

Vehicle: 1996 PONTIAC GRAND PRIX: GTP 3.4L V6 (X) LQ1-GAS-FI-N

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TIMING BELT, REPLACE

This engine is classified as a free-wheeling engine. Because of this free-wheeling design, if the timing belt breaks or jumps timing, there is less chance of a piston contacting an open valve. To avoid belt breakage, replace the timing belt as recommended by the vehicle manufacturer timing belt replacement interval.

1. Disconnect and isolate the battery ground cable.
2. Remove the air cleaner assembly.
3. Drain the coolant into an approved container. After draining, close drain valve.
4. Disconnect the control cables from the TBI unit.
5. Pull up fuel injector sight shield at the upper intake manifold side, then pivot sight shield forward and remove.
6. Relieve the fuel system pressure as follows:
 - a. Loosen the fuel tank filler cap to relieve fuel tank pressure.
 - b. Connect GM fuel pressure gauge tool No. J-34730, or equivalent to the fuel pressure connection on the fuel rail. When connecting the gauge to the connection, wrap a shop towel around the connection to avoid fuel spillage.
 - c. Insert the bleed hose into a suitable container, then open valve allow fuel pressure to bleed down.
 - d. After pressure has bled down, remove fuel pressure gauge.
7. Disconnect the fuel lines from the fuel rail, then remove the fuel mounting bracket.
8. Disconnect the heater hose and bracket from the lower intake manifold.
9. Remove PCV valve and disconnect vacuum line from TBI unit.
10. Disconnect the electrical connector from the EGR valve.
11. Remove the EGR valve to upper intake manifold attaching bolts, then position the EGR valve out of the way.
12. Disconnect the canister purge solenoid and MAP sensor electrical connectors.
13. Disconnect the vacuum lines from the upper intake manifold tee. Tag the lines so they can be installed in the same locations.
14. Remove the wire loom bracket for the rear bank spark plug wires.
15. Disconnect the power brake unit vacuum hose.
16. **If required, remove the upper intake manifold as follows:**
 - a. Remove the upper intake manifold support retaining nuts.
 - b. Remove evaporative emissions canister purge solenoid bracket attaching bolts, then remove the solenoid and bracket.
 - c. Disconnect spark plug wires from coils. Tag the spark plug wires so they can be installed in the same locations.
 - d. Remove the control module to bracket mounting bolts.

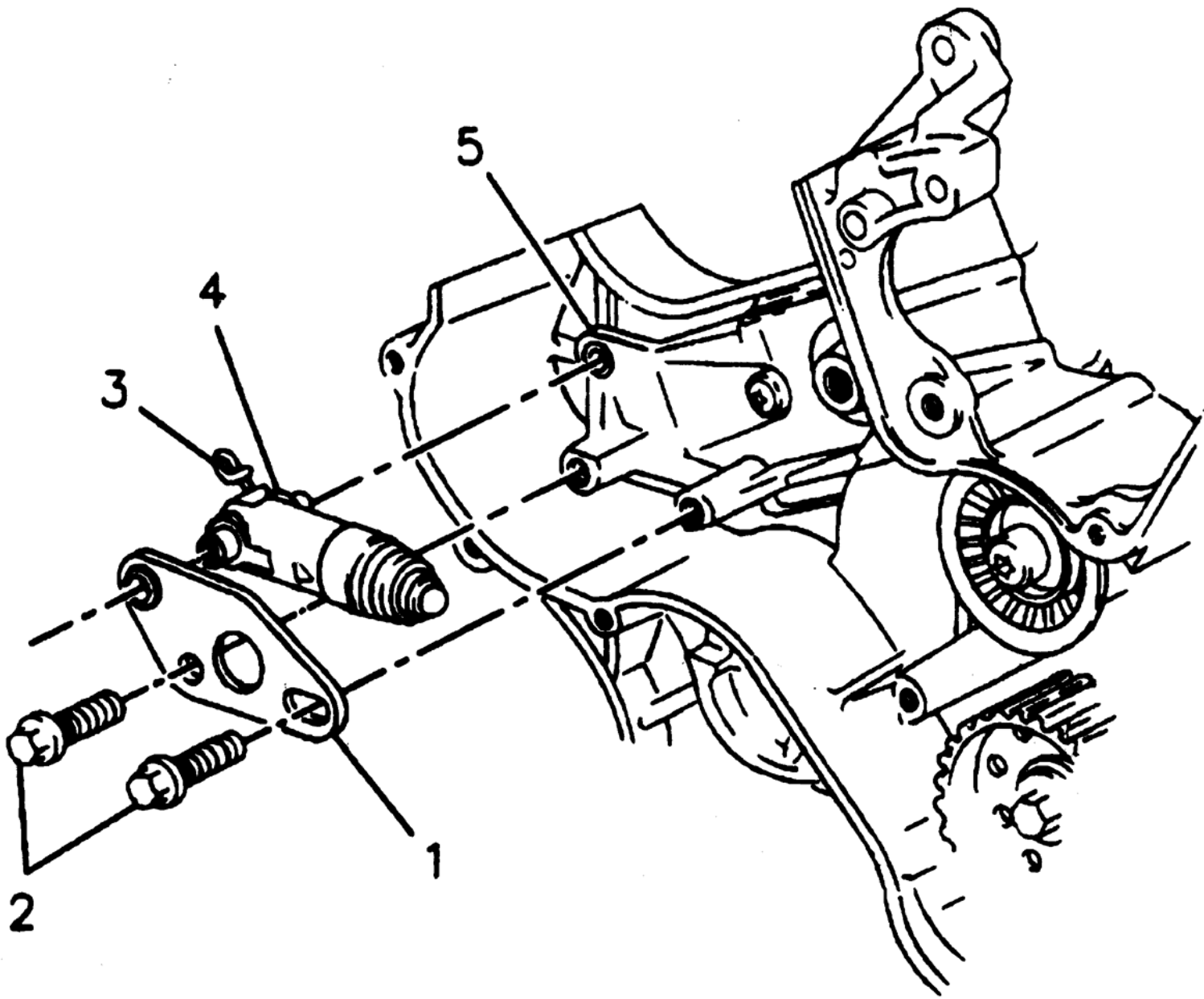
- e. Remove the control module and coils.
 - f. Remove the control module mounting bracket attaching bolts, then the bracket.
 - g. Remove the upper intake manifold mounting bolts, then the upper intake manifold and gasket.
17. Remove the coolant recovery reservoir hose clamp at the radiator overflow fitting, then disconnect the hose.
 18. Remove the coolant recovery reservoir retaining nut from the strut tower stud.
 19. Remove the front upper retainer from the coolant recovery reservoir and the fender upper rail.
 20. Lift the coolant recovery reservoir from the lower retainer and the strut tower stud.
 21. Using a suitable box wrench rotate the serpentine drive belt tensioner clockwise to release belt tension, then remove the serpentine drive belt.
 22. Remove the serpentine drive belt tensioner retaining bolts, then the tensioner.
 23. Position the ignition control wiring harness near power steering pump aside.
 24. Disconnect the pressure and return lines from the power steering pump. Position the power steering pump to provide clearance for timing belt removal. Allow the power steering fluid to drain into a suitable container. Cap ends of the power steering lines and pump fittings.
 25. **On 1991-93 models**, position the PCM aside, then remove the PCM mounting bracket.
 26. **On 1994-97 models**, disconnect the PCM electrical connectors and position out of the way.
 27. **On all models**, disconnect the spark plug wires from the spark plugs.
 28. Detach the wiring harness cover at the righthand strut tower.
 29. Remove the fuel line bracket.
 30. Remove the lefthand upper timing belt cover retaining bolts, then the cover.
 31. Remove the righthand upper timing belt cover retaining bolts, then the cover.
 32. Remove the power steering line retaining clip from the alternator mounting stud.
 33. Remove the front timing belt cover retaining bolts, then the cover.
 34. Disconnect the breather hose from the rear camshaft carrier cover.
 35. Disconnect the crankcase vent hose from the breather manifold.
 36. Remove the front and rear camshaft carrier retaining screws, then the covers.
 37. Remove the bolts and side plate from the tension actuator, **Fig. 1**.
 38. Rotate the tension actuator from the tensioner actuator pulley socket and out of the mounting base. Removal of the tension actuator from the tensioner actuator pulley will allow the actuator to extend to its maximum travel.
 39. Remove the timing belt actuator pulley attaching bolt, then the pulley.
 40. Lightly clamp the timing belt tensioner actuator body in a suitable vise with the rod tip facing downward, **Fig. 2**. Allow the actuator oil to drain to the boot end for at least 5 minutes before refilling. **The tensioner actuator uses a tapered bushing between the actuator and the mounting base. Use care not to damage or lose the bushing when removing the actuator.**
 41. Fabricate a standard 0.032 inch diameter paper clip without serrations to dimensions illustrated in **Fig. 3**.
 42. Remove the rubber end plug from the rear of the tensioner actuator. **Do not remove the vent plug as this may allow oil to escape.**
 43. Push the tool fabricated from the paper clip through the center hole of the vent plug into the pilot hole. **Do not remove the vent plug.**
 44. Position a suitable small screwdriver into screw slot inside actuator at the rubber plug end.

45. Rotate the screw in the clockwise direction until the actuator plunger is fully retracted. Push on the tool fabricated from the paper clip and slowly rotate screw counterclockwise until the paper clip engages.
46. Remove the timing belt, **Fig. 4**.
47. Remove timing marks from the camshaft and intermediate sprockets.
48. Position the crankshaft so that No. 1 cylinder is at TDC compression stroke. Mark the timing indicator with white paint, or equivalent on the crankshaft balancer and front cover.
49. Position camshafts so that flat spots are facing upward.
50. Install GM tool No. J-38613-A, or equivalent, on both camshaft carriers, **Fig. 5. Ensure the bolt holes are free of debris prior to tool installation.**
51. **On 1991-93 models**, remove the camshaft sprocket bolts and washers, then the camshaft sprockets using GM tool No. J-8614, or equivalent.
52. **On 1994-97 models**, remove the camshaft sprocket bolts and taper lock rings, then the camshaft sprockets by lightly tapping with a soft faced mallet.
53. **On 1991-93 models**, install camshaft sprockets with new washers, lock rings and bolts and finger tighten.
54. **On 1994-97 models**, install camshaft sprockets with new taper lock rings and bolts finger tight.
55. **On all models**, install the new timing belt in a counterclockwise direction around the sprockets, **Fig. 6. Ensure the belt teeth fully engage the sprocket teeth.**
56. Install the timing belt tensioner actuator pulley. Torque the pulley retaining bolt to 37 ft. lbs.
57. If required, add oil to the tensioner actuator through the end hole. Fill to the bottom of the plug hole only when the tensioner actuator is fully retracted and the pin is installed. Use clean SAE 5W-30 synthetic motor oil.
58. Push the end plug onto the rear of the tensioner actuator until the plug is flush and snapped into place.
59. Install the tensioner actuator bushing into the side plate. **Ensure the bushings and holes are clean. Do not lubricate.**
60. Install the tensioner actuator and side plate onto the front cover. **Ensure the tapered fulcrum of the tensioner actuator is properly seated in the tensioner actuator bracket bushing.** Torque the side plate retaining bolts to 18 ft. lbs. Rotate the pulley into the timing belt a maximum of 11 ft. lbs. to permit engagement of the actuator shaft into the pulley arm sprocket.
61. Pull the lock pin from the tensioner actuator. Torque the pulley to 11 ft. lbs. in a counterclockwise direction to seat the pulley against the timing belt.
62. Torque both the rear bank (righthand) camshaft sprockets to 96 ft. lbs.
63. Remove GM tool No. J-38613-A, or equivalent, from the rear bank (righthand) camshaft carrier.
64. Rotate the crankshaft 360° (1 turn) in the clockwise direction, aligning the reference marks previously placed on the crankshaft sprocket and front cover. **Ensure both the rear bank (righthand) camshaft flat spots are facing down.**
65. Torque both the front bank (lefthand) camshaft sprockets to 96 ft. lbs.
66. Remove GM tool No. J-38613-A, or equivalent, from the front bank (lefthand) camshaft carrier.
67. Rotate the crankshaft 720° (2 turns) clockwise, aligning the reference marks previously placed on the crankshaft sprocket and front cover. **Ensure both camshaft flat spots for one bank are facing up, while both camshaft flat spots for the opposite bank are facing down.**
68. Install the camshaft carrier covers with the gaskets. Torque the cover retaining bolts to 97 inch lbs.
69. Connect the breather hose to the rear of the camshaft carrier cover and the crankcase vent to the breather manifold.
70. Install the timing belt covers. Torque the retaining bolts to 89 inch lbs.
71. Install the fuel line bracket. Torque the retaining bolt to 62 inch lbs.

72. Install the wiring harness at the righthand front strut tower.
73. Connect the spark plug wire to the spark plugs.
74. Connect the PCM electrical connectors.
75. Position the power steering pump, then connect the pressure and return lines to the pump fittings.
76. Install the serpentine drive belt and tensioner. Torque the tensioner retaining bolt to 33 ft. lbs.
77. Install the coolant recovery reservoir.
78. Install the upper intake manifold and gasket. Torque the retaining nuts and bolts to 22 ft. lbs.
79. Connect the power brake unit vacuum hose.
80. Connect the vacuum lines to the upper intake manifold tee.
81. Connect the electrical connectors to the canister purge solenoid and MAP sensor.
82. Install the wire loom bracket for the rear spark plug wires.
83. Install the EGR valve, then connect the electrical connectors. Torque the attaching bolt to 18 ft. lbs.
84. Install the PCV valve, then connect the vacuum line to the TBI unit.
85. Connect the heater hose and install bracket to the lower intake manifold.
86. Install the fuel line bracket and bolt.
87. Connect the fuel pipes to the fuel rail.
88. Install the fuel injector sight shield.
89. Connect the control cables to the TBI unit.
90. Install the air cleaner assembly.
91. Open the cooling system bleed vent on the thermostat housing and the bleed vent on the heater coolant inlet pipe near the brake booster.
92. Fill cooling system with proper mixture of coolant and water to the bottom of the radiator filler neck. Wait two minutes, then inspect the level again and add coolant as required. Install the radiator cap, then close the bleed vents at the heater inlet pipe and thermostat housing. Use care not to over torque the bleed vents.
93. Fill the coolant reservoir with the proper mixture of coolant and water.
94. Fill the power steering pump to cold full mark with power steering fluid meeting GM specifications. Inspect all hoses and fittings for leaks.
95. Connect the battery ground cable.
96. Bleed the power steering system as follows:
 - a. Raise front of the vehicle until the front wheels are off the ground. Support the front of vehicle with jackstands.
 - b. Place the steering wheel in the full lefthand turn position. Inspect the power steering fluid level and add fluid as required to bring to the cold full mark.
 - c. With the engine off, cycle the steering wheel from side to side without contacting stops. Keep power steering fluid level at the full cold mark. Power steering fluid with air in it will be light tan in appearance. This air must be eliminated from the fluid before normal steering operation can occur.
 - d. Start the engine.
 - e. Inspect the fluid level and add fluid as required to bring to cold level.

- f. Return the steering wheel to the center position, then turn the engine off. Remove the jackstands from under the vehicle. Lower the vehicle to the ground.
- g. Start the engine and allow to idle for two to three minutes.
- h. Inspect the steering system for proper operation.
- i. Inspect the power steering hoses and fitting for leaks.
- j. When system is at operating temperature, ensure power steering fluid is at full hot level.
- k. Start the engine and inspect for proper operation. Also inspect engine and power steering system for leaks.

Fig. 1 Timing belt actuator & plate



- 1 PLATE, TIMING BELT TENSIONER ACTUATOR
- 2 BOLT/SCREW, TIMING BELT TENSIONER ACTUATOR PLATE
- 3 PIN, TIMING BELT TENSIONER ACTUATOR LOCK
- 4 ACTUATOR, TIMING BELT TENSIONER
- 5 COVER, FRONT ENGINE

Fig. 2 Tensioner actuator assembly

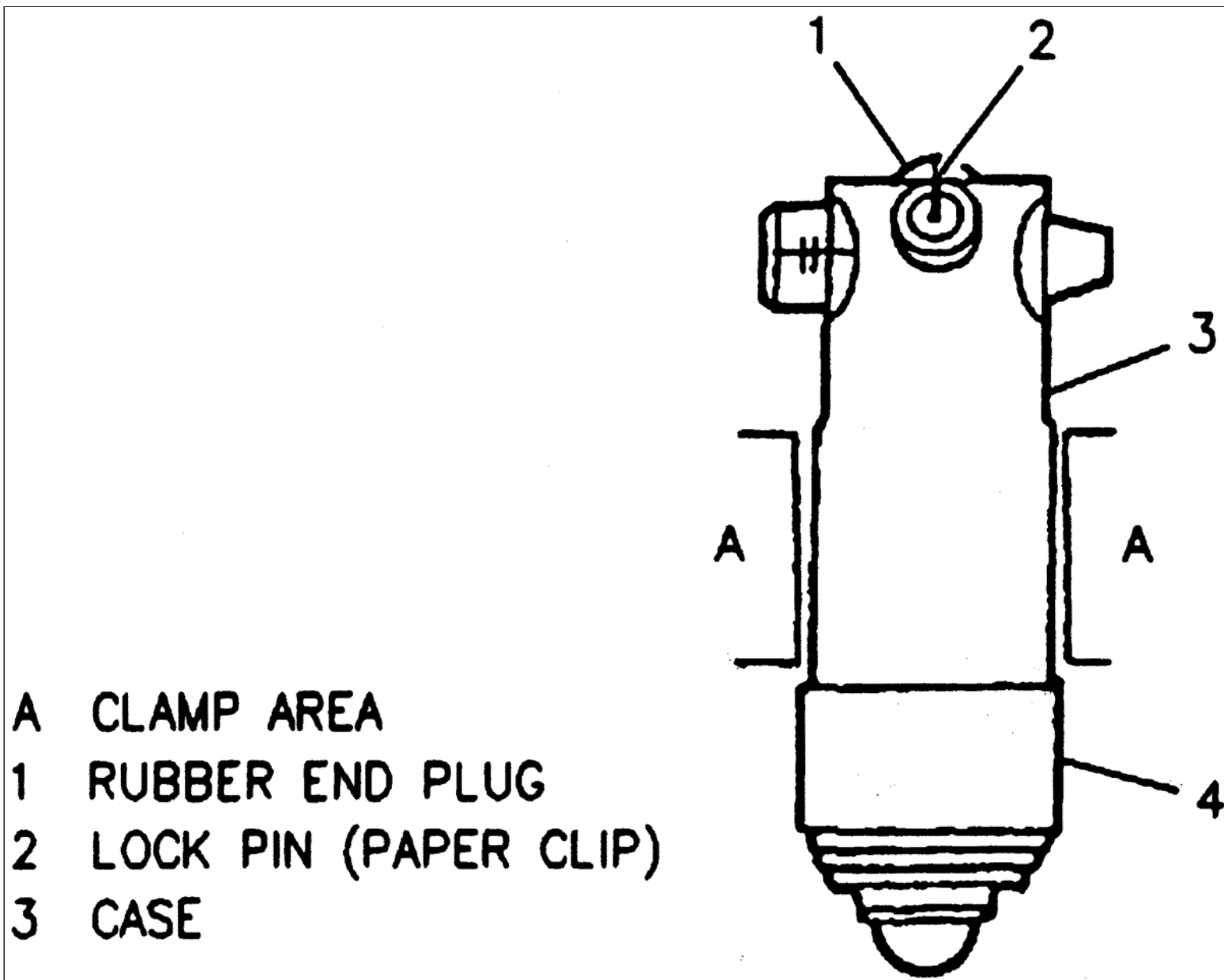
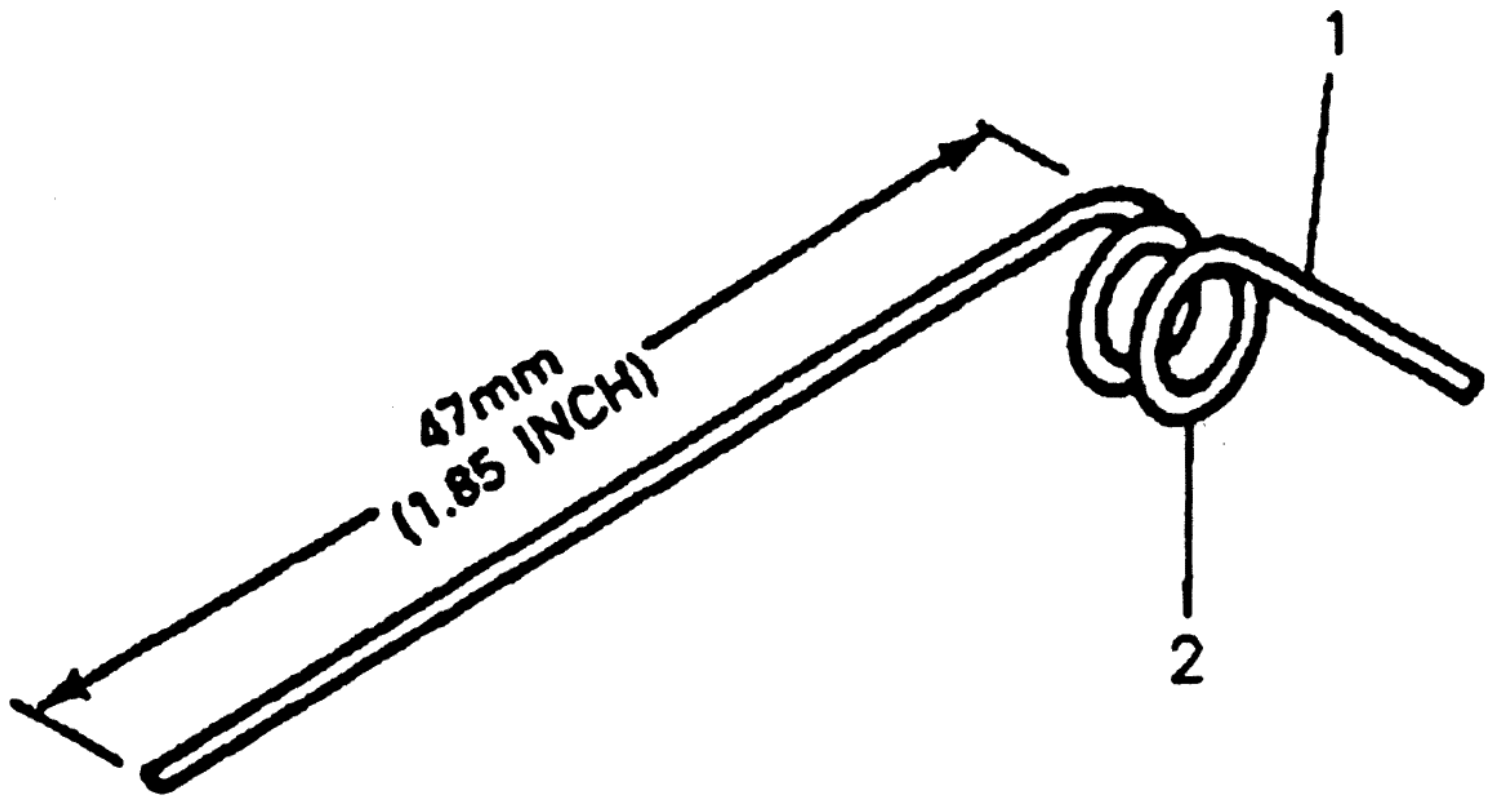


Fig. 3 Fabricating tensioner tool from paper clip



- 1 PAPER CLIP
- 2 DOUBLE LOOP

Fig. 4 Timing belt, sprockets, pulley & tensioner identification

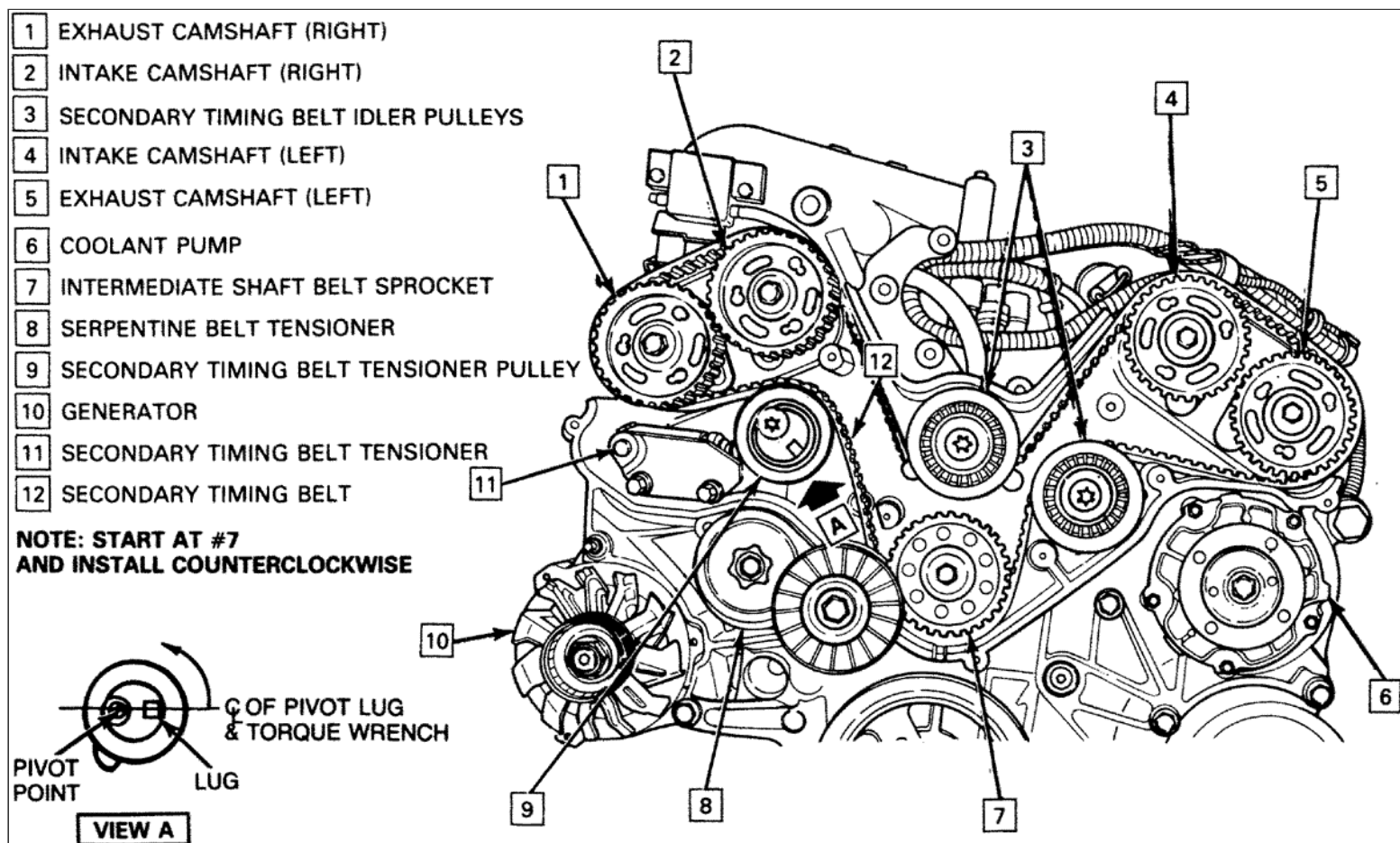
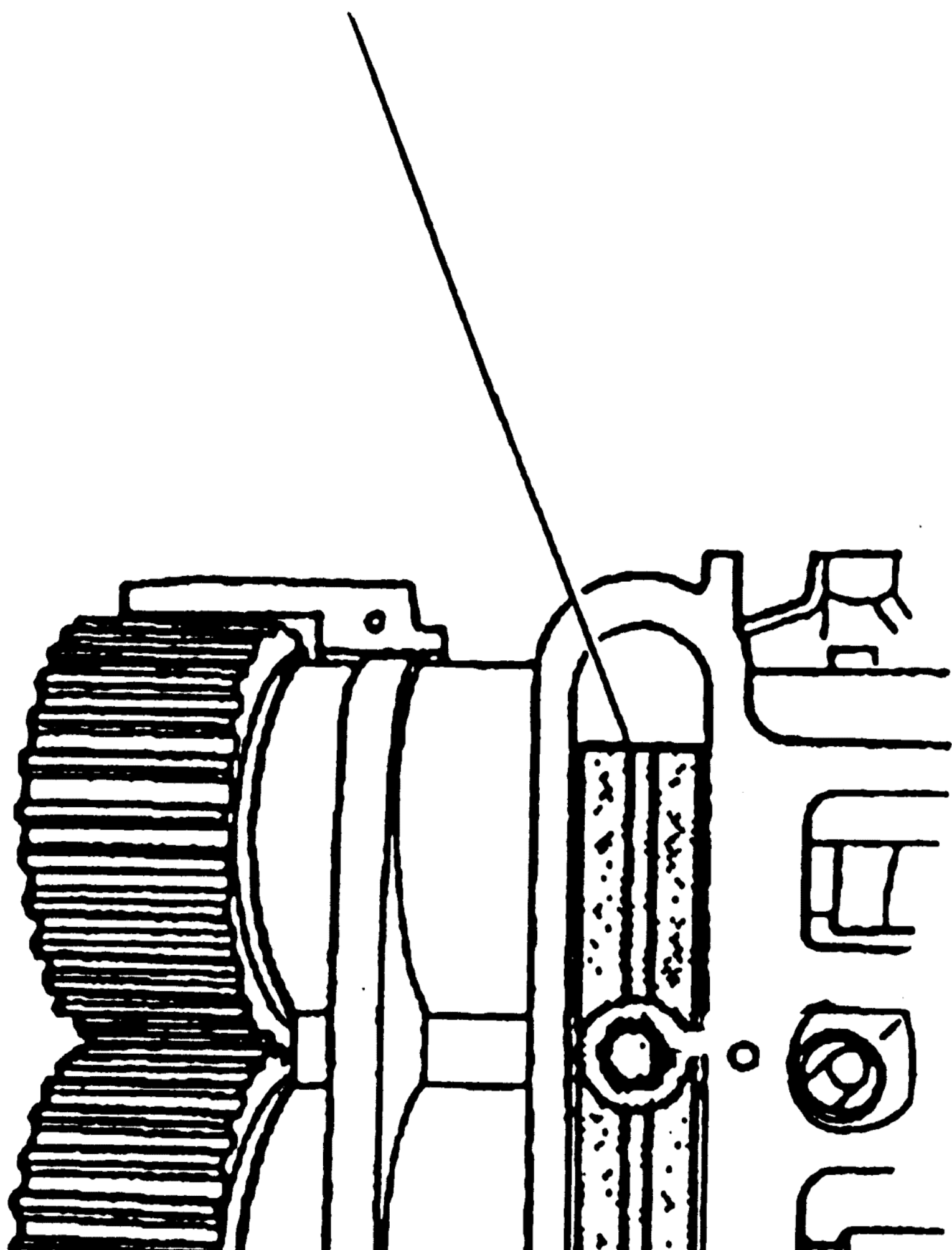


Fig. 5 Camshaft hold-down tool installation

CAM HOLD DOWN TOOL INSTALLED
AGAINST GROUND FLATS ON CAMS



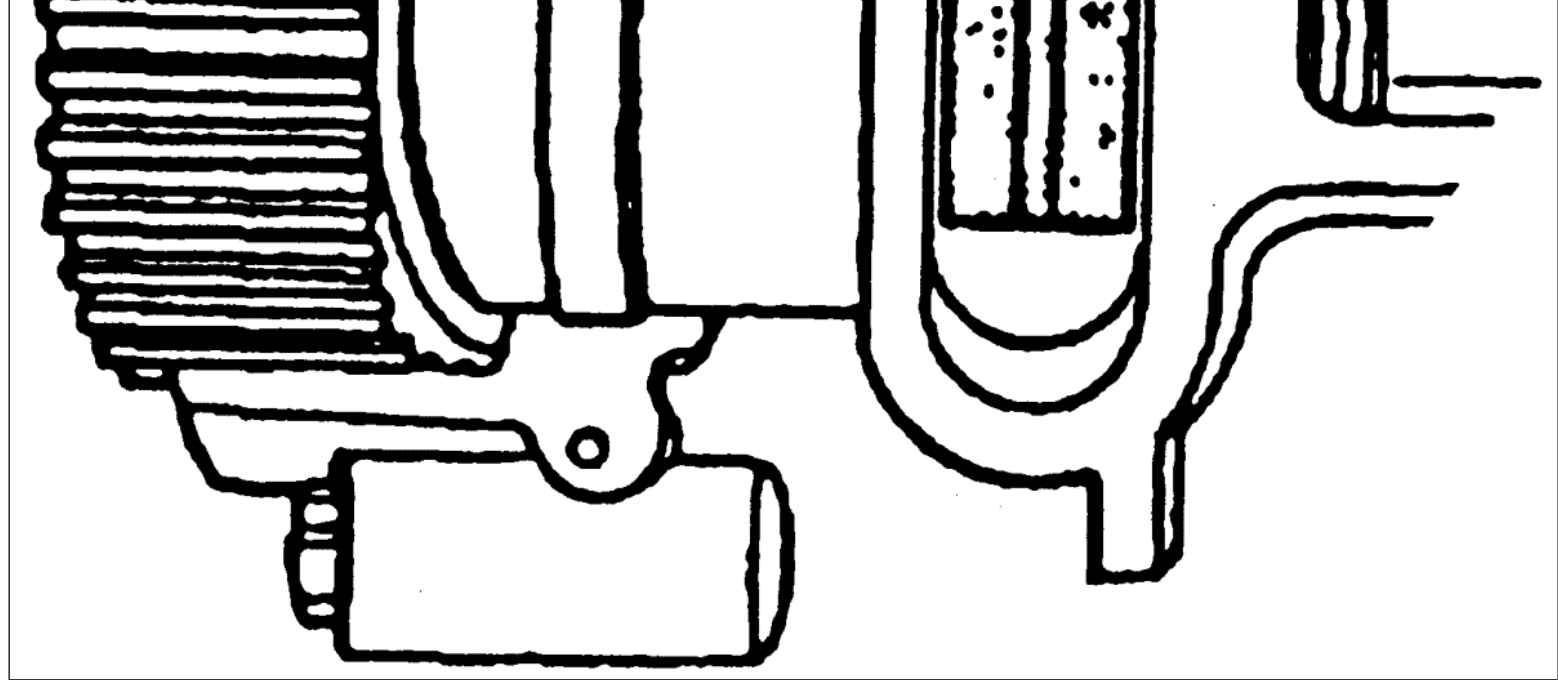


Fig. 6 Timing belt routing

