

D - ADJUSTMENTS

1994 Volvo 960

1994 ENGINE PERFORMANCE
Volvo On-Vehicle Adjustments

Volvo; 850, 940, 960

ENGINE COMPRESSION

Warm engine to normal operating temperature. Disconnect single wire from negative terminal of ignition coil(s). Check compression with all spark plugs removed, throttle valve wide open and at normal cranking speed (250-300 RPM).

CAUTION: Failure to disconnect ignition coil negative terminal may cause damage to ignition system control unit(s).

COMPRESSION SPECIFICATIONS TABLE

Application	Specification
Compression Ratio	
850	
Non-Turbo	10.5:1
Turbo	8.5:1
940	
Non-Turbo	9.8:1
Turbo	8.7:1
960	10.7:1

VALVE CLEARANCE

NOTE: 850 and 960 use hydraulic lifters. No adjustment is required.

940

1) Remove valve cover. Turn crankshaft center bolt until camshaft is in position for firing cylinder No. 1 (TDC). Both cam lobes should point up at equally large angles. Pulley timing mark should be at zero degree mark.

2) Using a feeler gauge, check valve clearance of cylinder No. 1 between camshaft lobe and adjusting discs. Intake and exhaust valves have same clearance.

3) If clearances are incorrect, adjust by changing thickness of disc(s). Discs are available in .002" (.05 mm) increments in .13-.18" (3.30-4.50 mm) range. Install disc with markings facing down. Use Valve Depressor (5022) and Pliers (5026) to depress and remove disc(s).

4) After valves for cylinder No. 1 are properly adjusted, rotate crankshaft to firing position for cylinders No. 3, 4 and 2 in sequence and repeat procedure. Install valve cover.

VALVE CLEARANCE SPECIFICATIONS TABLE (940)

Application	In. (mm)
Cold	
When Checking010-.018 (.25-.45)
When Setting014-.016 (.35-.40)
Warm	
When Checking012-.020 (.30-.50)

When Setting016-.018 (.40-.45)

IGNITION TIMING

Ignition timing is computer-controlled and is not adjustable.

IGNITION TIMING TABLE (Degrees BTDC @ RPM)

Application	(1) Timing
850	
Non-Turbo	10 @ 800
Turbo	4-8 @ 850
940	12 @ 725-825
960	5 @ 750

(1) - Ignition timing is computer-controlled and is not adjustable.

IDLE SPEED & MIXTURE

NOTE: Cold (fast) idle is computer-controlled. Basic idle speed for 850 and 960 is not adjustable.

Basic Idle Speed (940)

1) Ground Red/White wire in 2-wire test lead. See Fig. 1. Test lead is located on right side of master cylinder. Grounding wire will set air valve wide open.

2) Use air bleed knob located under throttle body to set basic idle speed. See IDLE SPEED & CO LEVEL table. Disconnect ground wire from test lead. Engine speed should increase.

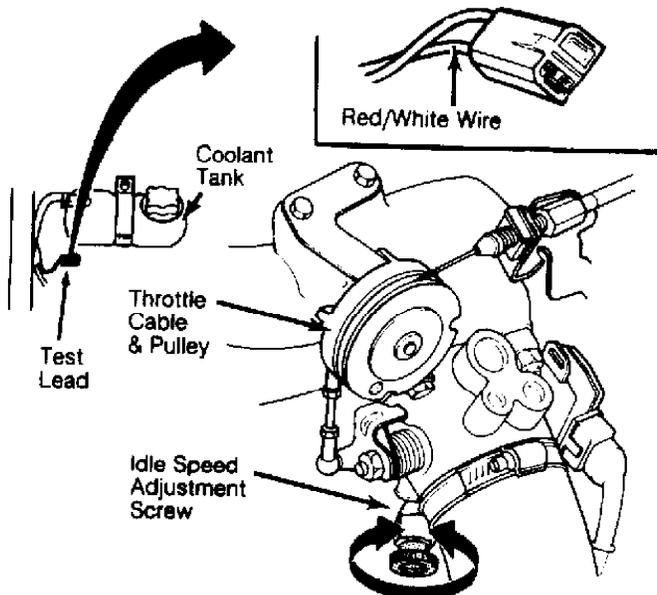


Fig. 1: Adjusting Basic Idle Speed (940)
Courtesy of Volvo Cars of North America.

IDLE SPEED & CO LEVEL

IDLE SPEED & CO LEVEL TABLE

Application	Idle RPM	(1) CO Level
850		
Non-Turbo		
Cooling Fan On	800	0.6%
Cooling Fan Off	825	0.6%
Turbo	85020-1.0%
940		
Non-Turbo	775	0.6%
Turbo	750	0.6%
960	750	0.6%

(1) - CO level is measured before catalytic converter.

NOTE: Idle mixture adjustment is not a normal tune-up procedure. It should not be performed unless mixture control unit is replaced or vehicle fails emissions testing. On some 940 models, idle mixture may not be adjustable. On 850 and 960, idle mixture is not adjustable.

Idle Mixture (940)

1) Warm engine to normal operating temperature. Check idle speed and ignition timing. Disconnect oxygen sensor. Check CO level. See IDLE SPEED & CO LEVEL table.

2) If CO level is incorrect, turn off engine. Drill two 5/16" holes in adjustment plug. Pull out plug using snap ring pliers. Start engine, and adjust CO level.

3) Turning screw counterclockwise decreases CO level. See Fig. 2. Turning screw clockwise increases level. When adjustment is completed, reconnect oxygen sensor lead and remove test equipment. Seal idle mixture screw using a new plug.

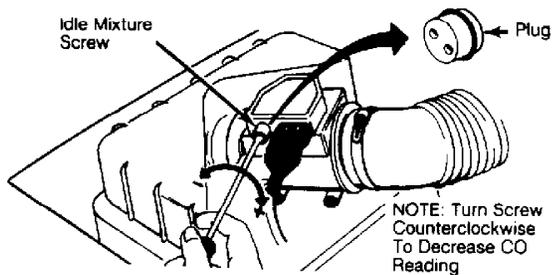


Fig. 2: Adjusting Idle Mixture (940)
 Courtesy of Volvo Cars of North America.

THROTTLE CONTROLS

THROTTLE SWITCH

NOTE: 850 and 960 throttle switch is not adjustable.

Checking (940)

Open throttle slightly and listen for a click. Click indicates throttle switch opens.

Adjusting (940)

Ensure throttle valve is closed. Loosen TPS retaining screws. Turn TPS switch clockwise slightly. Turn TPS switch back again until a click is heard. Tighten retaining screws. Recheck setting. Open throttle slightly, a click should be heard. Click indicates switch is activating.

THROTTLE LINK ROD

940

Install a .004" (.10 mm) feeler gauge between throttle pulley and idle stop. See Fig. 3. Ensure distance between throttle lever and adjustment screw is .004" (.10 mm). If measurement is not within specification, adjust link rod.

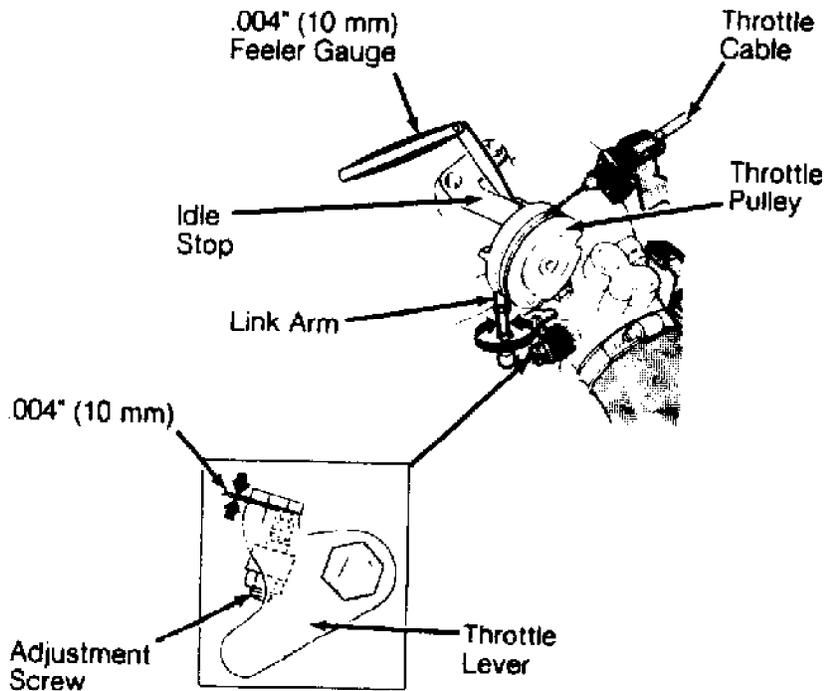


Fig. 3: Adjusting Throttle Link Rod (940)
Courtesy of Volvo Cars of North America.

850 (Non-Turbo)

1) Mount link rod on throttle housing with "L" mark on rod at

housing end and "R" mark on pulley end. Put a .10" (2.5 mm) feeler gauge at pulley stop. See Fig. 4. Turn middle of rod until clearance between lever and adjusting screw is .012" (.30 mm). Ensure rod does not turn and tighten lock nuts.

2) Recheck clearance. Ensure a .020" (.50 mm) feeler gauge cannot be inserted between lever and adjusting screw. Ensure a .004" (.10 mm) feeler gauge can be inserted between lever and adjusting screw. If clearance is not correct, repeat step 1).

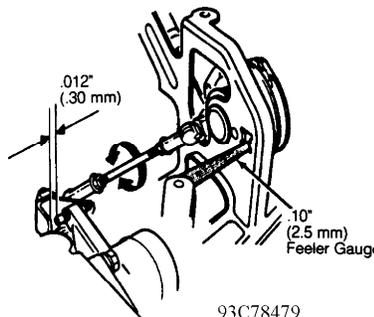


Fig. 4: Adjusting Throttle Link Rod (850 Non-Turbo)
Courtesy of Volvo Cars of North America.

850 (Turbo)

1) Loosen throttle link lock nut so link is separated and can spring back easily to its innermost position. Mount link in position.

NOTE: Lubricate link with petroleum jelly if needed.

2) Attach link end with ball and lock nut to throttle spindle. Ensure throttle spindle is in contact with adjusting screw "B" and pulley is seated against idle stop "C". Tighten link lock nut "A". Rotate pulley to ensure link seats against adjusting screw "B" before pulley seats against idle stop "C". See Fig. 5.

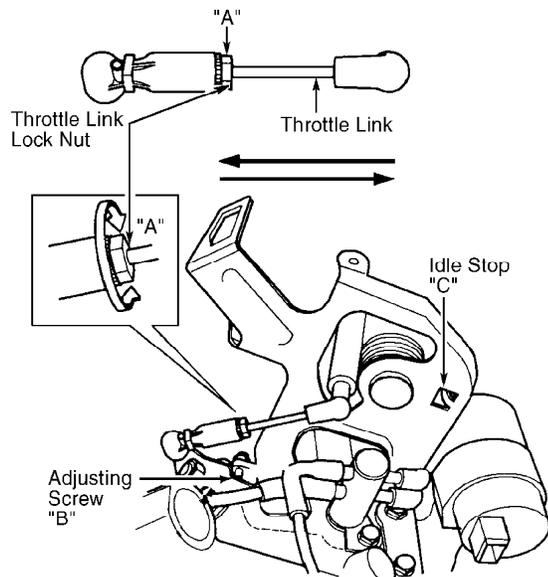


Fig. 5: Adjusting Throttle Link Rod (850 Turbo)
Courtesy of Volvo Cars of North America.

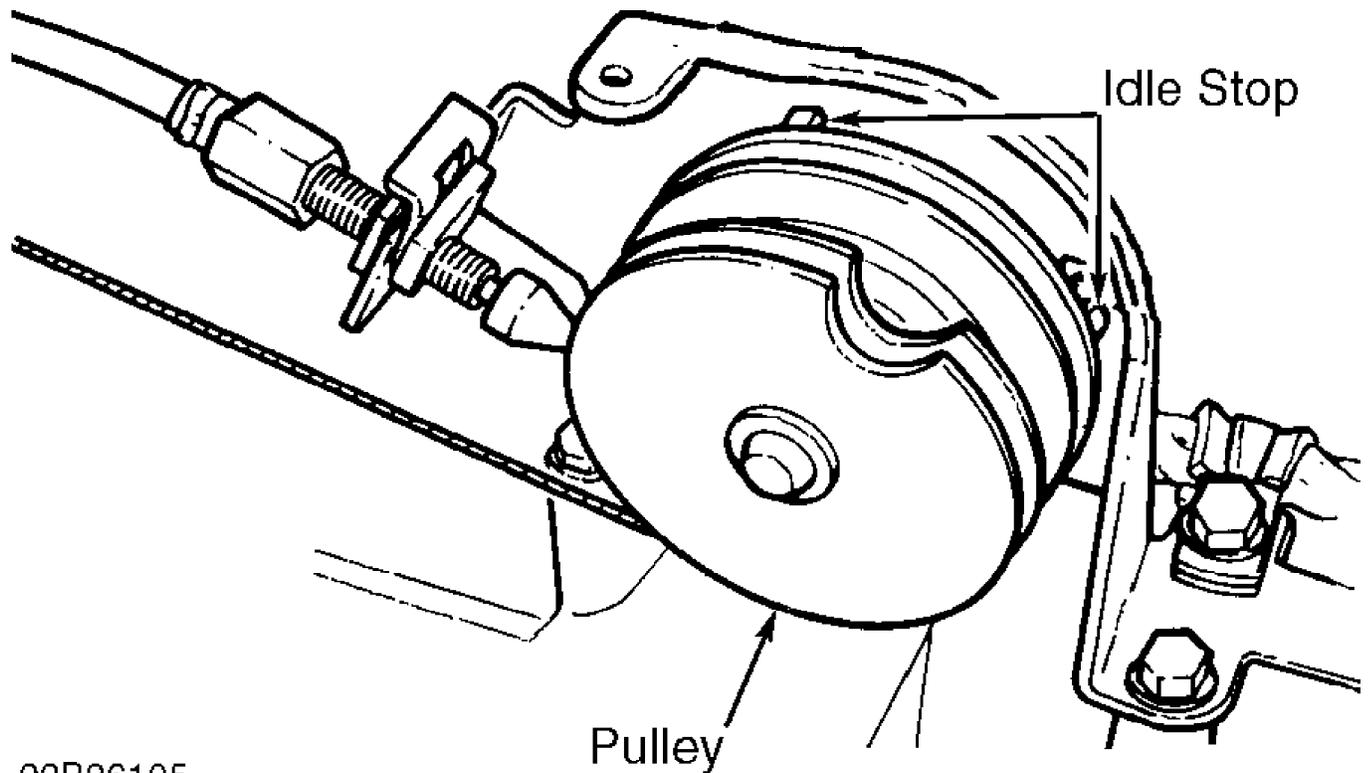
THROTTLE CABLE

940

Throttle pulley should contact idle stop in idle position. Cable should be taut but not affect position of throttle pulley. At full throttle, pulley should contact full throttle stop. Adjust throttle cable as required if it is out of adjustment. See Fig. 3.

850 & 960

Throttle pulley should move freely without sticking. Cable should be taut in idling position, without altering pulley position. Pulley should rest against idle stop. See Fig. 6. Adjust cable as necessary. Press accelerator pedal to floor, and ensure pulley reaches full-load stop.



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Fig. 6: Adjusting Throttle Cable (960 Shown; 850 Is Similar)
Courtesy of Volvo Cars of North America.

KICKDOWN CABLE

NOTE: Depress accelerator pedal. DO NOT turn throttle pulley by hand or adjustment will be incorrect.

On 940, fully depress accelerator pedal. At full throttle, distance between cable stop and cable casing should be 1.98-2.07" (50.4-52.6 mm). See Fig. 7. On 960, adjust cable until it is just pulled gently tight. Adjust kickdown cable if it is not within specification.

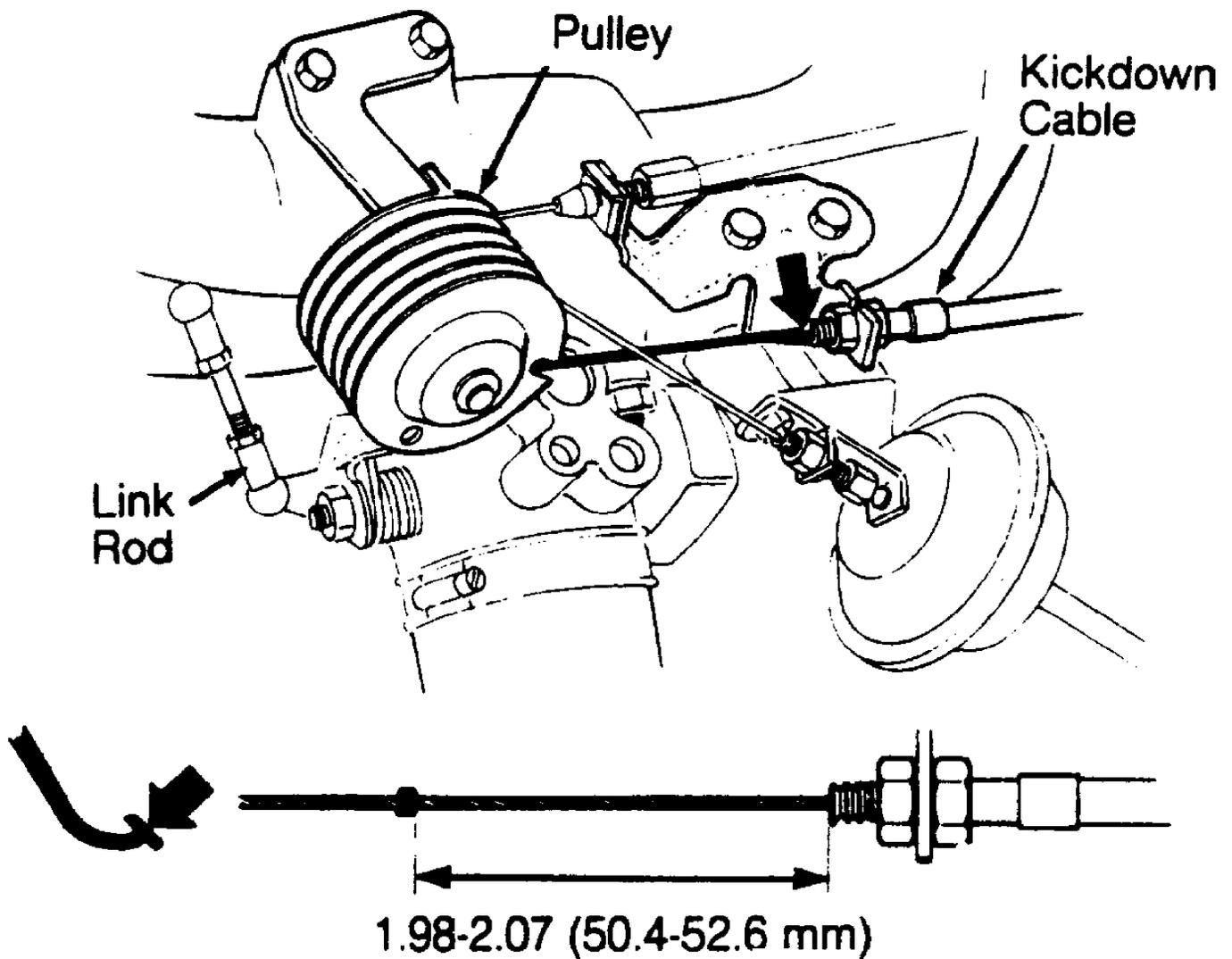


Fig. 7: Adjusting Kickdown Cable (940)
 Courtesy of Volvo Cars of North America.

BASIC THROTTLE SETTING

NOTE: If basic throttle setting is adjusted, throttle position will change. Therefore, throttle switch must be adjusted whenever basic throttle setting is adjusted. See THROTTLE SWITCH under THROTTLE CONTROLS. Basic throttle setting for 960 is not adjustable.

850 & 940

Loosen basic throttle setting adjustment screw lock nut. See Fig. 8. Turn screw until throttle is completely closed. On 940, tighten adjustment screw until it touches throttle lever and then turn an additional 1/4 turn. On 850, tighten adjustment screw until it touches throttle lever and then turn an additional 1/2 turn. On all models, tighten lock nut, making sure not to change adjustment. Recheck basic throttle setting.

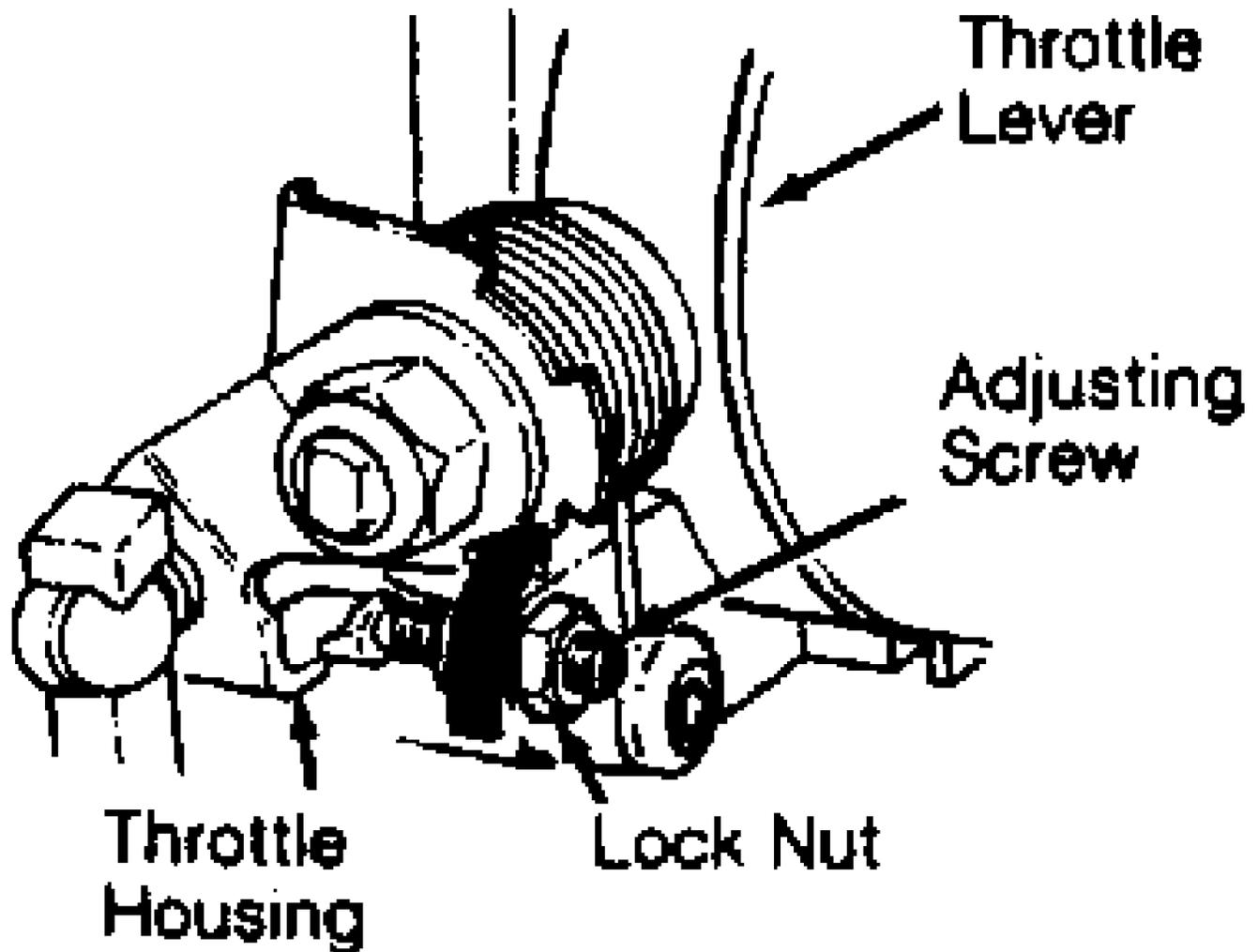


Fig. 8: Adjusting Basic Throttle Setting
 (940 Shown; 850 Is Similar)
 Courtesy of Volvo Cars of North America.

TIMING BELT TENSION

940

1) Install timing belt onto gears. Slowly loosen timing chain tensioner nut approximately one turn, tensioning timing belt. Tighten timing chain tensioner nut. Install timing belt cover.

2) Install crankshaft pulley. Install accessory drive belts. Start engine and run until normal operating temperature is reached. Ensure ignition timing is correct. Turn engine off.

3) Remove rubber plug from timing belt cover. Loosen timing belt tensioner nut approximately one turn. Using crankshaft bolt, rotate engine clockwise at least one half turn to Top Dead Center (TDC). Tighten timing belt tensioner nut. Install rubber plug in timing belt cover.