

TJ 2000-6 York Compressor Bracket

Instructions for belt tension tuning

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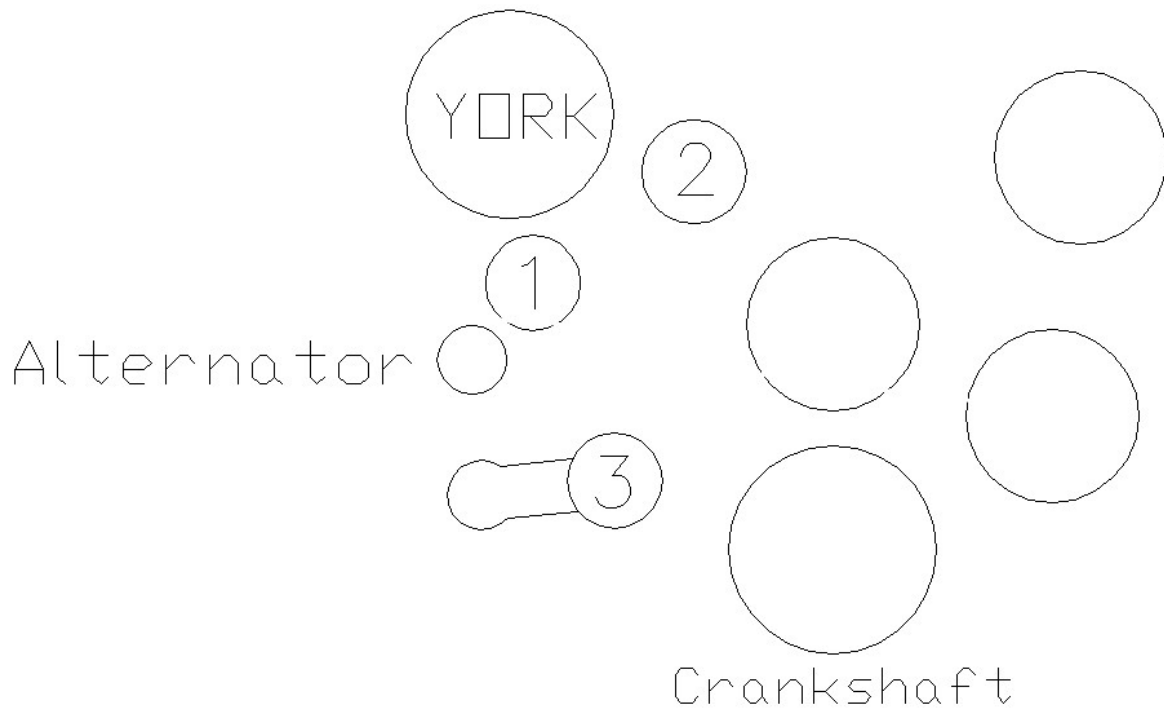
This document is to define things we have learned about the serpentine belt system on the 2000-06 Wrangler TJ/LJ with Our OffRoadOnly York compressor bracket system.

The system was designed to utilize the factory Belt tensioner. However, as the vehicles age and as other modifications are done, we are seeing many of the factory tensioners being replaced or needing to source a replacement when installing our bracket. After hearing from our customers and working thru some issues, we started asking questions about the tensioners they were using. We then ordered and acquired many of the same models/brands that our customers were using and did some more testing. What did we learn? LOTS! Seems that even though a replacement for an OEM part needs to bolt in place and work like original... this does not mean by default that they are all designed or produced to be identical.

The tensioner has 2 divots that key into the factory bracket as well as into our York bracket. This sets the rotation of the tensioner base. From there, the swing of the tensioner is regulated by the engineered stop points worked into the tensioner base. Seems each manufacturer takes these stop points, both on compression and extension to be loosely interpreted. The end result? In some instances, most in fact with replacement tensioner assemblies, we are seeing that the belt when warm and stretched, will in fact allow the tensioner to ride nearly at the stop position when the engine is idling. Being that the tensioner is near the stop position, it's safe to assume that the tension being applied is also at the minimum that the tensioner will produce. Turn on the compressor and the pulsing of the load on the belt results in a bit of a bounce in the belt and the result is that the tensioner will open slightly under the compression stroke on the compressor... and when it gets past the compression stroke, the relaxed cycle of the compressor will result in the tensioner slapping against the stop. Have this happen at an idle speed of 6-700 RPM and it sounds like the compressor is trying to get out from under the hood!

This condition may be diagnosed the easiest by running the engine, getting it warm, allowing the belt to get warm and stretch to its longest position and then shut it off, watch out for the hot hoses and radiator... reach straight down past the alternator to the tensioner, grab the idler pulley side of it and pull up... if it moves upward enough to make a solid stop against the travel stop... then there is not enough tension on the belt and we need to increase that! Another telltale sign, in the manual we describe the initial belt installation and note that the belt should be routed over all the pulleys in the system, and leave the steel idler at the front of the cylinder head as the last step, and when the belt is put in place, with the tensioner at full extension, you should be just barely able to start the belt past the edge of the pulley. IF the belt slips on easily, there is a quick indicator that you may find this condition of not enough tension.

How do we increase the tension? Shorter belt? Sure! But the next shortest standard serpentine belt available at most auto parts stores is too much to short. So then, how do we increase the tension without replacement/shortening of the belt? Easy! Increase the running length thru the pulleys to get the tensioner to rest closer to its extended position, rather than the compressed. How do we change the routing length? Easily? Simple. We just need to make some of the pulleys the belt runs around larger. The larger the pulley, the more belt length. And work this into the equation, the longer that the belt rides on the pulley, the more effect that larger pulley will have on the routing length.



Visual representation of the belt routing system, with 3 idlers numbered for reference in this doc.

The Kit comes with an idler pulley that mounts between the alternator and the compressor. (Item 1 in the above diagram) There is also a steel pulley that is mounted to the face of the cylinder head, this one can also be used to adjust belt routing length.(Item 2 in the above diagram) AND the idler pulley that is installed and interchangeable on the tension itself can also be changed to adjust the routing length. (Item 3 in the above diagram)

Some part numbers and diameters often used to mix'n match. These numbers are Napa numbers, but also interchange with MOST aftermarket manufactures.

38018 70mm diameter Idler pulley included in the kit.

38015 76mm diameter Idler pulley often used as the first step when an aftermarket tensioner is used

38043 76mm diameter Steel idler pulley mounted to front of cylinder head

Now, the process to get to a combination that will deliver the best tension is simply trial and error. Acquiring a 38015 is most likely the first step. Simply remove the belt, remove the idler placed between the alternator and compressor and then reinstall the larger 38015 idler. Now, reinstall the belt. Is it barely able to slip over the idler and get into place? Or does it slip on easily? Again, this is an indicator of where you will be on tension.

If the belt does not slip into place, then we need to reduce the routing length. Remember the note above that the length of belt contact area on the idler changes the length as does the diameter? So if we remove the 76MM steel idler and replace with the 70mm one we just took from the bracket, being the belt wrap is appx ½ on this location, this will offset the amount of change by appx 50%, back to being slightly looser. See how that works? The solution will be simply to change the routing length to get the idler in the best, most tension position that you can get the belt to install.

Install as per the stock Jeep setup, and the parts included with the OffRoadOnly bracket kit, the pulleys will be as defined below. We'll call this Configuration #1.

1. 70mm plastic
2. 76mm Steel
3. 70mm plastic

If this application results in the belt being too loose, slips over the idler to install very easily, then make the most aggressive change first. Change the #1 to the larger 38015 76mm plastic. We'll call this Configuration #2.

1. 76mm plastic
2. 76mm steel
3. 70mm plastic

IF the belt is now too tight, and you cannot get it in place, then swap the 38018 plastic you just removed into the steel pully position, ensure that the hardware used will not rub on the pulley surface. The stock hardware will work, but we have seen replacement hardware used in this position. This would be configured as following, Configuration #3

1. 76mm plastic
2. 70mm plastic
3. 70mm plastic

And, in the event that you have a working condition of one of the above configurations, and over time the belt stretches just a touch and a little more tension would be good, don't hesitate to replace the 70mm on the tensioner with a 76mm plastic. Configuration #4

1. 76mm plastic
2. 76mm steel
3. 76mm plastic

With these configurations, we have been able to make every application we tested work. However, there is so many variables, you may need to experiment a bit more to develop a solution for your application.

Belts. We include a Napa belt with the kit, 25061080 is the part number for the A/C version, 25060950 is the Non-A/C version. We have used other belt manufacturers and while some did perform well, the Continental Silent Drive was one we liked, but since Goodyear bought continental, that one no longer performs as we had experienced. IF you are using a non-napa belt, your experiences with the above may be different.