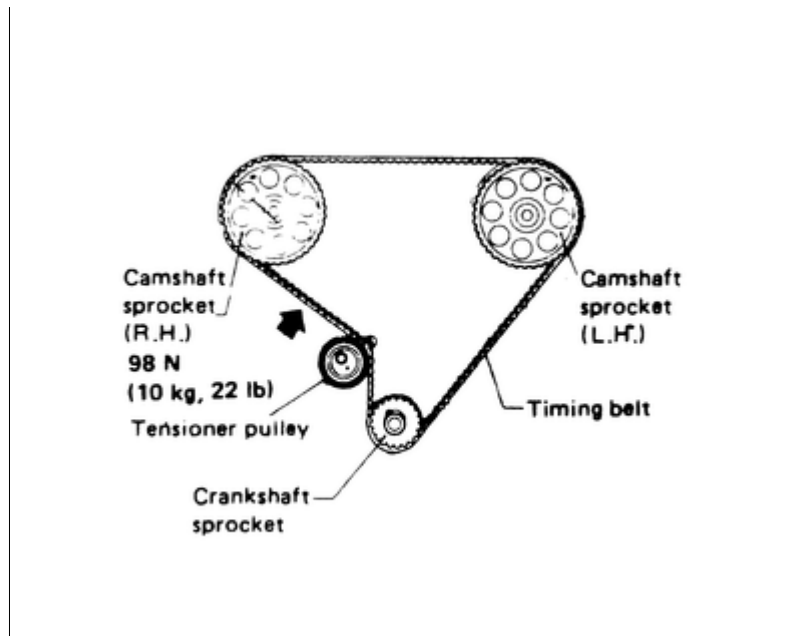


Fig. 11: Checking the timing belt tensioner

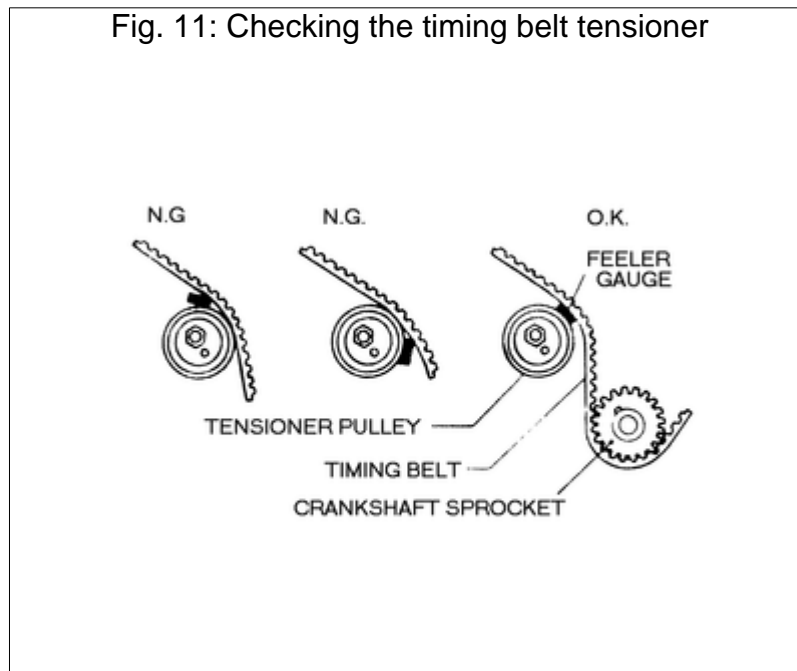


Fig. 12: Checking the timing belt slack

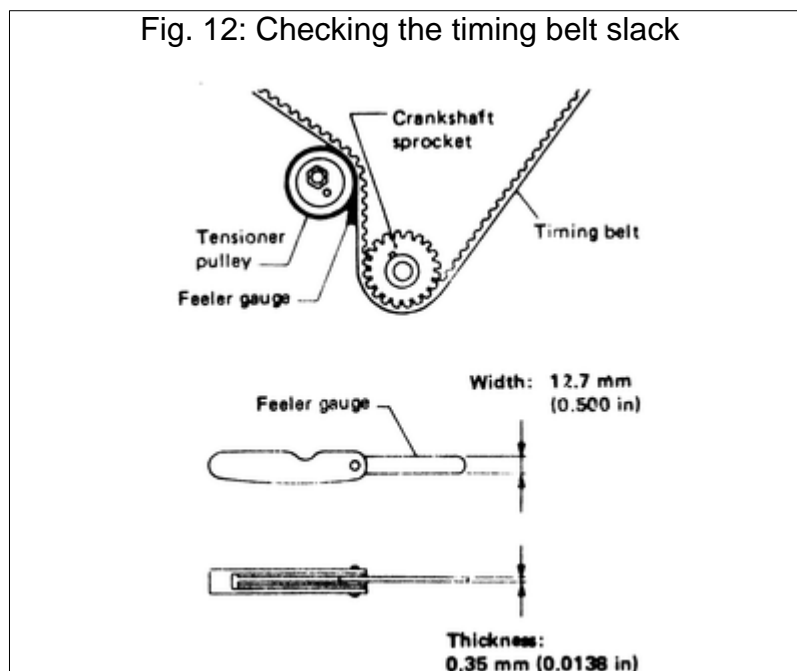
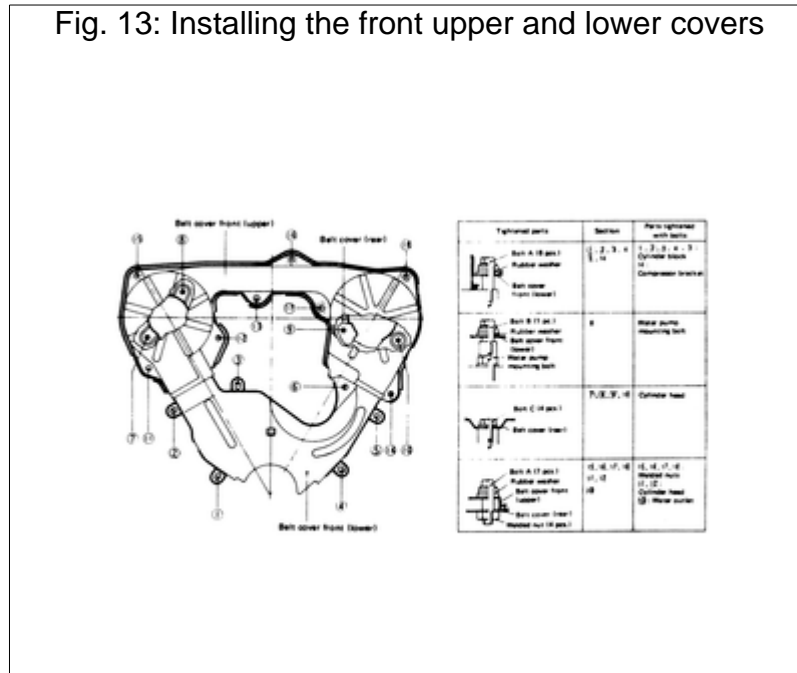


Fig. 13: Installing the front upper and lower covers



## VG30E Engine

1. Disconnect the negative battery cable. Remove the engine under cover.
2. Remove the radiator shroud, the fan and the pulleys.
3. Drain the coolant from the radiator and disconnect the water pump hose.
4. Remove the radiator.
5. Remove the power steering, A/C compressor and alternator drive belts.
6. Remove the spark plugs.
7. Remove the distributor protector (dust shield).
8. Remove the A/C compressor drive belt idler pulley and bracket.
9. Remove the fresh air intake tube at the cylinder head cover.
10. Disconnect the radiator hose at the thermostat housing.
11. Unfasten the crankshaft pulley bolt, then remove the pulley with a suitable puller.

Fig. 14: If a belt is to be reused, matchmark it to the pulleys before removal



Fig. 15: Release the timing belt tensioner assembly



Fig. 16: Note the proper belt routing during removal



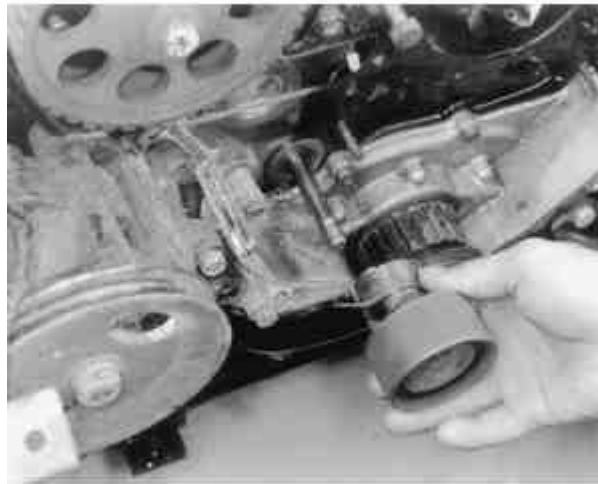
Fig. 17: Removing the water pump mounting bolts



Fig. 18: Removing the water pump assembly



Fig. 19: Removing the timing belt tensioner assembly



12. Unfasten the bolts, then remove the front upper and lower timing belt covers.
13. Set the No. 1 piston at TDC of its compression stroke. Align the punchmark on the left camshaft sprocket with the punchmark on the timing belt upper rear cover. Align the punchmark on the crankshaft sprocket with the notch on the oil pump housing. Temporarily install the crank pulley bolt so the crankshaft can be rotated if necessary.
14. Loosen the timing belt tensioner and return spring, then remove the timing belt.

**To install:**

**NOTE: Before installing the timing belt, confirm that the No. 1 cylinder is set at TDC of the compression stroke.**

15. Remove both cylinder head covers and loosen all rocker arm shaft retaining bolts.

**NOTE: The rocker arm shaft bolts MUST be loosened so that the correct belt tension can be obtained.**

16. Install the tensioner and the return spring. Using a hexagon wrench, turn the tensioner clockwise, then temporarily tighten the lock-nut.

17. Make sure that the timing belt is clean and free from oil or water.
18. When installing the timing belt, align the white lines on the belt with the punchmarks on the camshaft and crankshaft sprockets. Be sure to have the arrow on the timing belt pointing toward the front belt covers.

**NOTE: A good way (although rather tedious) to check for proper timing belt installation is to count the number of belt teeth between the timing marks. There are 133 teeth on the belt; there should be 40 teeth between the timing marks on the left and right-side camshaft sprockets, and 43 teeth between the timing marks on the left-side camshaft sprocket and the crankshaft sprocket.**

19. While keeping the tensioner steady, loosen the lock-nut with a hexagon wrench.
20. Turn the tension approximately 70–80 degrees clockwise with the wrench, then tighten the lock-nut.
21. Turn the crankshaft in a clockwise direction several times, then slowly set the No. 1 piston to TDC of the compression stroke.
22. Apply 22 lbs. (10 kg) of pressure (push it in) to the center span of the timing belt between the right-side camshaft sprocket and the tensioner pulley, then loosen the tensioner lock-nut.
23. Using a 0.0138 in. (0.35mm) feeler gauge (the actual width of the blade must be 1/2 in. or 12.7mm thick) positioned as shown in the illustration, turn the crankshaft clockwise slowly. The timing belt should move approximately 2 1/2 teeth. Tighten the tensioner lock-nut, then turn the crankshaft slightly and remove the feeler gauge.
24. Slowly rotate the crankshaft clockwise several more times, then set the No. 1 piston to TDC of the compression stroke; recheck all alignment marks.
25. Position the two timing covers on the block and then tighten the mounting bolts to 2–4 ft. lbs. (3–5 Nm).
26. Press the crankshaft pulley onto the shaft, then tighten the bolt to 90–98 ft. lbs. (123–132 Nm).
27. Connect the radiator hose to the thermostat housing.
28. Reconnect the fresh air intake tube at the cylinder head cover.
29. Install the A/C compressor drive belt idler pulley and bracket.
30. Install the distributor protector (dust shield).
31. Install the spark plugs.
32. Install the power steering, A/C compressor and alternator drive belts.
33. Install the radiator.
34. Reconnect the water pump hose.
35. Install the fan shroud and pulleys.
36. Connect the negative battery cable and refill the engine with coolant (bleed the cooling system).
37. Run the engine and check for any leaks.
38. Install the engine under cover.

