

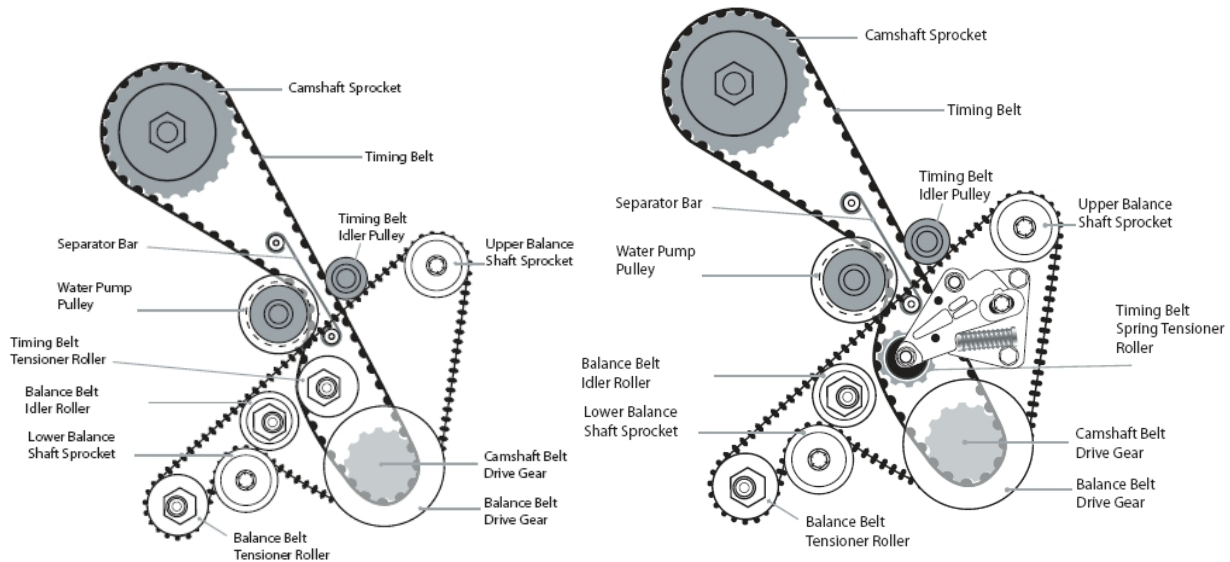
Version 6.185

## Using the 920X Belt Tensioning Tool

**Introduction:** this short document contains a step-by-step guide for using the 920X-v6 belt tensioning tool manufactured by ArnWorx Specialty Tools. This tool is designed to assist with the accurate tensioning of the cam belt and in some cases, the balance belt on the Porsche 944, 944s1, 944s2, 944 Turbo, 924S and 968. A downloadable version of this document is available at [http://arnworx.com/new\\_tensioning\\_tool.htm](http://arnworx.com/new_tensioning_tool.htm). There are also demonstration videos at that webpage to help with understanding the use of this tool.

Below are procedures for setting the tension of the cam belt and balance shaft belts. Before either procedure is started, a user calibration of the tool must be performed.

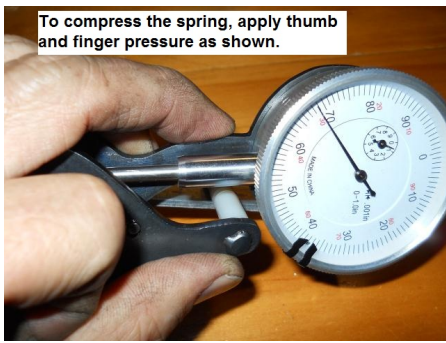
All adjustments are to be done on an engine that has cooled – warm to the touch is ideal. Shop and engine surface temperatures should be above 67 degrees Fahrenheit (19.4C). In extreme cold situations, you may need to tension the cam belt while cold; then start and warm the engine before tensioning the belts a second time.



Reference the above sketches for engine terminology.

### Calibration

This tool is shipped ready to use. Tool calibration can be confirmed by inserting the calibration bar (see images below).

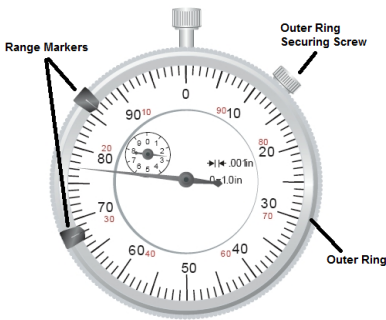


With the bar in place, loosen the gauge's outer ring securing screw and rotate the outer ring (either direction) until the large needle points to the noted number seen on the calibration bar. Tighten the outer ring securing screw.

These range markers are helpful for reading the gauge when installed in the engine but can inadvertently upset the calibration process. If you intend use the gauges range markers, it is best to set them while the calibration bar is in place. To do this, put finger pressure on the gauges lens, to hold it in place, and carefully position the range marker as needed. *Note: A quick reference sticker is available on the backside of the tool that shows the various ranges for tensioning.*

With the range markers in place, confirm that the large needle is pointing at the calibration value and then remove the calibration bar.

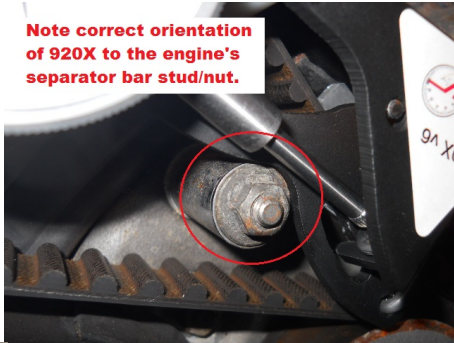
### Snapping the Gauge



As you can see in the image above, the 920Xv6 has aluminum sleds. These are meant to slide along the belt as the spring applies deflecting pressure. To ensure you get the best possible reading, always snap the gauge - lift the knob at the top of the gauge, approximately 1/4 inch (4mm) and release, allowing it to snap back. This simple step creates a small vibration and helps the sleds slip along the belt and thereby provide the most accurate reading.

### Cam Belt (944/924S/944S/944S2/944 Turbo)

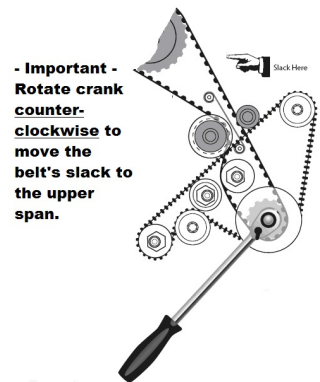
1. Begin by gaining access to the cam belt. This varies a little by model but generally, the air filter box, intercooler pipes, distributor cap/gear cover and upper belt cover must be removed.
2. Place the transmission in neutral and set the parking brake.
3. Remove the distributor cap, camshaft sprocket cover and rotor. *Note: This procedure assumes the cam belt is pre-set to tension tight enough so that rotating the crank will not cause the belt to jump or skip over teeth and loose enough that a slight arch is seen when the 920X is attached to the belt (see image below).* **CAUTION: For 87' and later model years, the spring tensioner must be secured and placing pressure on the belt prior to any rotation of the crank; else the cam belt may jump a tooth.** Using a breaker bar, rotate the crankshaft (clockwise) until the cam is at Top Dead Center (see image below).



Note correct orientation of 920X to the engine's separator bar stud/nut.

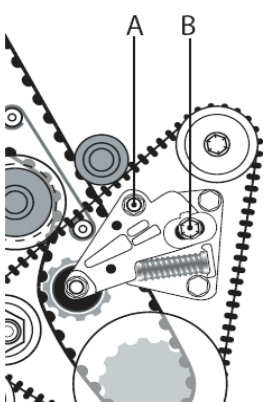


With the 920X attached, you should see a slight arch in the belt here.



- Important - Rotate crank counter-clockwise to move the belt's slack to the upper span.

4. Compress the 920X's spring and slip the tool onto the cam belt as shown – the center roller of the tool must fit between nubs of the belt while the two sleds fully contact the smooth side of the belt. Release the 920X spring and allow the tool to grip the belt. **CAUTION: Damage will result to both the engine and the 920X if the engine is cranked (using the starter motor) while the tool is installed.**
5. In this step we will ensure that the belt's slack is moved to the upper span. Using the breaker bar, slowly put **counter-clockwise** rotational pressure the crank while observing the gauge. The reading will increase (rotate clockwise) as the slack moves to the upper span, and then stretching of the belt will begin. Stop when you feel the stretching or as soon as the gauge reading reaches its maximum value. This will occur quickly, with almost no actual movement of the crank. Some settling back from this gauge value is expected when pressure on the crank is released. The resulting reading is the current tension value of the cam belt. *Note: If the gauge does not move at all, and/or no arch is seen; then the belt may be preset too tight or the tension tool may be contacting the rear belt cover. Evaluate and adjust as needed (prior steps may require repeating).*
6. *Note: For the following steps, refer to **Cam Belt Desired Deflection Values** for acceptable readings.*
7. For 86 and earlier 944s; while observing the 920X gauge, hold the timing belt tensioner roller with the thin wrench and loosen the 19mm securing nut. Once the 19mm nut is loose, you will observe how altering the position of the thin wrench immediately changes the 920X reading. Use the gauge's reading as a guide and position the thin wrench to achieve the correct tension. Once there, tighten the 19mm nut (33 ft. lb). Some patience and anticipation is needed as tightening the 19mm nut will invariably alter the tension reading somewhat.



For 87 or later model 944; cam belt tension is set by altering the position of the spring tensioner arm. To do this, see sketch at left and loosen bolts A and B; then push down or pull up on the spring tensioner. Using a pin wrench will make this easier. Once the 920X gauge shows the correct reading, hold this position and tighten the tensioner bolts A and B. If the spring tensioner cannot be adjusted to a point where the 920X tension tool reads the acceptable value, then examine the placement of the tension tool as it is likely touching either the rear part of the belt cover or the nut that secures the separator bar. Re-position the tension tool and re-do this step.

- Note: Refer to **Cam Belt Desired Deflection Values** for acceptable readings. Once an acceptable reading has been reached and the 19mm nut (or spring tensioner) has been tightened, the 920X can be removed and the engine hardware can either be re-installed or you can proceed to adjusting the balance shaft belt.

### Cam Belt Desired Deflection Values

New Belt: .X90 to .X97

Used Belt: .X01 to .X05

Note: .X90 is a tighter belt than .X97 and .X01 is a tighter belt than X.05

### Balance Shaft Belt (944/924S/944S/944S2/944 Turbo/968)

For this procedure, the engine does not need to be in any particular position.

- Begin by gaining access to the balance belt. Typically this means removing such items as the air filter box, snorkel, intercooler pipes, and the upper front belt cover. Evaluate the condition of the balance belt for damage or excessive wear. Replace if warranted.

**Note: a properly adjusted balance belt will, to most people, seem VERY loose.**

- If you are checking or re-tensioning a balance belt you should bring the slack of the balance shaft belt to the upper span by manually grasping the belt's upper span and pulling; then proceed to step 3. If you have just installed the belt or suspect the belt is too loose, then you should pre-set it to be tight (do not stretch the belt) and then proceed to step 3. Note: adjusting the belt from a too-tight situation will avoid occasional mis-readings that have occurred – more discussion on this in the FAQ section of our web page:

[http://arnnworx.com/new\\_tensioning\\_tool.htm](http://arnnworx.com/new_tensioning_tool.htm)

- Compress the 920X spring and slip the 920X onto the balance belt as shown. Release the spring and allow the tool to grip the belt. Snap the gauge and a tension measurement will be shown.

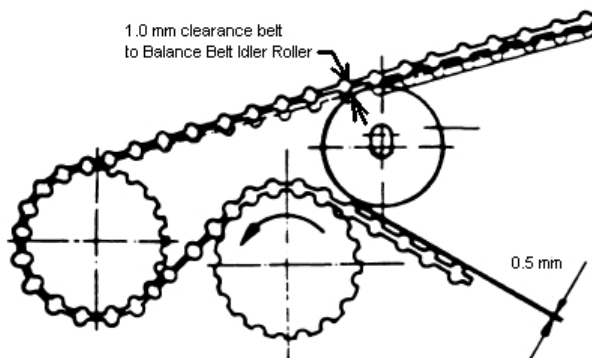


- Use a 19 mm wrench to loosen the balance belt idler roller. Also use a 24 or 27mm (as needed) thin wrench together with a 19 mm wrench to loosen the nut of the balance belt tensioner roller. Loosen the securing nut just enough so that the tensioner roller can be repositioned with the thin wrench. *Note: if the securing nut is too loose, the tension setting will not hold during measurements, if it is too tight, you'll not be able to change the tension while observing the gauge.*

5. *Note: Refer to **Balance Belt Desired Deflection Values** for acceptable readings.* While observing the gauge, use the thin wrench to adjust the balance belt tensioner roller to an acceptable reading and secure the balance belt tensioner roller by tightening the securing nut (33 ft. lb).

*Note: be careful to not alter the position of the thin wrench as this will alter the tension setting.*

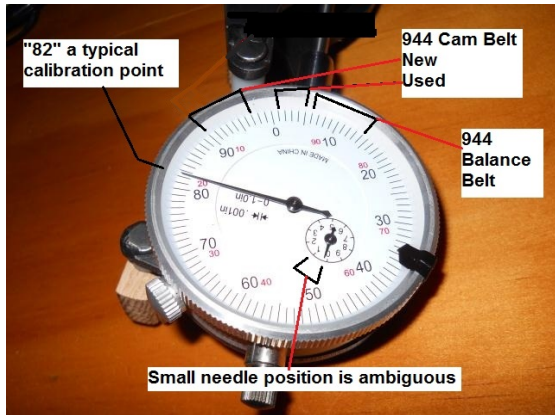
- Remove the 920X tension tool.
- Position the balance belt idler roller and adjust so that it almost touches the balance belt (see sketch at left).
- Install any engine hardware removed previously.



### Balance Belt Desired Deflection Values

New or Used Belt: .X06 to .X14

## Reading the Gauge



During the calibration process, the outer ring is set to a specified position (using the calibration bar). For our purposes, the small needle can be ignored. See the image below to help understand how to read the gauge. Note: Normally, to read a machinist gauge, you would first read the small needle to know the tenths and then read the large needle to know the hundredths and thousandths; but, because we alter the outer ring, the tenths can become confusing. For this reason, we ignore the small needle and represent it as an "X" e.g. .X82.

With changes to the tool's sleds and the reference bar, typical calibration points are now in the 60's to mid 70's.