

Honda 2.2 Liter

Cam Timing & Balance Belt Notes

Removal and Replacement

By Rob~O

I recommend that you do invest in the factory shop manual as it will give you some more information about the entire job than this post. The information in this post will add and help educate you in critical areas such as cam gear, crank gear, and front and rear balance shaft gear positions when tightening the timing and balance shaft belts into their correct correlation. [Here is a link to Helms online where you can buy a Honda Shop manual as well as the ETM \(electrical troubleshooting manual\).](#)

NOTE: If some of the pictures do not open... you can click on the Red Browser Stop button (Internet Explorer) and then right click on each picture then left click on "SHOW PICTURE"... Don't forget to print it all out.

Here are a few notes on the replacement of the Honda 2.2 Liter Engine Cam timing and balance shaft and front balance shaft seal "retainer plate."

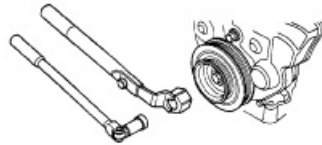
One of the first things that your going to want to ensure is that the crankshaft pulley (bolt) is not super tight. If you do not have a 3/4 or 1-inch impact wrench and you jack the front of the car up and start the job and find out that you can't get the crank pulley bolt out you are going to be frustrated. The easiest thing for you to do would be to stop by a shop in your area have someone remove the driver left front tire/wheel and put a metric socket on the front crank pulley (bolt) and break it loose with a healthy air powered impact wrench.

I have heard many say that you can bypass this taking one of the spark plugs out and feeding a wad of some nylon rope down into the cylinder. When you turn the crankshaft around and the piston moves to its top highest travel it will stop against the rope and thus stop the crankshaft from turning allowing you to break the front crank pulley bolt loose. This method (rope) could cause a connecting rod to be bent as well as damage to the rod bearing. Honda as well as several other aftermarket companies make a special tool that attaches to the front crank pulley with an opening in it for a separate metric socket to attach the front crank pulley retaining (bolt).

I personally have had trouble removing the front crank pulley (bolt) even with a good 1/2-inch air powered impact wrench. I have also found that heat from a torch on the head of the pulley retaining (bolt) can loosen up the locktite that was put on the threads of the front crankshaft retaining (bolt) at the factory. In any regards make sure that the bolt will come out before you start

jacking up the car and removing all parts necessary to gain access to the timing and balance belts as well as the water pump. It would be sad and frustrating after spending hours removing parts to find out that you can't get the (bolt) loose.

Below: Picture of Honda Special Crank Bolt Removal Tools



Let us begin: I recommend that you do invest in the factory shop manual as it will give you more information about the entire job than this post. The information in this post will add and help educate you in critical areas such as gear position when tightening the timing and balance shaft belts into the correct correlation.

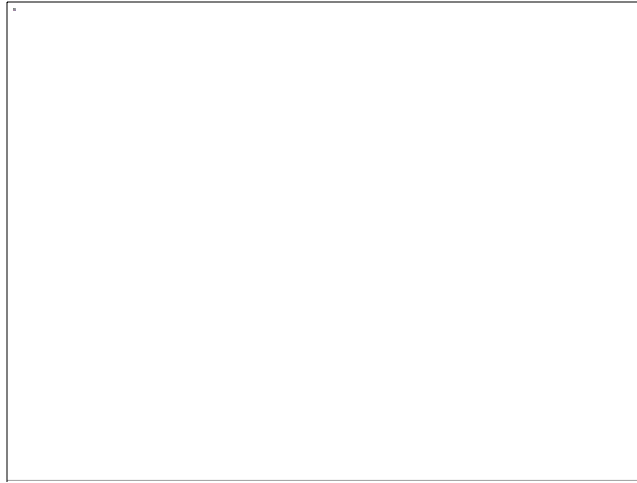
Make sure that you use Honda OEM parts. I have seen problems with aftermarket parts! I have been a little over kill when ever I have serviced Hondas' including my own for a very simple reason. If I want to drive from Arizona to New York cross country, then I want to know the engine is going to make it without any problems.

Honda recommends replacement of the timing and balance shaft belts at 90,000 miles. I have seen cars with less than that mileage towed into the shop with extensive damage due to the timing belt breaking. When that happens a piston when it comes up to the top of the cylinder will hit and bend a valve as well as break the valve guide. If you have thousands of dollars to invest in another cylinder head than you don't even need to be reading this :-)

Parts needed at 75,000 miles:

Timing Belt, Balance Shaft Belt, Water Pump, Valve Cover Gasket / Seal, as well as New Valve Cover Grommets, New Fan Belts, Front Balance Shaft "Seal" and (METAL RETAINER PLATE FOR THIS SEAL), new O-ring seal for Rear Balancer Gear Case Housing, New Rubber Washer for Lower Timing Cover (where tension adjustment bolt sticks through cover). Antifreeze and distilled water.

You might also consider getting a little tube of the blue Loctite #242 threadlocker. In the picture below this is the big bottle that I use for just about everything (that is metal) to keep fasteners (nuts and bolts) from coming loose. You sure don't want the tensioner bolt coming loose after you tighten it or you could end up with thousands of dollars in bent valves and damage to the cylinder head and or pistons. So the little insurance that this product brings me is worth the cost. You can get this product at most automotive part houses in small tubes. You just put a little on the threads of the bolt or stud and then tighten.



If the car has over 130,000 miles and this is the second service then make sure you get a New Timing belt "IDLER PULLEY BEARING" as well as a New Balance belt "IDLER PULLEY BEARING." You will also want 5 quarts of antifreeze and a couple of gallons of distilled water. I like the antifreeze / water mix % to be about 55/45%. If the coolant thermostat is 7 years old then get another coolant thermostat and also it's rubber seals (2). If the thermostatic switch that turns the cooling fan on is over 7 years old then get a new one of these also.

Tools Needed: Metric open / closed end wrenches and sockets of 10mm, 12mm, 14mm and 17mm. (The socket size for front crank pulley bolt is: 19 mm). It helps to also have a set of 1/4-inch drive sockets/rachets/and extensions. You also need small bottle jack hydraulic pump and piece of wood about 5x6 to place between jack and oil pan. Also good set of (2) jack stands.

It makes things a lot easier (and safe) if you jack up the front of the car and place some jack stands under the uni-body frame. Buy or borrow some jack stands and get good ones because I don't want to hear that you died because a set of concrete blocks fell apart and the car came down and crushed and killed you. This happened to a very dear friend of mine many years ago.

Disconnect one of the cables on the battery and tie it down away from the top battery post so that it can not jump back and touch the battery post.

Jack up front of car.

Remove the left front tire and wheel. Remove any plastic shrouding under the vehicle on the drivers side.

Remove all fan belts. Remove bolts that hold power steering pump position pump off to side as far as you can without removing hoses (on some Hondas lift up reservoir and move aside as far as you can. Remove bolts that hold cruise control assembly and electrical connection and little rubber vacuum hose (be careful when removing hose or you may break the plastic piece) and lift up and set aside assembly. Place bottle jack under oil pan (use wood 4x4s) under jack to get proper lift and place piece of wood between jack and oil pan and just pump jack up enough to set a little pressure to hold engine in place when you remove the drivers side motor mount (this is motor mount just above crank pulley). You do not have to remove alternator but you will have to remove the adjuster bracket at top so that alternator can be pivoted out of the way.

Remove valve cover. Remove top plastic timing cover. Remove crankshaft bolt and pulley. Remove

lower timing cover. There is a small 10 mm bolt on the front side of the timing cover that can be difficult to remove if you do not have a 1/4-inch drive socket and extension... be careful here. This small bolt also holds the oil dipstick in place. Remove this bolt and also the oil dipstick. Make sure to put a piece of duct tape over the hole the dipstick went into so that you don't drop something down into the hole and then have to remove the oil pan to retrieve it.

Ok so we have all the timing covers off and we can see the timing and balance shaft belt (s).

1 Front balance shaft



This is a close up of the retainer plate (avail from Sure Seal 1-800-645-7584). These plates are cheap and easy to install, and will keep the seal from popping out, which I have seen, happen before, costing the customer a new engine. If that seal pops out all the engine oil can be lost in 30 seconds. I will not do a timing belt job on this engine without installing a new OEM Honda seal and the retainer plate. You can also get a retainer plate from Honda but I do not like them as well.

Which Cars and Engines need the retaining plate?

Every car from 1990 to 1997 needed a retaining plate

90-93 all 2.2Litre needed retaining plate

94-97 EX 2.3 Litre needed retaining plate

94-95-96-97 DX and LX 2.2 needed retaining plate

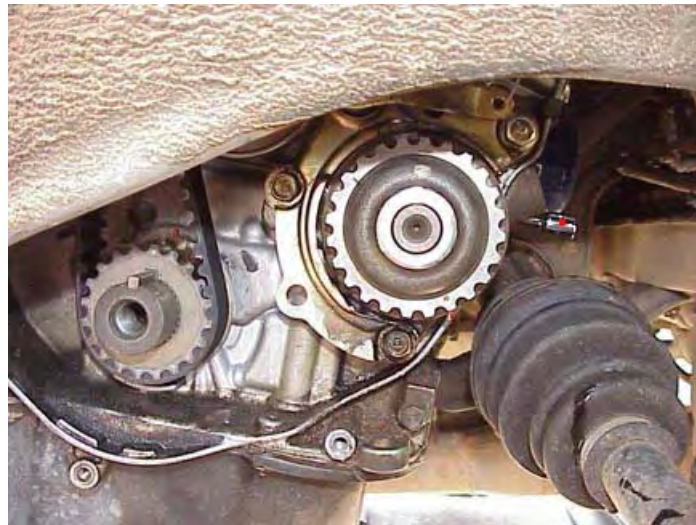
1998 and up 2.3L do not need retaining plate

You will have to remove the belt sprocket from the front balance shaft to facilitate the removal and installation of the new seal.

Note the groove in the balance shaft. I have put 2 red highlights on either side of it. Note the arrow behind and just to the top of the retainer plate. These 2 marks (the groove and arrow) are you're timing alignment marks. Make sure that cylinder #1 is at top dead center, and the crankshaft timing alignment marks are aligned also. The alignment marks are not perfectly lined up in this photo, it is off a little bit, if I turned the crankshaft to its TDC alignment marks, the groove would line up with the arrow alignment mark behind and just a little above the retainer plate. I just forgot to set engine perfectly at TDC when I took this photo.

Note: Just to the right of the cam timing belt and just down a little and left of the tensioner spring you'll see a (white) service bolt that I use to facilitate and easier installation and timing alignment of the balance shaft's belt. The timing belt is hiding it a little bit in picture, but you can see it. This bolt will hold and keep the cam timing belt in place while you work with the alignment and installation of the balance shaft's belt.

2 Rear Balance Sprocket



As you look at the sprocket on the right, this sprocket is connected to another gear on the inside of the gear case that meshes with the gear on the end of the rear balance shaft. This sprocket is an integral part of the Rear Balance Shaft Gear Case.

At around the 5 o'clock position you will notice a dot on the right sprocket.

In The picture ABOVE there is also a raised boss area on the oil pump front cover assembly

housing, which I have highlighted in Red (This boss area is highlighted WHITE in picture BELOW). These are the alignment timing marks. They must be lined up as well as the crankshaft alignment marks.

NOTE: All marks as outlined here... Front Balance Shaft Gear, Crankshaft Gear, and rear Balance Shaft Gear should be at their perspective marks when job is finished.

Notice to the right of the rear balance sprocket and just above the axle boot I have a 4 inch 1/4 inch drive wobbly extension sticking into the side of the block (I put a red dot on the extension). If you can... to facilitate this job it would be nice if you could get your hands on a Letter "E" drill bit which is (.249-inches in diameter) instead of the wobbly extension. I used to use the wobbly 1/4-inch drive extension... but the drill will lock and hold the rear balance shaft a lot better and keep it from turning and you will not need 3 hands then.

In the picture below: The aluminum boss area at 5:00 PM is highlighted (WHITE)

1990 Honda 2.2 Liter rear balance shaft gear alignment marks. This is a correction (do not use the wobbly extension). With #1 piston at Top Dead Center and the Crankshaft Gear at the TDC mark, this is where this rear gear should be. when the balance belt is on and tight, with your 2.49-inch drill bit all the way in, (at least 2.900-inch).



There is a service cap plug that unscrews in the side of the block (Image Below), remove it and insert a 4 inch wobbly 1/4 inch drive extension the wobbly end in first (USE THE DRILL IF YOU CAN FIND ONE CHECK WITH ACE HARDWARE OR AN AUTOMOTIVE STORE... THEY CAN ORDER ONE FOR YOU).

Rear Balance Shaft Alignment Service Hole

Image Below: Here's where the Rear Balance shaft Alignment Service Hole is.



It's just above the Drivers side inner Axle boot, in the side of the engine's block. Thats a 4 inch, 1/4 inch drive, wobbly extension in the hole. I just put the wobbly in the hole to show you in the picture where it is located. I recommend that you use the Letter E .249-inch drill bit.



With you're right hand pushing in on the extension, the wobbly end of the extension will find its way into a detent recessed area on the balance shaft as you turn the sprocket. With you're left hand turn the sprocket and you will feel the extension find its way into the recess, and the dot on the sprocket will line up with the raised boss area on oil pump cover housing (highlighted red). The sprocket turns the balance shaft at a 3-to-1 ratio. Meaning that, if you have the correct alignment the timing marks will line up and the extension will go in all the way. How far is all the way. Experiment: If you are on the correct alignment and you then turn the sprocket 360 degrees clockwise, you will fine that the extension will not go in as far, and if you turn the sprocket yet another 360 degrees clockwise it will still not go in all the way, and if you turn the sprocket yet another 360 degrees clockwise you will come back to place where the marks line up perfectly and the extension will now go in all the way, that is of course if you were right on the very first

alignment. Remember 3 turns and it comes back in, and the alignment marks are right on.

If you look at the crankshaft sprocket (IN 6th PICTURE BELOW) on the left, you will see a dot (highlighted white) just above the key in the crank. On the oil pump housing cover assembly there is an arrow (I put a red mark just above the arrow) these are the crankshaft TDC alignment marks. These must also be lined up when the rear balance shaft sprocket is at its timing marks.

Front balance shaft oil seal



Note: There is no front balance shaft seal retainer in this picture ABOVE, see picture #1 for a view at a retainer plate you can get real easy.

This is the seal that likes to pop out. I pulled it out, because I am replacing it with an OEM Honda seal and I am also installing the retainer plate (see picture 1).

If you ever get one that the seal has popped out there will be oil everywhere. If the seal has popped out get some brake cleaner from the auto parts house and spray over area and wipe with paper towels. If you are doing this in your garage in the winter time... and the furnace is on and you have no ventilation be carefull that you do not blow up the place from the brake cleaner fumes.

You can see the groove in the balance shaft (red dot highlights on each side), and the little (red square highlight), on the oil pump front cover housing assembly (lower right gear in picture), very well in this picture. Make sure that these two are aligned up perfectly with #1 piston at TDC and that the crankshaft sprocket alignment marks align perfectly, and also the rear oil pump and balance shaft sprocket alignment marks must be lined up at the same time.

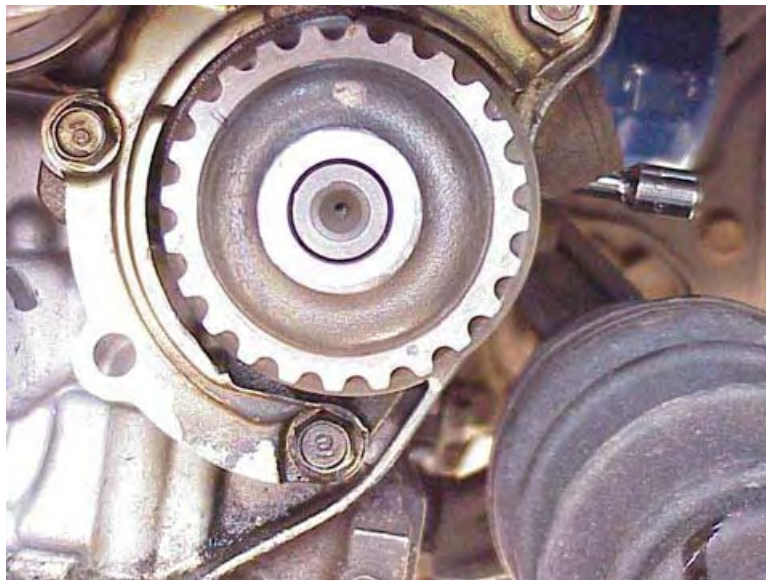
Also you can see (bottom corner of picture) the crankshaft timing marks, (white small square on the crank sprocket and red mark above the arrow on the oil pump cover housing assembly).

If the vehicle is in for regular timing belt and balance shaft maintenance, I usually will set #1 at

TDC and use one of those touch up white paint containers with the little brush in it. I will then put my own marks on the backside of the cam sprocket, the crank sprocket, and the rear oil pump balance shaft sprocket. If you have one that has jumped timing, or the belt has broken, then your going to need these pictures if you're not familiar with this engine.

Notice to the right of the front balance shaft in this picture, the little elongated arm (highlighted with little red squares). There is a threaded service hole inside this elongation (little white square). This elongation arm is attached to the Cam timing belt "Tensioner" I loosely install a 6mm x (1.0 thread pitch) x about 5/8 inch long bolt with a washer in here. I then install the new cam-timing belt, and then adjust the tension on the Tensioner and tighten this bolt. I always give this arm a little nudge with my finger before I tighten the Tensioner lock nut even though there is a spring. If you nudge it too much the timing belt will wine when engine is running because the timing belt is too tight. The use of this bolt will help you install the balance shaft belt. **You must remember to remove this service bolt after you install the balance shaft belt and adjust its tension, and lock down the main tensioner lock nut. Otherwise no one will be able to adjust the tension of the cam timing belt in the future.**

4 Balance shaft gear case shaft seal seeping oil



You will notice (In Above Image) that there is a residue seepage of oil just below the sprocket, and on the shrouding and bolt below the sprocket.

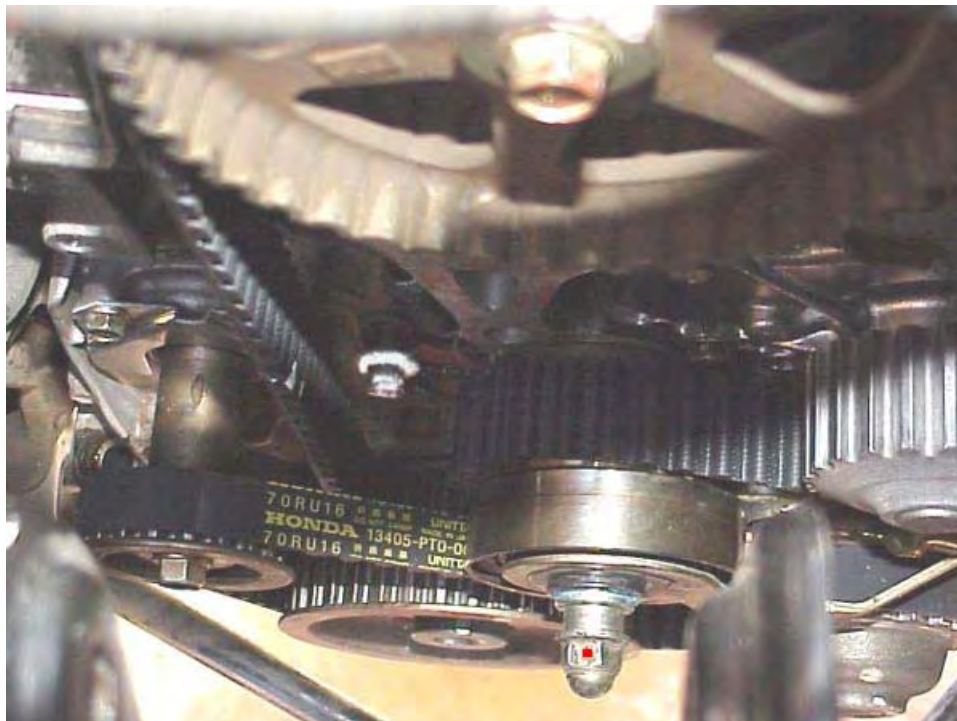
The shaft seal in the balance shaft gear case is leaking. You'll have to buy a new gear housing to fix this one.

Sometimes you'll see the oil seeping from under and in back of the shrouding. You'll have to remove the 2 bolts and 1 nut and then remove the gear case and install a new O-ring, its easy.

1990 Honda Accord 2.2 Liter, replacing defective leaking O-ring between balancer gear case and oil pump engine side cover. I used a drill letter size "E" which is .0249. Honda says to use a 6 mm bolt (.230-inch dia), 74 mm (3.0-inch) long, but I prefer the size "E" drill because it fits tighter and the gear doesn't move around as much, making it easier to reassemble. Make sure that the drill goes in at least 2.900-inch. When you get ready to reinstall the gear cover case its very important to make sure that the timing marks are back in alignment. Because there are teeth involved here and the gears are of different size it is possible to install the gear case wrong so that the **alignment marks** on the outer gear that the balance belt turns would be off.



5 Service Bolt

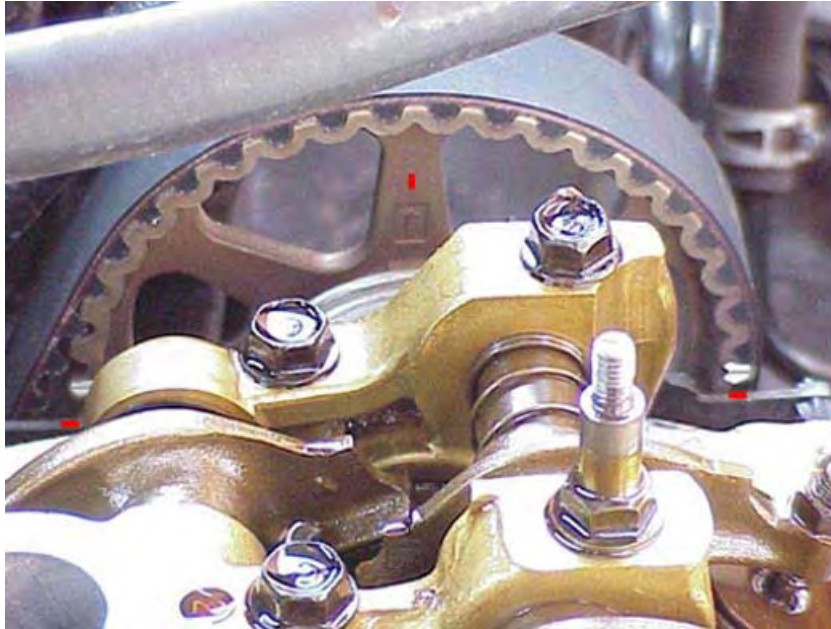


Just to the left of the center of the picture (ABOVE) you can see the (I painted it white) service bolt that is used to hold the cam timing belt tight, while you're installing and adjusting the balance shaft's belt. The bolt is a 6mm X 1.0 thread pitch X about 5/8 inch long with a washer on it. You can get one of these at the parts house or junk yard.

Make sure that you remove this bolt after you install the balance shaft's belt and tighten the main

Tensioner's adjustment NUT (highlighted with red square). Otherwise no one will be able to adjust the cam timing belt tension in the future. I did this once and had to remove the timing belt cover, to get back in. What a pain in the old butt!

6 Cam Sprocket Alignment Marks



Here we see the back side of the Cam Sprocket

There will be 2 little notches 180 degrees apart on the back of the cam sprocket (cam side), (highlighted white) these notches are to be level and even, on either side with the top of the black **inner** plastic timing cover (highlighted red).

With #1 piston at TDC notice the arrow on Cam Sprocket pointing up (red dot just above arrow on cam gear) almost to top center of sprocket. How do you know where #1 piston is at top dead center? Pull the spark plug out of #1 (closest cylinder to front crank pulley) and move crankshaft clockwise while watching through the spark plug hole with flashlight watching piston as it comes to the top of the cylinder and also watching your crank gear for the marks to line up, and also looking at the cam lobes (for cylinder 1) if you are at top dead center on cylinder #1 all cam lobes for that cylinder will be pointing away from the rocker arms. You don't want to be turning the crankshaft with the timing belt off or the piston could come up and bend a valve.

In the picture below: The outer gear for the balance belt has been removed from the end of the crankshaft so you can see the timing belt gear.

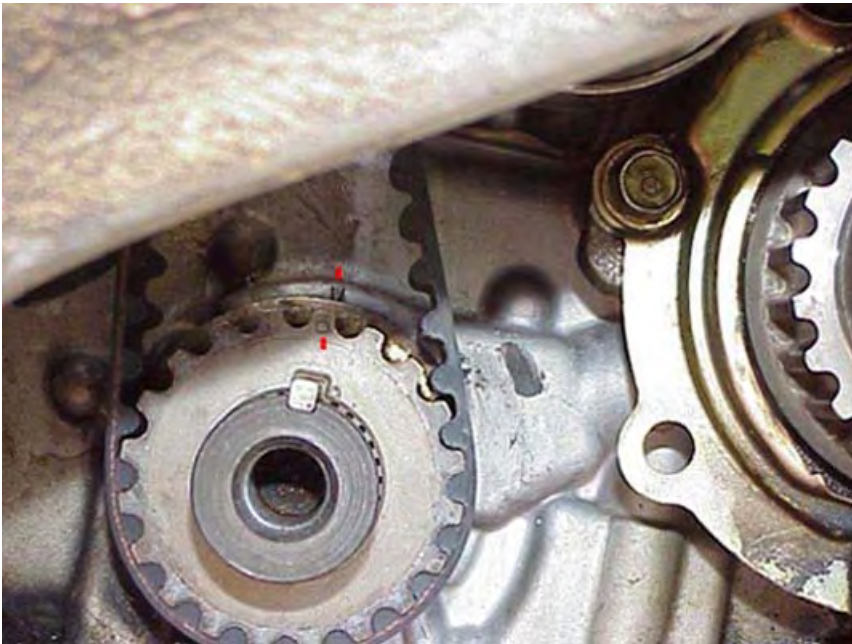
Here we see the mark on the front aluminum oil pump cover with a red dot above it. We also see a mark on the crank gear with a little red dot. Remember that the crankshaft turns 2 times for every time the cam gear turns 1 time. If you have these marks lined up down here as you see in the picture and you also have the marks lined up on the cam gear as outlined in the picture above then you are set to go.

YOU get the timing belt alignment with all marks correct and the belt tight, then you tighten the white service bolt.. then you work on getting the front and rear balance shaft alignment marks all

lined up with the belt snug and then tighten the NUT that locks both tensioner bearings.

NOTE: I usually use a screwdriver to apply a little pressure to the elongated metal bracket that the service bolt tightens against to adjust tension on the timing belt... then I tighten the service bolt.

After you get the timing belt and balance belt alignments right and tighten the cam/balance tensioner NUT... put a couple of thick washers on the crank bolt (so the end of the bolt does not bottom out in crankshaft end hole) then put a socket on the crank bolt and turn the engine over (counter-clockwise as you are looking at it from drivers side of the car) a few turns and recheck all your timing marks! If all marks are right on the money and the belts are tight and snug... then remove the white service bolt. The reason you turn the crank counter clockwise when checking timing and balance shaft alignments... is because this is the normal direction of rotation when the engine is running. By turning counter clockwise this will take out any slack on the one side of the timing belt and allow the tensioner (on the other side of the belt) to tighten the belt. If you ever want to just tighten the timing belt... just turn crankshaft a couple of full turns counter clockwise.. then looses adjustment nut... then turn crankshaft a half a turn counter clockwise... then tighten adjustment nut. You can do this with the lower timing cover in place (that is why the adjuster nut goes through the lower timing cover), however I like to put just a little bit of extra pressure on the tensioner when I adjust the tension... and the only way to do that is to remove the lower timing cover.



I have done millions of these jobs with no problems. I also didn't appreciate the lack of some information within the Honda service manual. That is why I did this post!

The problem with the Honda manual stems from having someone who has never done the job writing the description of the job. Sure the writer may be an engineer, but of what nationality and origin? If you want English speaking people to be able to do the job... then you better find someone who is English speaking do the job a few times himself then write about it and take pictures.

AND SCREW THE DAMN ABSTRACT DRAWINGS IN THE SHOP MANUAL!

AMEN!

Hopefully the reader will come away armed with a little more information from the detailed pictures as outlined in this post... this is my intention!

I have the highest degree of respect for Honda cars. In my own opinion Honda makes the best car on the road for it's price.

Best and finest regards

Rob~O

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[Back to front page](#) *** [Back to Honda Auto Tips Main Index](#)

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