



PRECISION MACHINE SPINDLE REBUILDING *Educational Video Series*

Part 3a: Assembling a Levin Accessory Spindle

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

0. Introduction

00:00:20 in Part 3a

We assemble a Levin accessory spindle that is used in many Levin attachments such as the Micro Drilling, Milling and Grinding attachments and also on the Micro Drill Press. This particular spindle is the smallest and most common spindle that is utilized by Louis Levin & Son.

a) This Video Sub-Part 3a is focused specifically on the Levin Accessory Spindle

This Introduction section is specific to the Levin accessory spindle that is used on all of the Levin attachments that utilize a spindle such as those listed above. This video Sub-Part 3a is focused on the assembly of this spindle type.

b) We discuss in depth the Bearing Types that will be used

00:01:26

We share the Bearing Part Number(s) that will be used for this spindle. A complete listing of all the bearing part numbers and details that are used on all the Levin spindles can be found under the Levin Bearings section for this video series on our website at the following website link.

<http://www.activeatom.com/education-spindle-rebuilding-levin.php>

c) Applying Machine Oil on all Spindle Parts

00:02:26

During the spindle assembly process, we want you to begin applying a thin coat of machine oil on all the parts to help reduce rust and corrosion. Also very important to apply a drop of oil on the threads of all the fasteners as we have found this to be a common area for corrosion and rust. Of course, we highly recommend what we use, NyOil as it is a high quality and highly refined mineral based oil which also prevents corrosion and rust.

d) Chemtronics ControlWipes

00:05:33

We highly discourage the use of paper towels during the assembly of your spindle as they leave too much lint on the wiped surfaces. Instead, we highly recommend the use of Chemtronics ControlWipes which is a spunlaced polyester cellulose fabric that is lint-free and for general purpose use. These sheets are very strong (will not tear) and are highly absorbent so they are a perfect choice for this application.

If you cannot acquire these ControlWipes, you can use a cotton fabric but only if it has been prewashed first in order to reduce any lint or other foreign material it may have.

1. Applying Grease to Bearings

00:08:03 in video Part 3a Section 1

We discuss more on spindle bearings, bearing manufacturers, syringe use and the application of bearing grease. We share the great rule we use about not opening the sealed bearing packaging until you are ready to apply the bearing grease followed by the installation of the bearings onto the spindle shaft.

a) Barden Grease Chart

00:19:19

The general rule for the amount of grease to apply in precision spindle bearings is 20-30% of the internal bearing area (ball bearings, cage & raceways). However for better accuracy especially for smaller bearing sizes that don't contain much grease, the Kluber grease supplied by Barden includes a chart to indicate the exact amount of grease to apply in CC (cubic centimeters) depending on the bearing size. We discuss CC (cubic centimeter) versus ML (milliliter) which is exactly the same amount 1:1. We will be using this Barden lubrication chart for applying the correct and precise amount of grease into our bearings for all of the Levin Spindle types.

b) Supplies Needed for this procedure

In addition to the Kluber Isoflex NBU15 bearing grease that we will be using to grease the bearings, we will also be using a 1 ml Syringe and an 18 Gauge Blunt Tip Needle for applying the grease in the bearings. We will first transfer the grease we need from the large Syringe that came with the grease and into the smaller 1 ml Syringe so we can better monitor the precise amount of grease to use. We prepare a set of syringes with grease and show the grease application in fine detail under a stereo microscope to best share the grease application method with you.

2. Installing Bearings onto the Spindle

00:48:55 in video Part 3a Section 2

a) SKF Bearing Installation Tool Kit

For this bearing installation procedure, we will be using our SKF Bearing Installation Tool Kit but if you don't have this kit and don't want to purchase one, you can purchase a dead blow hammer and make the bearing insertion tools out of Delrin. You will however need a larger lathe for turning the Delrin parts. We also highly recommend a dead blow hammer (a true life saver in bearing installation) as it provides a much better striking force but most important, it reduces the amount of rebound so the hammer strikes are more controlled. We also share the use of a hockey puck in our bearing installation procedure which protects the spindle shaft from any damage.

b) Lubricate the Spindle for Bearing Installation

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Very important to apply a thin coat of oil (NyOil) on the spindle shaft to assist in the bearing installation which helps the bearing slide down the shaft into position. Only add oil to your spindle shaft and spindle components when you are actually ready to begin the assembly procedure. This is to prevent turning your oiled metal parts into foreign material magnets.

c) Bearing Arrangement and Alignment

00:54:28

When installing the Angular Contact Bearings, you need to pay attention to the bearing arrangement which for all Levin spindles, is in a Back-to-Back arrangement. Also very important, you will need to align the runout markings on the bearing with the witness mark on the spindle shaft that designates the high spot. The markings on the bearings are installed 180 degrees from the high spot witness mark you made on the spindle shaft. The purpose of this alignment procedure is to reduce the overall runout of the spindle assembly by using the runout on the spindle and bearings to cancel each other out. This will provide the most accurate installation with the most accurate near zero runout you can achieve. So pay careful attention to this procedure, listen closely and take your time.

d) Bearing Installation

00:57:46

If the External Bearing Spacer was pressed out of the spindle housing during the disassembly process, this part needs to be pressed back in the spindle housing before moving forward with the bearing installation procedure that follows.

With your loupe, inspect the bearings and the grease within them to confirm there are no foreign objects that the grease might have captured from yourself, the surrounding or the air, as this is the last time you are going to see these bearings. Also reminder that bearings have an acceptable size tolerance on the inside race bore diameter and this may result in bearings being tighter or looser when installing them on the spindle shaft.

e) No Deep Groove Bearing

01:05:35

The Levin accessory spindle contains only a duplex pair of Angular Contact Bearings with no Deep Groove Bearing. This Accessory spindle is the only Levin spindle that does not have the addition of a deep groove bearing where all the other Levin headstock spindles do. After applying some NyOil to the spindle shaft and its spacer after we installed the 1st bearing onto the spindle shaft, now insert the spindle shaft into the spindle housing and then press the 2nd bearing onto the spindle shaft. We stop for a minute to share a final review of the bearing with the loupe and we mention how we deal with removing any foreign objects that might be seen.

f) Inner Bearing Spacer

01:15:43

We share some quick tool talk for the accessory spindle and the spindle housing inner bearing spacer removal and re-installation.

3. Installing the Spindle Nut

01:19:33 in video Part 3a Section 3

a) Install Spindle Housing

For the remaining assembly steps, we recommend installing the spindle housing onto it's attachment such as the mounting bracket for the Grinding Attachment or the slide for the Milling Attachment. The only exception is for the Micro Drilling Attachment where you cannot mount it onto the small slide until the spindle is fully assembled. For this micro drilling attachment spindle, you can use a plastic wedge to keep this spindle assembly from rolling off the table and onto the floor which could cause sever damage.

We also discuss that the socket head cap screw length that is listed on the Levin blueprint for the Grinding Attachment is not correct as they are too short. These are the 2 socket head cap screws that are used to fasten the spindle housing onto the mounting bracket. We specify a longer length that we recommend for better securing the spindle assembly onto the mounting bracket.

b) Remove Fastener on Spindle Nut

01:35:23

Before installing the Spindle Nut onto the spindle, remove the fastener that is used for securing the spindle nut in place. This ensures that we don't damage the very fine spindle threads when installing the spindle nut.

c) Install Spindle Nut & Fastener

We share some tools, methods and vise action on how to best install the spindle nut and its small locking fastener. This section brings us some additional spindle disassembly tips to help you in this procedure.

Tighten the spindle nut and test that the spindle is always spinning freely. Then install the locking screw to hold that spindle nut onto the spindle shaft threads.

4. Installing Felt Rings

01:44:03 in video Part 3a Section 4

Before the bearing caps can be installed in the following step, the felt rings need to be installed in them first. These felt rings should have already been removed during the disassembly procedure so they could be properly cleaned. We share more tools and share how to make your own tools for installing the felt rings and retainer clips into the bearing caps.

5. Installing Bearing Caps

01:53:15 in video Part 3a Section 5

a) Check Spindle Rotation

01:54:30

Before installing the Bearing Caps, rotate the spindle by hand and insure that the movement is smooth with no resistance areas. Do not continue if there are any issues detected with the spindle as it may need to be disassembled for diagnoses.

b) Install Bearing Caps

01:54:40

We first start with the rear bearing cap and then install the front bearing cap. After the front bearing cap is installed, the rotating bearing shield needs to be pressed onto the spindle head that rides closely to this front bearing cap. We show how to confirm that the felt ring is slipping over the spindle shaft with no binding and then we share how soft these bearing cap nut threads are. We also share a great tip for working with very fine screw threads in your future endeavors. Lastly, we discuss some custom tools that you can make and other tools you can purchase, and showing the use of them.

c) Install Belt Pulley

02:05:06

For the final step, we need to install the belt pulley on the rear end of the spindle. As shown in the video, you may need to install the set screw from the inside of the belt pulley. Then slide the belt pulley on the spindle shaft so that it seats flush with the end of the spindle shaft and then tighten the set screw.