

BEW engine timing belt replacement procedure from MOGolf (as demonstrated on a 2004 Jetta).

Based on the procedure published by Volkswagen, but modified for the "average" shadetree mechanic. Some special tools are required. Tools can be sourced from www.metalnerd.com, or genuine VW (and OEM suppliers) tools from www.zelenda.com, www.samstagsales.com, and other vendors of tools for VW vehicles.

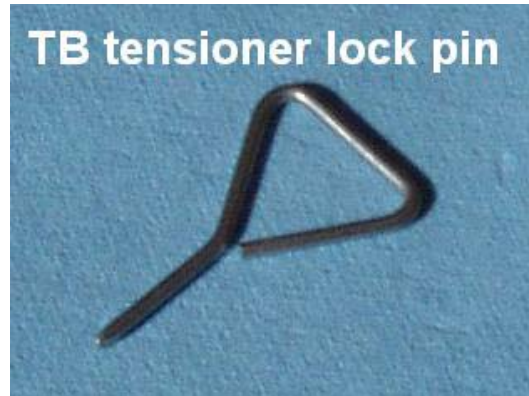
Those tools are:

serpentine tensioner locking pin



crank locking tool T10050

timing belt tensioner locking pin



camshaft locking pin

timing belt tensioner pin tool (Metalnerd brand shown)



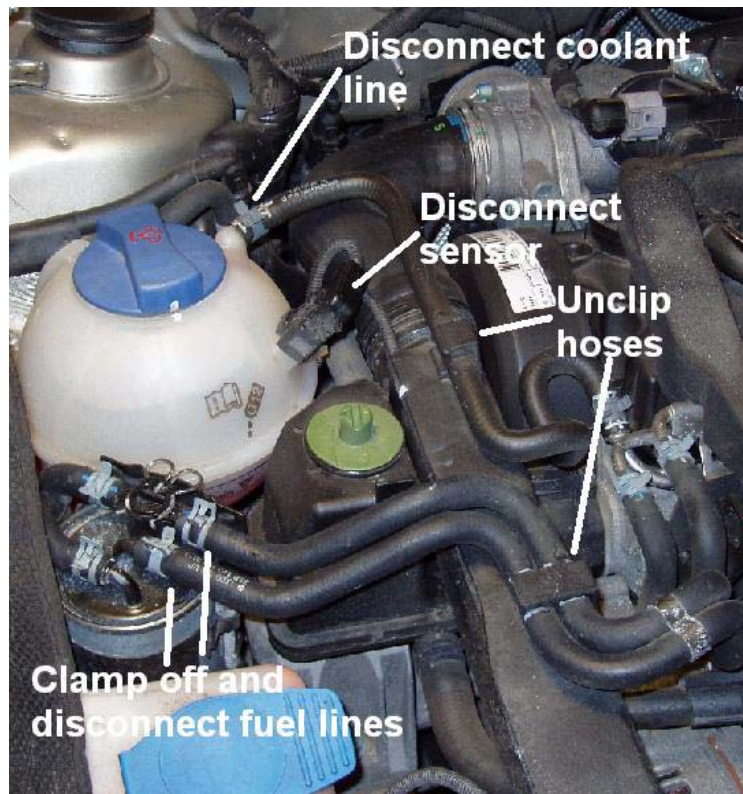
You will also need a means of supporting the engine from above or below, with some mobility forward and aft.

The following steps are in the sequence I recommend. It is easier than the sequence published.

First, make the coolant expansion bottle "mobile". The coolant expansion bottle is the round ball on the right side of the engine compartment with a blue cap. Disconnect the coolant line and cap off the nipple.



Then unclip the hose from the rigid intake pipe. Then disconnect the sensor. The bottle is held in place by two Phillips head screws. Remove them.



Slide the fuel line hose clamps along the hoses and clamp off the hoses, then remove from the filter with a disposable towel at the ready to catch the small amount of fuel that will leak out. The fuel lines are not pressurized.

Unclip the fuel lines from the rigid intake pipe and move aside.

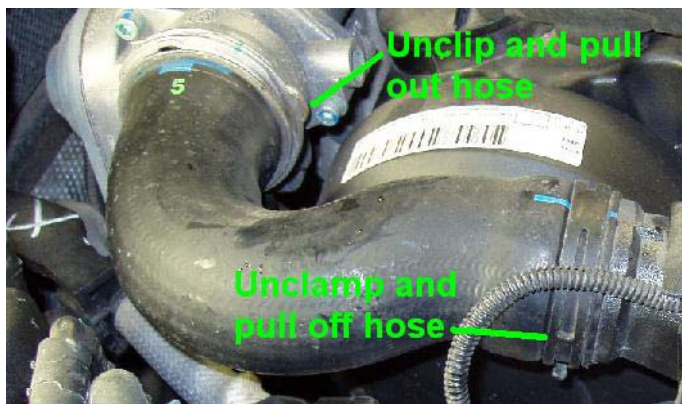


Remove the 5mm hex bolt that holds the power steering reservoir in place.



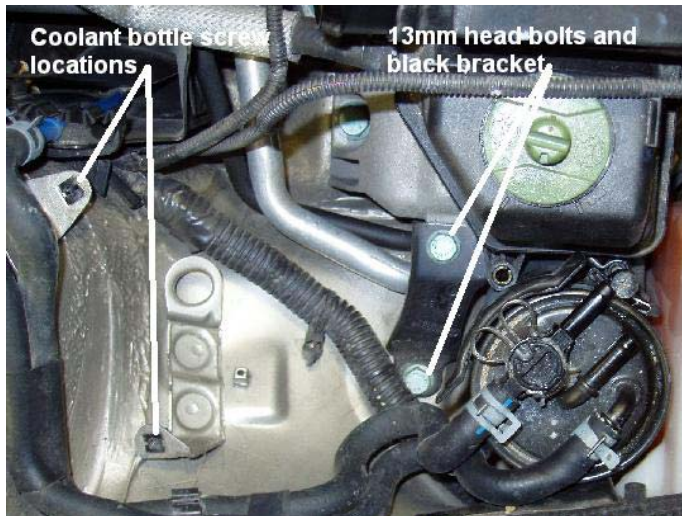
Now you can maneuver the lower coolant bottle hose under the power steering reservoir and move the bottle forward. This will give better access to the upper intake hose clamp.

Remove the upper intake hose.



Optionally, the more nimble person can unclip the rigid pipe from behind and below the right headlight, thus removing the entire rigid pipe and hose the entire distance from behind the headlight to the EGR valve.

While you're in the vicinity of the coolant bottle and power steering reservoir, you can remove the black bracket attached between the engine mount and body

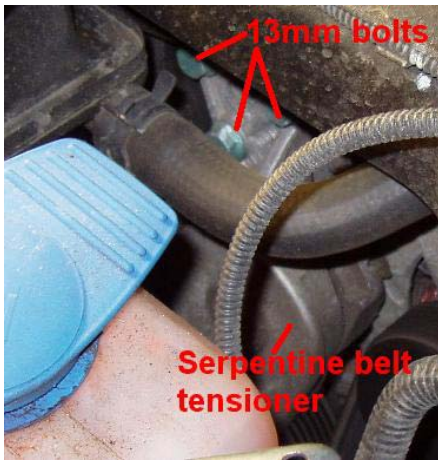


Next remove the serpentine belt tensioner. In the pictures below I have shown the VW tool T10060 and the Metalnerd locking pin. The latter is double ended and it doesn't matter which end does the locking job. I found it easier to grasp than the small knob on the T10060 pin during removal.



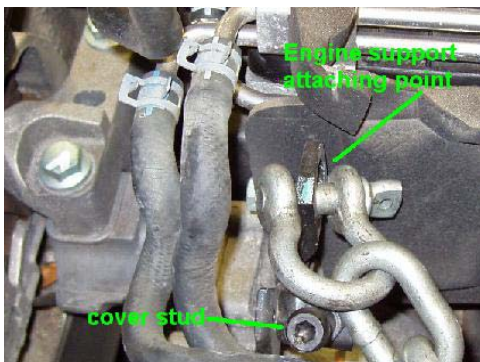
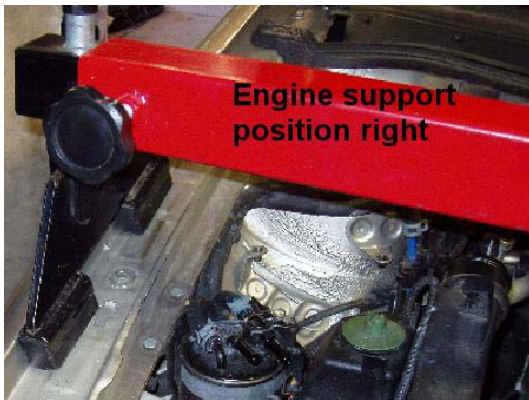
Use a 16mm open end wrench/spanner, or adjustable wrench, on the tensioner tab. Pull towards the front of the car. **Caution:** This is a strong spring mechanism. Insert the locking pin through the holes and remove the wrench. Then slip off the serpentine belt from the tensioner.

Now remove the three bolts securing the tensioner with a 13mm socket wrench, and remove the tensioner. It can come out through either angle of the pictures shown above. You made the coolant bottle with its hose, and the power steering reservoir with its hose, "mobile" to make this easier.



Unclip and remove the top belt cover. It's an obvious step so I didn't picture it.

Now is the time to support the engine. I supported the engine from above as pictured below.



If you're supporting the engine from above, skip to the next paragraph. This procedure can be followed if the oil pan is cast aluminum. To support the engine from below, now is the time to loosen the lug bolts from the right front wheel, raise the front right corner of the car, and support with a jack stand as noted later. Then remove the under-engine sound deadening panel and right front wheel. Place a floor jack with a block of wood, or plastic material, under the rear corner of the oil pan and raise to the point that the engine just starts to lift.

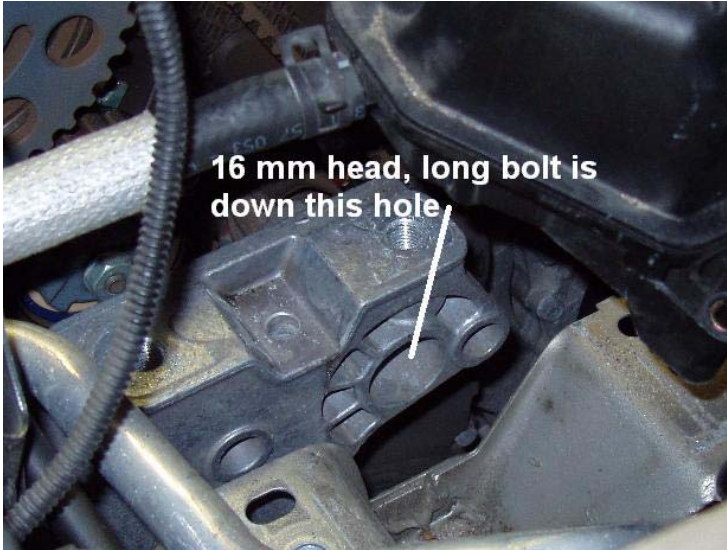
Make sure the engine weight is supported by your means of support, then loosen several turns but do not remove the 16mm head bolts attaching the engine mount to the body. The rear bolt is pictured below. I'm sure you can find the front bolt without a picture or you should not be doing this job.



With the engine securely supported, and slightly lifted to ensure the engine is not hanging by the engine mount, remove the 18mm head bolts attaching the body mount to the engine bracket. This sequence is used to lessen the possibility that the removal of the 18mm head bolts will pull out threads from the aluminum engine bracket.



Once these bolts are removed, the 16mm bolts can be completely removed and the engine body mount can be removed from the engine compartment.



Now remove the long 16mm head bolt from the engine bracket.

Now turn your attention to the work that needs to be done from below. If you're supporting the engine from below, skip to the next paragraph. Either lift the car on a hoist, or just jack up the right front of the car and support securely on a jack stand. Regardless of the method, you might find the following steps easier if you remove the right front wheel. Loosen the lug bolts first, then raise and support the car. Remove the wheel. Also remove the under-engine sound deadening panel. This vehicle had one secured by T-25 Torx screws.

Next remove the lower intake pipe by removing a 10mm nut, unclip the pipe from the rear (just above "10mm" in the picture) and front connecting locations, then pull out.



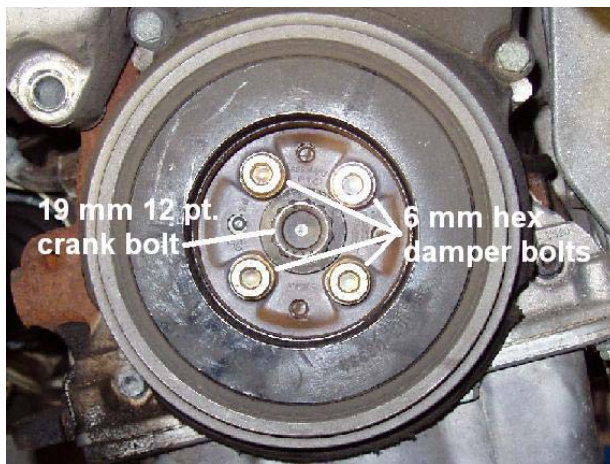
Remove the side splash panel by inserting an appropriate pry tool between the panel and car body at the rear clip (missing from this car) and pry it off of the stud. Then work towards the front of the car and unclip the panel from above the front intake pipe connection. Maneuver the panel out from under the car. Now lower the engine to a point where the entire lower pulley is exposed as pictured below.

Slip the serpentine belt off of the crank pulley, and other pulleys.

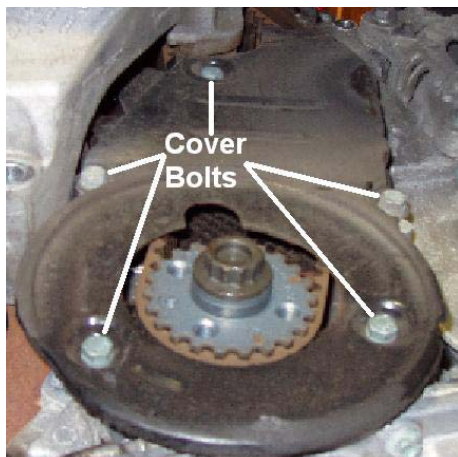
Remove the cover over the vibration damper/belt pulley bolts. Insert a flat screwdriver (or other suitable tool) all the way between the cover and pulley then pry out the cover. It's easier than trying to pry directly on the edge of the cover.



To remove the damper you will have to counter hold the crank with a 19mm 12-point socket and breaker bar, while using a 6mm hex bit socket on the bolts. These are fairly snug and may take some effort to remove. If hard to remove use an Irwin Bolt-Grip, or Sears Craftsman Bolt-Out, to remove. If this is the second timing belt replacement, plan on replacing the bolts.



This will give you good access to the lower belt covers and lower bracket bolt (already removed in the picture above). Remove the lower and center belt covers. These are secured by five 10mm head bolts.



Note: These covers can be removed (and later installed) without removal of the engine bracket, if need be.

The covers have a sound deadening material bonded on the inside. Do not scrape it off while removing worn off belt dust.

Use a 16mm socket wrench to remove the bracket bolt, and the one that is hard to get at above it. I use a mid-length 16mm Craftsman socket and Craftsman 3/8 inch thin head ratchet. Once loosened, using a 3/8 inch adapter in the socket makes it easy to turn and remove by finger.

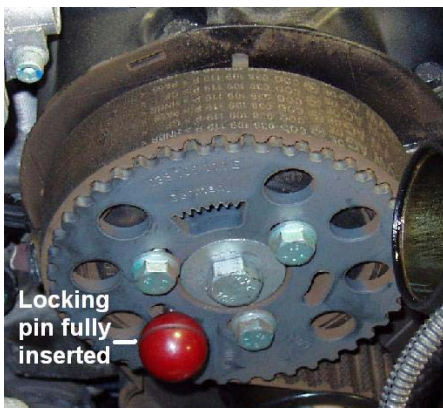


Rotate the engine **clockwise** until the timing mark on the crank pulley is near the alignment pin locking location. This picture was taken before the cover was removed and the engine needed to be turned nearly a full rotation.

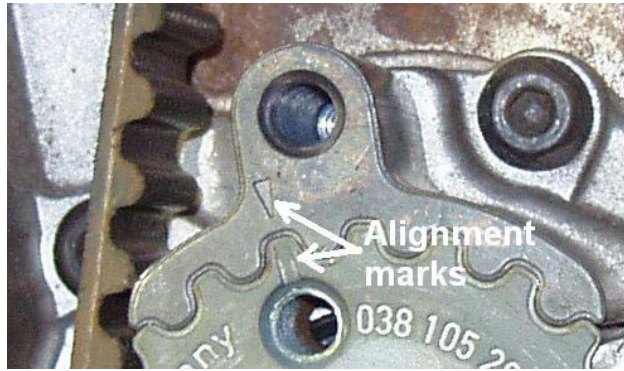
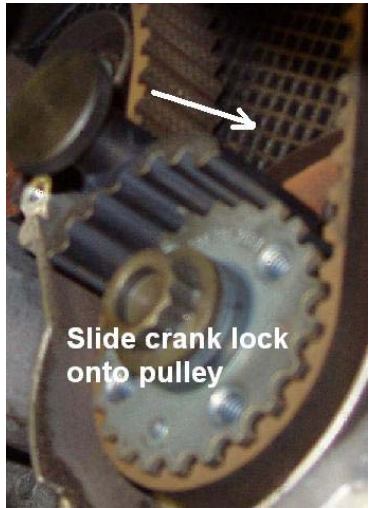
At this point look for the cam locking pin hole aligning properly. Use a mirror to find the hole and insert the cam locking pin fully.



You might get the hole nearly right by turning the crank and then "fine tune" by using a 18mm socket on the cam bolt to vary the cam back and forth until the pin goes into the hole.



Once the cam is locked, return the crank and turn it until the crank lock inserts into the locking hole. It should not take much, if any. The crank lock slides onto the teeth of the pulley. Do not just lay it on top of the pulley. With everything right, the alignment marks mate up. The knob is removable from the T10050.



At this point the engine bracket is fully loose. VW says with the engine lifted and pulled forward a bit you can remove the bracket. Or you can work around it.

From above, loosen the 15mm nut on the tensioner and use the tensioner tool to adjust the tensioner counter clockwise until the tensioner pin can be inserted.



Then turn the tensioner clockwise until it stops and snug up the tensioner nut.



Next loosen the three cam pulley bolts.

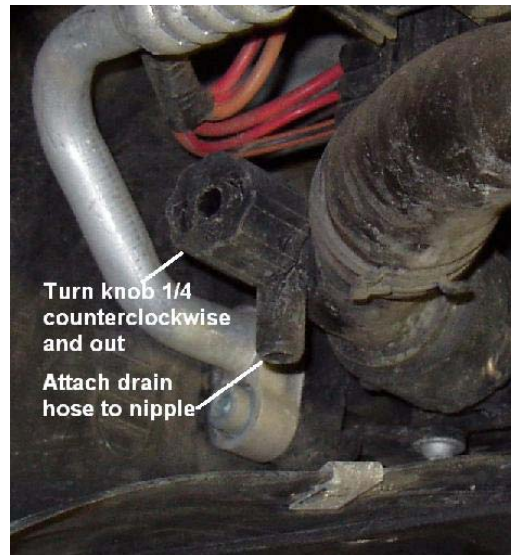
Now remove the timing belt.

Installation is the reverse of removal.

Or if you're also replacing the small roller, water pump and tensioner, don't put the timing belt on just yet.

Small roller is replaced by removing the 13mm nut, removing the roller from the stud, installing a new nut and tightening to 18 ft-lbs (25 Nm).

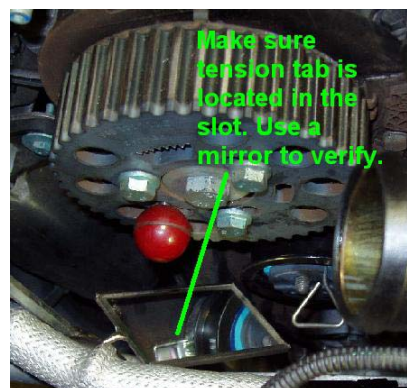
The water pump is replaced by first draining the coolant. This car has a drain at the lower radiator hose connection to the radiator.



Attach a piece of tubing to the nipple, route to a container, then open the drain by turning $\frac{1}{4}$ turn counterclockwise and pull out. Open the expansion bottle cap, or remove the cap from the nipple to get it to drain. Tighten the cap, cap off the nipple and blow compressed air into the previously disconnected coolant tube to get more coolant out. Then close the draincock by pushing in and turning $\frac{1}{4}$ turn clockwise. Remove tubing from draincock nipple.

Remove three 10mm head bolts from water pump and pull it out. Install the new water pump, making sure it has a good o-ring seal, and evenly tighten the 3 bolts to 132 inch-pounds (11 ft-lbs). Refill the engine with coolant.

The tensioner is replaced by removing the 15mm nut and sliding the tensioner off of the stud. Push the engine bracket down if necessary to gain clearance. Install the new one on the stud, with a new 15mm nut but do not tighten the nut. Make sure the tab on the tension is located in the slot.



Now we can install the new belt.

Use the tensioner pin tool and turn the tensioner fully clockwise until stop, then snug but do not tighten the nut.

Loosen the three 13mm cam pulley bolts, and rotate the cam pulley fully counterclockwise until the bolts hit the ends of their slots. Snug one bolt

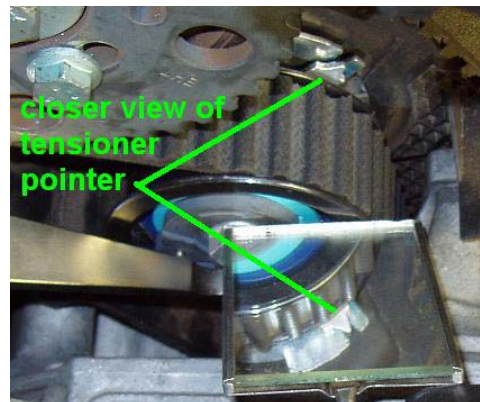


Now install the new timing belt. Loop under the crank pulley first. Then route past the tensioner, and around the cam pulley making sure there is no slack in the belt between the crank and cam. Make sure the belt routes between the tensioner and the engine mount (if the mount is not removed from the car).

Now loosen the snug bolt on the cam pulley. The other "side" of the belt loop should be able to loop around the water pump pulley with a little effort, but not a lot. If you're trying to pull hard on it to get it over the water pump, then you don't have the tensioner properly positioned, or the cam pulley wasn't fully counterclockwise when the belt was looped over it.

Center the belt on the crank pulley, cam pulley and water pump pulley. Make sure the engine bracket is not resting on the belt. Insert bolts as necessary to keep the bracket off the belt.

Next loosen the nut on the tensioner, pull the pin out of the tensioner and adjust the tensioner until the pointer is centered over the slot behind it. Tighten the nut to 15 ft-lbs (20 Nm), plus 45 degrees.



(Note: the tensioner pin holes will be closer to "top" than pictured here. This was "staged".)

Tighten the cam pulley bolts to 18 ft-lbs (25 Nm). Remove the cam locking pin, and the crank locking tool.

Using a 19mm 12 point socket on the crank bolt, rotate the engine clockwise at least 2 rotations. This is supposed to validate that the valves won't hit the pistons, but they were locked in position so they won't be hitting.

Install and tighten to 33 ft-lbs (45 Nm) the lower and upper rear bolts in the engine bracket.

Install the lower timing belt covers. The bottom of the upper cover installs over the top of the lower cover. Tighten the five 10mm bolts to 15 ft-lbs (20 Nm).

Install the crank serpentine belt pulley. Note that the boltholes should line up with the crank pulley and the small nub on the crank pulley will seat into a hole on the serpentine belt pulley. Counter hold the crank with a 19mm 12 point socket while tightening the four 6mm hex bit bolts to 7 ft-lbs (10 Nm) plus ¼ turn.

Raise the engine and install the long 16mm head bolt into the engine bracket. Tighten to 33 ft-lbs (45 Nm).

Slip the engine to body mount into position. Install new 16mm head mount bolts by starting them into the holes, but do not tighten. Leave the engine mount able to move up and down.

Align the engine-to-body mount hole with the engine bracket boltholes, and start the 18mm head bolts. Lift the engine so that the two engine mount parts meet. You should be able to run the 18mm head bolts into their holes by finger. Make sure the bolts and mounts are aligned as shown in the picture before disassembly.



Tighten the 18mm bolts to 74 ft-lbs (100 Nm).

Lower the engine so the weight of the engine is now supported by the mount. Tighten the 16mm head bolts to 30 ft-lbs (40 Nm), then ¼ turn.

Completely remove your method of engine support.

Install the serpentine belt tensioner. Tighten the 13mm head bolts to 18 ft-lbs (25 Nm).

Route a new serpentine belt around the crank pulley, power steering pump, AC compressor and alternator making sure the belt is properly seated in the grooves. Use a 16mm open end wrench, adjustable wrench, or whatever you used on the serpentine belt tensioner before, to apply pressure on the tensioner. Remove the locking pin and gradually let the tool move towards the engine. The tensioner will now apply the appropriate pressure to the serpentine belt.

Install the upper timing belt cover.

Return to under the car. Install the side panel making sure the tab at the front fits into the slot below the radiator. I use a deep socket on an extension and push the clips over the studs to secure the panel in place.

Install the lower intake tube, making sure the clips are fully seated and the tube cannot be pulled back out. Secure with the 10mm nut on stud. Hand tight is good enough.

Install the right front wheel, snug the bolts.

Install the lower engine sound deadening panel.

Remove the jack stand and lower the car. Tighten wheel lug bolts to 89 ft-lbs (120 Nm).

Return to the engine compartment and install the upper intake components removed earlier. You either removed the entire rigid pipe and rubber coupling piece, or just the rubber coupling piece. Do not install the clamp at the rubber coupling to rigid pipe joint with the tabs on top. The tabs must be on the bottom, or moved to the engine side. If positioned on top, they will chafe the coolant hose.

Install the black bracket between the engine mount and body. Tighten the two 13mm bolts to 18 ft-lbs (25 Nm).

Route the large coolant bottle hose under the power steering pump so that the coolant bottle can be put back in its position. Install the 5mm internal hex bolt to secure the power steering reservoir hand tight.

Install the coolant bottle and secure with the two Phillips head screws.

Connect the small coolant hose to the expansion bottle and secure into the clip on the intake tubing.

Connect the fuel lines to the fuel filter, unclamp the hoses, and reposition the original clamps back to their positions on the filter and its thermostatic tee. Secure into the clip on the intake tubing.

Top up coolant as necessary.

Start the car. If the coolant was drained, fully warm up the engine and top up the coolant as necessary while the engine warms.

Clean tools and put them in their proper places.

Wash hands and pat yourself on the back for a job well done.