

SHOPSMITH BEARINGS GUIDE



This document was not prepared by nor endorsed by Shopsmith Inc.

It is an Owner prepared testament to the Quality, Durability, and enduring Value of Shopsmith branded equipment through decades of sustained excellence.

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Everett L. Davis 2017

BEARINGS IN SHOPSMITH EQUIPMENT

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Dedication to Bill Mayo

I am dedicating this document to the memory of a good friend and personal mentor Bill Mayo who entered his eternal reward at 6:15 PM Tuesday March 14, 2017, and thanking his gracious wife Ann for sharing him with us, and with me through the years. A bit of Bill lives in all of us who knew him.

Bill and I had discussed the need for a Shopsmith bearing documentation project in 2015 before he went into the hospital for surgery. In January 2016 he had expressed how slow his recovery was from his previous bypass surgery. It was still a struggle, and he was concerned that the anesthesia from another surgery he was about to have would really set him back with his struggle with Alzheimer's. He fought it aggressively by staying active in the shop and keeping his mind active and problem solving.

Bill and I could talk Shopsmith all day if we had time. We were to have collaborated on the bearing project but his struggle to stay active in the shop left him tired. He would work sometimes several 20-30 minute periods, then have to rest a bit. Bill had invited me out to Florida to stay with them in his home so we could work face to face and even record some audio pieces for the project but was not strong enough to engage that at the time.

We discussed some topics and shared notes and email back and forth, but he grew weaker and we shelved the idea hoping in time he would regain strength to work on it in addition to the things he kept on his plate daily.

We were unable to continue, and I re-engaged other projects like the Mark VII Owner's Manual Restoration. Only recently did I find the will to pick the bearing project up again, and I am working to complete it in Bill's honor and to his memory. I hope when it is finished, it will be something he'd find informative and beneficial to the Shopsmith community we serve. He did contribute to the project in so many ways.

IN APPRECIATION

Without the help of Shopsmith Forum members John S. Burger, James Grange Sr. (JPG), Dusty, Ed and our late friend Bill Mayo, this document would not have been possible. Each are mentors to me, and so many others.

A special thanks to John, who tirelessly proof read the content and helped me correct typos, errors, omissions, and phrasing to help clarify points.

PURPOSE

This document is prepared to help you acquire just a bit of knowledge about why one type of bearing is used opposed to another, and help you identify where someone inadvertently used the wrong type of bearing in a previous service procedure.

This document is offered to help make you conversant and conceptually aware of the most relevant issues to servicing your Shopsmith, but not make you a bearing expert by any means. Expertise in that area exists with the Mechanical Engineering professionals.

It was never intended to be a simple list of part numbers but a true guide to help someone functionally acquire the parts, assemblies and knowledge to service, repair, or restore a piece of Shopsmith equipment.

Without disassembling your Quill Assembly or other assembly and physically inspecting the bearing or bearings, you won't know exactly what you have inside. If you know it is OEM and unaltered, Shopsmith likely will know.

You may not know what has been done, what has been upgraded, what has been altered unless you spend time familiarizing yourself with the OEM products so you can recognize upgrades or alterations that may be present in your machine today.

Once you read the bearing numbers to find what is there, and measure them to insure you are ordering the right replacement size, and shield or seal, you can service them yourself if you have the right tools and skills whether OEM or not.

SHOPSMITH IS ALSO HERE TO HELP

Don't forget Shopsmith is here to help. <https://www.shopsmith.com/> info@shopsmith.com (937) 890-5197
In addition to Brand New Shopsmiths, they have technical support, parts, and repair services available.

They sell fully functional Quill Assemblies for the Poly-V belt systems used since 1960 that fit your Mark V or Mark 7 machine. The best news of all is, that likely no matter what bearing is there now, it can be replaced either with components from Shopsmith, or from a bearing supplier.

The Mark VII is a different Headstock and has some unique parts; Quill Spindle, Drive Sleeve Assembly, Idler Shaft Assembly, and Control Sheave Assembly to name a just a few. They look remarkably similar. James Grange Sr. (JPG) in the forums has extensive knowledge that he has shared freely. He is the Mark VII Guru among us.

SOME CONSIDERATIONS AND EXPECTATIONS

Considering Shopsmith as a brand was founded in 1947, some 70 years ago at this writing, defining the details is a large task. There are a lot of products, model revisions, production changes, and third party modifications through the years that expands the list of bearings and the application of those bearings accommodating the changes.

Shopsmith has existed through the years (or not existed at times) by a collection of companies beginning with Magna Engineering Corporation of San Francisco, CA from its founding 1947 into the 1950's when it was bought by Yuba Power Products, Inc. of Cleveland, OH.

Yuba subsequently sold the Shopsmith line to a group of employees who named their company Manga American Corporation.

Due to market forces created by far cheaper foreign imports and knock-offs who essentially cloned the profile of the machine, with drastically reduced quality, and a group within Montgomery Ward who thought they could make a cheaper machine (and succeeded in making a 'cheap' machine that they marketed until they sufficiently eroded their product's name) Magna American closed their doors in the mid 1960's.

John Folkerth, a stockbroker in Dayton, OH who was simply searching for a saw blade to fit a used radial arm saw made by Magna, began an adventure to locate a part that led to the reformation of Shopsmith as a brand in Troy, OH in 1972 before relocating to Vandalia, then Dayton by 1980. Production continued for several more decades and various new models of the Mark V were released.

Before we get to the physical bearings, let's put some things in context to understand what is available today.

Enter the lawyers. In 1994 a Mr. Jefferson David Huff bought a used Mark 5 in an estate sale of Dr. Tom B. Dominick who bought it forty (40) years earlier in 1954. Made by Magna decades before, Mr. Huff's wife was passing by the 40 year old tool as he operated it. Her loose clothing was pulled into the blade causing her serious injury. The original lawsuit was filed against both her husband, and the newly resurrected company [Shopsmith Inc.] was dismissed in 1998 after the first four years of legal attempts to make them liable for a product they never made. Shopsmith's legal costs defending itself were incalculable and unrecoverable from the plaintiffs.

Shopsmith, Inc. repeatedly won lawsuit after lawsuit, yet appeal after appeal cost Shopsmith massive legal fees. For those with an interest to read more, you can find more in a 2015 thread post I wrote in Shopsmith Forums at: http://www.shopsmith.com/ss_forum/viewtopic.php?p=192574#p192574

The resurrected new manufacturer, Shopsmith Inc. filed for bankruptcy / reorganization in 2009 and reorganized as RLF Brands with a massive reduction in personnel size, closing all their stores nationwide.

A small number of highly dedicated Shopsmith personnel, some who had been with the company 30 years remain to this day. In 2010 'this Shopsmith' introduced the new Power Pro Mark 7 with Digital Variable Reluctance Motor (DVR), a remarkable piece of engineering that sets new standards in function.

RLF Brands LLC was registered in Ohio as a Domestic Limited Liability Company by Robert L Folkerth on 1 June 2010 and continues to this day.

Understandably, against the backdrop of the potential lawsuits and product liabilities for products they never made, one can understand why some services, parts and components will not be embraced or sold by the current company even though some parts made for today's equipment may fit the decades older equipment, or they may have a small quantity of those parts or documents about them in the inventories they acquired years ago. They were not legally liability then, and are careful not to do anything that would suggest it today.

They simply cannot afford to do anything that would legally connect them to equipment that neither they, nor the subsequent companies that came before them manufactured 40, 50, 60, now 70 years ago today.

Hopefully that will give you a backdrop to understand why some 'OEM' parts are not available today, or appear not to be. The 'Original' Equipment Manufacturer, even Subsequent Equipment Manufacturer(s) are not the Current Equipment Manufacturer. As legal entities, they no longer exist.

Shopsmith definitely exists today, and folks are there to help you acquire new equipment, accessories, and parts that might well fit the older one you inherited or bought used somewhere.

This hopefully will give you a frame of reference and a frame of mind in how to deal with Shopsmith on the phone today when you call them about something they never made, but will help you fix in any way they can.

Be polite, be respectful, be patient. They deserve that and so much more for keeping the 60+ year old Shopsmith equipment we love not only running, but still upgradeable today.

Think of it this way; "You don't have a problem, you have an opportunity working together to restore your equipment or even improve it." – Everett -

[The Home for "Shopsmith Bearings Guide"](#) Initial Public Release is Version 1.00 Dated 15 Oct 2017.

The most current revision of it will be made public in My Google Drive which you will find linked in the post titled "Shopsmith Large Format Drawings, Illustrations and More" in the Maintenance and Repair Shopsmith Forum at:

http://www.shopsmith.com/ss_forum/viewtopic.php?p=185690#p185690

The Restored Manuals for 10E, 10ER, Mark VII etc. also exist in folders in My Google Drive, as do extensive other documents such as "Got Rust?" that many have found useful beyond Shopsmith restorations and maintenance, as well as attached files small enough to fit in the Forum, and links to other files and discussions about them.

They are all free, and donated to the Worldwide Shopsmith Community.

SHOPSMITH OEM SPINDLES

10E & 10ER

Photo is of John Burger’s restored 10ER

There are 2 other OEM spindle shaft types; one that is turned all the way across and one that is not turned in the center.

Quill Bearings in all 10E and 10ER’s

PN 102-18 FAFNIR: 202KLL3 with Rubber Shields
C1 Precision - 2(ea.)

Greenie’s 1953-1960

A & B Headstock
(A was sand cast and had no 3” inspection hole on back side under the emblem)

Quill bearing Greenie

It is still available however Shopsmith lists it as:
502962 Belt Sander Ball Bearing @ \$5.99

Goldie’s 1960-1963

The Fourteen Spline Spindle was introduced in 1961 starting with SN: 371348 and above, and continues to this day in all subsequent spindles

1962 introduced the 1 1/8 HP Motor

Mark VII’s 1960

Custom Headstock & Machine. The Quill assembly was similar to the Mark V in appearance. The housing looks the same, but the spindle assembly is just a bit shorter. You will learn later that the Drive Sleeve is just a bit longer for example.

James Grange Sr. (JPG) states some are 5/8" x 35mm x 11mm.

Mark V (again) 1972

Mark 5 and Earlier Mark V’s B & C Headstocks
B Headstock shown (toggle switch)

Mark V’s with first Double Bearing quill began In October of 1984 (starting with serial number 190000.

Mark V - 510 - 1985

The Mark V 505-510 was introduced in 1985 and came standard with the double bearing quill.

C Headstock shown (safety switch) began 1991

Mark V – 520 - 1999

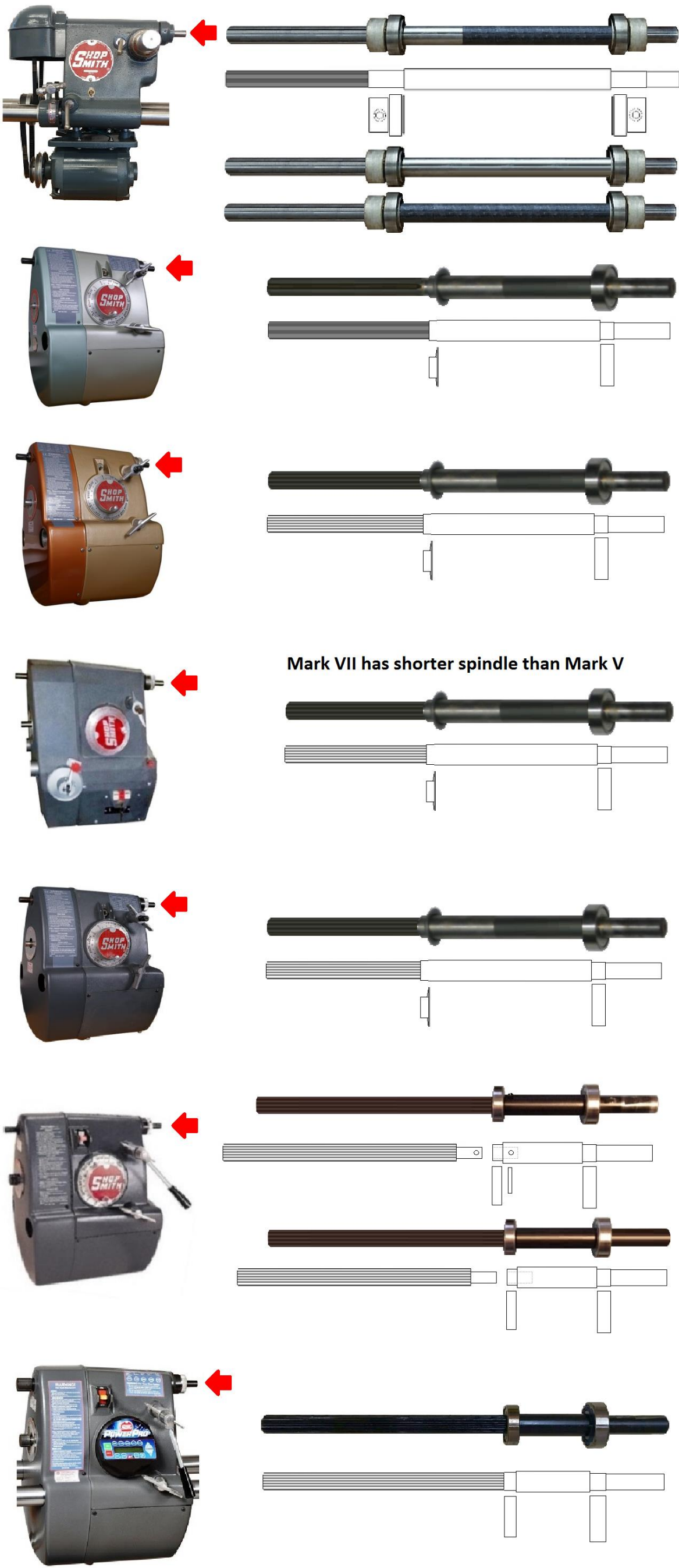
There are a series of changes in Quills including the spindle shaft, the bearings on it, and the machining in the Quill housings necessary to accommodate the different bearing sizes.
B & C Headstocks

Mark 7 Power Pro 2010

Mark 7 Power Pro’s, all later Mark V 505-520’s, All current shipping models, and current replacement quill assemblies.

Current Quill Bearings are:
17 x 40 x 12 and 17 x 35 x 10

The Mark 7 also introduced the *Double-Tilt* feature. C Headstock is shown, however all headstocks A – C can accept the Power Pro upgrade.



QUILL MAY HAVE ALTERATIONS

Bill Mayo

The Late Bill Mayo tried numerous modifications, with various bearings in the rear, different sizes of bearings and numerous machine shops before he found one who could maintain aligned boring precision of the Quill Housing to .001 Inch required for such modifications. He performed services and made modifications for well over a decade commercially.

(Left) Bill Mayo's last series of *Modified Quills* used 2 bearings separated by the inner race salvaged from a discarded bearing. (11 mm Spacer). This required precision machining of the Quill Housing, and machining the Spindle Shaft itself. He also tried many different bearing sets.

5/8" X 35mm X 11mm with an 11mm spacer between them

The OEM Mark 5, Mark V 500, Mark VII, Mark V 505-520 and the Power Pro Mark 7 all use C3 bearings, but not the same bearings throughout the years. All of the most recent machines may use the same bearing number as in previous years, but the grease inside is a higher temp rated grease made necessary by the higher speed Power Pro.

Since Quill assemblies will physically interchange for Mark V and Mark 7 equipment made over the last 50 years, Shopsmith only offers *one* Quill Assembly today, (the high speed rated one for the Mark 7 Power Pro). [Not Mark VII]

The “complete” assembly will fit. The various Quill housings, Shafts, and Bearings on those Shafts have been undergoing OEM revisions through the years and are matched together by the required machining tolerances for the pieces to work correctly.

I am unaware of any commercially modified Quills specific to the Mark VII at this time, but Mark 5 / Mark V units clearly exist.

Hog Winslow <http://stores.ebay.com/hogwinslow1960/>

(Right) Tom Hauser dba Hog Winslow, bought Bill Mayo’s 10E and 10ER business some years ago. He also offers customization of various Shopsmith Quill Assemblies. The photo shows one of his various attempts at reducing run-out that involved the original bearing, backed up by three smaller bearings. All required custom machining.



Skip Campbell www.mkctools.com/

Skip Campbell at MKC Tools offers custom machining of quills (either *early 6* or *later 14* Spline) presently at \$105 or \$95 respectively, by adding the bearing at the rear of the Quill Housing. He has series of videos about the process at his website.

He has numerous other product offerings, including a bolt on variable speed DC motor package for 10ER Shopsmith and even offers a Trexon digital tachometer option.

Jacob Anderson <https://jacobs-repairshop.com/>

Jacob Anderson provides, services, parts and has extensive free YouTube DIY videos available He has rebuilt over 1400 headstocks thus far in the past 9 years for Shopsmith owners.

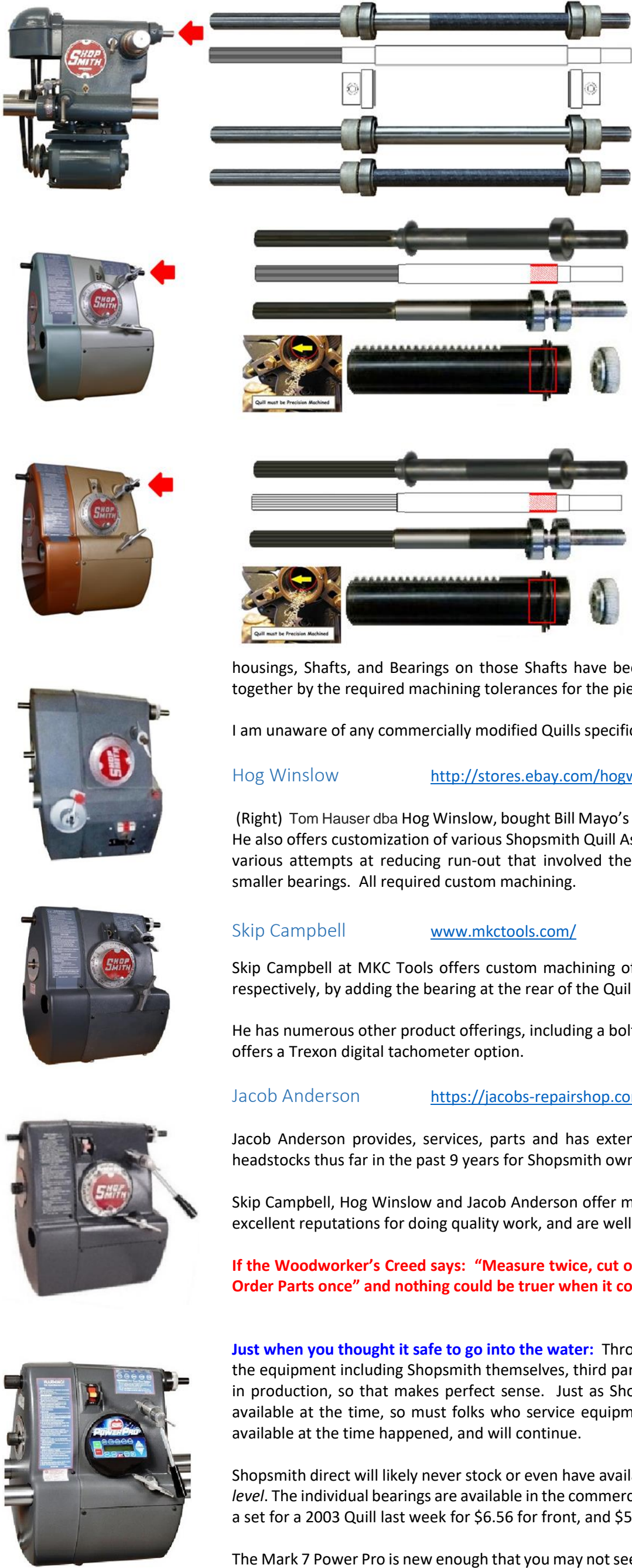
Skip Campbell, Hog Winslow and Jacob Anderson offer many other products and service for Shopsmith equipment and have excellent reputations for doing quality work, and are well respected. There are others out there as well.

If the Woodworker’s Creed says: “Measure twice, cut once”; the Self-Service creed might say: “Measure three times, and Order Parts once” and nothing could be truer when it comes to bearings.

Just when you thought it safe to go into the water: Through the years, folks have made additions, changes, or alterations to the equipment including Shopsmith themselves, third parties, and both current and former owners. It’s been about 70 years in production, so that makes perfect sense. Just as Shopsmith originally made their systems with components that were available at the time, so must folks who service equipment years later. Fabricating something from what one had locally available at the time happened, and will continue.

Shopsmith direct will likely never stock or even have available every bearing / shaft combination ever made *at the component level*. The individual bearings are available in the commercial bearing community, either locally or via on-line vendors. I bought a set for a 2003 Quill last week for \$6.56 for front, and \$5.49 for the rear from Shopsmith.

The Mark 7 Power Pro is new enough that you may not see any third party alterations yet. The 10E and 10ER’s have remained with the same Precision Bearings C1 standards through the years. C3 spec bearings used in the later Mark 5 and Mark V’s are not the right bearing for the 10E and 10ER units, though you will occasionally find that someone has used them in one.



DRIVE SLEEVE ASSEMBLIES

10E & 10ER

The 10E & 10ER Drive Shaft Assembly remained pretty much the same and used the same bearings front and rear.

Drive Shaft Bearings in 10E and 10ER's

PN 102-21 - FAFNIR: 205KLL2 with Metal Shields 2(ea.)

Greenie's 'Gilmer' Drive Sleeve

Inner and outer remained the same.

Greenie Gilmer Drive Sleeve Bearing

501297 Drive Sleeve Bearing @ \$7.58

Goldie Poly-V Drive Sleeve

Inner and outer remained the same

Goldie Poly-V Drive Sleeve Bearing PN: 501297

501297 Drive Sleeve Bearing @ \$7.58

Courtesy of James Grange Sr. whose photo I have retouched for illustration here, the Mark VII Drive Sleeve Assembly is longer than the Mark V Drive Sleeve Assembly. The bearings are the same.

You may recall that while the Mark VII Drive Sleeve Assembly is longer, the Mark VII Spindle Shaft in the Quill is shorter. They may well be approximately the same length measured from the outside of the installed bearings when each are paired together. I do not have one of each available to confirm that.

501297 Drive Sleeve Bearing @ \$7.58

Mark V 500 Poly-V Drive Sleeve

Inner and outer remained the same

Mark V 500 Poly-V Drive Sleeve Bearing PN: 501297

501297 Drive Sleeve Bearing @ \$7.58

Mark V 505-520 Poly-V Drive Sleeve

Inner and outer remained the same

Mark V 505-520 Poly-V Drive Sleeve Bearing PN: 501297

501297 Drive Sleeve Bearing @ \$7.58

Mark 7 Power Pro Poly-V Drive Sleeve

The Drive Sleeve Assembly for the Power Pro Mark 7 was redesigned without the setscrew, and has bearings with High Temp Grease to handle the increased shaft speeds.

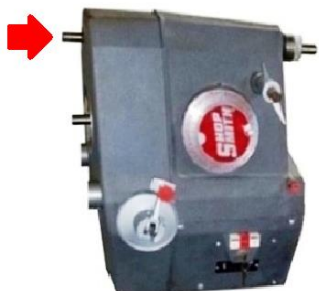
I have not yet found a separate PN other than 501297 for the bearings, nor have I confirmed whether or not the 501297 bearings are now shipping with the high temp grease. They may be.

It is the Drive Sleeve Assembly for all Poly-V models Mark V – Mark 7

518145 Drive Sleeve Assembly ... \$134.55

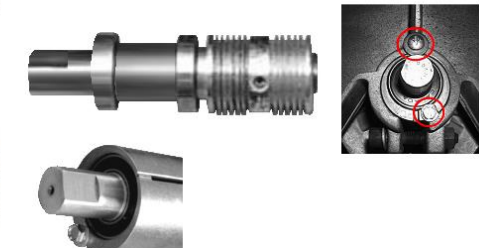
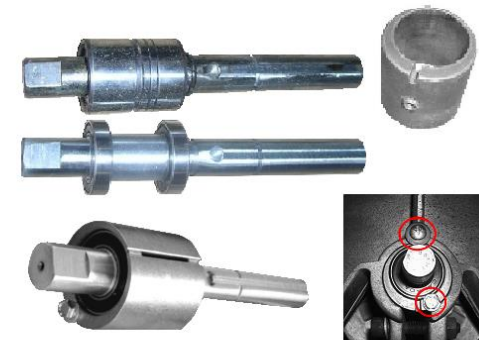
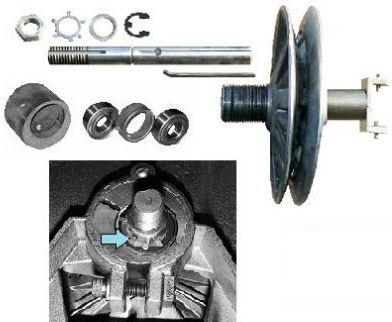
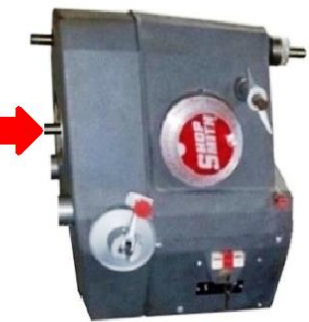
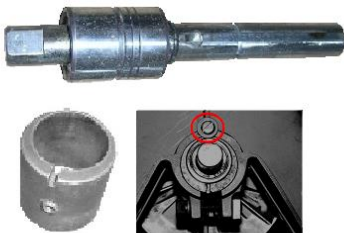
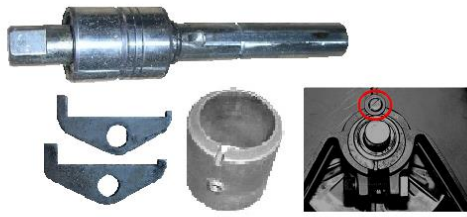


The Gilmer Drive Sleeve Assembly reportedly had a configuration with no internal clutch, followed by two variations of clutched Drive Sleeve Assemblies based on Bill Mayo's and Jacob Anderson's comments.





Not Present



IDLER SHAFT ASSEMBLIES

There were no Idler Shafts on 10E or 10ER's but there was an option pulley with a take-off Hub for the Drive Shaft to power SPT's as well as a special Hub for the lower motor pulley to drive the Jointer etc.

Greenies 1953

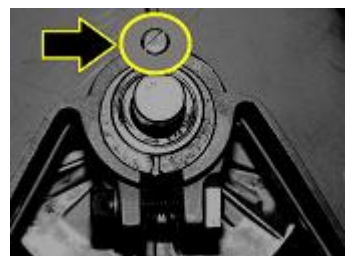
The original Mark 5 (Greenies) were introduced with a solid Eccentric to apply tension (by rotating it) to tension the Gilmer Drive Belt, retained by two clips that the Tension Bolt underneath went through. The Tension Bolt below snugs it up to hold the Eccentric to maintain belt tension once set. The Eccentric remained unchanged for decades. **Over tightening Bolt will break off the ear on the headstock itself.**

A setscrew in the Eccentric (backed out for illustration) fits into a groove in the Water Pump Style Shaft Bearings to keep bearing and shaft in place. It must secure the bearing, but not be over-tightened.

Greenies 1954 and all Mark V's following

(Left) Retainer clips were changed to a screw and washer threaded into the headstock that retained both the Eccentric and the Shaft Bearings. (Note: Red Circle) This remained the style for over 50 years.

(Right) My friend and mentor, the late Bill Mayo was fond of using a larger Fender Washer under the screw to insure the washer captured and retained both eccentric and the bearing shaft assembly.



Mark VII 1960's

The 1960's Mark VII was a complete redesign of the headstock. The Idler Shaft and while similar in function, had a threaded shaft, a star locking washer with tabs to bend down to hold the flat of the nut on the shaft (see small blue arrow). Note also the Control Sheave Button Bearing was redesigned with a bracket and pins that followed a plastic cam rotated by a redesigned speed control dial. **The Sheave is shorter than those on Mark V's**

Under high heat, the cam was prone to melt so keeping the small bearing in the end of the Control Sheave lubricated was crucial.

501020 Ball Bearing Mark VII Idler Shaft @ \$5.94

Mark VII was produced only for a couple of years, then discontinued.

The Mark V as it was now known continued production with the original Idler Shaft Assembly and Eccentric until 2010.

Through the years and through the various Companies who owned the Shopsmith brand name and rights, the machines continued to be produced. In 1964 the company Magna American closed as poor quality foreign knock-off clone units eroded the marketplace.

In 1972, John Folkerth a stockbroker at Merrill Lynch was looking for a saw blade for a used radial arm saw made by Magna that he bought, and started the journey that resurrected Shopsmith, restarting production.

<http://www.shopsmith.com/history.htm>

New Idler Shaft –Redesigned - 2010

In 2010 about the time of the Power Pro Mark 7's introduction, the Idler Shaft was redesigned, which required new bearings, a new Eccentric with a split in it, and a retaining screw and washer actually in the Eccentric to retain the bearing / shaft assembly, in addition to the one in the headstock to keep it in place. (Note two Red Circles)

Power Pro Mark 7 Idler Shaft

The Power Pro Mark 7 Headstock required a redesign of the Poly-V belt Idler Shaft as the Variable Sheaves, Motor and Drive Belt were replaced by a 1.75 HP –reversible- DVR motor. It has electronically variable speed control 250 RPM up to 10,000 RPM, and maintains full torque, continuously through the entire speed range.

I was told by Shopsmith recently the only change made to the bearings was to order them with High Temp grease from the bearing factory, and that these are now the standard type of bearings they sell.

SPEED CONTROL MECHANISMS

10E & 10ER

The Speed Changer Option for the 10E and 10ER was an Accessory that came out fairly early on in production in late 1949 or early 1950.

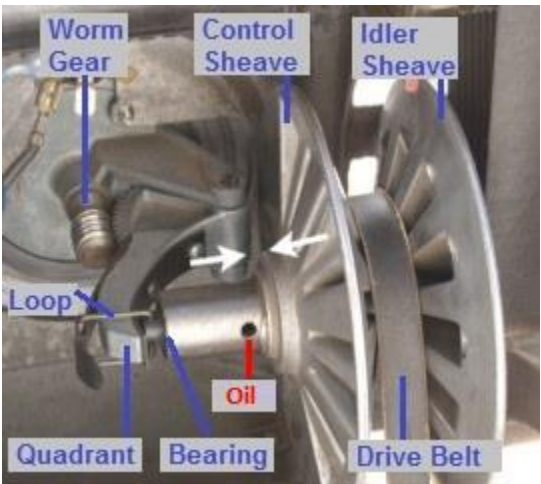
Mark V - Split Sheave Variable Speed Assembly 1953- forward

Lubrication



Periodic Lubrication is vital for the Button Bearing in the Control Sheave that the Quadrant moves in and out to control speed.

Per -Nick Engler -Every 10 hours of operation or 90 days if used lightly, put 6-8 drops of oil (turbine, 3-in-one oil etc.) in this hole, and raise the machine to drill press mode to allow it to run into the back side of the bearing. Run it through the speed ranges to warm it up and turn it off on low setting. It will migrate in overnight as it cools. Shopsmith does not sell the bearing by itself, though some third party suppliers do. There is a similar hole on the motor idler shaft beneath the spring which covers it.



A belt (not visible in this photo) on the back side of the Idler Sheave secured to the Idler Shaft by a keyway which the sheave sets are mounted on will be either grooved for the later Poly-V belt [used since 1960] or toothed for the earlier Gilmer Belt. The power from the Drive Belt is thus transferred up to the Quill spindle and Drive Assembly by the Poly-V or Gilmer Belt, tensioned by the Eccentric discussed previously. Shopsmith still sells the Poly-V Control Sheave with bearing.

Mark VII 1960's

As stated previously, the 1960's MARK VII was a redesigned headstock. The Control Sheave half was mechanically moved by a Cam mechanism (Right) that sat between the two pins in the U-Shaped Cam Follower that mounted to the center of a bearing inside the shaft. **Oil it the same way!**

This configuration allowed the control sheave and the *outer* section of the bearing to rotate. It was driven by the drive belt from the motor, and allowed the bearing to spin around the stationary center of the bearing (opposite to what one normally expects).



As the cam moved the sheave half in and out (left and right) on the Idler Shaft, a Spring Loaded matching idler sheave on the motor would move reciprocally on the motor shaft (right and left) or out and in, allowing the speed of the shaft to change with the variable diameter of the sheave pair, just as it did in the Mark 5, Mark V 500, and Mark V 505-520's which used a Clip [Loop], Spring, and Quadrant Assembly to perform the same function.

Third Party Replacement Control Sheave Bearings

Shopsmith only sells the Poly-V Control Sheave with Button Bearing pressed in, not the bearing itself. It is far more common for many folks to just replace it with the bearing already installed. 515556 Control Sheave w/Hardware \$56.65

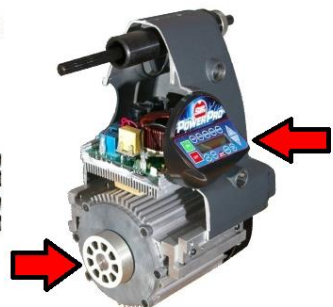
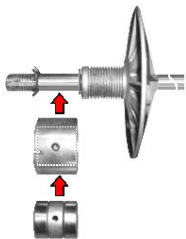
Jacob Anderson sells a replacement control sheave bearing, and bearing with button at his web site: <https://jacobs-repair-shop.myshopify.com/collections/repair-parts> He has a free video about the control sheave and bearings at: <https://www.youtube.com/watch?v=2hJWnRggq1Q> He has 30 free Shopsmith YouTube videos as well as more extensive repair DVD's and access to other repair videos at his website. <https://jacobs-repairshop.com/>

Mark 7 Power Pro with Reversible Digital Variable Reluctance Motor (DVR)

The -Reversible- Digital Variable Reluctance Motor (DVR) 1.75 HP allows variable speeds from 250 RPM to 10,000 RPM, with full torque through the entire range.

The Motor directly turns the modified idler assembly via a 2nd Poly-V belt discussed previously.

The bearings in the DVR motor are not known to be available separately, but likely are available once you know what you have, by consulting a reputable bearing supplier. The new DVR motor has a 5 year manufacturer's warranty from Shopsmith and I have not seen any bearings in one fail yet personally.



RECENT SHOPSMITH BEARING ORDER FOR 2003 MARK V - 520 QUILL BEARING SET

As I mentioned I recently ordered a Quill Bearing Set for one of my 2003 520’s and I believe there is something to be learned in this for those largely unfamiliar with the process.

First it should be noted that the parts are available from Shopsmith and second that they aren’t that expensive. I told them what I had and they told me what I needed. I can do that because I know the history of the machine, and that the bearings are original.

In my discussion with the order desk I was able to confirm that these bearings are now made available with the very same High Temperature grease that is in the Mark 7 Power Pro Quill. In fact, I was able to find that they are the same bearing set that was used previously in my 2003 unit, just filled with the newer grease. That is good information to know. Shopsmith is there to help and they will answer questions about parts if they know or can find the answer.

Shopsmith
6530 Poe Ave
Dayton, OH 45414

Order Number:**To:** EVERETT DAVIS
 LUBBOCK, TX

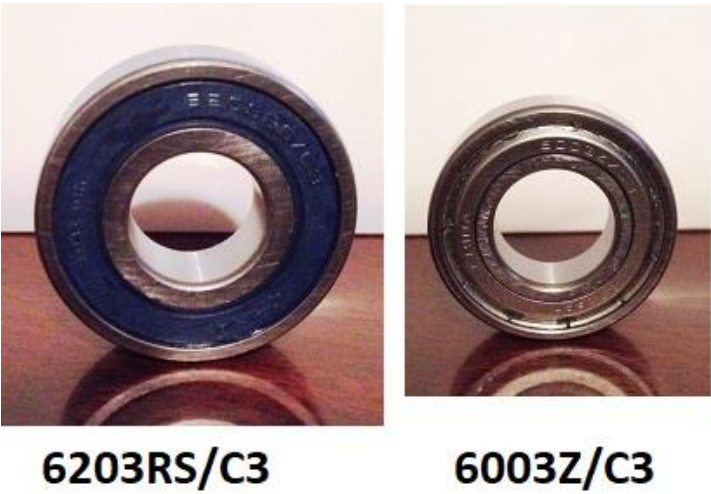
Shipping Document
Date: 9/18/17
Customer Number:**Ship Via:** STANDARD SHIPPING
PO Number:**Method of Payment:****Special Instructions:**

Line	Order	Ship	B/O	Code	Loc	Item	Description	Price Each
02	1	1✓	—	E11	51406201	Ball Bearing for Double B		6.56
01	1	1✓	—	SER	513388	Ball Bearing, Quill/Plane		5.49
03	1	1✓	—	SER	501621	Retaining Ring Spirolox R		1.74
04	1	1✓	—	SER	501624	Retaining Ring 5108-77 1.		3.44
05	1	1✓	—	SER	504205	Spacer Sheave		1.96

What did they look like and who made them?

That too is important to know and if a picture is worth a thousand words, let’s start with a picture. For starters, they are not the same size. Next we see that the larger outer bearing has a Rubber Seal and the smaller inner bearing is metal Shielded. (RS and Z respectively in bearing terms for this vendor.)

The vendor is RB tech <http://www.rbibearing.com/> and both bearings are made in China. In China like everywhere else there are good manufacturers, and less capable ones with less quality. When one orders off the web, from an unknown source with a ridiculously low price or not, it is important to know the brand, but it is far more important to know the specifications you need, vs. the specifications they intend to sell you. One can buy less than what they need, what they need, or far more than what they need. **Shopsmith No. 513388 is for the 6203RS/C3 and No. 51406201 is for the 6003Z/C3.**



RB tech						
Bearing	Bore		Outer Diameter		Width	
	mm	in.	mm	in.	mm	in.
6003Z/ C3	17	0.6693	35	1.378	10	0.3937
6203RS/C3	17	0.6693	40	1.5748	12	0.4724

Most Shopsmith folks will speak in terms of a 17 x 35 x 10 bearing and when I got out a set of dial calipers to measure what I received, that’s what I expected to see; but as the metric calipers are in the shop, I found that the only tool I had in the house was a Fractional and Decimal set.

Thank goodness the bearing manufacturers list both. So if you want to know what I saw when measuring the bore, it resembled this reading:



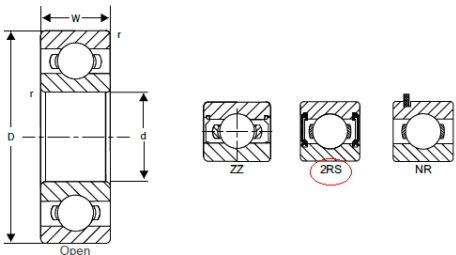
That is a .6693” measurement, indicating from the RB tech data that I indeed have a 17mm bore for the bearing which will be pressed onto the Shopsmith spindle at both ends.

Let me take something from the RB tech manual to illustrate what I mean by stating measure, measure, measure. If you recall I said earlier, measure three times and order once. There are far more than just one of the 6203 bearings, and there are three measurements.

- The Center bore17 mm
- The Outer diameter40 mm
- The Width12 mm



6200 SERIES - METRIC & INCHES



RBI Bearing No.	Bore d		Outer Diameter D		Width W		Radius r		Basic Load Rating (lbs.)		Weight (lbs.)
	mm.	in.	mm.	in.	mm.	in.	mm.	in.	Dynamic C	Static C ₀	
6200	10	.3937	30	1.1811	9	.3543	0.6	.023	1150	530	.071
6201	12	.4724	32	1.2598	10	.3937	0.6	.023	1530	680	.082
6201-1/2	12.7	.5000	32	1.2598	10	.3937	0.6	.023	1535	685	.082
6201-13	13	.5118	32	1.2598	10	.3937	0.6	.023	1540	690	.082
6202	15	.5906	35	1.3780	11	.4331	0.6	.023	1710	830	.099
6202-1/2	12.7	.5000	35	1.3780	11	.4331	0.6	.023	1740	805	.110
6202-5/8	15.875	.6250	35	1.3780	11	.4331	0.6	.023	1740	805	.090
6202-16	16	.6299	35	1.3780	11	.4331	0.6	.023	1720	840	.090
6203	17	.6693	40	1.5748	12	.4724	0.6	.023	2150	1070	.143
6203-1/2	12.7	.5000	40	1.5748	12	.4724	0.6	.023	2160	1030	.154
6203-15	15	.5906	40	1.5748	12	.4724	0.6	.023	2140	1050	.148
6203-5/8	15.875	.6250	40	1.5748	12	.4724	0.6	.023	2160	1030	.150
6203-16	16	.6299	40	1.5748	12	.4724	0.6	.023	2140	1060	.150
6203-3/4	19.05	.7500	40	1.5748	12	.4724	0.6	.023	2160	1030	.140

Do all bearing manufacturers present the data and their numbering in the same manner? Sadly, no, but some do.

Timken Part Number 6203-2RS is a 17 x 40 x 12 Rubber Sealed bearing for example. It likely would be an excellent bearing for this application.

Tractor Supply sells a bearing they list as a Radial Bearing, 6203-2RS for \$6.99 for trailers that specs out as

- Inside Diameter:2/3 in.**Is it 0.6693 or 0.667?**
- Outside Diameter:1-5/8 in.**Is it 1.5748 or 1.625?**
- WidthHow wide is it?**Unknown**
- Product Type:Trailer Bearings
- Manufacturer Part Number: 6203-2RS BULK

We need to know a bit more before we select the bearings. We will talk about that just a little more, then we will get into the bearings in detail for Shopsmiths.

The very first sentence in this document began with “This document is prepared to help you acquire just a bit of knowledge about why one type of bearing is used opposed to another”.

On the next page, let’s begin to answer that question.

Bearing Classes and Standards

Bearings are available by Classes or Standards and there is more than one governing body.

The classes relate to the physical attributes of the bearing in terms of radial play (around the radius) or axial play (edge to edge play along the axis). C3 is a normal bearing rating, while C1 would have more precision (less play).

The table upper left illustrates the more modern iteration of standards, but frequently, one will see the 'C0, C1, C2, C3, C4, C5 specification in the table on bearing manufacturer's sites.

BEARING CLASSES BY STANDARD		
ANSI Standard 20	ISO 492	DIN 620
ABEC 1	Class Normal	P0
ABEC 3	Class 6	P6
ABEC 5	Class 5	P5
ABEC 7	Class 4	P4
ABEC 9	Class 2	P2

Bore Diameter

Outside Diameter

Overall Width

That can be a bit misleading at first since the specifications are listed in a table relative to each other in terms like less than C3, less than C2 and so on.

Deep Groove Ball Bearing Nomenclature

Bore Code

00 10 mm
01 12 mm
02 15 mm
03 17 mm
04 and up: bore (mm) = code x 5

Internal Clearance:

C2 tight
C0/blank normal
C3 loose
C4 extra loose
C5 extra-extra loose

62

05

ZZ

C3

Series:

600 extra small
61700 extra-extra-ultra-light
61800 extra-ultra-light
61900 ultra-light
16100 extra-extra-light
6000 extra-light
6200 light
6300 medium
6400 heavy
16000 extra-light thin-type
62000 light wide-type
63000 medium wide-type

Suffixes:

Z one shield
ZZ two shields
RS one contact seal
2RS two contact seals
RZ one non-contact seal
2RZ two non-contact seals
NR snap ring
N snap ring groove

Courtesy of Timken Bearings 2017 - Everett

The Chart at left courtesy of Timken / Fafnir Bearings reflects a numbering sequence that is far more common with today's bearings.

6203RS/C3 would be a 6200 series (light), 03 means 17 mm bore, RS (two contact seals [Rubber Seal] /C3 (loose tolerances)

6003Z/C3 would then be a 6000 series (extra light), 03 means 17 mm bore, Z is one shield (ZZ actually both sides) /C3 (loose tolerances)

This is Timken spec. The RB tech 6003Z/C3 discussed on the previous page that I bought from Shopsmith directly has 2 metal shields (one each side) even though they use one Z in the part number.

You have to check each manufacturer's Nomenclature in their manual to insure it is what you expect it to be.

Do you remember the earlier statement? ***“When one orders off the web, from an unknown source with a ridiculously low price or not, it is important to know the brand, but it is far more important to know the specifications you need, vs. the specifications they intend to sell you. One can buy less than what they need, what they need, or far more than what they need.”***

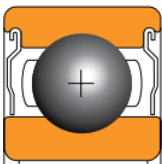
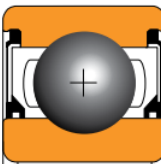
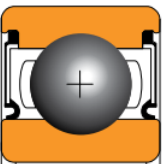
With Shopsmith Direct, Hog Winslow, Skip Campbell, or Jacob Anderson they know what to ask you to determine what you need. With Amazon, eBay, or an unknown website..... Maybe, and maybe not. You need to know and that is the purpose of this document.

Now what is Seal (Rubber) vs. Shield (Metal)? What is C3 vs. C1? What are the three (3) measurements? What type do I use where? What did Shopsmith use? Will the number on the bearing tell you all, or just some of those things?

What did the bearing manufacturers say about those things? Alphabetically, “What” comes before “Which”. Regarding bearings, ‘what’ actually defines ‘which’. Just a bit more, and we will get on with defining all that.

Do I use one bearing type in an electric motor, and a different bearing on a jointer, thickness planer, or band saw? Yes, and no.

Did Shopsmith use precision bearings? On some machines, Yes.

CHARACTERISTICS OF BALL BEARING SHIELDS AND SEALS			
Type	Shields ZZ	Non-Contact Seals 2RZ	Contact Seals 2RS
Construction			
Material	Low carbon pressed steel	Nitrile Buna Rubber with steel case	Nitrile Buna Rubber with steel case
Speed Capability	High speed	High speed	Less than ZZ/2RZ due to seal contact
Operating Temperature	-50 to +120° C	-40 to +120° C	-40 to +120° C
Grease Retention	Good	Better than ZZ type	Excellent
Dust Resistance	Good	Better than ZZ type	Excellent
Torque	Low	Low	Higher than ZZ/2RZ due to seal contact

Courtesy of Timken Bearings 2017 - Everett

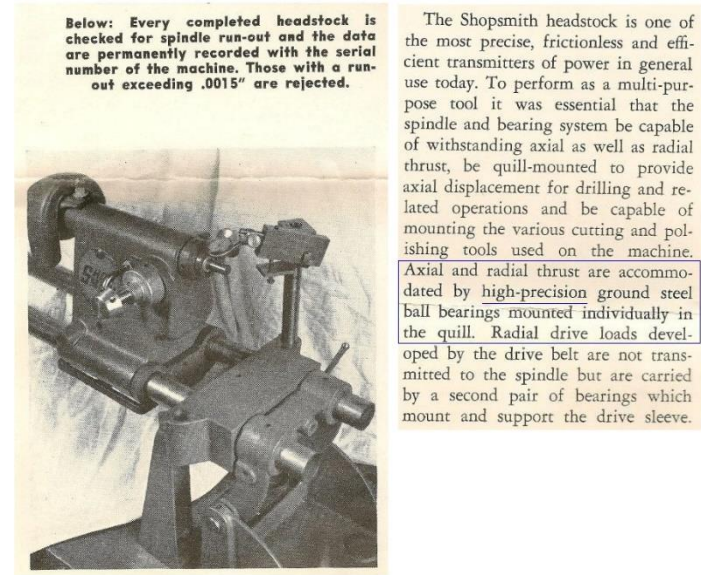
Here Timken shows a cross section of the single row ball bearing and the seals.

Note the Dust Resistance field and find the Seals that are rated Excellent.

Do you think those might be necessary where the quill mounts the saw blade or sanding disk? - Yes.

Do you think those might also be excellent in an electric motor sucking the ambient air through it to cool itself? - Yes.

In 1947 Magna Engineering produced the first Shopsmith. Model 10E. In 1948 they introduced the 10ER.



An article in Western Machinery and Steel World in January 1951 described the machine with glowing terms. See small excerpts.

The most relevant to bearings were the statements that: 1) machines with a run out of greater than .0015” on the Quill were rejected, and that 2) Axial and Radial Thrusts are accommodated by high-precision ground steel ball bearings mounted individually in the quill.

Do you think a C3 rated bearing (described as ‘loose’ by Timken / Fafnir) today would qualify as a precision bearing then? No.

Fafnir was the OEM bearing supplier of the 10E and 10ER as documented by Magna in the Owners Guides which listed them by their 1940’s-1950’s Fafnir part numbers.

Would a C3 rated bearing be found in a modern Mark V or Mark 7 Shopsmith today?

Absolutely.

Are you beginning to grasp the concepts behind bearing specifications and why one is selected over another?

Now we are ready to get into the specifics.

You have a bearing and you can read the number on it, but that is the base number, and seldom if ever does the number on the bearing itself tell you the detail that was on the box it came in that actually specified what the Bore Measurement truly is. Your Bearing simply says 6203RS/C3.



6200 SERIES - METRIC & INCHES

RBI Bearing No.	Bore d		Outer Diameter D		Width W		Radius r		Basic Load Rating (lbs.)		Weight (lbs.)
	mm.	in.	mm.	in.	mm.	in.	mm.	in.	Dynamic C	Static C ₀	
6202	15	.5906	35	1.3780	11	.4331	0.6	.023	1710	830	.099
6202-102	12.7	.5000	35	1.3780	11	.4331	0.6	.023	1740	805	.110
6202-5/8	15.875	.6250	35	1.3780	11	.4331	0.6	.023	1740	805	.090
6202-16	16	.6299	35	1.3780	11	.4331	0.6	.023	1720	840	.090
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6203-15	15	.5906	40	1.5748	12	.4724	0.6	.023	2140	1050	.148
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6203-16	16	.6299	40	1.5748	12	.4724	0.6	.023	2140	1060	.150
6203-3/4	19.05	.7500	40	1.5748	12	.4724	0.6	.023	2160	1030	.140

Is the bore 17 mm, or is it ½, ¾ or other Bore diameter? You won’t know for sure until YOU measure it. To measure the Bore, it has to be off the shaft or spindle. The other two you can measure with it still on the shaft or spindle.

Do you plan to re-use the bearing? If so you had better not pull it off with a 3 Jaw Puller, on the outside of the Bearing, or you may damage it and shorten what life it has remaining. We will discuss how to do that in a moment.

Tools to Work with Bearings

We need something (or someone) to take the bearing off without damaging it or the shaft it is on.

We need something (or someone) to press a bearing (new or re-used) back on without damaging it or the shaft it is on.

We need something (or someone) to accurately measure the bearing once we have it off, to measure the shaft it goes on, and to measure the bearing we are replacing it with.

Something or someone equates to you with tools and skills, a machine shop with the tools or a friend with the tools and skills, which can add cost, or lastly if Shopsmith or some other vendor sells a complete assembly.

I must presume that since you are still reading, you are a self-service type personality, have a constrained budget or timeline, or a bit of both.

Hydraulic 12 Ton Press You may not need a 12 Ton Press but if you have one, they can be useful.

Bearing Separator and Puller Set A small Harbor Freight Bearing Separator and Puller Set is \$49.99 or less with a 20% coupon, or even less when it’s on sale with a 20% off coupon.

It can be configured to pull or push (to remove or install) bearings. My late friend Bill Mayo was quite fond of his Harbor Freight puller and used it commercially in his shop for years.

Personally I have both a 12 ton press, and the Harbor Freight Bearing Separator and Puller Set. I use the Separator and Puller Set most of the time.

A Few Personal Tricks of the Trade I have a few tricks I am fond of using that you may find useful as well.

When I am pushing a bearing back on, I use a short length of pipe to press on the bearing bore race only, again with a large deep wall socket now over the pipe.

For other automotive grade items I am pressing with the hydraulic press I bought some custom length cuts of ¼” wall DOM tubing with the right ID from Metals Depot for strength, but I digress. I also use black pipe.

Keeping the Bearing Separator and Puller Set centered helps insure that I apply equal down force so I will not bend the quill or other shaft. You can imagine how frustrated you might become if you were installing C1 precision bearings to reduce run out to less than .0015” and bent the shaft and made it wobble at .1500 inch or more just because you weren’t careful in keeping the down-force centered as you pressed and bent the shaft.

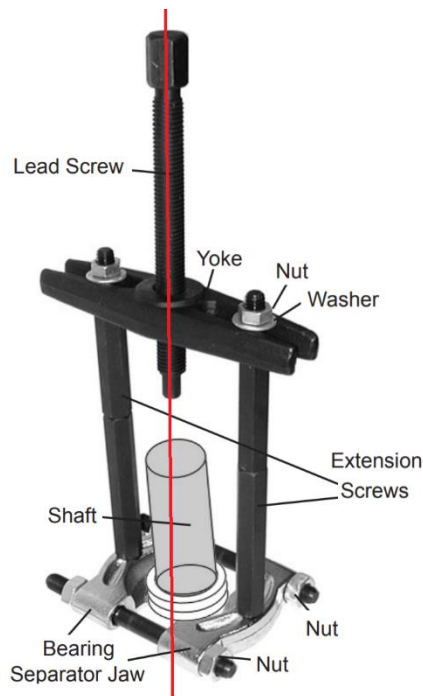
Thinking “Inside the Box” has helped me mitigate those issues; Inside the box of Shopsmith Accessories that is.

Three Shopsmith Parts you may likely have can help, and you don't have to modify them in any way, just use them.

Removing and Installing Bearings with a Bearing Separator Kit

Here you can see an example just as it came from the OEM Tool Manufacturer's Instruction Manual. The only thing I added, was a red line to illustrate that it was off-center.

It can be a challenge as you adjust the Bearing Separator Jaws to fit the bearing and pull or push on the inner bearing race, to keep the Yoke aligned against the shaft as you turn the Lead Screw to apply pressure. It is essential to do, but not always easy to do as you need three hands and a vice it seems just to hold everything, much less align it.



Some Lead screws have a small center point, or even a centering ball bearing to help with that, but it has to have a counterpart centering hole (Red Arrow at Right) in the dead center of the shaft for it to work for you instead of against you. Shopsmith shafts and many electric motor shafts where you may be replacing bearings do not have that centering hole. The Lead Screw will have a tendency to walk off center as it rotates.

It is not as prevalent with the Hydraulic Press, but they can be persnickety (a problem) in their own way depending on their quality of workmanship.



Bearing Separator Kit Adaptations by Everett

Here is what I have done using a Shopsmith 514631 1/2-inch Router Chuck. The 1/2"Chuck end allows a 1/2"shaft to totally drop through it into the larger 5/8" opening. Normally the Quill shaft is there and it will be in our configuration because that's what we will be pressing on.

The challenge was the Lead Screw's threaded area was wider than 1/2", and the reduced area, while less than 1/2" was not long enough to reach through the body of the chuck to press on the spindle. Yes I could turn a section of threaded portion down to make it fit inside. Yes I could ream out the Router Chuck to make it accept the Lead Screw threads to drop in and rotate against the spindle.



I did not want to do either of those things. What I did after finding that none of my 1/2" drill bits were candidates to destroy to make a metal plug from, I went to my local Re-Tool store and found one missing one of the sides of carbide. When I explained what I wanted to do, they gave it to me.



Doing all the precision measurements and processes to build a short shaft plug was more than I wanted to undertake myself. So it was 1/2" wood dowel to the rescue. I installed the Router Chuck on my 520 until it bottomed out on the end of the Quill, stuck in a 1/2" wood dowel in the end until it bottomed against the end of the quill (passing through the Router Chuck) and I marked it with a pencil at the end of the Chuck.

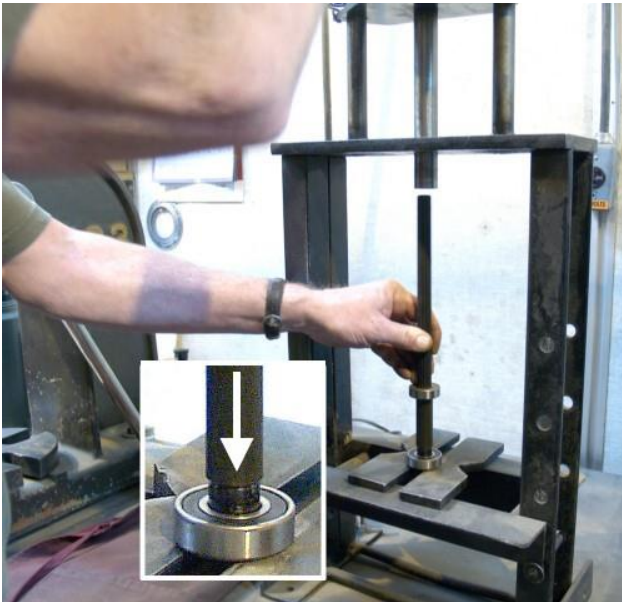
I took off the Chuck, removed the dowel from it, took my Lead Screw and laid it out against the pencil line and drew another line that would position the lead screw to partially go into to the recess then rest the ball in a centering hole in the metal plug. I cut off the dowel, and trued it up with my 12" sanding disk. I have a pattern! Off to my favorite machinist with a 32oz Coke, a 1/2" shank of the discarded drill bit for the plug stock, and a wooden mock-up pattern the size I wanted, and in 10 minutes I had my hardened 1/2" plug, with centering hole. Cost – one 32oz Coke at Sonic purchased during happy hour.



Next I need something to help on the Hydraulic Bearing Press to better secure the mating surface of the press centered on the smaller quill shaft. Enter the magic of a Shopsmith 505601 Lathe Screw Center, with the screw removed and set aside for later re-use.

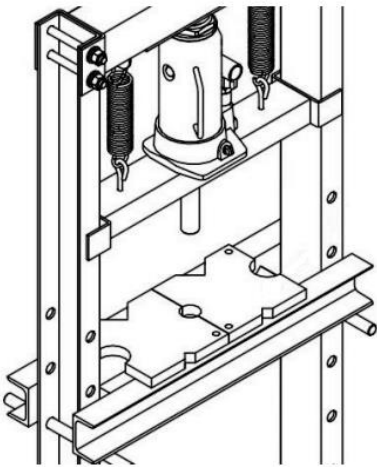


Yes this fits the business end of the Quill, just like the 1/2-inch Router Chuck, and yes both will fit the business end of the Drive Sleeve Assembly just as well. No the hole in the top is not the right size for the ball bearing or the pointed tip on the Lead Screw for my puller. It may be for yours.



Here is a picture Nick Engler posted some years ago showing a Hydraulic Bearing Press at Shopsmith. All I do here is to first slip the Lathe Screw Center over the end of the Quill Shaft and Press it off (reverse of what they are doing here)

I have a short length of black pipe with a cap on it that I true up square for flatness on the 12" Disk Sander to protect the spline ends if I am pressing on the splined end of the Quill.



If you look at the spline ends, they have the centering holes for the other method.

I also use a suitable size length of Black Pipe that rests against the inner race of the bearing when I am pressing down a long shaft from the spline end with the Hydraulic Press. I cut off the threads if any, and true it up with the 12" Sanding Disk.



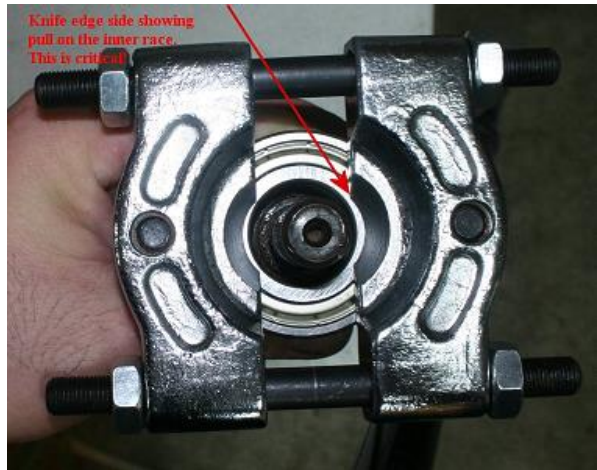
What is that third Shopsmith thing I mentioned? As you recall, I mentioned that the Bearing Separator Kit with the tool assembled around the part can be a bit awkward to hold. If I have a 5/8" shaft at the other end, then back to the turning accessories I go, and Faceplates can form a very suitable base for the stack of parts you're attempting to work with. They screw to wood blocks for turning and don't complain at all even when I screw them down to the bench top to hold things in place..... When I do this, I do tighten the set screws to securely hold the Spindle, or Drive Sleeve against the beveled flat. Yes I presume you could use a 12" Sanding Disk, but I try to keep those secure and well out of harm's way.



Some Random Ideas Others have devised

Sometimes it is helpful to look at what others have done in their attempts to do similar work with materials they had available. I will post some basic pictures with no real comments other than these are representative ideas that maybe you can adapt in your shop.





The arrow above is to insure you configure it to press on the inner most bearing race to press it onto a shaft.



By now you are undoubtedly seeing ways you can do this.

What if the shaft isn't 5/8"? I have used 1/2" Drive Impact 6 point Deep Well Sockets to slide over various shafts.

I have used an Oil Plug from a scrap bin that I flattened and drilled a small chamfer for the Lead Screw Bearing, or Pointed tip to center into then

dropped into the square 1/2" drive opening to press on. Just use something to protect the shaft and press in a straight line.

I know I keep talking about that ball bearing in my Lead Screw. Here's what mine looks like.



So what do you do if you can't drill a centering hole in a shaft for this to fit into? I have been there.

What I do is find a small Fender Washer with size of hole the ball bearing just fits into. I put a screw and nut on it, and spin it in a drill against a file until I have turned the washer diameter down sufficiently to fit snugly inside the pipe or sleeve that I am using.

I remove the screw and nut, grease the washer, rest it on the shaft, put the sleeve over it and the spindle or shaft, then turn the Lead Screw against it. The ball keeps Lead Screw centered in the washer and the washer's edge fits just inside against the edges of the pipe sleeve, insuring the tool presses in a straight line. One could also fabricate a short 5/8" diameter plug etc. from a discarded shaft that had a centering hole.

There are any number of ways to do it. I choose to do everything I can not to bend any shafts and introduce any more run-out than exists in the bearings. I am sure you can envision other ways to do the same things.

The next segment is regarding Bearing Classifications as they relate to Shopsmith today, opposed to the industry as a whole in which micro-miniaturization in manufacturing processes, robotics, medical or surgical devices have forged a new frontier in precision bearings, material and applications.

In the 1940's the bearings on a precision lathe or milling machine would have tighter tolerances than the same size bearing used in an agricultural combine. Equally, today the bearings in a dental tool would vary widely compared to a 3 Point Mounted Earth auger on a Tractor.

There were tables that defined what C3 range of acceptable tolerances were based on the diameter of the rotating shaft. They were relative to the size of the shaft. CN - clearance normal, vs. C2 - Less than Normal, C1 - Less than C2, C3 - Greater than Normal, C4 - Greater than C3 or C5 - Greater than C4 were the standards.

The modern era with high precision bearings with tolerances measured in Precision Classes in ISO, ABEC or P#

They are different. Vastly different. Here are some notes in Q&A at NTN for example.

Explain the difference between C3 and normal clearance? Clearance classes are established by ABMA. C3 is a clearance specification one class larger than "C Normal" (sometimes referred to as "C0" in deep groove radial ball bearings).

Is it safe to use a C3 fit in place of a standard fit? C3 is not a fit, it is an internal clearance. Fit is how tight or loose the shaft and housing hold the bearing in place. In most electric motor rebuild applications a C3 clearance can be used in place of a normal clearance.

What is the difference between ABEC-3 and C3? Does the fit get better going up to C4 or down to C2? ABEC-3 is an ABMA tolerance class. C3 is an internal clearance specification. Fit is the relationship between the bearing bore and outside diameters to the housing bore and shaft outside diameter. Tolerance, clearance, and fit are independent dimensions, although in some cases choosing a larger internal clearance can allow you to use a tighter interference fit.

What does CE or C0 fit mean? NTN does not use "CE" or "C0". These are competitor terms for electric motor and normal internal clearances. Clearance does not indicate any type of fit.

Explain the difference between C3 and normal clearance? Clearance classes are established by ABMA. C3 is a clearance specification one class larger than "C Normal" (sometimes referred to as "C0" in deep groove radial ball bearings).

A bearing for example may have a Precision Class of ABEC-5 and an Internal Radial Clearance of C2

..... Where C2 = Tight; C0 = Standard; and C3 = Loose; and the amount of space for each is specified in a chart based on the size of the bore. They are truly different things. Inter-related, but different.

Now for the brave of heart:

[Where might Industry Changes affect change in product specification for us?](#)

[Bearings with Solid Oil](#)

Bearings with Solid Oil are designed for use in applications where high levels of moisture and incidental contact with water and other contaminants are real issues. These bearings are also an excellent choice for applications where re-lubrication is impractical or dangerous.

Solid Oil is an oil saturated, polymer material that virtually fills all of the free space in the bearing. The polymer material is molded into the bearing forming very narrow gaps around the rolling elements and raceways, enabling the bearing to rotate freely. The polymer material has a porous structure, with millions of micro-pores that hold the lubricating oil retained by surface tension. In service, oil is released from the material into the narrow gaps between it and the bearing components, thus providing effective minimum quantity lubrication.

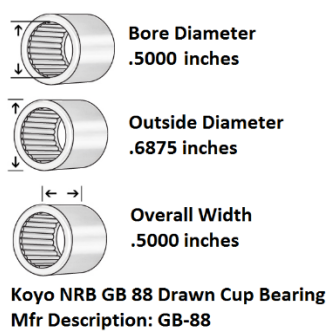
Shopsmith has moved to High Temp Grease in the Mark 7 and all new bearings. If Solid Grease is proven to keep out water and contaminants, sawdust intrusion could perhaps be eliminated if they chose it in the future. Bearing manufacturers are in the business of selling more bearings. This makes them last longer. One has to ask for it.

Remember, you read that here first. The specification for SKF bearings for example, would be Lubricant W64 and there are options within that for temperature. I will include some in the bearing table at the end should someone want to read more. They are “Co\$ \$tly” to say the least until production volumes escalate.

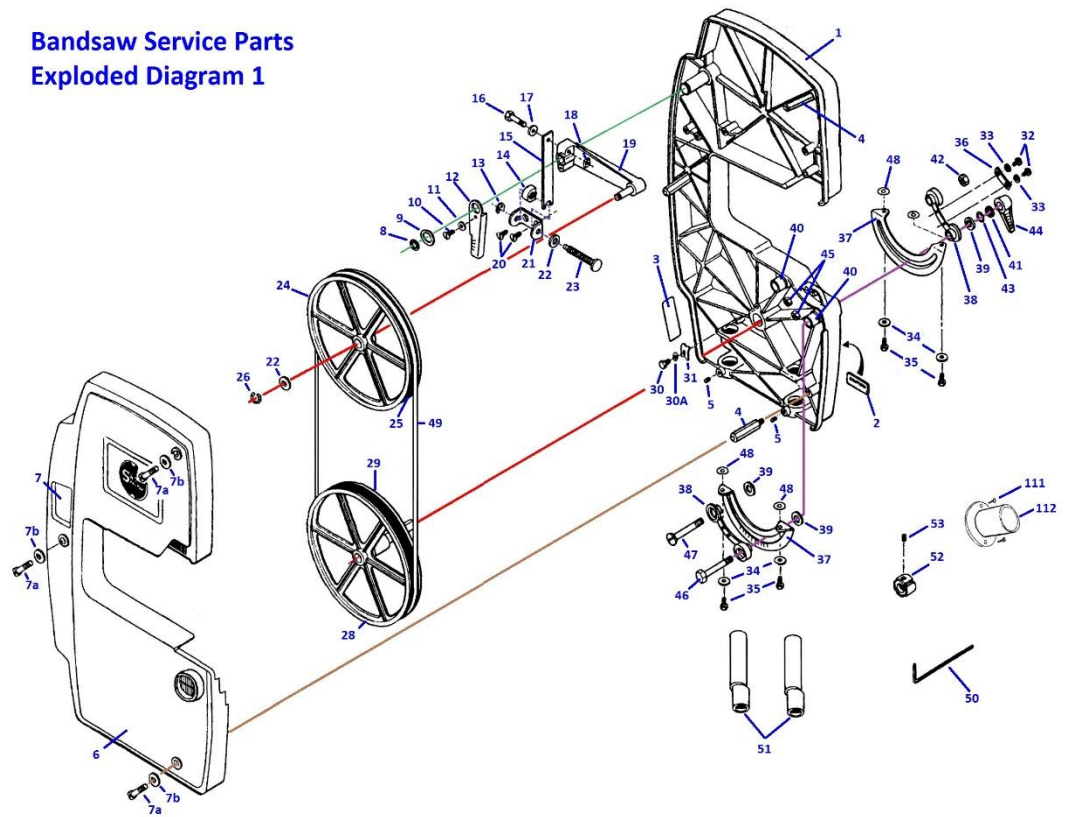
Bandsaw

Historically the Shopsmith Bandsaw has been one of the most popular Special Purpose Tools they sell. Yes the Exploded Parts Diagrams 1 & 2, I re-drew for this project.

There are differences through the years. Yours may be OEM or vary from production by upgrades that were made through the years and sold to the owner base.



Bandsaw Service Parts
Exploded Diagram 1



502691 Upper Wheel Assy.

1 ea. (incl. 24, 25 in drawing) Upper Wheel and GB-88 Bearing

509032 Lower Wheel Assy.

1 ea. (Incl. 28, 29 in drawing) Lower Wheel, Bearing and Axle

Replenish the grease in the upper wheel bearings about once a year. Remove the upper wheel by taking off the blade and releasing the wheel retainer snap ring with a screwdriver. Then pack a small amount of grease in the wheel bearing, and replace the wheel and snap ring. Wheel Bearing grease for automotive is fine. You may find some refer to it as Cup Grease. There are other grease compounds available as well. Keep it greased, but Shopsmith stated use only a Non-Lithium Grease. Shopsmith also suggested Furnace Bearing Grease.

One can only buy the Upper and Lower Wheel Assemblies today from Shopsmith.

At this time I personally know of no commercially available lower wheel assembly replacement shaft assembly though some have to my knowledge, unsuccessfully tried to replace the bearing on the shaft.

Nick Engler wrote in 2006: *"I strongly recommend that owners let us replace the lower bearing. The bearing's position on the shaft is critical"* indicating it can be done, but I think they were just pressing in a new shaft assembly, not replacing the bearing on the shaft. Now they only sell the Lower Wheel Assembly with bearing and shaft. See 2006 post: http://www.shopsmith.com/ss_forum/viewtopic.php?p=1093#p1093

GB-88 Cup Bearing in the upper wheel is available commercially as a replacement part from a variety of sources and the specs are straightforward.

Koyo GB-88 Precision Needle Roller Bearing, Full Complement Drawn Cup, Open, Inch, 1/2" ID, 11/16" OD, 1/2" Width

Bore 12.7 (mm)

O.D. 17.463 (mm)

Width 12.7 (mm)

Manufacturer UPC Number: 605790272981

Motion Industries Item #: 00091229 \$11.74 Sep 2017

You may find reading this post very informative: Shopsmith Bandsaw Bearings #17013 by billmayo

http://shopsmith.com/ss_forum/viewtopic.php?p=17013#p17013

The early Magna Bandsaw may indeed have a replaceable lower bearing. I don't have one early enough to know for sure as even my earliest has had the lower wheel assembly replaced by the newer style.

There was a seller years ago who acquired a Water Pump Style Bearing and Shaft Assembly they modified and sold at a high price point as I read in that thread. I didn't find anyone on eBay selling one today. It doesn't mean the shaft assembly isn't out there still from someone. If you have a mill to modify one, you might make it work if you know how to specify it and can find the right shaft assembly.

Far more important to me is that the aluminum wheel itself has not warped over the years with blade tension never released. In my opinion it doesn't matter how good the bearing is if the wheel it's in is not true.



Upper Bandsaw Wheel and Bearing

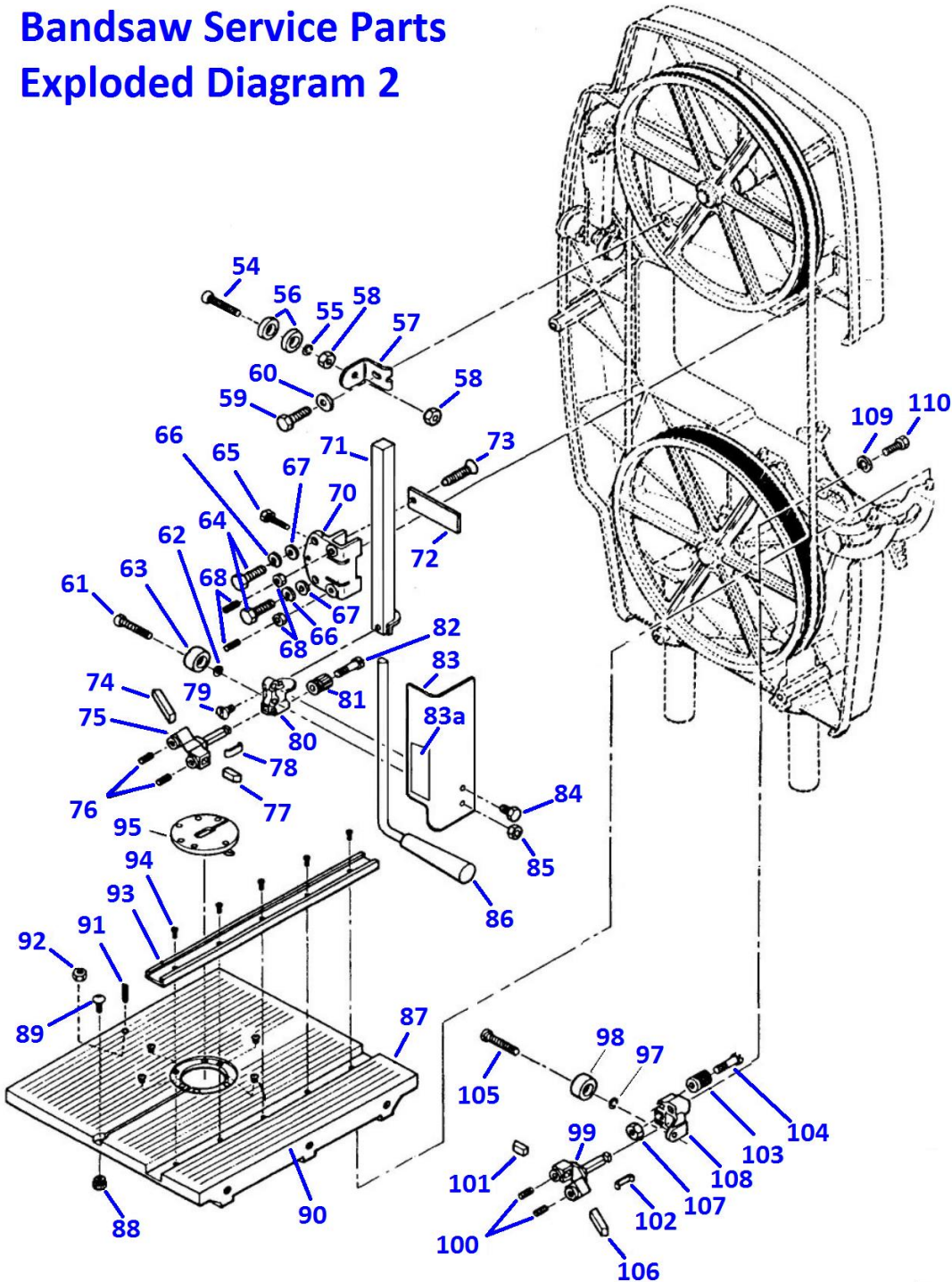


Replacement Bearing
GB-88 Cup Bearing
For Upper Wheel



Lower Bandsaw Wheel and Bearing Shaft

**Bandsaw Service Parts
Exploded Diagram 2**



There are other bearings in the Bandsaw beyond the Upper and Lower wheels, some in areas that started life in the original 1950's machine as bushings opposed to bearings. Production changes and upgrades upgraded them to bearings.

I have documented only the latest version of the Bandsaw. I have released a separate Illustrated Parts Manual based on these new drawings.

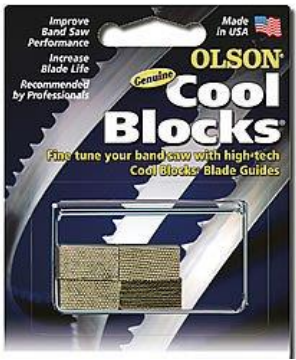
- Item 56 - 514011 Bandsaw Tension Bearing @ \$5.93 (2 ea.)
- Item 63 - 514007 Upper Bandsaw Backup Bearing @\$13.89 (1 ea.)
- Item 98 - 514007 Lower Bandsaw Backup Bearing @ \$13.89 (1 ea.)

For Older Model Shopsmith Bandsaws with Bronze Bushings for Back up Rollers, which often squeak, there is a
No. 555074 Bandsaw Backup Roller Retrofit Kit @ \$32.97



I would be remiss if I failed to mention 3rd Party Accessories that also are quite useful.

[Olson Saw CB50030BL Shopsmith Band Saw Accessory Cool Blocks @ \\$15.00](#)



Cool Blocks blade guides are made from a high tech, non-metallic composite material, "Graphite Impregnated Phenolic Laminate" which contains three synthetic dry lubricants that lubricate the blade but do not make it oily. Contains: 2 guide blocks 3/8" x 3/8" x 1" and 2 guide blocks 3/8" x 1/4" x 1 1/2".

Metal to metal contact made by old metal guide blocks creates heat and friction which cause premature blade wear and breakage. It isn't a bearing, but it is a helpful addition.

Next comes two products from Carter. If you are buying a used Bandsaw and it has either of these, you have added value involved. Be sure to get the original guides from the owner as well.

[Carter Stabilizer kit Shopsmith-SHS1 @ \\$79.95](#)



The unique patented Stabilizer[®] from Carter is very different from any traditional guide in that it is not designed to hold the blade with immovable support on three sides. Instead, its grooved bearing wheel firmly prevents the blade from moving backwards or shifting left or right while still permitting the front of the blade to twist slightly side to side.

This allows the user to make tight radius complex curves that no traditional guide system can achieve. Check out two videos (done on a different Bandsaw) at: <http://www.carterproducts.com/stabilizer-demo-videos#>

They achieve the same thing on a Shopsmith Bandsaw. You don't have to have one of these, but it is available. It is for 1/4" or less width Bandsaw blades i.e. 1/4, 3/16, 1/8 or 1/16" blades only regardless of Bandsaw brand.

[Carter SHSM-11 Shopsmith conversion kit @ \\$119.99](#)

This kit updates your saws performance through the use of all sealed ball bearing roller guides. It provides your saw with reduced blade friction and improved cutting accuracy. The kit contains both upper and lower roller bearing side support assemblies, which work in conjunction with the existing Shopsmith thrust bearing. **These would negate the need for Cool Blocks unless you plan to use the Shopsmith Guide from time to time.**



Whether you have these, or the OEM Shopsmith Guides and want to do the fine intricate turns with the SHS1, you first remove the upper guide, insert the SHS1 Stabilizer in its place, and back off the lower guide allowing the (smaller Bandsaw blade to move freely) now controlled by the Stabilizer.

Do be sure to look at those two videos as these options are used on dozens of other brands to do the same work and solve the common problems when performing many operations on any brand of Bandsaw. I know this is a bit off topic, but you bought the Bandsaw to make cuts that a Bandsaw can excel at. I am just providing information to help you do that more easily on your Shopsmith Bandsaw.

Also see the 2009 Shopsmith Forum thread titled "The Carter Stabilizer Band Saw Guide" at: http://www.shopsmith.com/ss_forum/viewtopic.php?p=36951#p36951 validating they have been around for a while for Shopsmiths. They have different bearings that you can obtain from Carter direct if you ever need one.

Other 3rd party vendors have bearing products as well. Jacob Anderson, who I mentioned previously, in addition to the 30 Free Shopsmith YouTube Videos he has available at <https://jacobs-repairshop.com/youtube-videos/> also has a \$15 (plus postage) Bandsaw Tune up and Repair DVD that is very informative, just as is his \$30 Mark V Headstock Repair DVD's which includes 4 styles of motor repairs.



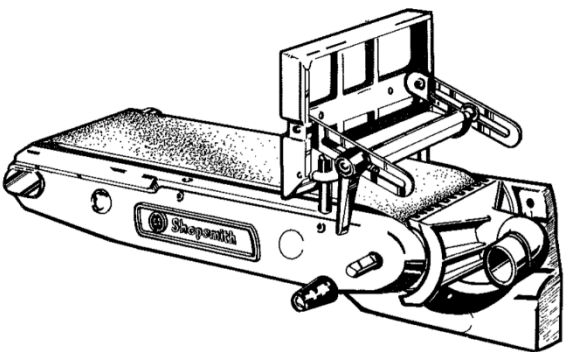
Belt Sander

The Shopsmith 6" Belt Sander is one of those tools that some wonder why it took them so long to acquire once they actually use it.

The Belt Sander parts list shows the definition of Bearing for Item 40 and Ball Bearing for Item 57. Items 40 are bushings

(2 ea.) Items 57 are Ball Bearings (2 ea.)

Neither are available separately according to the Shopsmith interactive Webpage. Shopsmith sells them both as separate assemblies:

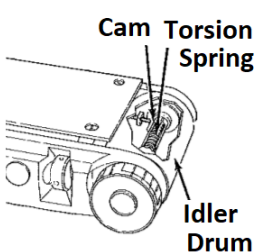


502934 Belt Sander Idler Drum Assembly (includes items 37-47) for \$110.97

502789 Belt Sander Driver Drum Assembly (includes items 57-62) for 112.36

Sawdust Session #2

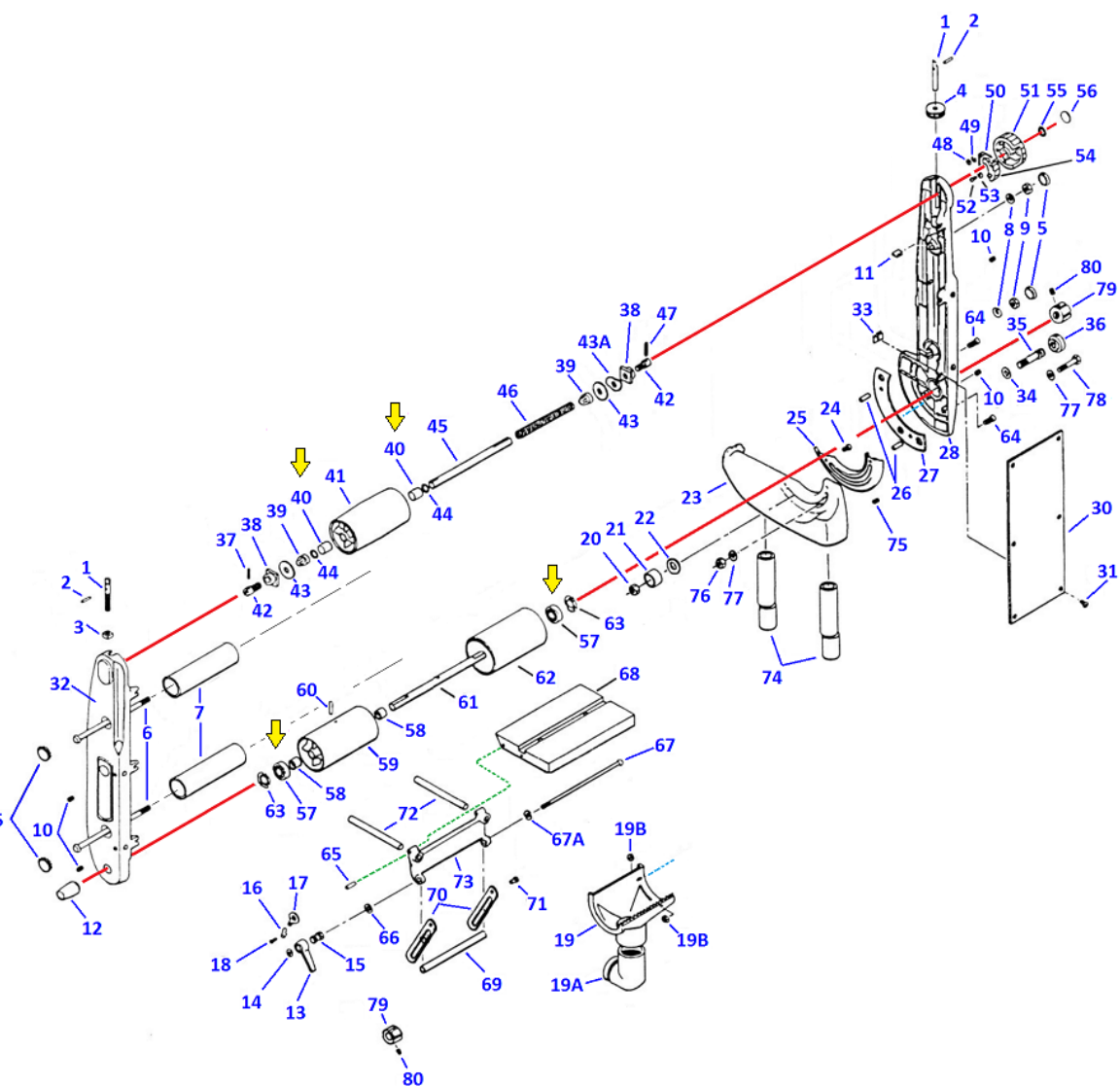
Nick Engler created a video that shows a good bit of information by disassembling a Belt Sander that had the idler assembly binding up as it turned. He only mentioned the drive end bearings. The Idler assembly has a torsion spring in the hollow shaft.



Do not

disassemble the spring section when servicing.

Nick demonstrates how to do a Belt Sander Tune-Up and in the presentation he provides excellent information on what needs lubrication and attention,



demonstrating it by taking the unit apart to gain access to those areas. It was produced at a time when high resolution video on computers was less than today so it is a bit grainy; even more so when enlarged. *I highly recommend* that you watch it if you are not really familiar with the process.

http://www.shopsmithacademy.com/SS_Archives/SS112/SS112_Belt_Sander_Tuneup.htm

Considering what I have just said about the bearings not being available from Shopsmith, it is curious that one appears to be; if you interpret what I found the same way I did.

502962 Belt Sander Ball Bearing @ \$5.99 is still in the system. It was the 5/8" original Greenie Quill Bearing which was not an interference fit. Not an interference fit means you can slide it on opposed to having to press it on.

A friend and mentor, James Grange Sr. (JPG) in the forums, restored a Belt Sander in the following 2011 post which is filled with high resolution photos and valuable comments. I recommend it highly.

http://www.shopsmith.com/ss_forum/viewtopic.php?p=94202#p94202

JPG stated the bearings are 5/8" x 35mm x 11mm shielded 6202-10-ZZ which is double metal shield. NSK 6202-10ZZ shows a Radial/Deep Groove Ball Bearing - .6250 in ID, 35 mm OD, 11 mm Width, Double Shield, C0, Round. Today I am betting that this should be a 2RS (Rubber Shield) based on intrusion of dust contamination. With a 5/8 Bore it should slide on, and not have to be pressed. A VXB 6202-10-2RS 5/8 x 35 x 11, perhaps.

Strip Sander



516421 Strip Sander Tracking Wheel & Shaft
[Item 6] (1 ea.) @ \$38.38

523099 Strip Sander Idler Wheel
[Item 17] (2 ea.) @ \$16.28

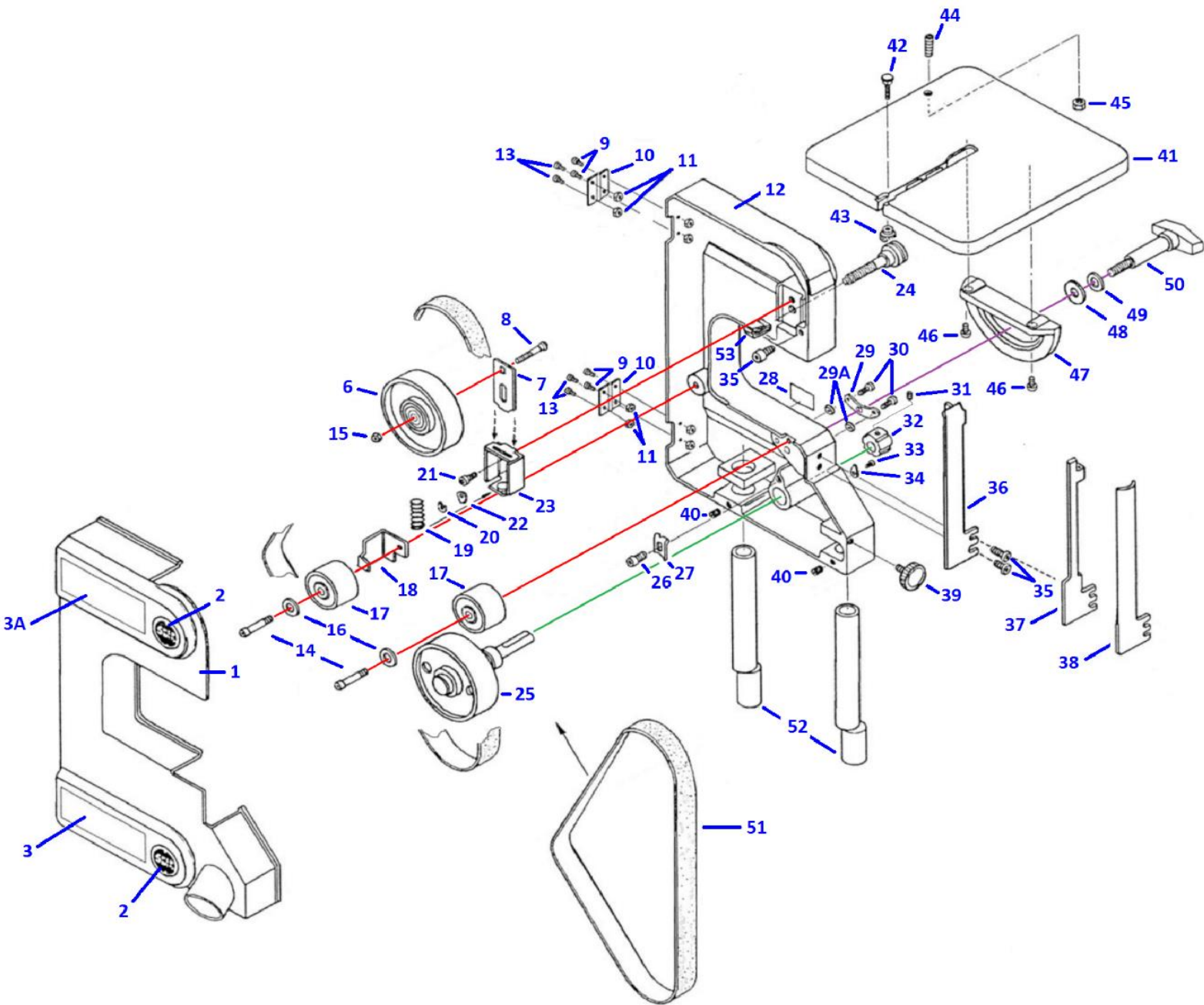
515392 Strip Sander Wheel & Bearing
[Item 25] (1 ea.) @ \$56.16

There were plastic idler wheels with bushings and at some time bearings were added to a new wheel assembly.

There appears to have been a few changes through the years but I have no specifics on what bearings came with them from Shopsmith, or if they are replaceable.

There is one thread on Strip Sanders that might give you some background: https://www.shopsmith.com/ss_forum/viewtopic.php?p=194982#p194982 where a poster had Polyurethane Wheels custom fabricated. I reached out to forum members for more input, and no one responded with further information on bearing specifics at this time.

FYI as part of this project I re-drew the illustrated parts list for the Strip Sander shown below. Full size drawing is available by ctrl+clicking the graphic below which will take you to [Shopsmith Large Format Drawings, Illustrations and More](#) page in the forums.



4" Jointer



The 4" Jointer was introduced by Magna in the early 1950's and like the Bandsaw, has been one of the most popular Special Purpose Tools ever introduced.

Its quality, durability and overall design remains stable through the years.

The Feather Guard was introduced a number of years back. The 555480 Jointer Feather Guard Retro-fit Kit @ \$59.30 for machines without them remains a very popular add-on.



The 555077 Jointer Dust Chute Retro-fit Kit @ \$39.70 provides significant dust removal vacuum port and covers the underside of the cutter head from exposure to small or large hands.



The 555655 Auxiliary Fence Kit with two Feather board hold-downs @ \$79.43 increases safety and accuracy and transforms the older unit to current standards.

Dusty informs us that bearings he uses for the jointer are: 12.7mm x 28.575mm x 7.938 mm. and that Shopsmith Part Number is 502898 Ball Bearing @ \$9.48. Inner: .5 Inch - 1/2"; Outer: 1.125 Inch - 1 1/8"; Width: .313 Inch - 5/16" (actual .3125 rounded up to .313 in some specs.)

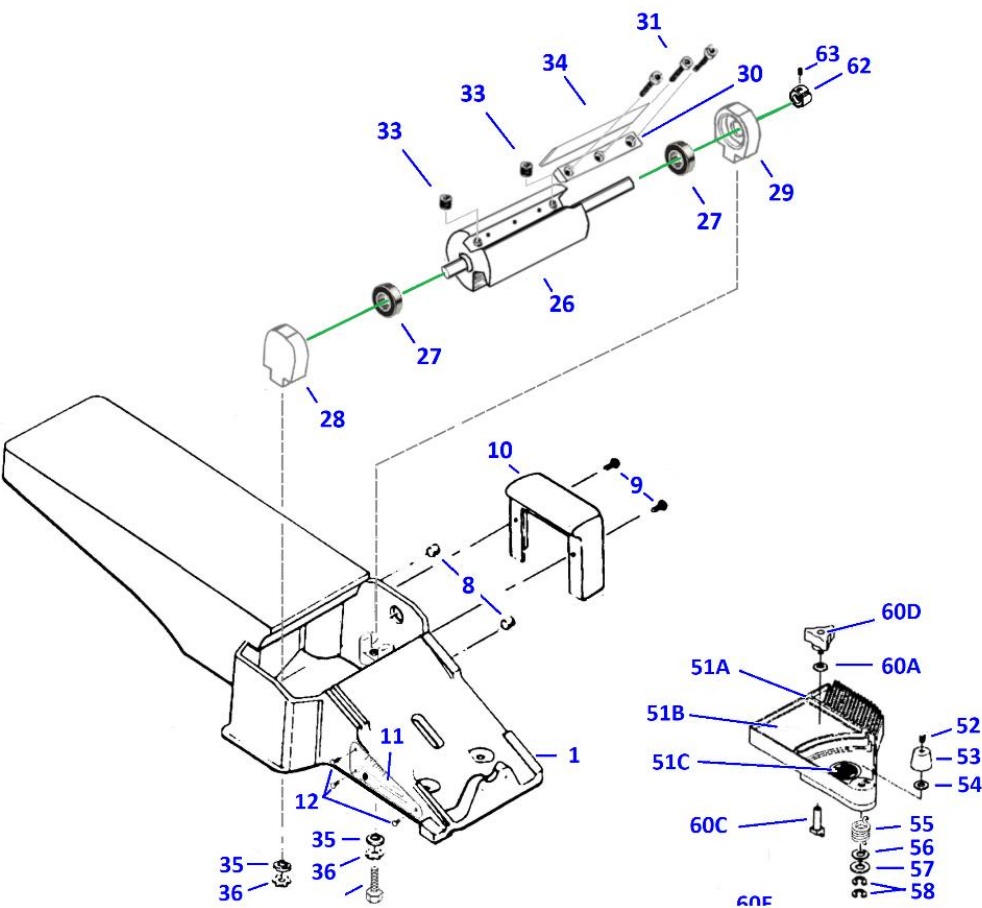
He states that is equal to VXB No. **R8-2Z**. They were 2RS opposed to ZZ (2Z) in the early 1950's.

99R8 is the Radial/Deep Groove Ball Bearing - .5000 in ID, 1.1250 in OD, .3125 in Width, **Double Seal** version. It is the same as R8-2RSJ AC Delco and others - alternator bearing.

The small extract below taken from the Revised Jointer Illustrated Parts drawing - completely redone for this project and is available full size at: http://www.shopsmith.com/ss_forum/viewtopic.php?p=185690#p185690

I can confirm the shaft size has remained the same 1/2" through the years. - Everett

This FAFNIR Bearing appears to have been the OEM bearing in the original early 1950's Jointers. Double Sealed - Bore 1/2" OD 1 1/8" Width 5/16"



FYI – The Router Chuck (Inverted) will fit either end of the Jointer's Cutter Head's 1/2" Shaft which has a centering hole for the Puller's Lead Screw.



The Lead Screw's threads will pass through the 5/8" end, but I like to wrap them with some tape to protect the threads, just in case it drifted.



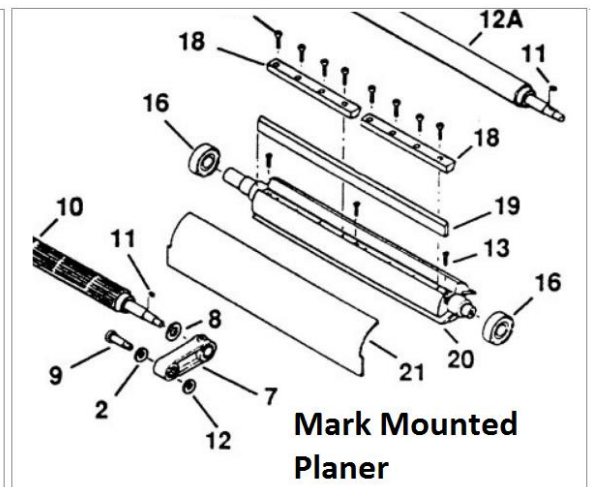
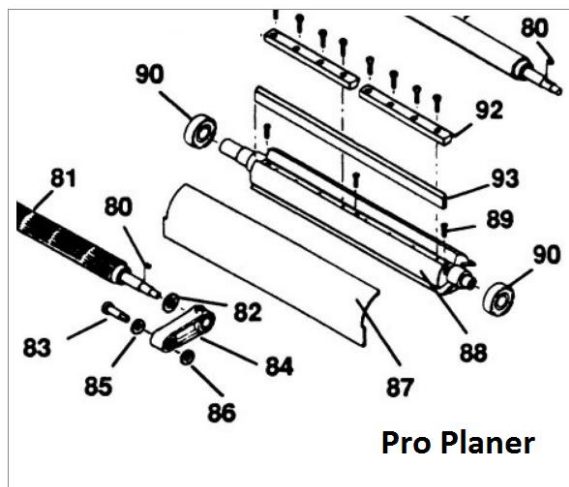
If you retain a small connecting segment from a 5/8" shaft, you can use a second Router Chuck on the bottom and use the 5/8" shaft segment to secure it to a Faceplate for support.



Pro Planer and Mark V Mounted Planer

There are some notable differences between the two planers other than the power that drives them.

Further, there was an option to convert the Mark Mounted to a Stand Mounted Planer. It did not make it a Pro Planer as it did not replace the aluminum bed with cover, with the much heavier cast iron machined bed etc.



Due to the differences in the Pro Planer Manual vs. Mark Mounted Manual and the Illustrated Parts Drawings, I will not delay the Bearing Project by extensively reworking both manuals drawings before proceeding. It is on my long term to-do list however.

I inserted the two excerpts above to illustrate the clear similarity of the devices, yet the divergence of the parts numbering in the Bearing / Cutter-head areas in the respective manuals.

There is a PDF document that I presume Nick Engler and his staff wrote regarding Planer Cutter-head Removal on a Pro Planer. http://www.shopsmith.com/ownersite/catalog/cutterhead_stand_mount.pdf Read it if you are changing bearings. The number references are for the Pro Planer Parts numbering. The Mark Mounted parts are exactly the same in the cutter head area, while the item references for them are clearly not.

Nick and his team also produced a Planer Tune-Up PDF and a YouTube Video that is worth reviewing as well.

<http://www.woodshoptips.com/tips/030705/030705.pdf>

https://www.youtube.com/watch?v=GFqi_Y4xtUg

The Cutter-head assembly and bearings are available from Shopsmith though their web page currently says they are not. They are working on revising their parts listing on the webpage. Call them. They will look it up and if it is available, they will gladly sell it to you, even ordering it if not in present stock, but available. Wonderfully helpful folks. Be patient, and be kind to them. They are there to help.

516075 - Planer Cutter Head @ \$404.84

505982 - Planer Replacement Knives @109.99 (Item 93) - Set of 3 - are available.

513388 - Quill Ball Bearing (*also Planer Ball Bearing) @ \$5.49 – (Item 90 or 16 – you will need 2) is also available



6203RS/C3

They are the same on Pro Planer and Mark Mounted Planer

The OEM bearings were sealed based on a series of other Pro Planer owners I have contacted. Mine look just like these which came from a Forum member who bought his rusted Pro Planer from someone on Craigslist - His keyway slot was deformed as I recall from his post. I suspect a machinist's file would have allowed him to square up the slots.



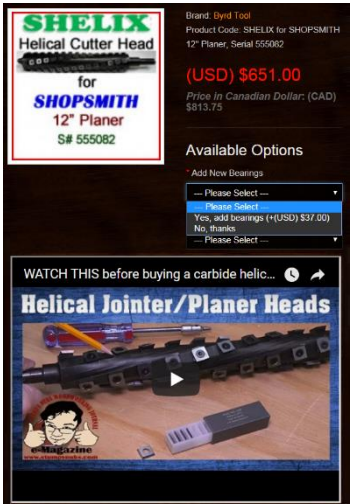
The 513388 Bearing (6203RS/C3) is definitely Sealed not Shielded, and the cutter-head shaft ends *have the centering alignment holes* for the bearing separator / puller.

- What if I could still replace the Cutter-head assembly and bearings, but not from Shopsmith, or even a used Shopsmith cutter-head on eBay?
- What if I could change it to a system that would pay for itself over time, just from the savings of buying replacement knives, or sharpening the knives?
- What if I could reduce the time dramatically when I get a nick in the blade by not spending a good bit of time resetting the knives or replacing them?
- What if replacing the blades did not require alignment at all?
- What if I could replace a damaged blade another three times without any additional cost, and spend less than 5 minutes to do it?
- What if they lasted 40 times longer?
- What if I want to eliminate wash boarding, or chip outs?
- What if I could reduce the noise level by 50% or more?
- What if it virtually eliminated dust extraction clogs and improved dust extraction dramatically with smaller wood chips?
- What if you could invest in that cutter-head and add a set of bearings for \$37.00 to install them on your Shopsmith planer?



Well, truth is you can do all of that, and if your existing ‘Shopsmith’ OEM cutter-head is in good shape, it may fetch a really good price on eBay to help you offset a portion of that investment for someone who needs a cutter-head assembly and can’t pay over \$400.

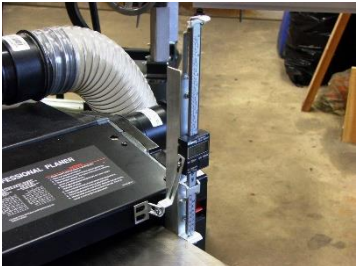
There is a technology used in upper end planers for years that has migrated its way into the DIY marketplace and now is available for over 600 models of smaller 12” format planers, with Shopsmith among them. It isn’t cheap, but it is economical, and an investment that will pay for itself for some Shopsmith Planer users rather quickly.



If you have been there and done that with the ‘What if’s” then you may want to go here, and do this....

Before you say I am not spending that, it might be worth viewing the video

One of the more common things noticed by a variety of upgraders regardless of the planer brand is that the Shelix Cutter Heads may register a bit smaller by a 1/16 or so from their OEM cutter head, requiring an adjustment to the removal index indicator to zero it.



When you consider 600+ models, the manufacturer’s cutter-heads are not exactly the same diameter, and Shelix is not going to manufacture 600+ different cutter-head stocks for their cutter-heads.

If you need a cutter-head already and can invest an extra \$250, the Shelix is at least worth a strong consideration.

John Burger, another one of my Shopsmith mentors, connected a Wixey Digital Readout in 2007 that he wrote about in this 2016 post. (Ctrl + Click photo above) John mentioned that he adapted a Wixey model that was made for Lunch Box planers, but that they now offer the *Wixey Portable Planer Readout model WR510 Type 1 or Type 2* which would have been easier to adapt to the Shopsmith. It might really provide accuracy if you do the Shelix upgrade and a significant amount of thickness planing. It’s quick, it’s easy, and it’ dead-on accurate.

They state: “It mounts in minutes and is calibrated in seconds.” - \$64.99 <http://www.wixey.com/planer/>

What about Motor Bearings?

I realize also that members may want to replace bearings in the various Motors in Shopsmith equipment, which will be the genesis for a new Shopsmith Motor Project, and will precipitate a Revision 1.x of this Bearings Document after that project completes.

I hot-linked the specific cell for Shopsmith Part Numbers for Bearings that are available from Shopsmith and other vendor sites where possible. I am not recommending these sites as ‘the place to buy them’. You may find lower pricing elsewhere. Realize they may make part number / price changes in coming years or links become inactive.

Your Comments

As we go through this document you are invited to help me correct errors and omissions with your thoughts and input.

To avoid duplication of reported errors or omissions, please post corrections and submissions in the thread Shopsmith Bearings Guide https://www.shopsmith.com/ss_forum/viewtopic.php?p=240099#p240099

This is an on-going document, so even though it was released as Shopsmith Bearings Guide, I will update etc.

There is no scheduled update frequency.

Bearings Specifications Spreadsheet

In the Spreadsheet the presence of “-”, in a cell signifies that this model *did not have* this item opposed to “n/a” in a grayed section indicates that the information is not available, and we are seeking it if it is available. I do not expect it to be available, but I have learned things in the past, and I am open to learning things today.

Provide information that you have to complete these “n/a” areas. Specify whether you know it is correct by submitting a photo or citation source etc., or if you’re speculating based on knowledge and personal experience and observation. That’s fine. It may be all we have. In some cases, the only folks who may have truly known on the oldest gear, passed many years ago.

Consider the pricing a snap-shot in time, and the part numbers subject to change. I do not know how frequently I might review and update the document. It is a reference guide, not an order guide.

The Core data and measurements are what we are getting at - *not to help you know what to order based on the age / vintage of your machine* as anyone could have changed parts through the years, even the headstock / serial number / date of manufacture code.

It is most often: “What’s There Now” that determines what you need, unless what’s there now, is just plain wrong and should not be. Measure. Measure correctly.

The table is designed from the standpoint that once you have visually and accurately measured what parts you have, to help you match them up with knowledge, to obtain the appropriate replacement part.

In Review – Manufacturer’s use different nomenclature for the same thing

Before you examine the following table, let’s review this one last time to help make the industry variances in nomenclature and presentation more apparent to folks who just want to repair their Shopsmith.

One example will show up early in the table:

The part no. 501962 bearing which was the Quill bearing on Greenies and measured 5/8 inch x 40 mm x 12 mm.

Later versions of the Mark V and the current Mark 7 part no. 513388 Quill bearing measures 17 mm x 40 mm x 12 mm (6203 2RS)

There are at least two other metric bearing sizes with the same 17mm bores that are different than the 40mm diameter. Yes that means the Quill housing was machined differently for them, directly from Shopsmith through

the years, even though the Spindle inside it remained the same. That will make you pause a bit about buying a quill housing on eBay, or at least, should.

Functionally the completed assemblies will interchange perfectly as outside quill dimensions are equal.

So, how do I specify 5/8" opposed to 17mm? How do manufacturers specify it?

It will vary by brand, and it is why I highly recommend you obtain the OEM Bearing Manufacturer's definitions of Bearing Nomenclature for the bearing you wish to buy, if you are not buying it from Shopsmith.

There are various ways of designating the 5/8" bore -- some are in the most recognizable format of 6202ZZ-5/8 which will appear on the box the bearing comes in, but not always on the bearing itself.

No standards body (and there are several of those) mandate how they present this information so manufacturers have their own nomenclature.

Equally there are variances not so recognizable at first. For example: a 6202ZZ-10 bearing which one might first think was metric, but it is (for whatever reason) an unreduced fraction of 10/16" which is more commonly recognizable as 5/8" in reduced form. Before you ask, I have no clue why they chose this representation method, but some have.

A 6202-ZZ-10: One manufacturer lists as: Bore 15.875mm O.D. 35mm Width: 11mm.

When you convert 15.875 mm to inches it equals 0.625 inches. To re-confirm that .0625" equals 5/8", use a calculator and divide 5 by 8 and you confirm it equals .625 inches. Yes old school math works and you can do it by hand too.

Using the table you will find that Shopsmith sells this Quill bearing as mentioned above, and that it's also used in the Belt Sander. Many bearings are available from Shopsmith, and they will be happy to talk with you.

With that in mind, and the knowledge that the active links on the table pages that follow are simply a place to illustrate the various cross-references between equivalent bearings, and not an endorsement of a vendor's bearing, nor is it *by any means* intended to represent the best value one can find acquiring them, you are prepared.

I truly hope you find this document of value to you. If it has been, I am confident that my late friend and mentor Bill Mayo is smiling down on us today. His memory is what inspires me to complete this project.

You are now ready to use the table that follows.....

– Everett

Model	Description	SS No.	Cost	RB Tech	FAFNIR	Timken	NSK	VXB	SKF	NTN	NACHI	KOYO
Part Number Direct Links in Cells are to Illustrate the Part Number of an OEM or equivalent bearing, NOT that this is the least cost source to acquire them. Search for best value once you Measure yours.												
Quill Front Bearing												
10E & 10ER	Bearing Size 16 mm x 35 mm x 15 mm (2 Seals) C1 Precision				202KLL3							
Mark V & Mark 7	Bearing Size 17 mm x 40 mm x 12 mm (2 Seals)	513388	\$ 5.49	6203RS/C3	P203PP	6203-2RS-C3	6203 DDU C3	6203-2RS	6203 2RSJEM	6203LLUC3/EM	6203-2NSE	
Mark 5	Bearing Size 5/8 inch x 40 mm x 12 mm (2 Seals)	502962	\$ 5.99									
	Early Greenies, Goldies and Belt Sander											
MarkVII	Bearing Size 5/8 inch x 40 mm x 12 mm (2 Seals)	502962	\$ 5.99									
	JPG states some are 5/8" x 35mm x 11mm											
Quill Rear Bearing (2 Bearing Quills)												
10E & 10ER	Bearing Size 16 mm x 35 mm x 15 mm (2 Seals) C1 Precision				202KLL3				6203 2RSJEM			
Mark V & Mark 7	Bearing Size 17 mm x 35 mm x 10 mm (2 Shields) [Current]	51406201	\$ 6.56	6003Z/C3				6003-2Z			6003-2NKE	
	2nd Size											
	1st Size											
MarkVII	-											
Drive Sleeve Bearing - Outside												
10E & 10ER	Bearing Size 25 mm x 52 mm x 15 mm (2 Shields)				205KLL2				6205-2Z		6205ZZE	
Mark 5		501297	\$ 7.58									
Greenie / Goldie		-same-										
MarkVII	Bearing Size 25 mm x 52 mm x 15 mm (2 Shields)	-same-										
Mark V		-same-										
Mark 7		-same-										
Drive Sleeve Bearing - Inside												
10E & 10ER	Bearing Size 25 mm x 52 mm x 15 mm (2 Shields)				205KLL2				6205-2Z		6205ZZE	
Mark 5		501297	\$ 7.58									
Greenie / Goldie		-same-										
MarkVII		-same-										
Mark V		-same-										
Mark 7		-same-										
Idler Shaft Assembly- Original												

Model	Description	SS No.	Cost	RB Tech	FAFNIR	Timken	NSK	VXB	SKF	NTN	NACHI	KOYO
10E & 10ER	not present	-										
Mark 5	Older Water Pump Style requires non-split Eccentric	-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Greenie / Goldie		-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MarkVII	Special Shaft Assembly	501020	\$ 5.94	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mark V		-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mark 7		-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Idler Shaft Assembly- New Style												
10E & 10ER	not present	-										
Mark 5	New Style Idler requires new Eccentric with split	522741	\$ 43.99	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Greenie / Goldie		-same-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MarkVII	Special Shaft Assembly - only Mark VII	501020	\$ 5.94	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mark V		-same-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mark 7				n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Speed Control Mechanisms												
10E & 10ER	- add-on accessory -	-										
Mark 5	Control Sheave	-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Greenie / Goldie	Control Sheave with hardware (110-112) 505-510-520	515556	\$ 56.65									
MarkVII	Custom Control Sheave	-										
Mark V	Control Sheave	-same-										
Mark 7	DVR Variable Speed Motor											
		-										
Sheave Bearing	Bearing Size 5 mm x 19 mm x 6 mm (Double Shield) (VERIFY)				35KDD	635-ZZ	635 ZZ C3	635 ZZ C3	635-ZZ	635ZZ		635ZZ
	You must adapt a staking mounting procedure if you choose this											
Upper Wheel Assembly												
Bandsaw	Wheel Assembly Including GB-88 Needle Bearing	502691	\$ 118.30					-				-
GB88	Bearing Size 0.5000 in x 0.6875 in x 0.5000 in (Open Ends)	-										NRB GB 88
Lower Wheel and Shaft Assembly												
	Bandsaw Lower Wheel Assembly	509032	\$ 112.56	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bandsaw Bearings for Blade												

Model	Description	SS No.	Cost	RB Tech	FAFNIR	Timken	NSK	VXB	SKF	NTN	NACHI	KOYO
	Tension Bearings (2 ea.)	514011	\$ 5.93									
	Upper Back-up Bearing (1 ea.)	514007	\$ 13.89									
	Lower Back-up Bearing (1 ea.)	514007	\$ 13.89									
4" Belt Sander												
	Belt Sander Idler Drum Assembly	502934	\$ 110.97									
	Belt Sander Idler Drum Oilite Bushing - Have not found a source	-										
	Belt Sander Driver Drum Assembly	502789	\$ 112.36									
	Bearing Size 5/8 inch x 40 mm x 12 mm (2 Seals)	502962	\$ 5.99									
Strip Sander												
	Strip Sander Tracking Wheel & Shaft	516421	\$ 38.38									
	Strip Sander Idler Wheel	523099	\$ 16.28									
	Strip Sander Wheel & Bearing	515392	\$ 56.16									
Pro Planer and Mark Mounted Planer												
	Planer Cutter Head Assembly	516075	\$ 404.84									
	Bearing Size 17 mm x 40 mm x 12 mm (2 Seals)	513388	\$ 5.49	6203RS/C3	P203PP	6203-2RS-C3	6203 DDU C3	6203-2RS	6203 2RSJEM	6203LLUC3/EM		
	Planer Bearing Same as Quill Bearing on recent Quills											
	For those interested in learning more on Solid Oil Bearings											
	Fafnir 205KLL2 or SKF 6205-2Z with solid oil											
	6205-2RSH/C3W64											