MODEL SB1224
12" 3-JAW SCROLL CHUCK
Instruction Sheet

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Introduction

This chuck uses a direct-mount camlock system to attach to the spindle. Direct-mount chucks provide a number of advantages over chucks that require a back plate for mounting.

The main benefit is a larger maximum working area between the chuck jaws and tailstock. The increased space is created by the absence of a back plate between the chuck and spindle.

Another benefit is that direct-mount chucks require less initial setup time because the machinist is not required to machine a back plate to fit the chuck.

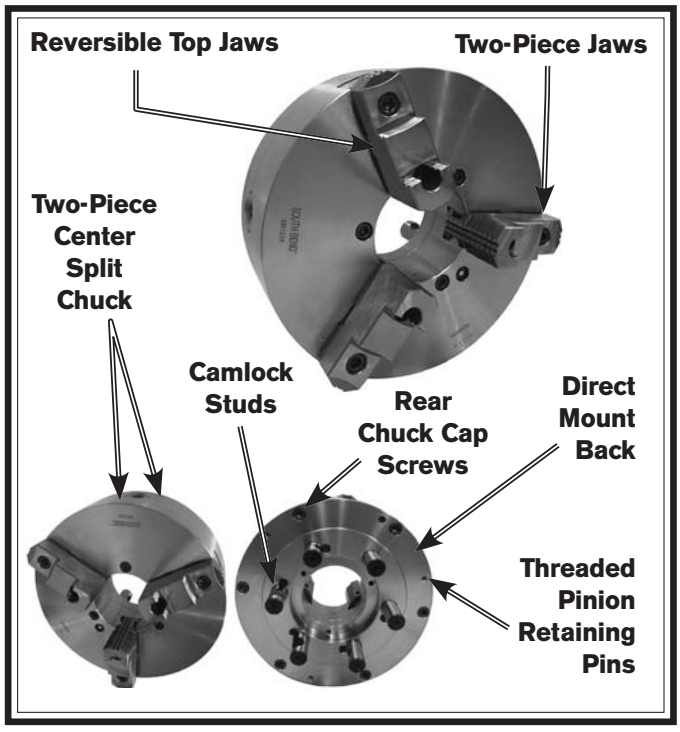
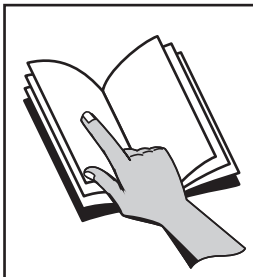


Figure 1. Main features of this chuck.



⚠WARNING

Incorrect use of this tool can result in death or serious injury. For your own safety, read and understand this entire document before using.

Specifications

Mounting Type	Direct Mount D1-8 Camlock
Chuck Outer Diameter	12.2" (310mm)
Chuck Bore Diameter	4.05" (103mm)
OD Clamping Range	0.12"–4.65" (15–300mm)
ID Clamping Range	1.78"–4.61" (90–290mm)
Static Clamping Force	9890 lbs
Maximum Chuck Key Torque	137 ft/lbs
*Maximum Speed	1800 RPM
Chuck Jaw M12 Cap Screw Torque	78.8 ft/lbs
Rear Chuck M12 Cap Screw Torque	78.8 ft/lbs
Chuck Weight	105 lbs
Country of Origin	Taiwan

* Even if a tailstock and steady rest are used, the maximum speed rating may not be SAFELY reached with certain workpieces. The workpiece must be balanced and appropriately sized for the chuck and lathe, and the chuck must be properly maintained to achieve maximum clamping force. As spindle speeds increase, centrifugal force also increases. If centrifugal force becomes too great, the workpiece can be thrown from the chuck with deadly force. Always use good judgment with each setup!

Chuck Safety

Trained Operators Only. Using a chuck incorrectly can result in workpieces coming loose at high speeds and striking the operator or bystanders with deadly force. To reduce the risk of this hazard, read and understand this document and seek additional training from an experienced chuck user before using this chuck.

Using Correct Equipment. Many workpieces can only be safely turned in a lathe if additional support equipment, such as a tailstock or steady rest, is used. If the operation is too hazardous to be completed with the lathe or existing equipment, the operator must have enough experience to know when to use a different machine or find a safer way.

Disconnect Power. Serious entanglement or impact injuries could occur if the lathe is started while you are adjusting, servicing, or installing the chuck. Always disconnect the lathe from power before performing these procedures.

Handling Chucks. Chucks are heavy and awkward to hold, especially if they are oily. A dropped chuck can result in amputation or crushing injuries and equipment damage. Always use some kind of chuck cradle, protective device, or lifting assistance when installing and removing chucks.

Chuck Key Safety. A chuck key left in the chuck can become a dangerous projectile when the lathe is started. Always remove the chuck key after using it. Develop a habit of not taking your hand off of a chuck key unless it is removed from the chuck.

Proper Maintenance. All chucks must be properly maintained and lubricated to achieve maximum clamping force and withstand the rigors of centrifugal force. To reduce the risk of a thrown workpiece, follow all maintenance intervals and instructions in this document.

Speed Rates. Fast spindle speeds increase the centrifugal force on the chuck and workpiece. Excessive centrifugal force can cause the chuck to lose its grip and throw a workpiece, or cause a chuck to break apart with deadly consequences. Use slow spindle speeds when ever possible, take all safety precautions, and double check the workpiece for proper clamping and support before starting the lathe.

Chuck Capacity. Avoid exceeding the capacity of the chuck by clamping an oversized workpiece. If the workpiece is too large to safely clamp with the chuck, use a faceplate or a larger chuck if possible. Otherwise, the workpiece could be thrown from the lathe during operation, resulting in serious impact injury or death.

Clamping Force. Inadequate clamping force can lead to the workpiece being thrown from the chuck and striking the operator or bystanders. Maximum clamping force is achieved when the chuck is properly maintained and lubricated, all jaws are fully engaged with the workpiece, and the maximum chuck clamping diameter is not exceeded.

Entanglement. Entanglement with a rotating chuck can lead to death, amputation, broken bones, or other serious injury. Never attempt to slow or stop the lathe chuck by hand, and always roll up long sleeves, tie back long hair, and remove any jewelry or loose apparel BEFORE operating.

Long Stock. Long stock can suddenly whip violently when the lathe is started, or without warning during lathe operations causing death or serious impact injury. Always use additional support with any workpiece that extends from the chuck or the end of the outboard spindle more than three times the workpiece diameter.

Camlock Stud Installation

This section provides information about how to install and adjust the camlock studs so the chuck properly mounts to the spindle.

Note: You can skip this section if the camlock studs are already installed.

To install the camlock studs:

1. Lightly oil the threads of each stud.

2. Thread the studs into the chuck until the datum line is flush with or just above the surface of the chuck, and the alignment groove is positioned over the hole.

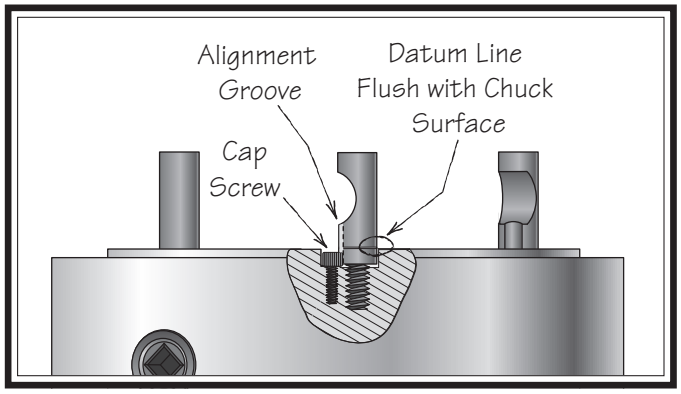


Figure 2. Camlock stud installation.

3. Install a cap screw in the hole next to each stud. These cap screws prevent the studs from rotating so they properly engage with the camlock during installation.

Note: It is normal for studs to have a small amount of play or looseness after installing and tightening the cap screws.

Chuck Installation & Removal Devices

⚠WARNING

A dropped chuck can cause amputation, serious crushing injuries, or property damage. Always use a lifting, support, or protective device to reduce this risk when installing or removing a chuck.

Because chucks are heavy and often awkward to hold, some kind of lifting, support, or protective device should be used during installation or removal. The weight and size of the chuck will determine the appropriate device to use (refer to the following figure for examples).

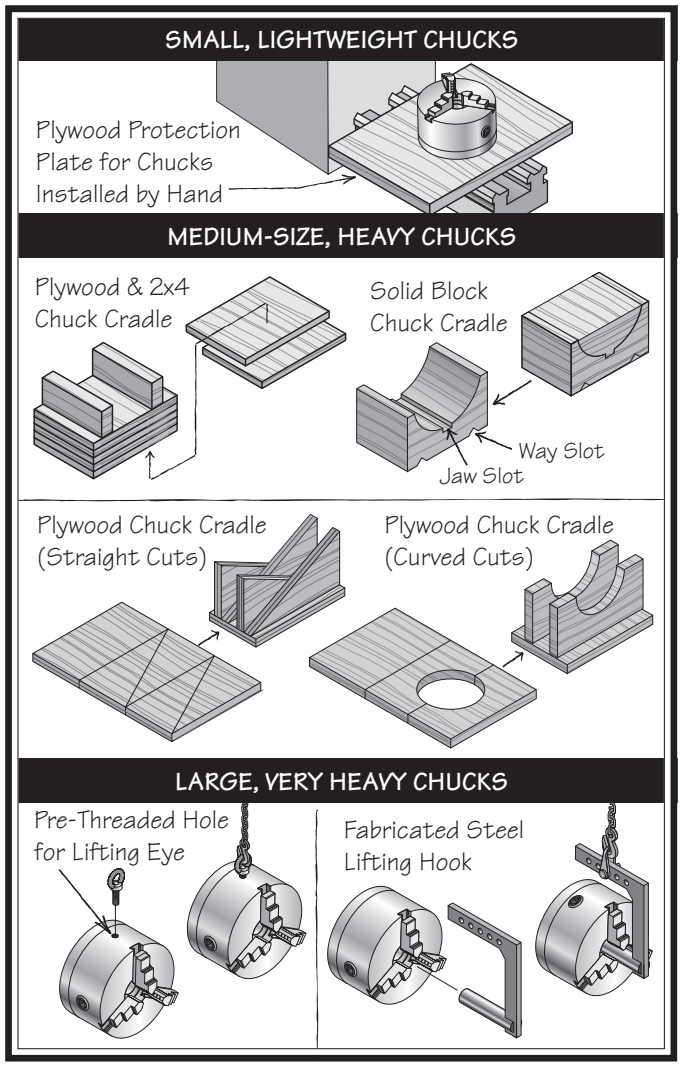


Figure 3. Examples of common devices used during chuck installation and removal.

Chuck Installation

To ensure accurate work, it is extremely important to make sure the spindle nose and chuck mating surfaces/tapers are clean. Even a small amount of lint or debris can affect accuracy.

The chuck is properly installed when all camlocks are tight, the spindle and chuck tapers firmly lock together, and the back of chuck is firmly seated against the face of the spindle all the way around—without any gaps.

To install the chuck:

1. DISCONNECT LATHE FROM POWER!

2. Use an appropriate lifting, support, or protective device to protect the ways and support the chuck.

3. Clean and lightly oil the camlock studs, then thoroughly clean the mating surfaces of the spindle and chuck.

4. Install the chuck by inserting the camlock studs straight into the spindle cam holes.

Important: Avoid inserting the studs by pivoting them in from an angle or rotating the spindle. This can damage studs or bores.

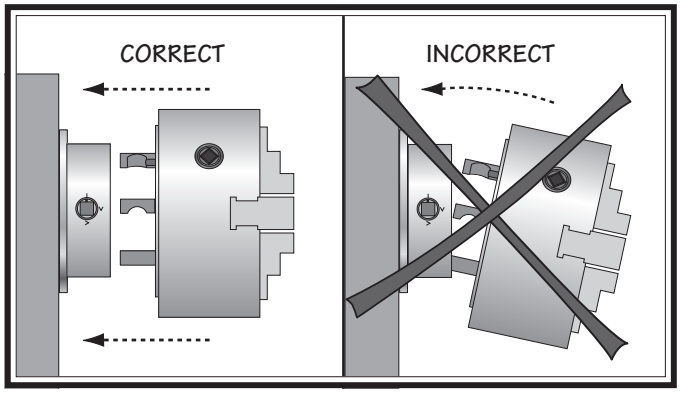


Figure 4. Inserting camlock studs into spindle bores.

5. Incrementally tighten the camlocks in a criss-cross or star pattern to ensure that the chuck seats evenly against the spindle.

6. When the chuck is fully seated and all the camlocks are tight, verify that the cam line is between the two "V" marks on the spindle nose, as shown in the following figure.

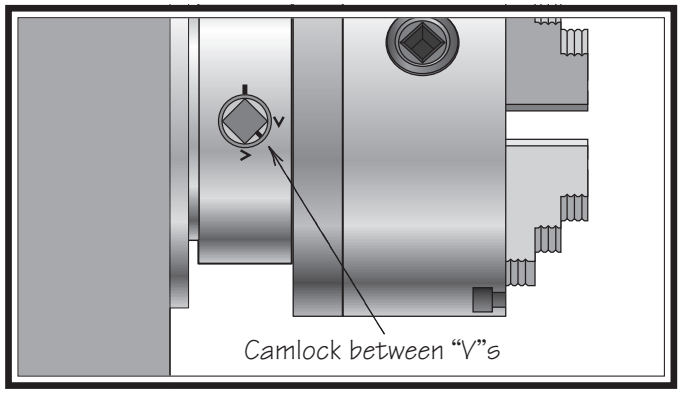


Figure 5. Cam line positioned between the "V" marks after the camlocks are fully tightened.

— If the cam line is NOT between the "V" marks when the camlock is tight, the stud may be installed at the incorrect height. To fix this, adjust the stud height as shown in the following figure. Make sure to re-install the stud cap screw afterward.

— If adjusting stud height does not correct the problem, try swapping stud positions on the chuck.

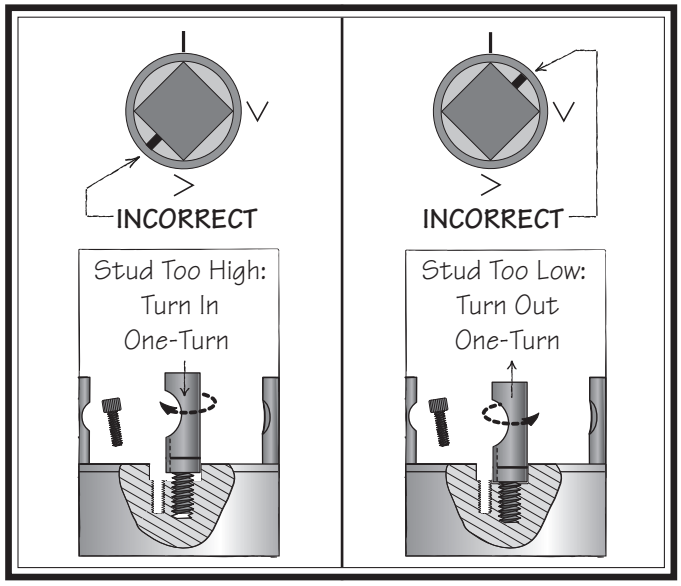


Figure 6. Correcting an improperly installed stud.

7. Verify that the chuck fits the spindle properly by checking for any gaps between the mating surfaces.

— If there are no gaps, proceed to **Step 9**.

— If there is a gap, remove the chuck, re-clean the mating surfaces carefully, and re-install. If the problem persists, refer to **Troubleshooting**.

8. Verify that the chuck/spindle tapers are seating firmly together by removing the chuck, per the **Chuck Removal** instructions, and paying close attention to how easily the tapers release.

— If it was necessary to bump the chuck or use a mallet to release the tapers, then they are seating together properly.

— If the tapers released easily with little intervention, they are not seating together firmly as required. Remove the chuck, re-clean the mating surfaces carefully, and re-install. If the problem persists, refer to **Troubleshooting**.

Registration Marks

Lightly stamp registration marks across the mating seams of chuck components. These marks will help you re-install the chuck in the same position after removal, which ensures consistent chuck balance and turning results, and allows the same camlocks and studs to operate together for consistent locking and unlocking.

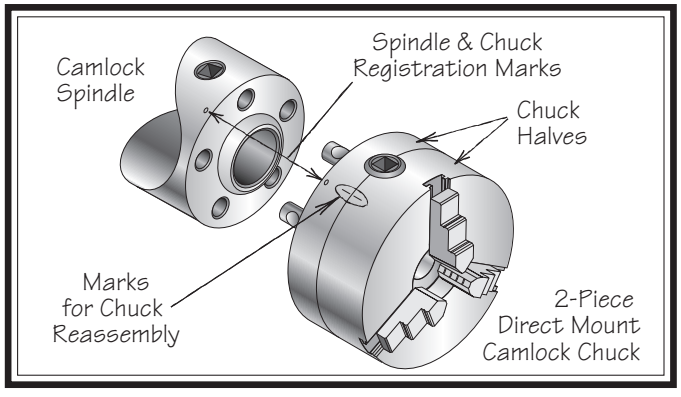


Figure 7. Registration mark locations.

Chuck Removal

To remove the chuck:

1. DISCONNECT LATHE FROM POWER!

2. Use an appropriate lifting, support, or protective device to protect the ways and support the chuck.

3. Loosen the camlocks by turning the key counterclockwise until the cam lines are aligned with the mark on the spindle nose.

Tip: Camlocks can become very tight. A cheater pipe may be used as a last resort to add leverage when loosening. After loosening, you may need to wiggle the chuck key in the camlock to fully disengage the stud.

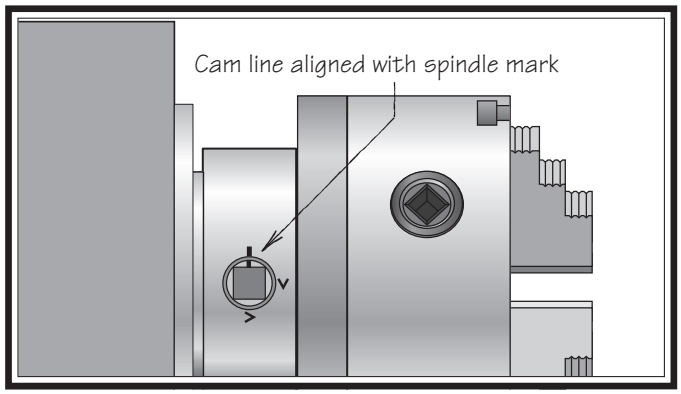


Figure 8. Camlock is fully loosened when the cam line is aligned with the spindle mark.

4. Using a dead blow hammer or other soft mallet, lightly tap around the outer circumference of the chuck body to loosen it from the spindle.

5. Remove the chuck from the spindle, using a light rocking motion to carefully slide the studs out of the bores.

— If the chuck does not immediately come off, rotate it approximately 60° and tap it again. Make sure all the marks on the cams and spindle are in proper alignment for removal.

Scroll Chuck Clamping

This scroll-type chuck has an internal scroll-gear that moves all jaws in unison when adjusted with the chuck key. This chuck will hold cylindrical parts on-center with the axis of spindle rotation and can be rotated at high speeds if the workpiece is properly clamped and balanced.

Never mix jaw types or positions to accommodate an odd-shaped workpiece. The chuck will spin out of balance and may throw the workpiece! Instead, use an independent jaw chuck or a faceplate.

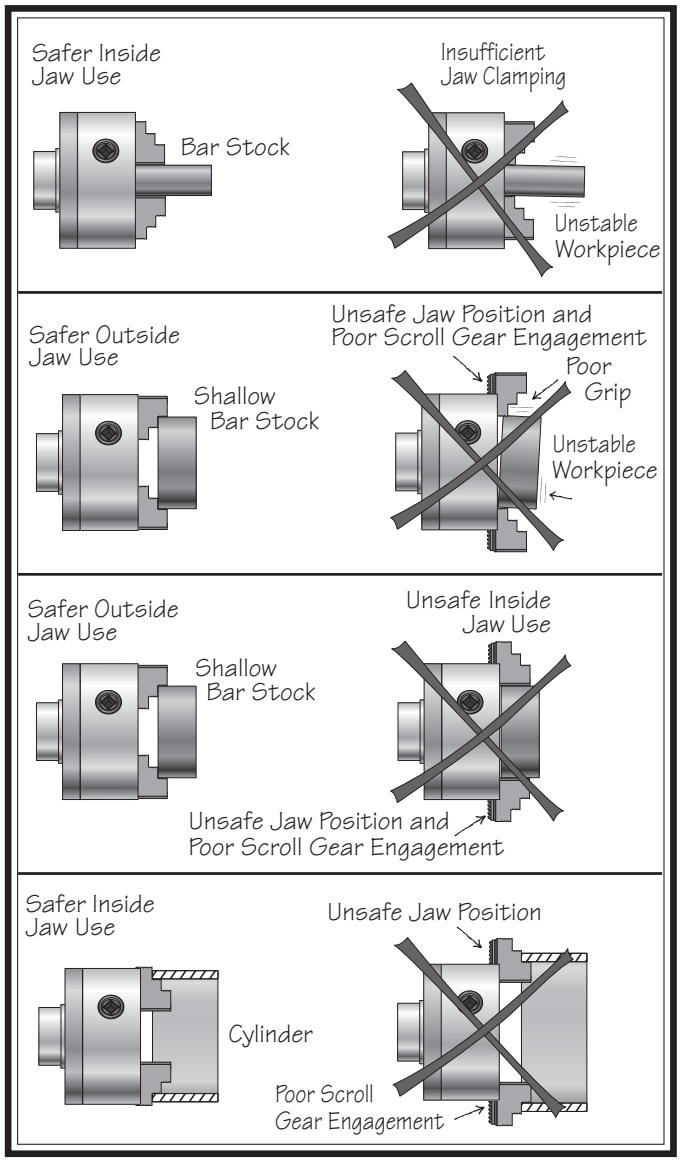


Figure 9. Jaw selection and workpiece holding.

Chuck Jaw Reversal

This chuck has 2-piece jaws that consist of a top jaw and a master jaw. The top jaw can be removed, rotated 180°, and re-installed in the reverse position for additional work-holding options. When reversing the top jaws, always keep them matched with their original master jaw to ensure the best fit.

To reverse 2-piece jaws:

1. DISCONNECT MACHINE FROM POWER!
2. Remove the cap screws that secure the top jaw to the master (bottom) jaw.
3. Remove the top jaw, rotate it 180°, then re-install it with the longest cap screw in the tallest portion of the jaw.
4. Repeat **Steps 2–3** with each remaining jaw (we recommend only reversing one jaw at a time to keep all original parts together).

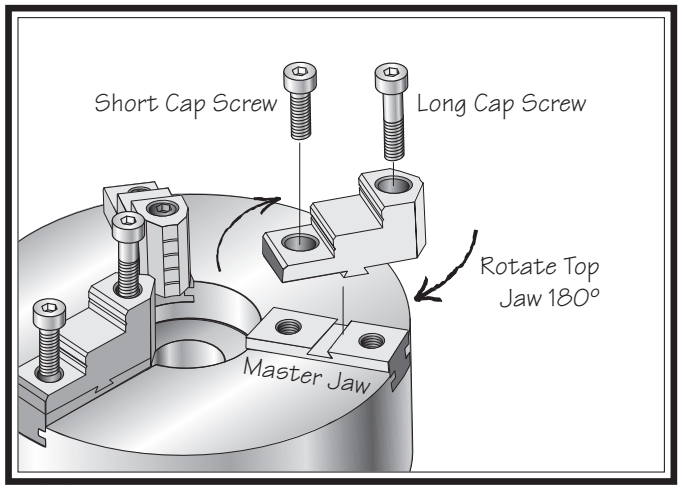


Figure 10. Reversing the chuck jaws.

⚠WARNING

Remove all tools before turning lathe ON. Thrown tools can cause serious injury or death to operator or bystanders.

Maintenance

A chuck can only achieve its maximum clamping force when its internal components are clean and well lubricated.

During operation, centrifugal force displaces and thins the lubricant inside the chuck, forcing it out over time. If the chuck is exposed to cutting fluid, this process happens even faster. If maintenance is not followed daily, the chuck will lose its internal lubrication and collect cutting fluid sludge, rust, and metal chips—which can cut the maximum chuck clamping force in half!

A chuck with reduced clamping force has a much higher risk of losing its grip during operation and throwing the workpiece with deadly force.

Daily Maintenance

- Check/correct loose mounting bolts.
- Use a vacuum, rag, or brush to clean the chuck after use.
- Wipe down the outside of the chuck with a light machine oil or way oil.

Regular Lubrication

Recommended Lubricant

Chuck Grease ..... Bison #7-799-025
(or Equiv. Moly-Disulphide Chuck Grease)
Oil ..... South Bend Way Oil #SB1365

Lubricate the scroll thread and jaw slides regularly, using either chuck grease or way oil. To lubricate, remove and clean the jaws, clean chips off the scroll gear if necessary, then re-install the jaws and apply lubricant to the scroll gear and jaw sliding surfaces. Move the jaws in and out to distribute the lubricant.

Chuck grease provides superior lubrication and clamping force; its drawback is that chips easily stick to it and get drawn into the chuck, leading to binding and reduced clamping force.

Way oil is a good alternative lubricant to reduce the amount of chips that stick to the chuck; its drawback is a reduction of clamping force, making it a poor choice for heavy clamping loads.

Chuck Service

Proper chuck service requires full disassembly, cleaning, and lubrication. Perform this service every six months, or more frequently if the chuck is exposed to dirty work environments, heavy workloads, or cutting fluid.

To avoid damage when servicing the chuck:

- Only clamp chuck parts in a vise equipped with soft jaws or wood/aluminum blocks.
- Never use an open flame on chuck parts!
- Never strike the chuck with a steel hammer. Instead use a brass hammer or soft mallet.
- Never apply force to stuck components if you are unsure about how they are fastened together. Refer to the instructions.
- When separating or removing mated components, do not attempt to pry or wedge them apart. Instead, patiently tap them at various locations with a brass hammer or mallet while rotating and pulling on them.
- If the scroll gear or retainer is stuck, soak parts in penetrating oil or solvent (overnight if needed) to break down grease suction, then carefully rotate, lift, and tap it loose.

Items Needed	Qty
Hex Wrench Set (Metric)	1
High Resolution Caliper 8"	1
Crocus Cloth & Wire Brush	1 Ea
Diamond Hone or Dressing Stones	Various
Files & Thread Chasing Tools	Various
Mineral Spirits and Cotton Rags	As Required
Calibrated Torque Wrench	1
Stiff 1" Brush for Applying Grease	1
Oil ..... South Bend Way Oil #SB1365	
Chuck Grease ..... Bison #7-799-025 (or Equiv. Moly-Disulphide Chuck Grease)	

Disassembly

1. Verify that registration marks have been made on the chuck and spindle. (Refer to **Registration Marks** section for details.)

2. Inspect the jaws and their slots to make sure they have matching numbers or marks. If none are found, stamp or scribe your own before continuing. (During re-assembly, jaws must be installed in the same slots.)

3. Use the chuck key to back out and remove the chuck jaws.

4. Unthread all chuck fasteners and separate the chuck halves, then remove the remaining chuck components to completely disassemble the chuck (see below).

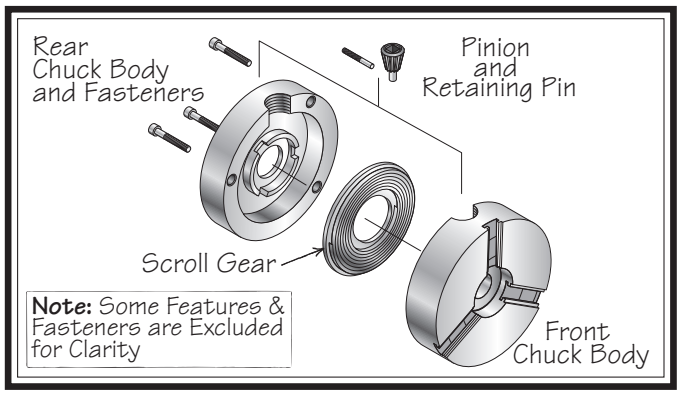


Figure 11. Chuck components.

Cleaning

When cleaning chuck components, make sure to remove all grease, sludge, and metal particles using a brush and clear-type mineral spirits or standard paint thinner. Avoid using white-colored mineral spirits, acetone, brake parts cleaner, gasoline, or acids. If an incorrect solvent is used, stains, additives, acids, or contaminants can be left behind as a corrosive coating. After cleaning and drying parts, be sure to wipe down parts with an oiled rag to prevent rust.

Light rust can be removed in a blast cabinet with soda blasting media. For heavy rust, have the chuck components "hot tanked" at a local automotive machine shop (remove all non-ferrous items first or they may dissolve).

Inspection & Dressing

Inspect all components carefully for burrs, wear, scoring, bent parts, cracks, and thread damage.

Carefully inspect the chuck jaw clamping surface for tapered wear from front to back. For minor wear, jaw regrinding may be more economical than jaw replacement. If the taper is heavy, or grip, or work holding accuracy is a problem, chuck replacement is likely required.

Burrs, dings, flakes, high spots, or galled surfaces can usually be removed by lightly dressing them away with diamond lapping boards or honing stones with lapping oil. Be sure not to change part dimensions while dressing surfaces. Thread damage can usually be corrected with files and thread chasing tools.

If any parts are overly worn, bent, cracked, or otherwise damaged, they must be replaced (if available). Never attempt to repair chuck components by welding them. If damaged parts are unavailable, replace the chuck. Continuing to use a chuck with damaged components will increase the risk of accidental death or serious injury. Do not risk it!

If replacing fasteners, make sure to use the same hardness or grade as the original fasteners that were installed on the chuck.

Reassembly

Brush all internal chuck components with a generous coat of chuck grease, but do not pack the chuck full of grease. Re-assemble components in the reverse order of disassembly. Make sure to follow the **Chuck Jaw Installation** instructions to ensure that the jaws are installed correctly.

Make sure you only use approved chuck lubricants. Some lubricants can stain your chuck or have unintended reactions with cutting fluid, which will destroy their ability to properly lubricate the chuck.

To avoid stripping threads or cracking a casting, never use fasteners to draw components together and avoid using impact tools. Instead, be patient and properly seat the mating parts, then use hand tools and a recently calibrated torque wrench to tighten fasteners.

Chuck Jaw Installation

When installing the jaws on a scroll chuck, it is important to make sure they are installed correctly. Incorrect installation will result in jaws that do not converge evenly and are unable to securely clamp a workpiece.

To install chuck jaws:

1. Rotate the chuck key clockwise until you see the tip of the scroll-gear lead thread just begin to enter jaw guide #1.

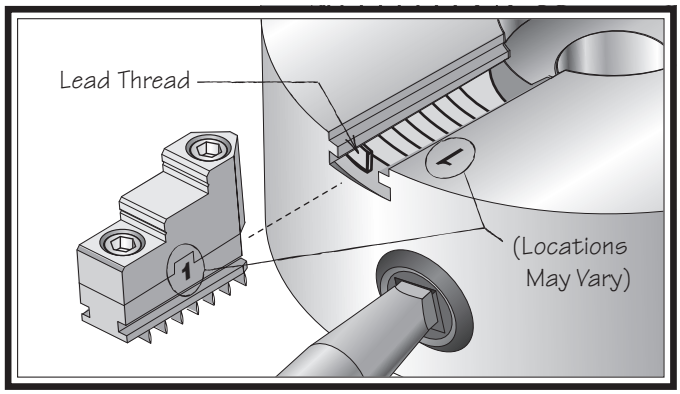


Figure 12. Installing jaw #1.

2. Insert jaw #1 into jaw guide #1, and hold the jaw against the scroll-gear.

3. Rotate the chuck key clockwise one turn to engage the tip of the scroll-gear lead thread into the jaw. Pull the jaw; it should be locked into the jaw guide.

4. Install the remaining jaws in numerical order, in the same manner.

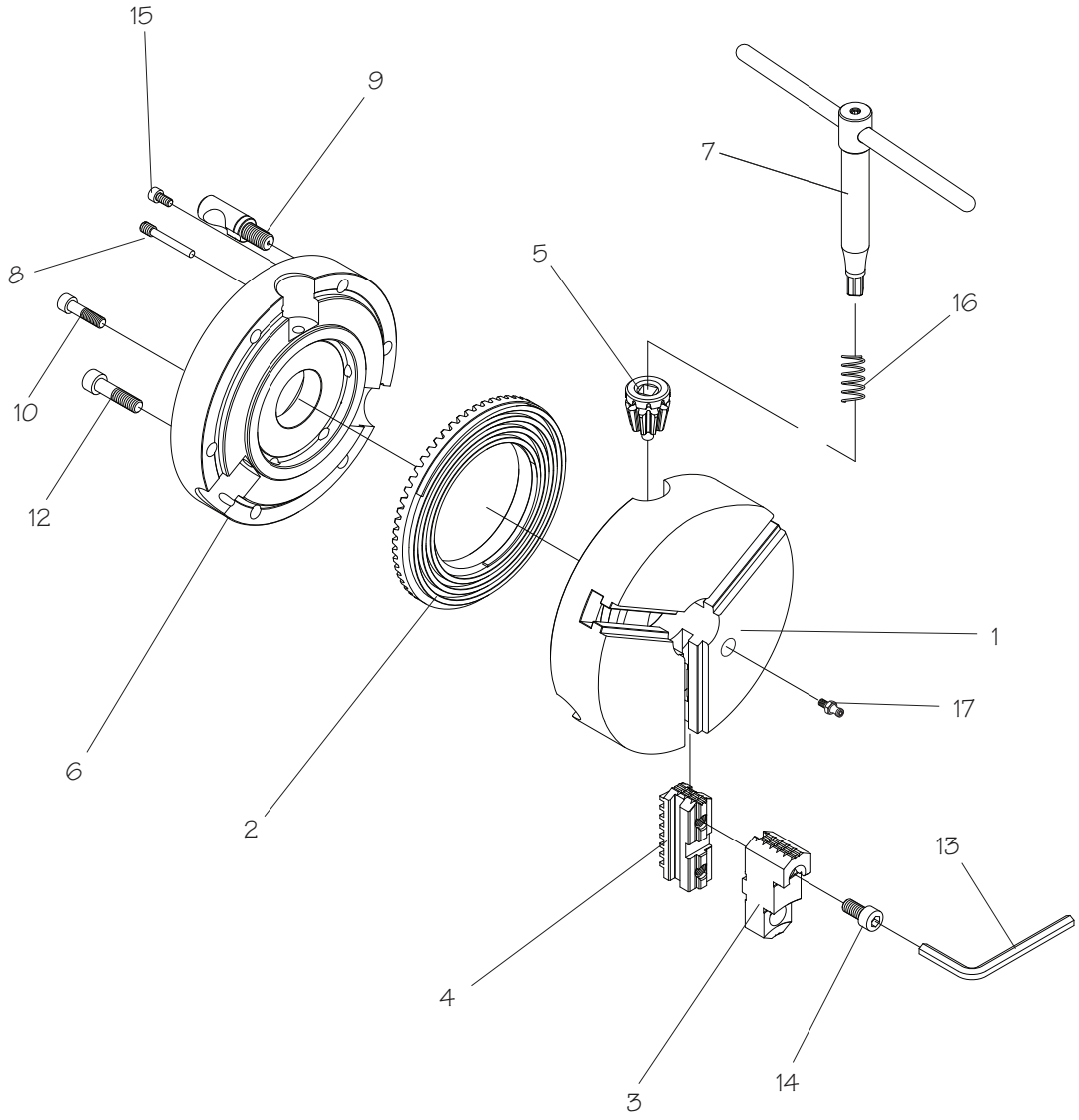
   — If installed correctly, the jaws will converge evenly at the center of the chuck.

   — If the jaws do not converge evenly, remove them. Make sure the numbers of the jaws and jaw guides match, then re-install the jaws and make sure each one engages with the scroll-gear lead thread during its first rotation.

Troubleshooting

Symptom	Possible Cause	Possible Solution
The chuck key is hard to turn, or it binds at some jaw locations.	**1.** Jaws poorly positioned.	**1.** Re-install jaws in correct order and position.
	2. Lack of lubrication; rust, burrs, metal chips, or contaminants inside chuck.	**2.** Disassemble, de-burr, clean, and re-lubricate chuck with chuck grease.
	3. Jaw guides, scroll gear, or pinion distorted, worn, or broken.	**3.** Replace damaged parts, or replace chuck.
Chuck mounts or seats incorrectly; gap exists between chuck and spindle; chuck vibrates during operation without a workpiece installed.	**1.** Chuck is loose or cocked on spindle; gap between spindle/chuck mating.	**1.** Remove chuck then clean and dress all mating surfaces of spindle & chuck.
	2. Chuck is too large for lathe.	**2.** Install smaller lathe chuck so spindle and bearings will not become overloaded and vibrate.
	3. Lathe spindle is loose.	**3.** Check and adjust lathe spindle end-play and bearing preload.
	4. Camlock studs are at fault.	**4.** Remove chuck and inspect/adjust/replace camlock studs for wear or damage as required. Re-install chuck with registration marks aligned.
	5. Lathe spindle is loose.	**5.** Check and adjust lathe spindle end-play and bearing preload. Adjust as required.
	6. Poor chuck/spindle taper fit causes radial or axil runout from chuck shifting when camlocks are tightened.	**6.** Isolate component at fault by installing a different chuck. If problem persists, lathe spindle may be at fault. If problem goes away, chuck may be at fault.
	7. Chuck is distorted or cracked.	**7.** Replace chuck.
Workpiece has runout; clamping accuracy or repeatability is poor; turning results are poor.	**1.** Workpiece is too long for jaw clamping only.	**1.** Use tailstock, rests, and outboard spindle support; use slower spindle speeds.
	2. Workpiece is improperly clamped or is misaligned.	**2.** Remove jaws, then clean, de-burr, and re-install.
	3. Jaws are positioned in the wrong jaw guides.	**3.** Re-install jaws in their correct guides.
	4. Top jaws are loose or improperly seated in their master jaws.	**4.** Remove jaws, clean jaw teeth and guides, then re-install jaws using the correct torque for fasteners.
	5. Chuck is loose; mounting is off center or improperly seated.	**5.** Refer to troubleshooting for chuck mounting incorrectly.
	6. Lathe spindle, tailstock, or cross slide is misaligned with lathe bed.	**6.** Align lathe components.
	7. Lathe bed is twisted.	**7.** Place shims under lathe to level bed ways.
The workpiece slips in the jaws.	**1.** Workpiece requires additional support in addition to chuck jaws.	**1.** Use tailstock, rests, and outboard spindle support. Use slower spindle speed.
	2. Incorrect jaw or workpiece clamping position.	**2.** Re-position jaws and workpiece for maximum scroll gear and jaw engagement. Verify that workpiece is not too large or heavy for chuck.
	3. Two-piece jaw is loose; top jaw improperly seated in master jaw.	**3.** Remove jaws, clean mounting surfaces, and re-install with the correct cap screw torque.
	4. Insufficient pinion and scroll gear torque.	**4.** Lubricate chuck, and re-tighten the chuck key.
	5. Jaws or jaw screws bind before full clamping force is achieved.	**5.** Service the chuck as described in this document.
	6. Cutting overload.	**6.** Reduce cutting depth or feed rate.
	7. Jaw teeth worn; 2-piece jaw is loose.	**7.** Have jaws reground, replace jaws, or replace chuck.

Parts Breakdown



REF	PART #	DESCRIPTION
1	PSB1224001	FRONT CHUCK BODY
2	PSB1224002	SCROLL GEAR
3	PSB1224003	TOP JAW
4	PSB1224004	MASTER JAW
5	PSB1224005	PINION GEAR
6	PSB1224006	REAR CHUCK BODY
7	PSB1224007	CHUCK WRENCH
8	PSB1224008	PINION RETAINING PIN

REF	PART #	DESCRIPTION
9	PCAP171M	CAMLOCK STUD
10	PCAP65M	CAP SCREW M10-1.5 X 70
12	PCAP73M	CAP SCREW M12-1.75 X 50
13	PAW10M	HEX WRENCH 10MM
14	PCAP36M	CAP SCREW M12-1.75 X 25
15	PCAP155M	CAP SCREW M8-1.25 X 14
16	PSB1224016	COMPRESSION SPRING
17	PSB1224017	GREASE FITTING

Please Note: *We included this parts breakdown for service purposes only. Since many of the parts shown are machined to each individual chuck, they may not be available as replacement items.*

Other Great Items from South Bend

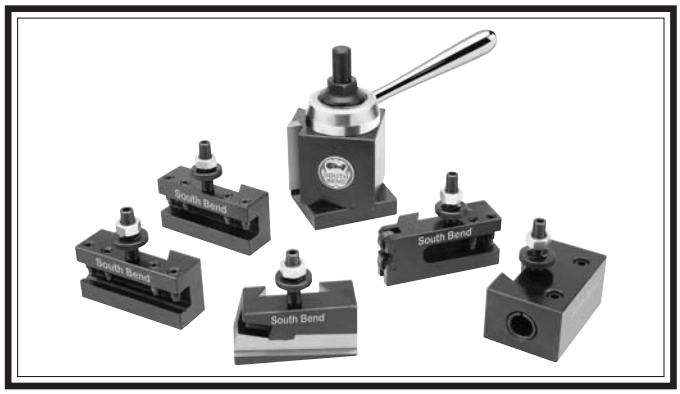
Quick Change Tool Post Sets

SB1405 Set 1 for 9" - 12" Swing Lathe
SB1406 Set 2 for 10" - 110" Swing Lathe
SB1407 Set 3 for 13" - 18" Swing Lathe
SB1408 Set 4 for 14" - 20" Swing Lathe

These are probably the smoothest and hardest locking tool posts on the market today. Wedge-locking design prevents tool holder from shifting during the heaviest of cuts. The unique and ergonomic locking handle was designed by South Bend engineers to prevent fatigue during frequent tool changes.

Set Includes:

- Turning Tool Holder
- Turing/Boring Holder
- Boring Bar Holder
- Parting Blade Holder
- Knurl/Facing Holder
- Tool Post w/ T-nut

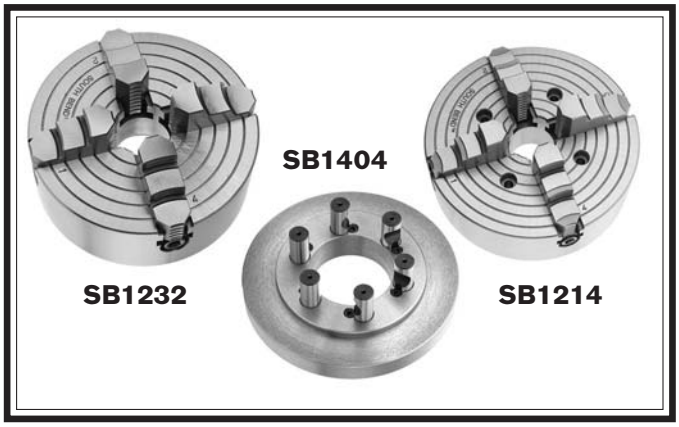


Way Oil

SB1365 Way Oil (12 oz)
Engineered for the high pressure exerted on horizontal or vertical ways and slides. Protects against rust and corrosion. Ensures stick-free, smooth motion which maximizes finishes and extends the life of your machine. Won't gum up! 12 oz. AMGA#2 (ISO 68 Equivalent)

4-Jaw Independent Chucks

SB1232—14" 4-Jaw Independent Direct Mount D1-8 Chuck
SB1214—12" 4-Jaw Independent Plain Back Chuck
SB1404—12½" Backplate D1-8 (for SB1214)
South Bend chucks are made for high precision work with tight tolerances to satisfy the most demanding machinists out there! Constructed of fine grain cast iron with a super finish.



South Bend Shop Clocks

SB1298—SBL Bench Lathe Shop Clock
SB1299—SBL Toolroom Lathe Shop Clock
SB1300—SBL Lathe with Man
These fine traditional shop clocks are constructed with a metal antique-finished frame. They are easy to read from a distance and measure 14" in diameter. Pictures just don't do them justice. They are very nice quality clocks and perfect for the South Bend Lathe aficionado.