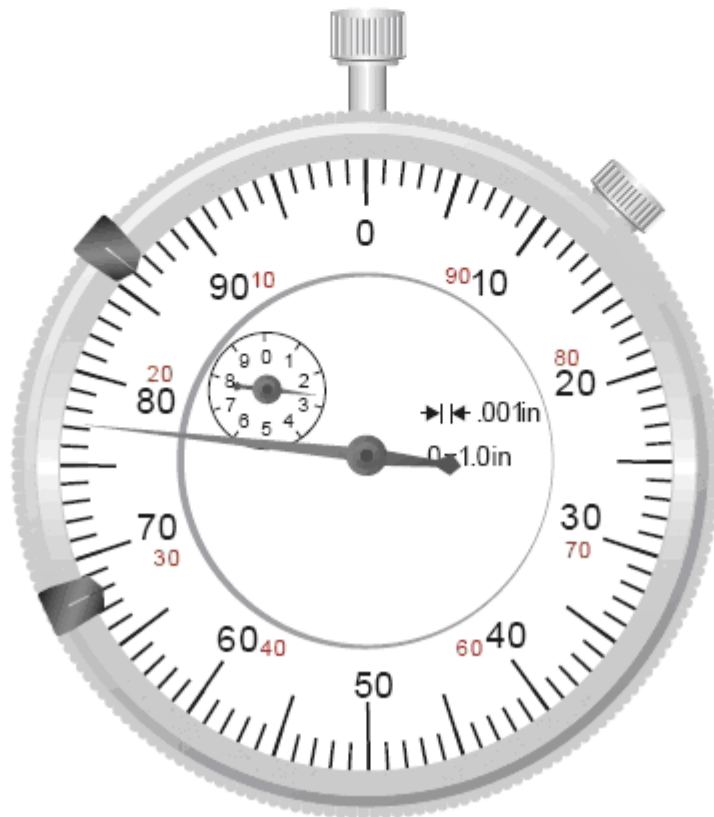




920X-928 Cam Belt Tensioning Tool



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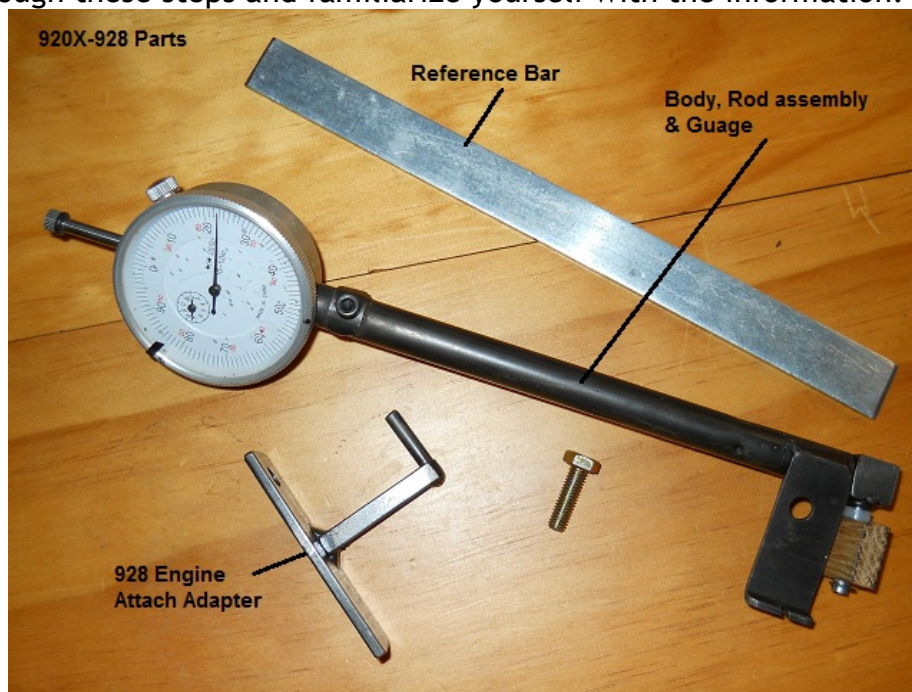
Using the 920X-928 Belt Tensioning Tool

Introduction: this short document contains a step-by-step guide for using the 920X-928 belt tensioning tool manufactured by ArnnWorx Specialty Tools. This tool is designed to assist with the accurate tensioning of the cam belt on the Porsche 928. The basic tool (body, rod assembly and gauge) can also be used on other Porsche models, only the reference bar and attaching parts are unique to 928 use.

Below is the procedure for setting the tension of the cam belt. This procedure uses a two-step process. First a reference reading is made using a supplied reference bar. The gauge value from that initial reading is used as a starting point to determine the ideal tension setting. The reference bar is then removed and the belt is adjusted until the gauge reads the ideal value.

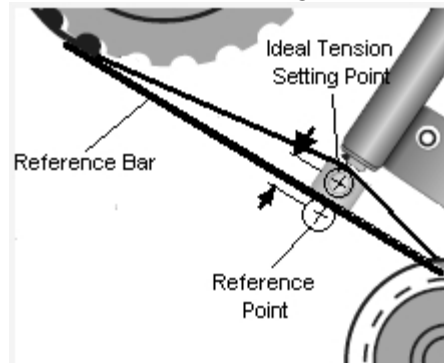
All adjustments are to be done on an engine that has completely cooled. Shop and engine surface temperatures must be above 67 degrees Fahrenheit.

While the 920X is a very sensitive device, a number of things can inadvertently lead to faulty or inconsistent readings. The procedural steps must be followed closely to ensure proper use. Please read through these steps and familiarize yourself with the information.



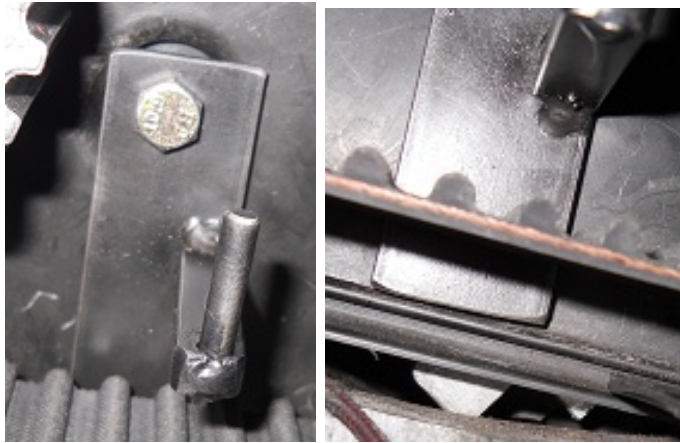
How It Works

The 920X has a small internal spring and an extending rod. When mounted, these parts deflect the belt and a deflection measurement can be made. That measurement represents tension. To get a precise measurement we need the gauge reading at two points. The first is the reference point, shown in this sketch. In order to get that point, we must first insert a reference bar. The thickness of the reference bar adds a small amount to the reading but that will be adjusted for. Next, we know the distance from the reference point to the ideal tension point, this distance was found through development tests for the tool. We also have a calibration value for each tool that is determined during fabrication; see attached 2" x 5" calibration tag. Through some simple math, each of these values come together to find the ideal setting. With a known ideal tension value we then remove the reference bar and adjust the belt's tension until we read the ideal setting.



Cam Belt

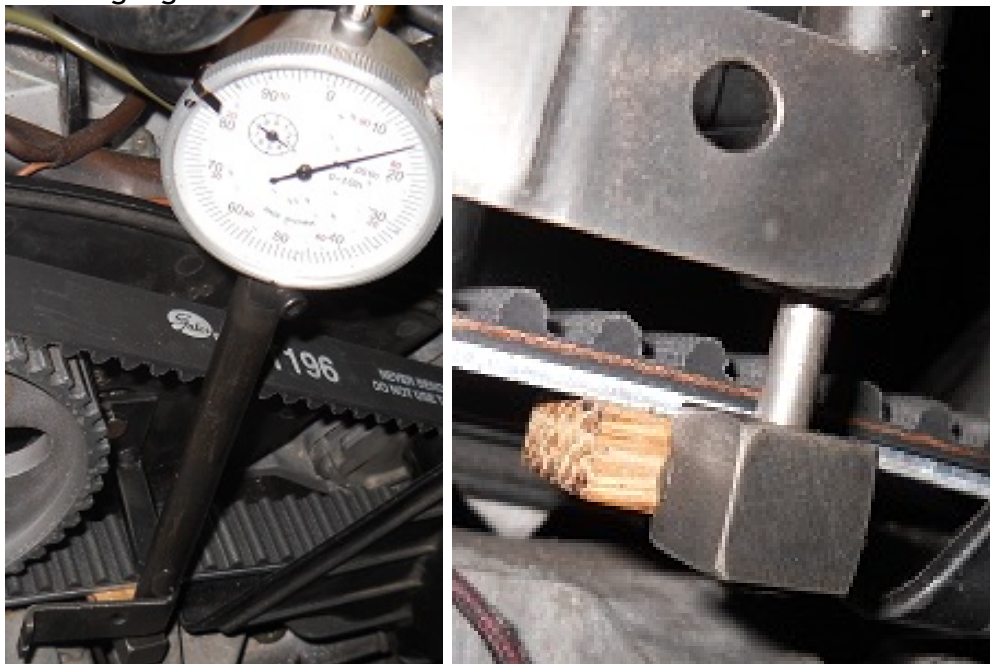
1. Begin by gaining access to the cam belt. This varies a little by model but generally, the passenger side air guide tube and the belt cover beneath it must be removed. Our images below also show a radiator hose and heater hose removed. This will make access easier but is not absolutely needed.
2. Rotate the crankshaft until both the passenger side cam and crank is at Top Dead Center. *Note: while facing the front of the engine, rotate the crank only in a clockwise direction. 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.*
3. Using the supplied M6 bolt, attach the 920X adaptor; align the lower edge of the adaptor to the lower lip of the rear belt cover.



4. Install the 920X gauge onto the 920X body. The gauge should be inserted fully into the fixture and be secured there using the small cap screw. The gauge can be rotated for visibility and/or clearance.
5. Place the 920X body onto the adapter's fixture pin.

WARNING: Damage will result to both the engine and the 920X if the engine is started or even turned over while the tool is installed.

6. Position the reference bar so that it fully contacts the belt and the left edge of the bar is centered beneath the cam gear. While holding the bar in this location, pull the wooden sled down and rotate it under the bar. *Note it may be helpful to push down on the rod extending from the top of the gauge.* The wooden sled must be positioned so it lies across the belt, perpendicular to belt travel. Snap the gauge. Read about snapping the gauge in the section below.



7. At the end of these printed instructions is a worksheet form, use the form to record the readings that you take from the gauge. The worksheet helps to calculate the correct tension for your engine.

- Read the gauge and record the initial reference reading in box 1 of the card.
 - Note the cam belt deflection value, provided on the calibration tag and copy it's value into box 1A.
 - Add the values of boxes 1 and 1A and enter your result in box 2 of the card.
 - Copy that result into boxes 3 and 4.
 - Add and subtract the tolerances (as stated on the card) and enter your corresponding results in boxes 5 and 6.
 - The value in box 2 is ideal setting. *Note: In subsequent steps, attempt to reach this value, but do not accept readings that are outside of those values seen in boxes 5 and 6.*
8. Remove the reference bar and position the wooden sled so it lies across the belt, perpendicular to belt travel. Snap the gauge.
 9. While observing the gauge, adjust the tensioner until the gauge reads the ideal tension. Try to achieve the desired reading without over-tightening the belt as stretching the belt is to be avoided. Also, all readings are only valid following a snapping of the gauge.
 10. Once an acceptable reading has been reached and the tensioner's jam nut has been tightened, the 920X can be removed and the engine hardware can be re-installed.

Snapping the Gauge

The 920X itself has some small resistance to change and this can affect small reading errors. Since we are also attempting to measure very small deflection distances, this error may be significant. To ensure that you have an accurate reading, always snap the gauge - lift the knob at the top of the gauge (approximately 1/8 inch) and release it allow it to snap back. This simple step creates a small vibration and helps the gauge and rod assembly settle and thereby eliminate errors.

Caring for your 920X

The tool is constructed of mild steel. The surfaces are coated using a process of acid etching followed with an oil based sealant. This gives the tool a soft black finish and that helps to hold a machine oil. The oil helps with the function of the tool and prevents corrosion. The tool will however, rust in the absence of the oil and the oil can be removed in the course of routine handling. After each use, the tool should be wiped down with simple motor or gun oil to preserve the finish. No lubrication is needed for the gauge.

About the Calibration Tag

With each tool, we include a calibration tag. It has two deflection values that are measured during final assembly/calibration of the tool. These vary slightly for each tool that we make and are included to provide an added measure of precision. Using the deflection values will provide the most accurate tension value.

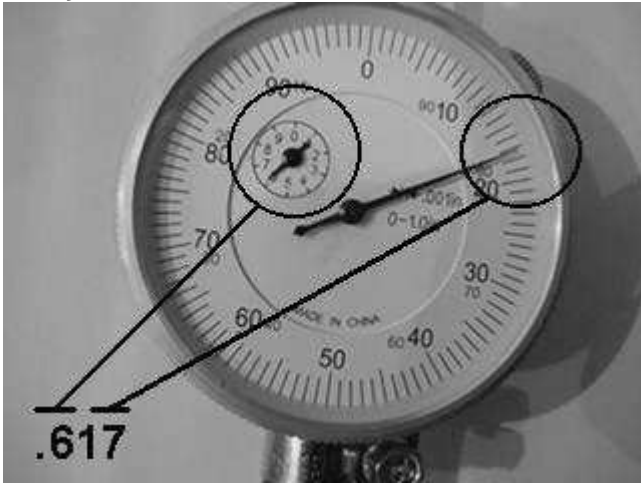
If the tag is lost, default values to be used are:

944/928 Cam Belt : 0.150

944 Balance Belt : 0.240

Reading the Gauge

Here is an example of how to read the gauge. *Note: Although not needed for these procedures, the gauge can be zeroed by rotating the outer ring. Take special care in reading values where the large needle is between 90 and 0, as this is where reading errors will most likely occur.*



Contact BruceArnn@ArnnWorx.com for replacement parts.

Worksheet Form

Tensioning of 928 Cam Belt	
Initial Reading (w/ Ref bar)	Box 1
Add deflection value, see calibration tag	Box 1A
Ideal Tension Setting →	Box 2
Box 4	Box 3
<u>+.003</u>	<u>-.003</u>
Box 5	Minimum
	Maximum
	Box 6