



PRECISION MACHINE SPINDLE REBUILDING

Tools & Supplies Checkoff Sheet

For all the videos in this Educational Video Series, please visit:
<http://www.activeatom.com/education-spindle-rebuilding-videos.php>

This Tools & Supplies Checkoff Sheet is a thorough list of everything you will need to rebuild a Levin Spindle. If you are rebuilding a spindle from another manufacture, you can still use this Checkoff Sheet but be aware that some tools listed here may not be required on your spindle while there may be other tools not listed here that you may still need to acquire. So please take the time to plan your machine spindle rebuilding project to ensure that you have everything required to do a proper job.

TOOLS REQUIRED	
<i>The following tools are required to perform all Spindle Rebuilds for any machine.</i>	
<input type="checkbox"/>	<p>Quality Allen Wrench Set</p> <p>You may need either an Imperial or Metric Allen Wrench set depending on your Spindle. For Levin Spindles, you will need an Imperial set.</p>
<input type="checkbox"/>	<p>Small Flat-Head Screwdriver</p> <p>On all the Levin spindles with the exception of the 3C closed style headstock, the spindle nut uses a very small slotted head screw for securing it onto the spindle threads.</p>
<input type="checkbox"/>	<p>Adjustable Pin Spanner Wrenches – 1/16”, 3/32” and 1/8”</p> <p>1/16” pin size is used on the Levin spindle nut or up to 3/32” for the 3c collet spindle nut. The bearing caps on the Levin open style headstocks use a 1/8” pin size and on the Levin accessory spindle, both a 1/16” and 1/8” pin size are used.</p>
<input type="checkbox"/>	<p>Bearing Separator</p> <p>A Bearing Separator is required for removing the bearings from the spindle. For the Levin spindles, we use the smallest available such as the OTC 1121.</p>
<input type="checkbox"/>	<p>Hydraulic Press or Dead Blow Hammer</p> <p>A Hydraulic Press is highly recommended for the removal of the bearings from the spindle as it provides better and safer control especially for difficult to remove bearings. If you do not have a hydraulic press, a dead blow hammer can be used and unlike a normal hammer, a dead blow hammer delivers a strong and controlled impact with minimal rebound. If you will be using a Hydraulic Press, we recommend using a piece of Delrin as shown in the video between the hydraulic press piston and spindle shaft in order to protect it from potential damage.</p>
<input type="checkbox"/>	<p>Bench Vise</p> <p>We recommend a bench vise for both the spindle disassembly and assembly procedure. We also recommend using soft jaws on the bench vise in order to protect the spindle and related parts.</p>

TOOLS REQUIRED – *continued...*

	<p>Bearing Installation Tool</p> <p>We use and recommend the SKF Bearing Installation (Fitting) Tool Set Model TMFT36 for the installation of the bearings onto the spindle. If you have a lathe, you can also make the bearing die's out of Delrin with the use of a Dead Blow Hammer.</p>
<input type="checkbox"/>	<p>Surface Temperature Meter – 2 Meters or 1 Meter with 2 Probes</p> <p>The temperature meter(s) are used to monitor the bearing temperatures during the break-in procedure. The bearing manufactures recommend the use of Type K Thermocouples</p>
<input type="checkbox"/>	<p>Steel, Brass or Aluminum Rod (~1 Foot Length)</p> <p>This rod is only required if you need to replace the collet key on the spindle. We recommend a rod that has a clean undamaged surface and large enough in diameter to place inside the spindle for inserting the collet key in place as shown in the video.</p>
<input type="checkbox"/>	<p>Wiha Tools – Precision Chip Lifter (Part # 26810)</p> <p>This tool is only required for use on the spindle bearing caps used on the Levin open style headstocks and accessory spindles. This tool is used to remove the retainer clip from the bearing cap that holds the felt ring in place.</p>
<input type="checkbox"/>	<p>Small 2 Ounce Hammer</p> <p>This small hammer is used together with a 1/8" pin punch for loosening stuck spindle nuts on the Levin spindles (if the spanner method does not work).</p>
<input type="checkbox"/>	<p>1/8" Pin Punch</p> <p>This pin punch is used together with the small 2 ounce hammer above for loosening stuck spindle nuts on the Levin spindles (if the spanner method does not work).</p>
<input type="checkbox"/>	<p>Soft Jaw Pliers</p> <p>We use soft jaw pliers to hold the Levin spindle for both the removal and installation of the spindle nut so that we don't damage the spindle. If you require additional gripping power, you can apply a strip of blue painters tape as we demonstrate in the video.</p>
<input type="checkbox"/>	<p>Blind Hole Bearing Removal Tool</p> <p>If a bearing gets stuck in the spindle housing after the removal of the spindle shaft, this blind hole bearing removal tool is the perfect tool for removing these stuck bearings. We show a good example of this in the disassembly of the Levin accessory spindle which can be seen in video Part 3.</p>

MEASURING INSTRUMENTS REQUIRED

The following measuring instruments and tools are used for testing the condition and accuracy of the main spindle shaft, and also for identifying the high spot on the spindle which is required for the installation of the Angular Contact Bearings. For machines spindles with high accuracy such as the Levin spindles, high quality measuring instruments and tools are an absolute requirement in order to determine condition and detect any runout.

<input type="checkbox"/>	<p>Surface Plate</p> <p>A quality surface plate is required for testing the condition of the spindle.</p>
<input type="checkbox"/>	<p>High Resolution Test Indicator</p> <p>A high quality test indicator with a resolution of either 0.000005" or 0.001 mm. This resolution is very important for use on the Levin Spindles which leave the factory with a guaranteed accuracy of 0.000005" T.I.R. (Total Indicator Runout) or roughly a little more than 1 Micron (0.001 mm).</p>
<input type="checkbox"/>	<p>V-Blocks</p> <p>Depending on the size of your spindle, you will need either a matched set or a single long length v-block. For example, on the Levin Accessory spindle, we use a single v-block. The v-block(s) is used to hold the spindle shaft for measurement.</p>
<input type="checkbox"/>	<p>Height Gauge (with test indicator holder) or Test Indicator Base</p> <p>As shown in the video, we use a Height Gauge with a test indicator holder for taking measurements of our spindle shaft. If you choose to use a height gauge, you will need the test indicator holder which is sold as a separate accessory. You can also use a Test Indicator Base which is non-magnetic and is designed to be used on a surface plate such as the Murkens Indicator Base.</p>
<input type="checkbox"/>	<p>Magnetic Test Indicator Stand</p> <p>This magnetic test indicator stand will be used to hold the test indicator on the machine for taking measurement readings of the assembled spindle. For the Levin spindles, we use a mini size indicator stand which is made by Starrett which is also very rigid. NOTE: It is very important to use a very rigid indicator stand especially when used with a high resolution test indicator.</p>
<input type="checkbox"/>	<p>10x Loupe</p> <p>Not necessarily a measuring tool or instrument but we list the 10x Loupe here as it can be very helpful for identifying needle movement on the test indicator especially when measuring high precision spindles such as from Levin where it can be very difficult to detect any runout. The loupe is also very useful for checking the surface condition of the spindle and related parts.</p>

SUPPLIES REQUIRED

This is a list of supplies recommended by us for performing a spindle rebuild.

<input type="checkbox"/>	<p>Acetone</p> <p>After disassembly of the spindle, we recommend the use of Acetone over 99% Isopropyl Alcohol as it has stronger cleaning power for removing old grease, oil and grime. Do not use on plastic or rubber parts, or painted metal parts. In these cases, use 99% Isopropyl Alcohol.</p>
<input type="checkbox"/>	<p>Machine Oil (NyOil)</p> <p>You will need a general purpose machine oil which you will be applying on all the spindle part surfaces during assembly. We use and recommend NyOil for it being a very good quality high refined mineral based oil that also prevents rust.</p>
<input type="checkbox"/>	<p>Chemtronics ControlWipes (Part # C910)</p> <p>We strongly discourage the use of paper towels when assembling a spindle because they are a paper based product that can contaminate the precision bearings. Instead, we highly recommend these general purpose wipes as they are nonwoven, spunlaced polyester cellulose fabric, highly absorbent and most important, are lint free. These wipes are also very strong and will not tear.</p>
<input type="checkbox"/>	<p>Bearing Grease (Kluber Isoflex)</p> <p>A good quality bearing grease is required for use in machine spindles. We recommend using Kluber Isoflex NBU15 bearing grease and you want to purchase it in a 30ml Syringe as it provides an easier method of transferring the grease to the smaller application syringes below.</p>
<input type="checkbox"/>	<p>1 ML Syringe</p> <p>For injecting the bearing grease into the bearings, we use a Syringe as shown in the video. A 1 ML Syringe is large enough for use with all Levin spindle bearings but for larger spindles, you may need to purchase a larger capacity syringe. We stock and use both 1 ML and 10 ML syringes which covers all our needs.</p>
<input type="checkbox"/>	<p>18 Gauge Blunt Tip Needle</p> <p>This blunt tip needle is used with the syringe listed above. The 18 Gauge size is perfect for injecting bearing grease into the bearings.. This type of needle is not an injectable type and is commonly used in labs for application or distribution purposes. This blunt tip type is not sharp and much safer to use.</p>
<input type="checkbox"/>	<p>Grinding Wheels / Bits</p> <p>After the assembly and burn-in procedure has been completed on the spindle, the collet seat may need to be reground if it is damaged, shows wear or measures out of factory Specification.</p>

SUPPLIES REQUIRED – *continued...*

<input type="checkbox"/>	<p>Loctite Retaining Compound (603 or 609)</p> <p>During the replacement of the spindle collet key on the Levin open style headstock in video Part 3, we mentioned the use of Loctite Retaining Compound if you find that the press fit of the collet key into the spindle is too loose. For this application when needed, we recommend and use Loctite 603 or 609.</p>
<input type="checkbox"/>	<p>Rodico or Rodico Premium (Bergeon Part # 6033 & 7033)</p> <p>This is a cleaning putty that is used in watchmaking and is commonly used when assembling a watch movement where you use this cleaning putty to clean any dust, specs, dirt, etc. that may have collected on the movement parts. We use this cleaning putty in the videos when assembling the precision bearings to ensure that they are perfectly clean.</p>