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Don't be intimidated by the large number of accessories we offer. Many are very specialized and will only be needed by a small percentage of our customers. We suggest you buy only what you need, when you have a job where it is needed. We ship orders within 48 hours of receipt, so you can always get what you need quickly. It's good to know that no matter what machining job you may decide to tackle in the future, the proper Sherline accessory is available to make that job easier and more fun.

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SHERLINE IS ON THE INTERNET

For the most up-to-date information, visit Sherline's home page on the Internet. It includes information on tools, accessories, new products, price and dealer lists plus links to items of interest for machinists. Our address is:

www.sherline.com

Sherline's owner, Joe Martin is seen here with the Model 5400 deluxe mill and the Model 4400A lathe. He has spent his life building things, from his youth in the building trades to becoming a self-taught machinist and mold maker. He has also worked in the radio control manufacturing industry and builds and operates his own R/C boats, helicopters and high performance aircraft. He is a founder of the sport of R/C Formula 1 aircraft flying and one of its early champions in competition. His attraction to competition plus his love for building and operating high performance equipment extends to racing a Formula Ford in SCCA events and a 1974 Spyder IndyCar in vintage racing events.

Joe has put his experience in working with tools and building things that really perform into the design and construction of Sherline tools. They are built to last and offer accurate, repeatable performance at a very reasonable cost.



WHY SHERLINE TOOLS ARE RIGHT FOR YOU

At Sherline, our goal has been to produce a high quality line of miniature machine tools at a price that offers the customer a great value. Accuracy and versatility have been prime requirements in the design process. As a result, we have been gratified to find that almost half our sales have been to technicians and industrial customers who adapt our machines to production line use to make a tremendous variety of small parts. This attests to the accuracy, adaptability and dependability of Sherline tools.

In 1972, the first Sherline lathe, along with several new accessories, was completely produced and marketed in the United States. In 1975, the Sherline vertical milling machine was totally designed and manufactured at our San Marcos facility. Since then, Sherline has devoted itself to providing versatile, quality products by using the latest manufacturing and engineering techniques. State-of-the-art computer-controlled equipment allows us to produce tools that are of higher quality and more accurate, while at the same time allowing us to keep production costs down, making Sherline tools an even better buy for the machinists and technicians who use them. A laser engraving machine now precisely engraves scales, providing greater utility and a higher quality look. It is also an example of one more job done "in-house" to both maximize quality and reduce costs. In fact, over forty major machine tools—an investment of over a million dollars—are used to produce all Sherline's machined parts.

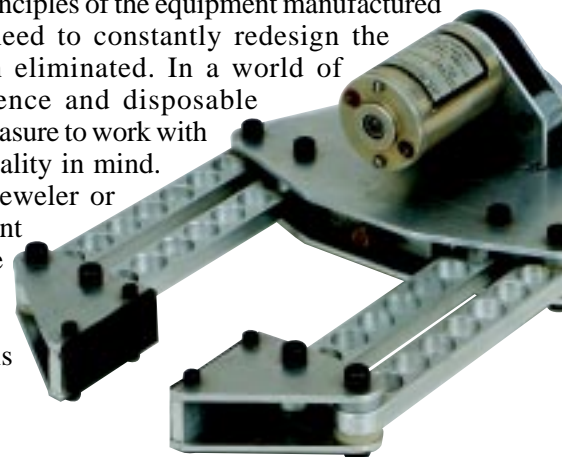
As Sherline tools enter their third decade of production, we take pride in certain benchmarks of progress. What began as an imported machine is now made entirely in the U.S.A. In addition, Sherline tools are now exported throughout the world. This is the sixth printing of our color

catalog, which has continued to grow as new products are continually introduced to the line. Attesting to the good basic design of the machine is the fact that accessories can work just as well on Sherline tools made twenty years ago or today. Sherline has the most complete line of miniature machine tools and accessories available. We will continue to expand that line with the introduction of new accessories each year.

Another feature that sets Sherline apart is our complete, well-written and illustrated instructions. We are able to pass on this valuable knowledge to our customers because the people who design and build Sherline tools use them themselves and understand your needs. Sherline's engineering staff has an extensive background not only as machinists, but also as modelers. The owner, Joe Martin, is both an experienced toolmaker and has also been involved for many years in competitive radio-controlled aircraft modeling.

With the sophistication of manufacturing techniques plus the sound design principles of the equipment manufactured by Sherline, the need to constantly redesign the products has been eliminated. In a world of planned obsolescence and disposable everything, it's a pleasure to work with a tool built with quality in mind.

If, as a hobbyist, jeweler or technician, you want or need to produce your own accurate, small, machined parts, Sherline tools are right for you!



PROJECTS BUILT BY SHERLINE MACHINISTS...



CO₂ powered race car • Scotty Hewitt, Van Nuys, CA

This brightly colored 5.5" long 1930's style racer won first place in the 1997 Sherline Machinist's Challenge in Detroit.



**Dual-flywheel, oscillating steam engine
Jerry Kieffer, DeForest, WI**

This engine weighs just 3.5 grains. Bore: .029", Stroke: .032". Jerry also made the finger-jointed wood box.



Miniature masterpieces show what can be done when you have the right tools

Throughout this catalog we talk about the accuracy, capability and versatility of Sherline tools. While those things are important, we added these pages to the catalog so you could see some of the projects that people have built using Sherline equipment. This, after all, is the ultimate test of the value of any machine...the results it can produce. On these pages and spread throughout the catalog are some fine examples of the type of precision work that can be accomplished when you have the right tools and the skill to use them properly.

We invite you to send in photos of your Sherline projects for our showroom scrapbook and for future catalog issues. These projects speak more eloquently about what you can accomplish with Sherline tools than any list of technical specifications could ever do. The people who made them are, for the most part, not professional machinists. They have all kinds of jobs and all kinds of interests. What they share is a creative spirit, a willingness to take the time to do the job right and Sherline tools.

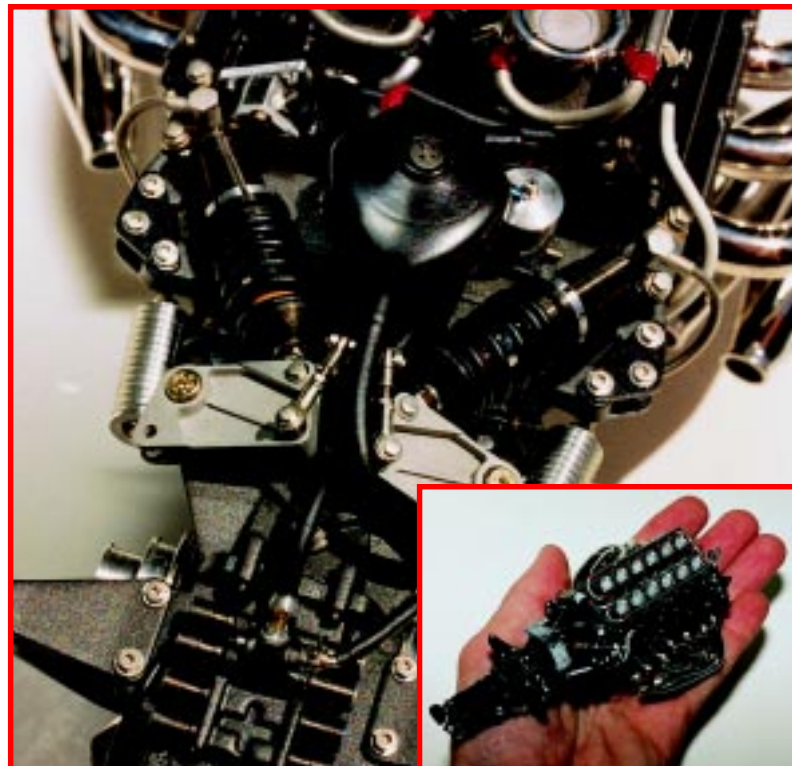
Although we have chosen to show projects built by hobbyists, it is a fact that a sizable proportion of our customers use their tools for industrial jobs. The projects we have shown are colorful and fun to look at, but remember that Sherline tools are also making parts in the industrial world day in and day out.

"Grasshopper" steam engine • Jerry Kieffer, DeForest, WI

The lady's wristwatch in the foreground shows how small this engine really is. Despite its size, it is loaded with scale detail.

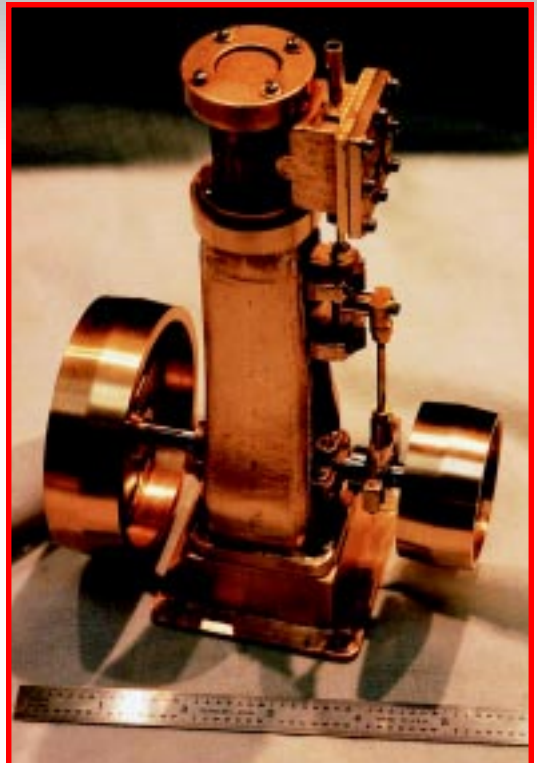
1/12 scale Ferrari Formula 1 engine • Bob Breslauer, Coral Gables, FL

Models like this V-12 engine took Bob's hobby and turned it into a career. He is now a professional modelmaker for a museum. The non-running engine contains about 1500 parts.

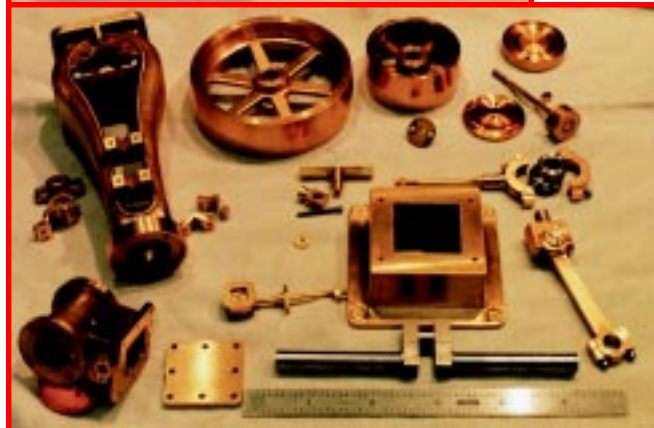




Model marine exhaust, drive and rudder • Don Martin, Sacramento, CA
These model drag boat parts are both functional and good looking



**1/6 Harley cylinders
 Jerry Kieffer, WI**
Harley Davidson owners will recognize these as cylinders for a model of a 1947 "knucklehead" motorcycle engine. The engine is now complete and Jerry is working on modeling the rest of the bike.



**"Coke bottle" steam engine
 Chuck Sherwood, Naperville, IL**
Chuck took on quite a challenge to build this steam engine from a bronze casting kit as his first machining project. The top photo shows the completed engine, and the second photo shows the unassembled individual components. A ruler is used for size reference.



**Railroad crane car
 Greg Conrad, WI**
Plenty of detail made this model train car a first place contest winner.

1/32 American LaFrance hotrod fire truck • Mike Foti, Hillsboro, OR
Mike's entry in the hotrod division of the 1999 Salt Lake City national model contest is made entirely from formed and soldered brass. Items like the wheels, gas tank, lights, bell and rail stanchions are turned on the lathe.



Custom brass wheel • Bob Breslauer
Bob designed a clever double rotary table fixture to machine these curved spokes.



SHERLINE

THE SMALL SOLUTION TO BIG PROBLEMS

Sherline tools are used throughout the world in industry, schools, labs and by the hobbyist...wherever there is a need for small, precision-machined parts. They are operated by engineers, scientists, technicians and model makers to produce prototype parts in metal, plastic and wood. Craftsmen should have no problem operating Sherline miniature machine tools, for they are designed to be operated by people with a "common sense" knowledge of mechanics. The skills of an experienced machinist are not required.

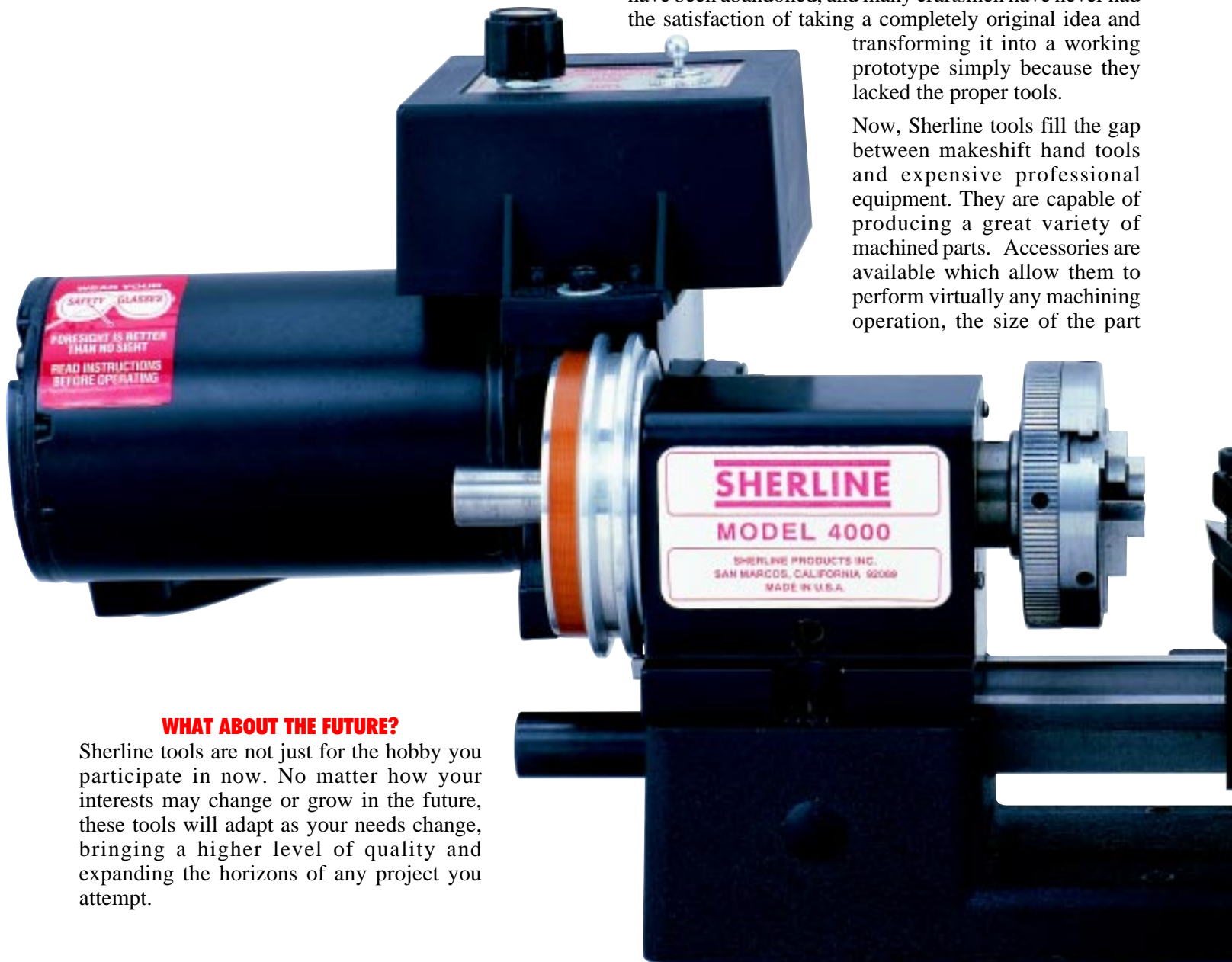
THE CRAFTSMAN'S ALTERNATIVES

Eventually every technician and hobbyist will find they need a part which cannot be purchased or built with ordinary hand or power tools. The choice has been either struggling with a hand drill and file or spending thousands of dollars on standard machine shop equipment. Projects have been abandoned, and many craftsmen have never had the satisfaction of taking a completely original idea and transforming it into a working prototype simply because they lacked the proper tools.

Now, Sherline tools fill the gap between makeshift hand tools and expensive professional equipment. They are capable of producing a great variety of machined parts. Accessories are available which allow them to perform virtually any machining operation, the size of the part

WHAT ABOUT THE FUTURE?

Sherline tools are not just for the hobby you participate in now. No matter how your interests may change or grow in the future, these tools will adapt as your needs change, bringing a higher level of quality and expanding the horizons of any project you attempt.



being the only limitation. Sherline's commitment to quality extends to our service department. Should the need arise, repair parts and/or service are top priority. You will experience a maximum of a two working day (in-house) turnaround time rather than weeks of waiting.

QUALITY...designed by a machinist and built from top quality material

Sherline equipment and accessories incorporate many features found only in the best production machines. For example, the lathe spindle and the milling machine spindle both utilize lifetime lubricated bearings with adjustable preload for maximum stiffness. With the exception of the electronic speed control's plastic housing and protective belt guards, all parts are metal, precision machined with instrument quality finishes on all working parts.

Both the lathe and milling machine feature fully dovetailed machine slides with adjustable gibs to give precise adjustment and maximum rigidity. Machining accuracy of one thousandth of an inch can be easily obtained. In fact, the handwheels are precisely laser engraved in graduations of .001 inch or .01mm on metric machines. The bases of both the lathe and the milling machine are made with mounting holes so that they can be permanently attached to a board or workbench for even more rigidity and vibration-free operation.

VERSATILITY... a small solution to big problems

Sherline machines have a tremendous capacity to turn out parts for all kinds of uses. Aluminum, steel, brass, plastic, or wood parts can be easily machined on the lathe, yet the entire lathe can be stored on a closet shelf. Together, the lathe and milling machine with their many available accessories are capable of performing all the standard

machining operations. Now, there is almost no small machining job that can hold up your project. If a part isn't available, just design and machine your own!

For those who prefer to work in metric increments, the Sherline lathe and milling machine are available calibrated in millimeters rather than inch equivalents, or if you're currently thinking in inches, buy a machine that is calibrated in inches. In other words, buy a machine that is calibrated in the same increments as the tools you are currently using to eliminate the aggravation of converting dimensions. Later, should you decide to convert an inch machine to a metric machine, all the parts are available. There's no need to buy a new machine. Additionally, the DC motor and speed control supplied with the machines will run domestically or outside of the United States without any change in motor or controller, and no transformer is required.

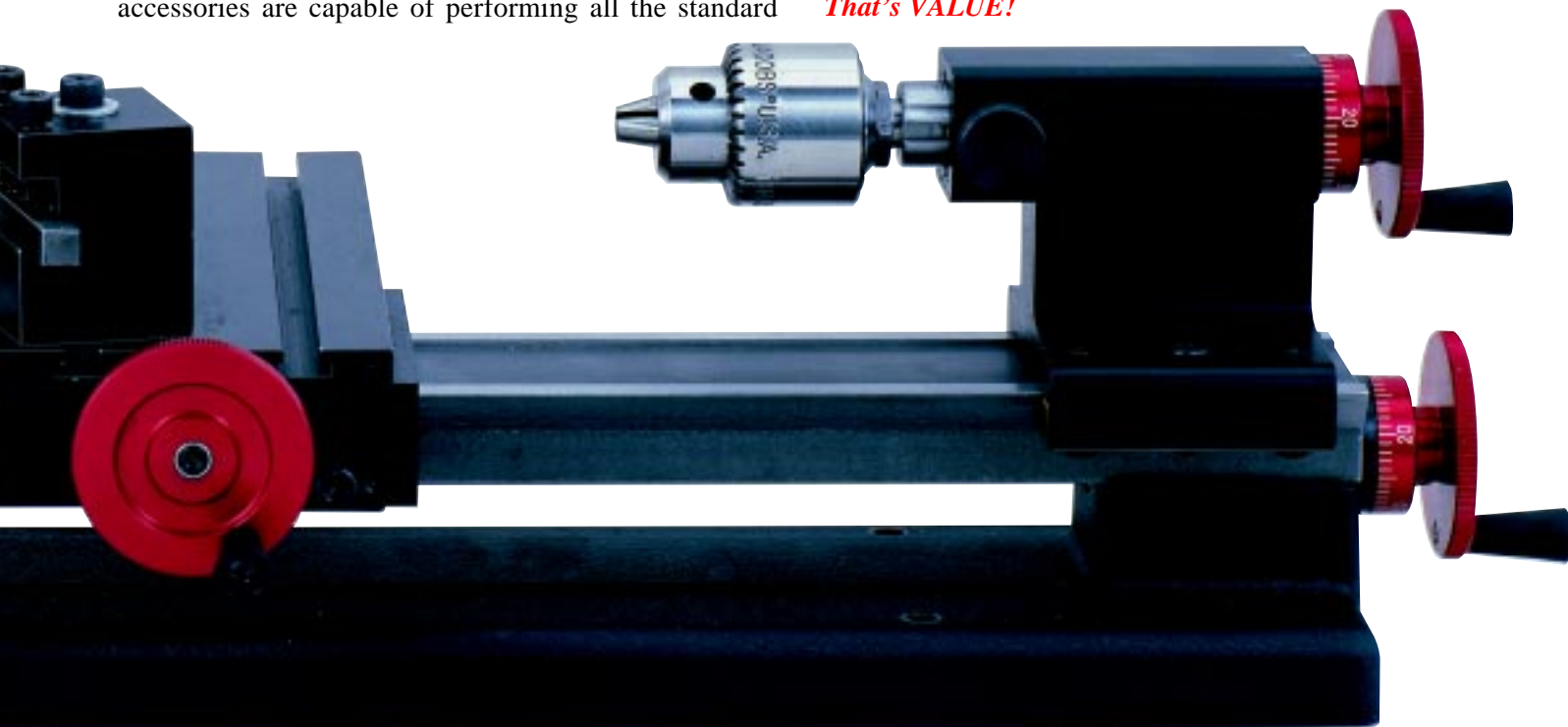
ECONOMY...it doesn't cost much to produce valuable custom made parts

The value of any tool is the relationship between its cost and the results it produces. For most of the small machining jobs encountered by the average user, Sherline machines will produce results equal to machines costing many times more. Unless money is no object, why pay more?

A good tool never becomes obsolete. The operations done on a lathe or mill have remained the same since the dawn of the machine age. A good 50-year old lathe still produces good parts. Sherline machines are designed and built to last for generations.

ECONOMY, VERSATILITY, and QUALITY— Sherline machines embody all three in an unbeatable combination.

That's VALUE!



COMPARE SHERLINE QUALITY

NO OTHER MINIATURE MACHINE TOOLS OFFER ALL THESE FEATURES...

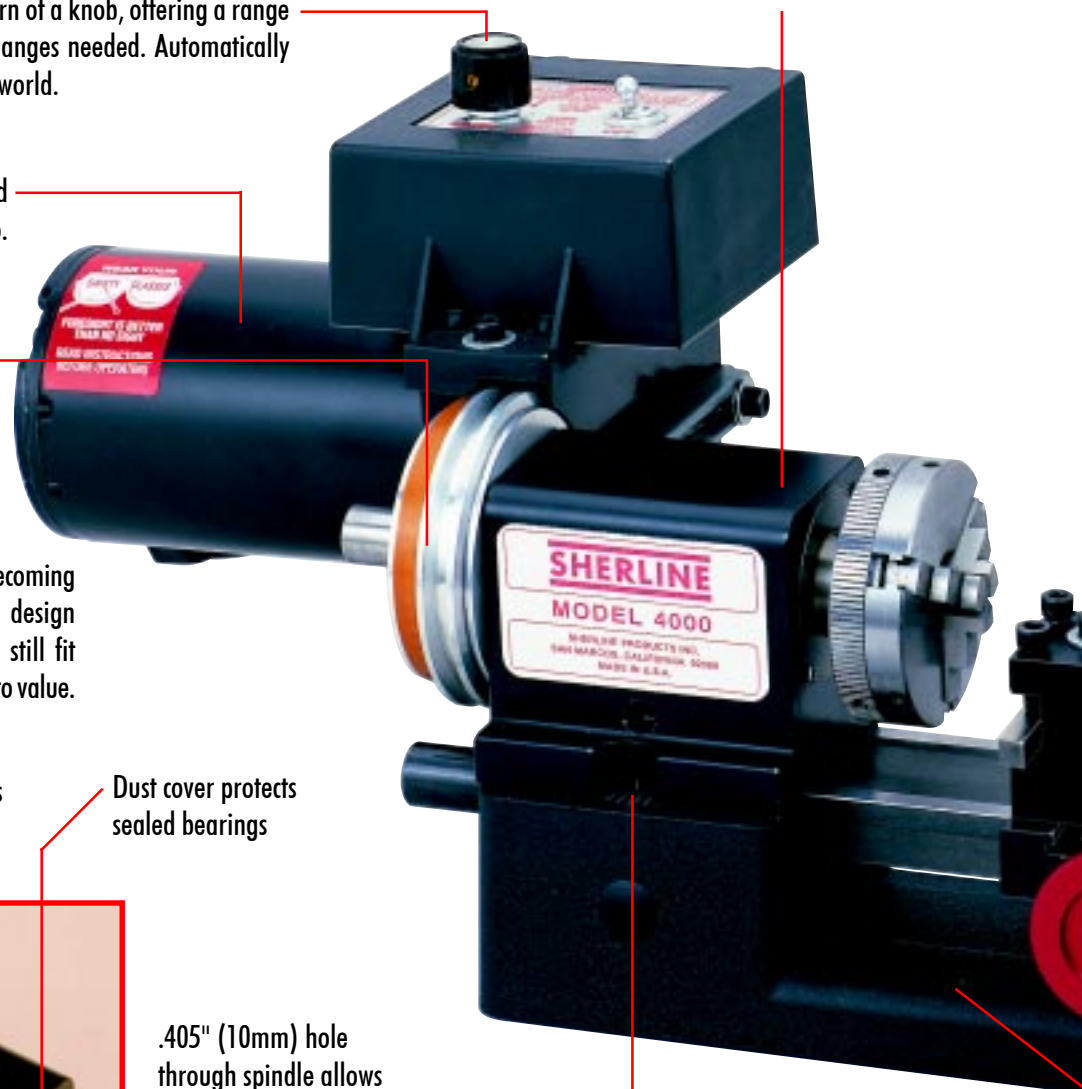
Headstock and motor assembly are easily relocated when switching to vertical milling column attachment. It takes less than one minute!

Speed is electronically controlled with the turn of a knob, offering a range of 70 to 2800 RPM with no gear or belt changes needed. Automatically adjusts to any current used throughout the world.

Motor is located out of the way on lathe and mill. Stays clear of chips and cutting oil too.

Two-speed "V" belt drive increases electronic speed control power range by offering lower ratio for more torque at lower speeds when turning larger parts.

- No need to worry about your investment becoming outdated. The soundness of the basic tool design means accessories made twenty years ago still fit today's tools. New accessories every year add to value.

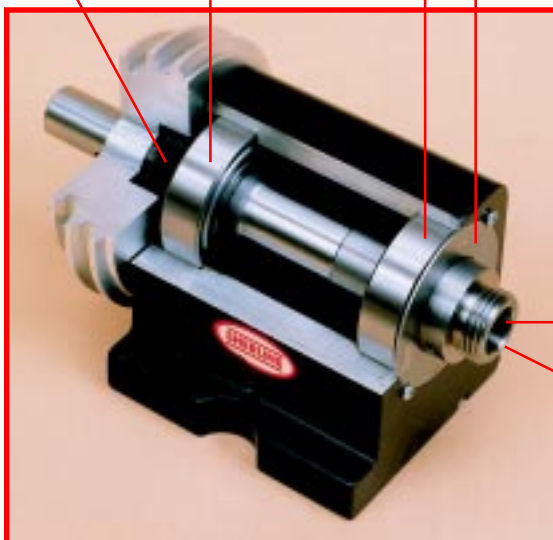


Adjustable preload nut
20mm lifetime lubricated bearings
Dust cover protects sealed bearings

.405" (10mm) hole through spindle allows machining of long stock.

Taper turning is accomplished simply by rotating the headstock to the proper angle.

Spindle nose has a standard #1 Morse inside taper, 3/4"-16 external threads.



CUTAWAY VIEW OF HEADSTOCK

Extra long slide travel and large 6" x 2-3/4" table

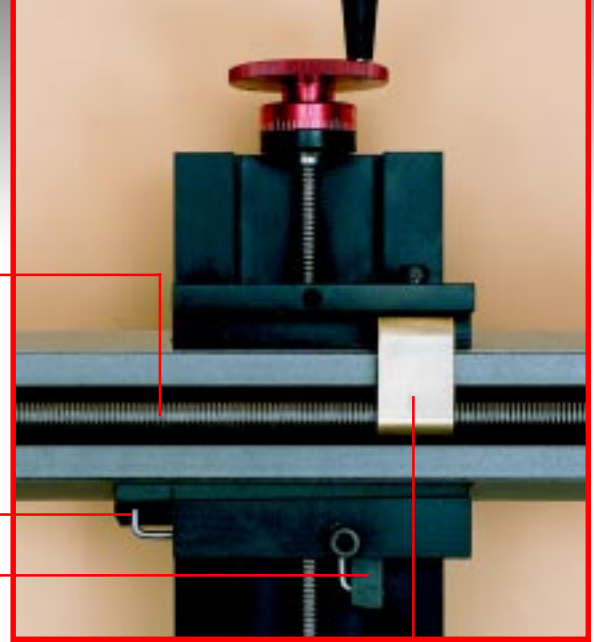
Saddle and crossslide are precision machined with tough anodized finish.

Leadscrew is underneath bed, protected from grit and flying chips.

Tapered adjustable gibs

Ground steel bed features dovetailed machine slides with tapered gibs that handle stress well in both lathe and mill configurations. This is the way most large, high-quality machine tools are built.

- Optional thread-cutting attachment cuts over 50 different pitches, metric or inch, left or right hand threads.
- Sherline offers not only a Vertical Milling attachment for the lathe, but also makes several complete vertical milling machines. (See pages 10 and 28.)
- Huge list of available accessories makes Sherline the most versatile tool line in the world. Virtually any conceivable machining operation is possible in miniature.



BOTTOM VIEW

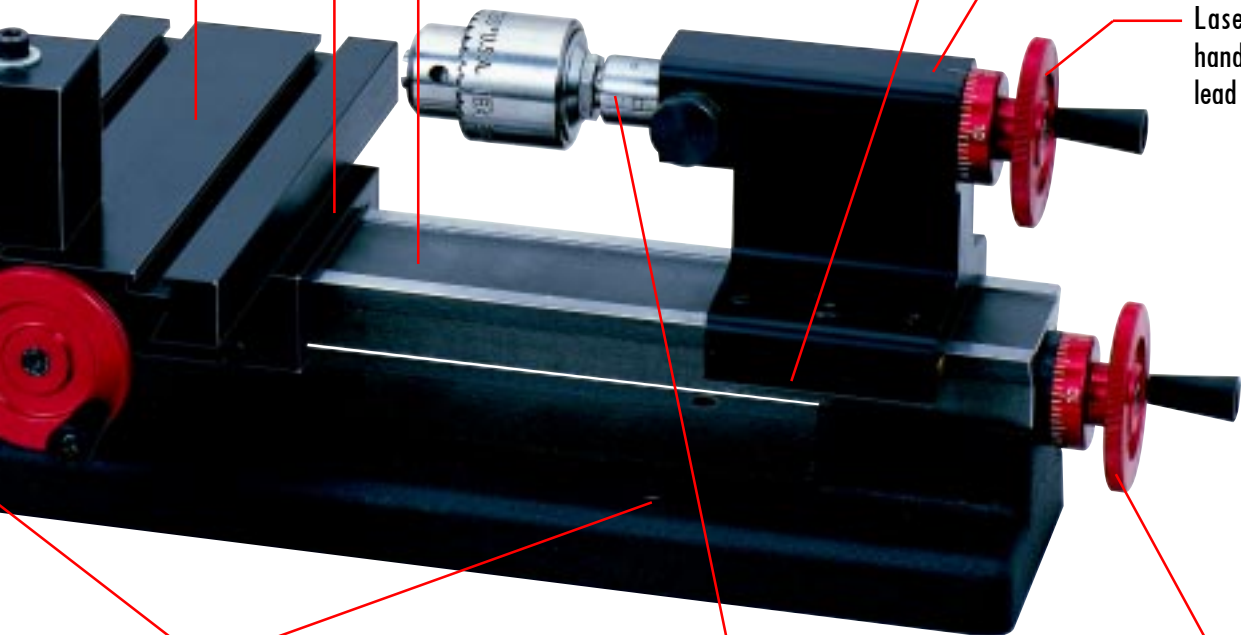
Saddle is connected to leadscrew with a brass part that is easily replaceable. An inexpensive way to correct backlash wear.

Brass gib on tailstock is adjustable for wear. Also makes it easy to remove tailstock without removing handwheels when adding riser block.

Black anodized finish on aluminum parts gives a professional appearance, plus it is tough and easy to care for.

Laser engraved aluminum handwheels with inch or metric lead screws and graduations.

- Optional resettable "zero" handwheels are available that can be unlocked and reset to "zero" (or any number) at any time. This makes dialing in a precalculated amount of feed much easier. (See page 14.)



Holes are predrilled into cast metal base for secure mounting to board or benchtop.

Tailstock spindle has a standard #0 Morse inside taper.

All handwheels are red anodized aluminum to increase the readability of the laser engraved scales.

SHERLINE LATHES

SHERLINE 3.5" (89mm) LATHE MODEL 4000/4100 with 15" (381mm) bed

When the Sherline lathe first came on the market over thirty years ago, its use of rigid, extruded components meant miniature machine tools were no longer just toys for producing simple hobby projects. They could now be considered serious machine tools built specially to produce accurate, small parts. Since then, we have not only added a vertical milling machine and extensive accessory line, we have also found ways to improve the accuracy and utility of the tools themselves. The introduction of CNC machines into our production facility has greatly improved the accuracy of Sherline tools. In 1999, we improved the lathe by changing the way the tailstock is tightened on the bed with the addition of a brass gib. The mill column lock was also replaced with a locking lever that tightens against the saddle nut for easier operation and a more secure lock. These improvements are typical of Sherline's commitment to continually upgrade the quality and functionality of our products. The Sherline tools in this catalog offer the best dollar-for-dollar value of any we have ever made.

MODEL 4000 LATHE (INCH) MODEL 4100 LATHE (METRIC)

(See Figure 1.) When used with its various accessories, Sherline lathes will perform a host of tasks. They will turn, face, bore, drill, ream, polish, cut tapers, and cut both inch and metric threads. When used with its vertical milling column attachment it can be used for milling, fly cutting, drilling, and boring operations.

Sherline now offers several lathes to fit every budget and need, and they are available with either inch or millimeter calibrations. A high-torque DC motor with variable speed control is standard on each machine. This speed control is internally equipped with a converter that automatically adjusts to incoming AC current from 100 to 240 volts, 50 or 60 cycles/sec without loss of torque.

Standard equipment for the basic model 4000 (metric 4100) lathe includes the motor and its speed controller, a 2.75" (70mm) x 6.0" (152mm) crossslide, 15" (381mm) steel bed to allow 8" (203mm) between centers, standard 1-5/8" (41mm) laser engraved aluminum handwheels, pulleys, belt, faceplate, lathe dog, two dead centers, three hexagonal keys, tool post, sharpened high-speed steel cutting tool, eight-foot, three-wire power cord and instruction booklet.

MODEL 4500 (INCH) LATHE WITH ADJUSTABLE HANDWHEELS —MODEL 4530 (METRIC)

The model 4500 (metric 4530) lathe is standard with the same equipment listed above, but with the addition of two 2" (51mm) resettable "zero" handwheels on the leadscrew and crossslide feed. (For additional information on the adjustable handwheels P/N 3420, see Figure 11, page 14.)



FIGURE 1—The 4000-series lathes offer an accurate, compact and versatile machine at entry-level prices.

All Sherline lathes are now available "CNC-ready" with stepper motor mounts. Lathes can also be ordered with Digital Readouts installed. See page 27 for details.

"A" PACKAGE INCLUDES EVERYTHING YOU NEED TO GET STARTED IN MACHINING

(See Figure 2.) If you are new to machining, the "A" package includes everything you need to complete about 85% of all work you will probably ever attempt on a lathe. You get a model 4000 (4100 metric) or 4500 (4530 metric) lathe plus a 2-1/2" (63mm) 3-jaw chuck (P/N 1041), a 1/4" tailstock chuck and key (P/N 1072) and a #1 Morse arbor and drawbolt so the chuck can be used in the headstock spindle as well. The model 4400 (4410 metric) lathe includes the larger 3-1/8" (79mm) 3-jaw chuck (P/N 1040) and 3/8" (10mm) tailstock chuck and key (P/N 1069). As you learn more and wish to attempt other special jobs, the required accessories can be purchased as you need them.

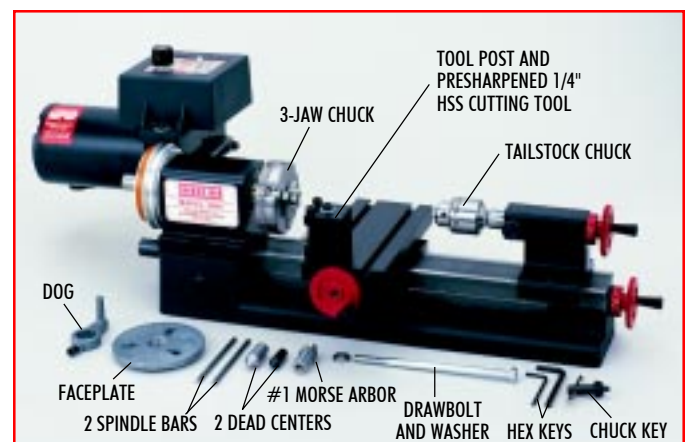


FIGURE 2—Buying your choice of lathe with the "A" accessory package gives you everything you need to get started in machining, including a 3-jaw chuck, tailstock chuck and key and more. The package pricing saves you money. Shown here is a model 4000A, but all lathes are available with the accessory package. Even more complete "B" and "C" packages are also available that include more accessories. See pages 23 and 24 for details.

SHERLINE ACCESSORIES

Thinking of buying a new lathe or mill? All your old Sherline accessories will still work with it. Have an older machine? All our new accessories will work with it too.



SHERLINE 3.5" (89mm) LATHE MODEL 4400/4410 with 24" (610mm) bed

The 4400-series "A" package includes a larger 3.1" 3-jaw chuck and a 3/8" tailstock chuck.

MODEL 4400 LATHE WITH 24" (610mm) BED (INCH) MODEL 4410 (METRIC)

(See Figure 3.) If you are interested in a lathe with more distance between centers, the model 4400 (metric 4410) lathe is available. Standard equipment is the same as on the model 4000; however, the model 4400 lathe has a 24" (610mm) bed that has 17" (431mm) between centers, a

FIGURE 3—The 4400-series lathes offer over twice the center-to-center distance and many luxury features.

2.5" (63mm) resettable "zero" handwheel on the leadscrew, two 2" (51mm) resettable "zero" handwheels on the crossslide and feed screw and a rocker tool post (P/N 3057) substituted for the standard tool post.

LATHE ACCESSORIES

VERTICAL MILLING COLUMN, P/N 3050 (3053 Metric) DELUXE VERTICAL MILLING COL., P/N 3480 (3485 Metric)

(See Figure 4.) With this attachment the Sherline lathe can be quickly and easily converted into a small milling machine. The attachment consists of a steel dovetailed vertical column with a solid aluminum base that attaches to the bed of the lathe in place of the headstock. The headstock then mounts to a dovetailed saddle on the vertical



FIGURE 4—The model 4000 lathe is set up with the vertical milling column attachment. Conversion from lathe to milling or back to a lathe takes less than one minute!

column. The saddle is raised and lowered to control the depth of cut by turning a handwheel. Calibrations on the handwheel enable depth control to .001" (.01mm). Parts to be machined are mounted on the crossslide. On the deluxe version, P/N 3480 (3485 Metric), a 2-1/2" adjustable "zero" handwheel replaces the standard handwheel.

This is the most economical way to get into milling. Most standard vertical milling operations can be performed with this attachment, with only size being the basic limitation. Conversion from the lathe to milling takes less than one minute. Almost all Sherline milling accessories may be used with the setup. At a later date, should you wish to upgrade to a complete vertical milling machine, the column will fit the Sherline XY bases (P/N 5200/5210, or 5401/5411. See pages 34 and 35.). This offers a cost savings compared to purchasing a complete vertical milling machine, because you save the cost of a second headstock, motor and speed control.

NOTE: Columns made prior to January 1996 will need to be modified to fit the XY table. Call Sherline for details.

MULTI-DIRECTION VERTICAL MILLING COLUMN, P/N 3580 (3585 Metric)

(See Figure 5, next page.) The new multi-direction vertical milling column provides all the movements of the new model 2000/2100 8-direction mill. (See page 29.) The entire Z-axis column can be swung, rotated, tilted or moved in and out for machining or drilling from just about any angle. At any time, you can purchase the new P/N 5600/5610 deluxe XY base, which has been designed to accept this special column. In doing so you have duplicated a model



FIGURE 5—The new multi-direction vertical milling column opens up many new machining possibilities on the lathe by turning it into an 8-direction mill.

2000/2010 mill while enjoying the cost savings of not purchasing a second headstock and motor unit. This incremental approach allows you to start machining now and add to your shop as your projects become more demanding or your budget allows.

TOOL POSTS

TWO-POSITION TOOL POST, 1/4"-1/4", P/N 3003—(See Figure 6.) It is not unusual to have to stop and change lathe tools several times while turning a part on the lathe. The change may be to switch from a left-hand tool to a right-hand tool, from a sharp-nosed tool to a radiused tool, or from a roughing tool to a finishing tool. Whatever the reason, each change requires a little setup time. This time can be reduced by using a two-position tool post. Each Sherline two-position tool post mounts two 1/4" lathe tools. By having one or more of these tool posts with your favorite lathe tools pre-mounted in them, you can simplify your work and reduce the time required to change tools.

TWO-POSITION TOOL POST, 5/16"-3/8", P/N 3008—(See Figure 6.) This two-position tool post looks similar to P/N 3003 but is designed to hold a standard 5/16" (8mm) square tool bit on one side, and a standard 3/8" (10mm) square tool bit on the other.

“I am a professional model builder of thirty years. I specialize in building working models of miniature oil field equipment. I have used my Sherline lathe and milling machine for four years and find it to be fine equipment, well designed and built for what it is intended. My Sherline equipment has assisted me in manufacturing miniature pump heads, pump shafts and cam work for my oil rig equipment. I highly recommend American-made Sherline equipment.”

John White, Professional Modeler
California

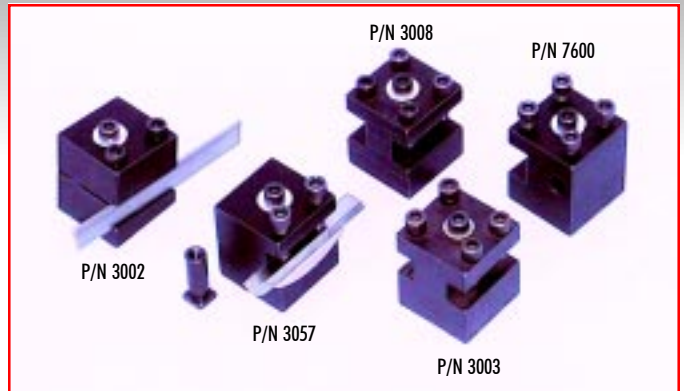


FIGURE 6—Cutoff tool holder (left) and tool posts.

1/4" ROCKER TOOL POST, P/N 3057—(See Figure 6.) The cutting edge of a lathe tool should be set right on or just slightly below the centerline of the part being machined. With new lathe tools this is not a problem, because Sherline tool posts are made to hold them at the correct height. Older tools that have been sharpened numerous times may require shimming to bring them up to the correct height. The Sherline rocker tool post is designed to eliminate the need for shimming. The height of the cutting edge can be changed by simply adjusting the two clamping screws. This inexpensive accessory reduces setup time and also extends the life and the usefulness of your old lathe tools.

3/8" INSERT HOLDER TOOL POST, P/N 7600—(See Figure 6.) Your present Sherline tool post may be modified to accept these special tool holders, but an easier solution is Sherline’s special tool post. It is designed to fit the larger 3/8" square and 3/8" round tool holders commonly used for carbide or diamond inserted tips. It will also hold Sherline’s own P/N 2256 (RH) and P/N 2257 (LH) 35° inserted tip tool holders. It is machined from solid aluminum and has a black anodized finish. Purchase of this tool post will allow you to keep your standard tool post available for use with 1/4" high-speed steel tools for jobs where they are sufficient and/or a specially ground and shaped tip is required.

NOTE: Carbide inserts and inserted tip tools are available through Sherline. Call for a complete listing or see our worldwide web site.

STEADY REST, P/N 1074

(See Figure 7.) All materials have a tendency to deflect away from the cutting tool when you are turning them in a lathe. This tendency is especially noticeable on long, slender parts and long pieces of bar stock, which makes it quite difficult to hold close tolerances. The best way to support a long part is with a center mounted in the tailstock. However, for one reason or another this is not always possible. As an example, it may be a piece of stock that you want to center drill so that you can mount it between centers, or it may be a part where a center drill hole would ruin the looks of the part. Whatever the reason, a steady rest provide a means of supporting the part while it turns. The Sherline steady rest has three adjustable brass blades mounted in a holder that mounts on the bed of the lathe. These blades can be adjusted to the diameter of the part to provide necessary support. Another advantage of the steady

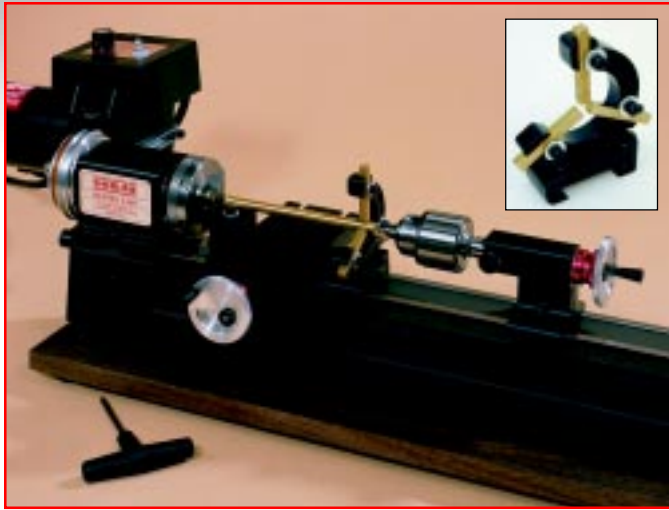


FIGURE 7—To drill a hole in the end of a long shaft, the lathe is set up with a center drill in the drill chuck, which is mounted in the tailstock. The steady rest keeps the shaft from wobbling and assures that the hole will be concentric with the outside diameter of the stock.

rest that is often overlooked is the fact that work held in position by the rest turns concentrically with its outside diameter. This means that concentricity is assured when working near the steady rest, because, at that point, it **must** be running perfectly true despite imperfections in how it is chucked or centered at either end.

The easiest way to set up a steady rest is to first mount the part to be machined in a collet or 3-jaw chuck. Then mount the steady rest onto the bed of the lathe and slide it over the free end of the part and up as close to the chuck as it will go. The three blades can then be adjusted inward until they lightly contact the part, supporting it, but not binding it. Once the blades are set and locked in place, the steady rest can be slid back out to support the free end of the part. If you want to check the accuracy of your setup, you can use a dial indicator mounted on the crossslide. Once you are satisfied with the setup, apply a drop or two of oil where the blades come in contact with the part, and you are ready to start machining. The Sherline steady rest will accommodate any size part up to 1.75" (44mm) in diameter.

“I own a small machine shop doing contract work for a major corporation. We use the Sherline lathe in a winding capacity in conjunction with a much larger machine. This system has been successful using Sherline equipment to the point where a multitude of machines have been purchased over the years.”

Larry Rubido, The Machine Shop
Massachusetts

LATHE FOLLOWER REST, P/N 1090

(See Figure 8.) The purpose of the follower rest is to keep long or small diameter work from deflecting when a cutting tool is applied to it. It is attached to the lathe saddle and moves as the saddle moves, keeping the point of support directly behind the cutting tool. This helps you maintain accuracy on long cuts and on small diameter stock.

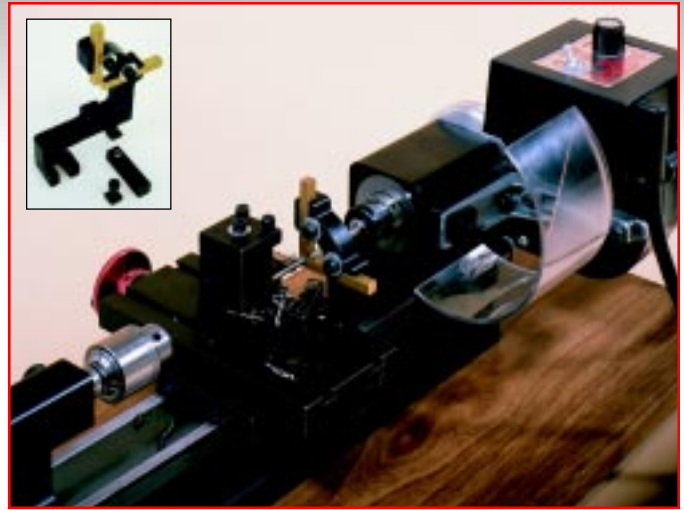


FIGURE 8—A follower rest in use supporting thin stock. The follower rest is mounted to the lathe saddle with one 10-32 set screw. It is not necessary to drill any mounting holes, and full instructions are provided for use. A support bar is attached to the table using a T-nut in the table slot. The support and T-nut are also provided. A small set screw adjustment at the end of the support presses down on the follower base to keep it from rising. It slides along the top of the follower base, allowing the tool post and tool to be moved in and out while still keeping downward pressure on the follower rest.

CHUCKS

Chucks are by far the most popular lathe accessories. The following page details the types and sizes that are available for your Sherline lathe.

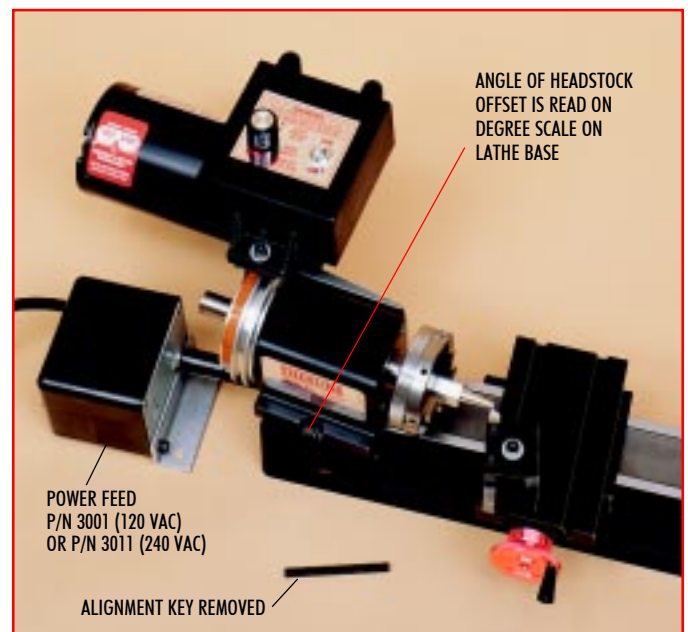


FIGURE 9—Here, a lathe is set up for taper turning. A three-jaw chuck holds a piece of hex stock. The alignment key (foreground) has been removed so the headstock can be rotated to a slight angle so a taper can be turned. A power feed accessory is also installed to save hand cranking and provide a smooth, even finish on the part.

Model Engineers—Visit the Pacific Rim Model Engineering Exhibition (PRIME) in Eugene, Oregon each September. See www.evmes.org for details.



FIGURE 10— Sherline offers a large selection of precision chucks. Top Row: 2.5" 4-jaw chuck (P/N1044), 2.5" 3-jaw chuck (P/N1041), 2.5" self-centering 4-jaw chuck (P/N1075). Bottom Row: 3.1" 4-jaw chuck (P/N1030), 3.1" 3-jaw self-centering chuck (P/N1040). Right side, bottom to top: 3/8" drill chuck (P/N1069), 1/4" drill chuck (P/N1072) and 5/32" drill chuck (P/N 1010 or 1015).

NOTE: All Sherline 3-jaw and 4-jaw chucks have reversible jaws for holding larger stock.

3-JAW SELF-CENTERING CHUCKS, P/N 1040, P/N 1041

(See Figure 10.) Three-jaw chucks are designed so that all three jaws move together and automatically center round or hexagonal parts or stock to within a few thousandths of an inch. These chucks provide the quickest and easiest way of holding work in the lathe. For this reason, they are the most popular of the Sherline accessories. The 2.5" (63mm) 3-jaw chuck (P/N 1041) is included when the 4000A/4100A or 4500A/4530A lathe is ordered. The 3.1" (79mm) 3-jaw chuck (P/N 1040) is included when the 4400A/4410A lathe is ordered.

The Sherline 3-jaw chucks are designed so that they can be used to clamp externally on bar stock or internally on tube stock. The 2.5" (63mm) 3-jaw chuck (P/N 1041) is designed to grip from 3/32" (2mm) up to 1-3/16" (30mm) diameter stock with the jaws in the normal position. For larger diameter work, the jaws must be reversed. The reversible jaws can grip up to 2-1/4" (56mm). The 3.1"



Aerospace Museum model shop craftsmen work on parts for a new display using a Sherline lathe. San Diego, CA

(79mm) 3-jaw chuck (P/N 1040) is designed to grip from 3/32" (2mm) up to 1-1/2" (38mm) diameter stock with the jaws in the normal position. For larger diameter work, the jaws must be reversed, and can grip up to 2.75" (70mm). Both 3-jaw chucks have a .687" (17mm) diameter through hole with a 3/4-16 thread. (The 2.5" chuck is also available with 1/2-20, 12mm x 1mm and 14mm x 1mm spindle threads to fit other brand machines.)

4-JAW SELF-CENTERING CHUCK, P/N 1075

(See Figure 10.) This chuck combines the ease-of-use advantages of the 3-jaw chuck with some of the advantages of a 4-jaw chuck. It will automatically center square or round stock. (The stock must be accurately shaped for all four jaws to grip.) It will also grip thin-wall tubing in four places rather than three, which spreads out the load and allows more grip without crushing the tubing.

4-JAW (INDEPENDENT) CHUCKS, P/N 1030, P/N 1044

(See Figure 10.) These chucks have four advantages over 3-jaw chucks. (1) They can be used to hold irregularly shaped parts. (2) With the use of a dial indicator, they can be used to center parts with a great deal of accuracy. (3) 4-jaw chucks can be used to deliberately hold a part off-center. (4) They can clamp stock tighter. This is a valuable asset when machining cams, crankshafts, and similar parts. The main disadvantage of the 4-jaw independent chuck is that the jaws must be individually set, adding considerable time to setups.

Like the Sherline 3-jaw chucks, the 4-jaw chucks can be used to clamp either externally or internally. The 2.5" (63mm) 4-jaw chuck (P/N 1044) is designed to grip from 3/32" (2mm) up to 1-3/16" (30mm) diameter stock with the jaws in the normal position. For larger diameters, the jaws must be reversed, and can grip up to 2-1/4" (56mm). The 3.1" (79mm) 4-jaw chuck (P/N 1030) is designed to grip from 3/32" (2mm) up to 1-1/2" (38mm) diameter stock with the jaws in the normal position. The reversed jaws can grip up to 2.75" (70mm). Both 4-jaw chucks have a .687" (17mm) through hole with a 3/4-16 thread. (The 2.5" chuck is also available with 1/2-20, 12mm x 1mm and 14mm x 1mm spindle threads to fit other brand machines.)

“As administrator in charge of McDonald Douglas’ MD-11 rework crew, we had a need for a small, accurate metalworking lathe. We chose the Sherline lathe for its ease of operation and accuracy. Now, ten thousand bushings of aluminum, titanium and stainless steel later, this lathe still holds .0002" tolerance.

This small machine has performed like a giant, greatly enhancing the scheduling, and it has added to the knowledge and skill level of much of our work force. Thank you for a fine American product!.”

George Cochran, Administrator
California

Although we recommend the 3-jaw chuck for standard lathe projects, the 4-jaw chuck is considered the accessory that could add the most versatility to your machine. If you have definite projects in mind and feel the 4-jaw chuck would be more useful, and you have no need for the 3-jaw chuck, the model 4000A/4100A, 4400A/4410A, or 4500A/4530A may be ordered with the 4-jaw chuck substituted upon request.

1/4" and 3/8" TAILSTOCK DRILL CHUCKS, P/N 1069, P/N 1072

(See Figure 10.) The drill chuck is probably the most important accessory you will need for your lathe. It will enable you to accurately centerline drill, ream, or tap any part mounted on the lathe. The part to be machined is chuck or collet mounted in the headstock. The tool is mounted in the tailstock chuck and fed into the part using the tailstock ram feed. Parts that are going to be mounted between centers can be center drilled this way. Other parts requiring a hole accurately drilled on center can also be machined this way.

These chucks can also be mounted in the headstock of the lathe. The Sherline tailstock chuck (P/N 1072) is a precision 1/32" (.8mm) to 1/4" (6.4mm) 3-jaw Jacobs chuck complete with key, drawbolt and two arbors. P/N 1069 is a 1/32" to 3/8" (9.5mm), 3-jaw Jacobs chuck with key, drawbolt and two arbors. A #0 Morse arbor fits the tailstock and a #1 Morse arbor fits the headstock. When ordering the model 4000A/4100A or 4500A/4530A, the 1/4" tailstock chuck and key (P/N 1072) is included. When ordering the model 4400A/4410A the 3/8" tailstock chuck and key (P/N 1069) is included.

0JT 5/32" DRILL CHUCK WITH #1 MORSE ARBOR (For Headstock, P/N 1010) or #0 MORSE ARBOR (For Tailstock, P/N 1015)

(See Figure 10.) The 5/32" chuck holds drills from 5/32" (4mm) down to #80 (.0135" or .343mm). It is designated "0JT" which stands for "Zero Jacobs Taper", because it comes with a #0 Jacobs tapered hole in the back. Into that we have pressed a special arbor that provides either a #1 Morse taper to fit into the Sherline headstock or a #0 Morse taper to fit the tailstock. A drawbolt and washer are included with P/N 1010 to secure the chuck in position. These chucks are useful for holding very small drills and their shorter length provides an increase of about 1/2" in working space between centers compared to the 1/4" drill chuck.

2" and 2-1/2" ADJUSTABLE "ZERO" HANDWHEELS

(Standard equipment on deluxe Sherline models.

Call for part numbers to upgrade your present machine.)

(See Figure 11.) Most expensive full-size machine tools allow the machinist to reset the handwheel to "zero" (or any desired setting) at any time during the machining operation. Now that option is available on Sherline's miniature machine tools as well. They install easily in place of the standard handwheels by simply releasing one set screw. Operation is simple as well. Just release the locking nut while holding the handwheel. Then reset the handwheel

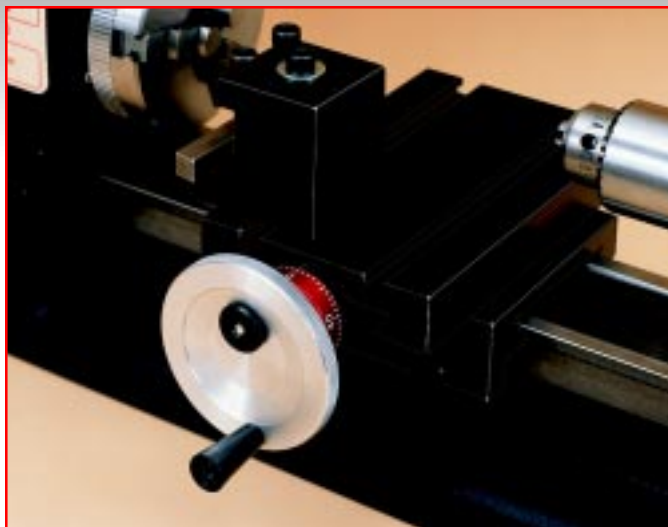


FIGURE 11— Adjustable "zero" handwheels can be reset to zero (or any number) at any time to make it easier to dial in precise amounts of feed without having to calculate your stopping point.

collar to "zero" and retighten the locking nut. Now you can dial in the amount of feed you want starting from zero without having to calculate your stopping point. It's a great timesaver and also reduces the chance of errors.

All standard handwheels can be replaced with 2" adjustable handwheels. For the Z-axis of the mill or vertical milling column, a 2-1/2" diameter handwheel is available. Newer machines come with a ball thrust bearing set to relieve the stress caused by the lifting action of the vertical Z-axis that is not present on the other horizontal axes. Older machines can be upgraded to use the new ball bearing set when getting the resettable handwheel. Call with the model number of your machine and we will help you select the proper handwheel upgrade.

CUTOFF TOOL AND HOLDER, P/N 3002

(See Figure 6.) After completing a part in the lathe it is frequently necessary to separate the part from the excess material used for chucking. This operation is best accomplished with the use of a cutoff tool or "parting tool" as it is sometimes called. The Sherline cutoff tool and holder consists of a very slender high-speed tool steel cutting blade mounted in a special holder. The thinness of the blade (.040" or 1mm) enables it to feed into the part quite easily, and, at the same time, minimizes the amount of waste material. The turning speed for parting should be approximately one-half the normal turning speed for any given material. One word of caution; never use a parting tool on a part mounted between centers. The part can bind on the cutter and result in a scrapped part or a broken tool. A small amount of cutting oil is a must. Parting off free machining material over a 1.00" (25mm) diameter will always be a problem on a machine of this size.

"I bought Sherline machines because of their reputation for quality and because they offered such good value. I have not been disappointed on either score."

C.T. Atkinson
Connecticut

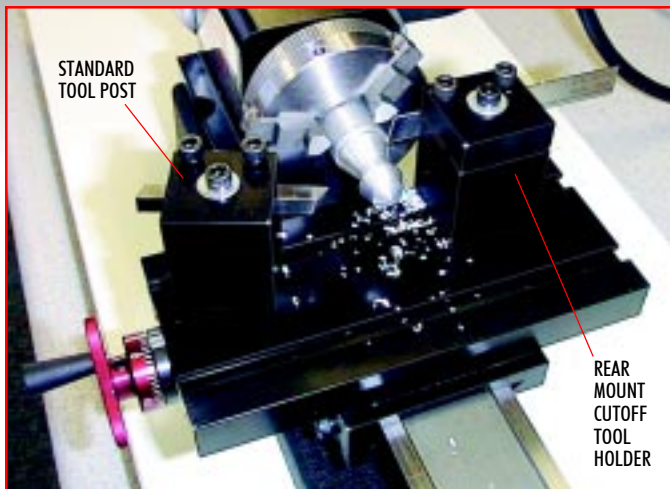


FIGURE 12—The rear mount cutoff tool holder can remain mounted to the lathe table. It is out of the way on the “back” side until needed for a cutoff operation.

REAR MOUNT CUTOFF TOOL AND HOLDER, P/N 3018

(See Figure 12.) This timesaving cutoff tool holder is designed to hold the cutoff blade upside down for use on the “back” side of the part. This allows the holder to remain mounted to the crossslide where it is out of the way while the regular tool holder stays mounted on the front of the crossslide.

CUTOFF TOOL REAR MOUNTING BLOCK, P/N 3016

(See Figure 13.) For those who already own a standard P/N 3002 cutoff tool holder, this spacer block will lift the cutoff tool holder the height of the blade, allowing the blade to be mounted upside down and used on the back side of the crossslide. With the standard P/N 3002 holder and this adapter, you have a choice of mounting the cutoff tool on either the front or rear side of the table.

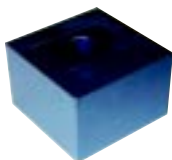


FIGURE 13

LIVE CENTER, P/N 1191

(See Figure 14.) The Sherline lathe comes equipped with two dead centers. One has a #1 Morse taper and fits the headstock, and the other has a #0 Morse taper and fits into the tailstock. These centers are used for holding parts that are mounted “between centers”. This system of mounting work in a lathe has been in use for many years. However, since the tailstock center is held stationary and does not turn with the part, it is a point of friction and requires frequent oiling and attention. Also, because of thermal expansion caused



FIGURE 14

by friction-generated heat, the pressure of the tailstock center must be checked frequently. This is especially important for parts made from thermal plastic materials which have a tendency to soften and even melt as a result of the heat.

The Sherline live center is designed to eliminate these problems. The center is ball bearing mounted so that it can rotate with the part. This reduces wear and heat and makes machining much more pleasant. The sealed bearings are permanently lubricated and require no maintenance.

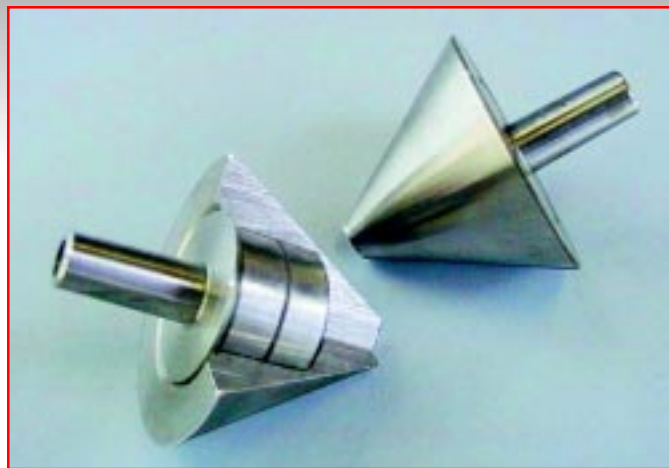


FIGURE 15—A cross-section of the bullnose live center shows the double preloaded ball bearing arrangement. It is designed to support tubing or long items with a hole in the end that is too large for a conventional live center.

BULLNOSE LIVE CENTER, P/N 1182

(See Figure 15.) A live center is the best way to support the end of a long piece held between centers in a lathe, but sometimes the piece may have a hole in the end that is too large in which to index a standard live center. The bullnose live center will support parts or tubing with an open end as large as 1-5/8" diameter. Its solid steel bullnose center turns on two preloaded ball bearings. It is fitted with a #0 Morse taper to fit the tailstock spindle. Rather than turn a sleeve to size down a hole, this special live center can be fitted up in seconds when needed.

THREAD-CUTTING ATTACHMENT, P/N 3100

(See Figure 16, next page.) One of the big advantages of having a lathe is being able to machine threads. Many threads can be cut using taps and dies, but having a tap and die set that will enable you to cut all the non-standard thread sizes would be quite expensive.

Sherline offers a unique and versatile thread-cutting attachment for its lathe. This low cost attachment enables you to machine thirty-six different unified thread pitches (Pitch range from 80 to 5 threads per inch) and twenty-eight different metric thread pitches (Pitch range from .25 to 2.0mm). What’s more, it allows you to cut them as either left-hand or right-hand threads. The lathe tool can be ground to cut any of the various thread forms, and any of these various pitches or thread forms can be cut on any pitch diameter you desire. This versatility enables you to machine any standard or nonstandard thread you might desire as long as it is within the size limitations of the lathe.

The attachment consists of 15 aluminum gears, mounting brackets, engagement mechanism, and 4.00" (102mm) handwheel. Threads are generated on the Sherline lathe by gearing the spindle to the leadscrew. As the spindle is rotated with the handwheel mounted on the headstock spindle, the tool will advance an amount determined by the ratio of the gears. When the tool has completed its movement, you simply stop cranking, back up the tool and turn the spindle in the opposite direction until the tool is past its starting point. Then reset the tool and you’re ready

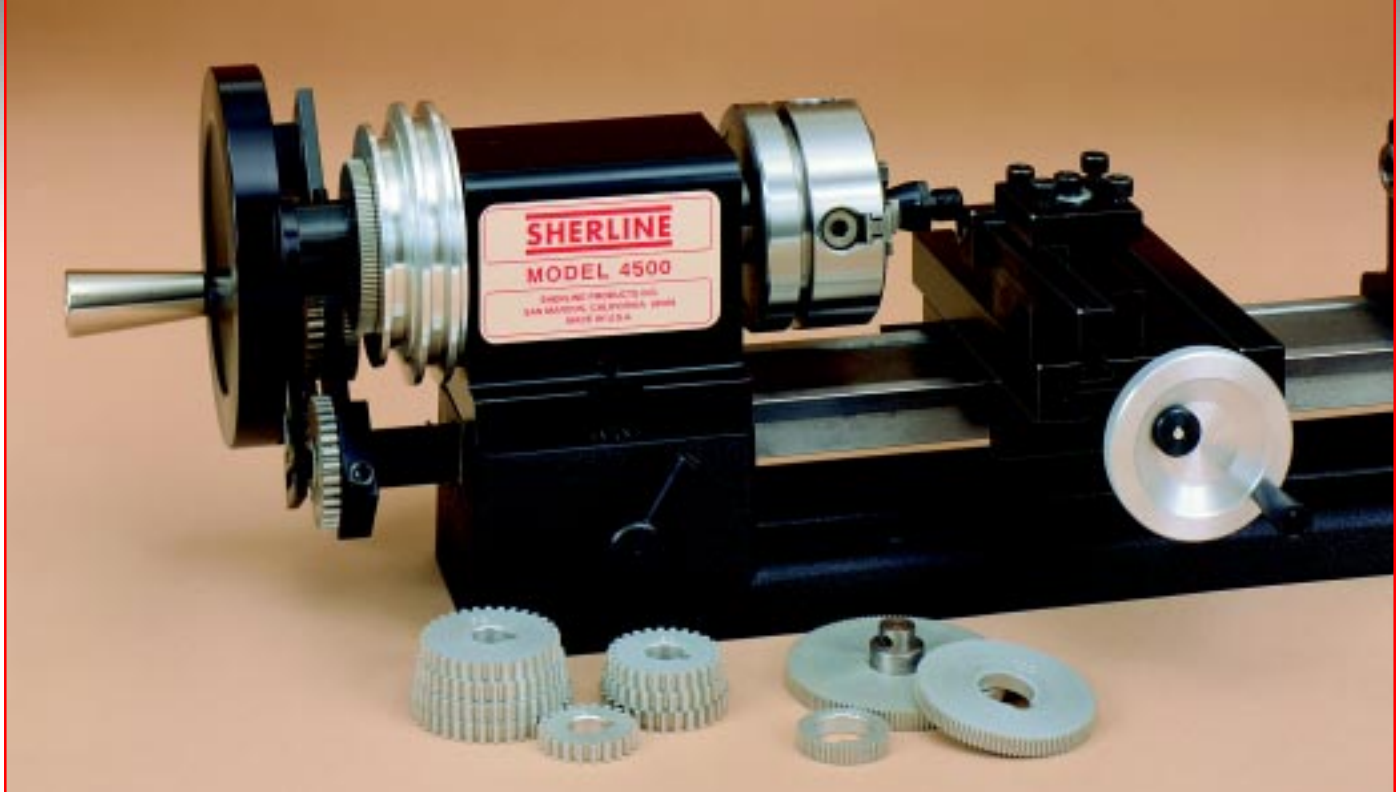


FIGURE 16—When the lathe is set up with the thread cutting attachment, the motor is removed and the spindle is turned by a large handwheel. A thread is being cut in a part held in a 4-jaw chuck. In the foreground are some of the change gears used for cutting different size threads.

for the next pass. It's as simple as tapping! By using a 127-tooth gear (supplied), true metric threads can be cut on an inch (model 4000, 4500, or 4400) or true inch threads on a metric (model 4100, 4530, or 4410) lathe.



FIGURE 17—The steel spindle handwheel makes it easier to control the spindle by hand.

SPINDLE HANDWHEEL, P/N 2049

(See Figure 17.) This 2.5" steel handwheel mounts on the end of the spindle shaft and looks and works much like a sewing machine handwheel. It allows the operator to quickly and safely stop a rotating spindle by hand. It also makes it

easy to hand index the spindle when working on a part. A black oxide finish was not used, because the smooth, machined surface offers a better feel on your hand.

CUTTING TOOLS

(See Figure 18.) Lathe tools, or tool bits as they are sometimes called, are the cutting tools that are used for turning and facing work on the lathe. The most popular lathe tools are those made of high-speed tool steel. They can be used for machining most materials including wood, plastic, aluminum, brass and steel. These tools will retain their hardness at temperatures up to 1000° Fahrenheit (588° C.). For this reason, depth of cut, cutting speed and feed rates are important. The big advantage of high-speed steel tools is the ease with which they can be sharpened. A standard aluminum oxide grinding wheel can be used. Once shaped and sharpened, they will retain their cutting edge for a long time.

P/N 3005 HSS BLANK



P/N 3007 HSS TOOL SET
(Includes LH, RH and boring tool)

P/N 3006 CARBIDE TOOL SET
(Includes LH, RH and 60° threading tool)

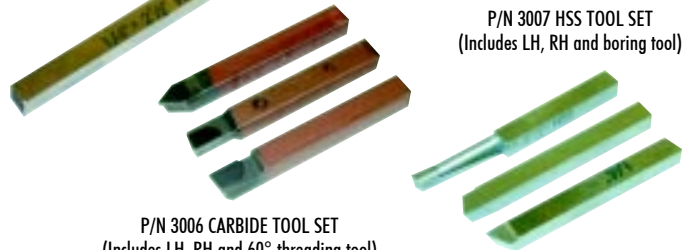


FIGURE 18—High-speed steel and carbide cutting tools.

Carbide lathe tools usually have a tungsten carbide cutting tip brazed or bonded to a softer steel shank. These tools are recommended for cutting hard or abrasive materials. Carbide tools can retain their hardness at temperatures up to approximately 1700°. This permits a higher cutting speed and faster feed rates.

Carbide tools are typically harder to sharpen than their high-speed counterparts. A silicon carbide or diamond grinding wheel must be used. The shape of carbide tools is also more critical than the shape of high-speed tool steel cutters, but their cutting ability makes them very popular.

“I initially bought my Sherline tools to do rough work... to rough in a piece and then put it in a jeweler’s lathe to finish it up, but since I bought the Sherline, I hardly ever touch the jeweler’s lathes. Now I can do what I did on the jeweler’s lathe just as accurately, faster, and the Sherline is easier to clean up.”

*Jerry Kieffer, Public Utility Field Representative
Wisconsin*



FIGURE 19—35° carbide insert holders and Torx wrench. The 3/8" shank fits in tool post P/N 7600.

35° RH AND LH CARBIDE INSERT TOOL HOLDERS, P/N 2258

(See Figure 19.) Sherline now manufactures its own inserted tip carbide tool holders. They are available individually as a right-hand holder (P/N 2256) or a left-hand holder (P/N 2257). The pair of RH and LH is P/N 2258. Each comes with a P/N 7605 55° carbide insert, hold-down screw and special Torx key. The 3/8" square shank is held in a P/N 7600 tool post. (See Figure 6 on page 11.) The 35° offset angle of the tip makes it easier to accomplish certain cuts. For example, by using the tool holder square with the crossslide, you can turn an O.D. up to a shoulder and then finish the shoulder by backing the tool out while still maintaining the proper tool clearance. The tip of the cutting tool is .375" from the bottom of the holder, which is the industry standard. The holders are made from case hardened steel with a black oxide finish.

CENTER DRILL SET, P/N 3021

(See Figure 20.) Center drills are used with the lathe to drill a hole in the end of stock for mounting between centers in the lathe. They are designed to drill a small diameter pilot hole followed by a 60° countersink that provides a bearing surface for the 60° point of the lathe center. Center drills are also used extensively with the milling machine to accurately start holes. The hole



FIGURE 20—
Center Drills

locations can be dialed in using the milling machine's calibrated handwheels, then the hole is started using the center drill. The large diameter shank on the center drill holds the drill point right on center. Once the hole is started, the center drill is replaced with a drill of the desired diameter and the hole is finished. It is imperative that a cutting lubricant is used, and the center drill is backed off several times to prevent the smaller tip from twisting off. This center drill set includes a #1, #2 and #3 double-ended high-speed steel drill. The #1 drill has a 1/8" shank, the #2 drill has a 3/16" shank, and the #3 drill has a 1/4" shank. The tip diameter of the #1 is .047", the #2 is .078" and the #3 is .109". Other smaller sizes are available upon request.

Think big, build small, have fun!

GRINDING YOUR OWN LATHE TOOLS

A sharp cutting tool is essential for producing good, clean parts, and our four-page illustrated guide makes it easy. It comes free with each lathe or set of cutting tools from Sherline. It is also available on our Internet site at www.sherline.com/grinding.htm.

WW COLLET SET, P/N 1160 (Metric P/N 1178)

(See Figure 21.) Collets provide a quick, easy method of mounting cylindrical parts or bar stock in the lathe with a great deal of centering accuracy. Each collet is actually a small, precision 3-jaw chuck that fits into a special tapered adapter in the headstock. A drawbar that passes through the headstock and threads into the back side of the collet is used to draw the collet up into the tapered adapter. The adapter causes the jaws of the collet to close down, gripping the part to be machined. Typically, collets provide a very accurate part mounting system, but each size collet can accommodate only a small range of diameters of approximately $\pm .001$ " (.02mm).

WW collets differ from milling collets (P/N 3060) in that WW collets have a hole all the way through the collet and drawbar. The maximum diameter stock that can pass entirely through the collet is 3/16" or 4.5mm. The WW collets that are larger than this diameter are sometimes referred to as "pot" chucks. (See Figure 24.)



FIGURE 21—The WW collet set includes adapter, drawbar, knockout bar and five collets.

The Sherline WW collet set includes a WW style collet taper adapter, a drawbar, and a set of five WW collets with .275-40 thread, sizes 1/16", 1/8", 3/16", 1/4", and 5/16". A metric (P/N 1178) WW collet set is also available and includes sizes 2.0mm, 3.0mm, 4.0mm, 5.0mm, and 6.0mm. These collets are manufactured by Sherline and are built to standard WW specifications; however, we have come across collets that are called WW and will not fit our drawbar and adapter. Be sure to check WW collets made by other manufacturers to be sure they fit our adapter before you purchase them. Sherline manufactures a slightly larger .315" (8.0 mm) adapter and drawbar set (P/N 1163) that will accommodate some of these other brands.



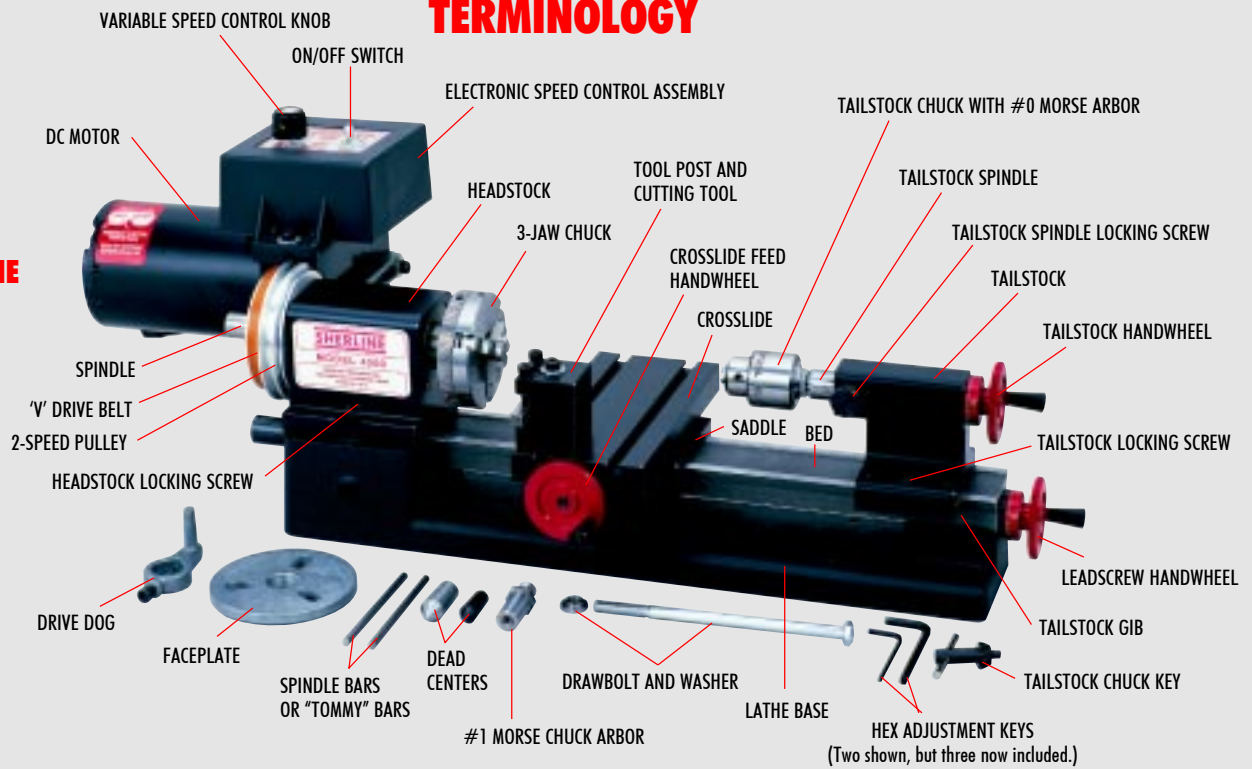
FIGURE 22

TOOL HEIGHT GAGE, P/N 3009

(See Figure 22.) This steel gage offers a simple way to assure the tip of your cutting tool is set to the centerline height of the lathe. The lower lip is for tools in the standard toolpost, while the upper lip is used with the riser toolpost. Just set the gage on the lathe table and position it in front of the tool tip to check height. It is much quicker and easier than checking height against a center in the headstock or tailstock.

TERMINOLOGY

LATHE



VERTICAL MILL

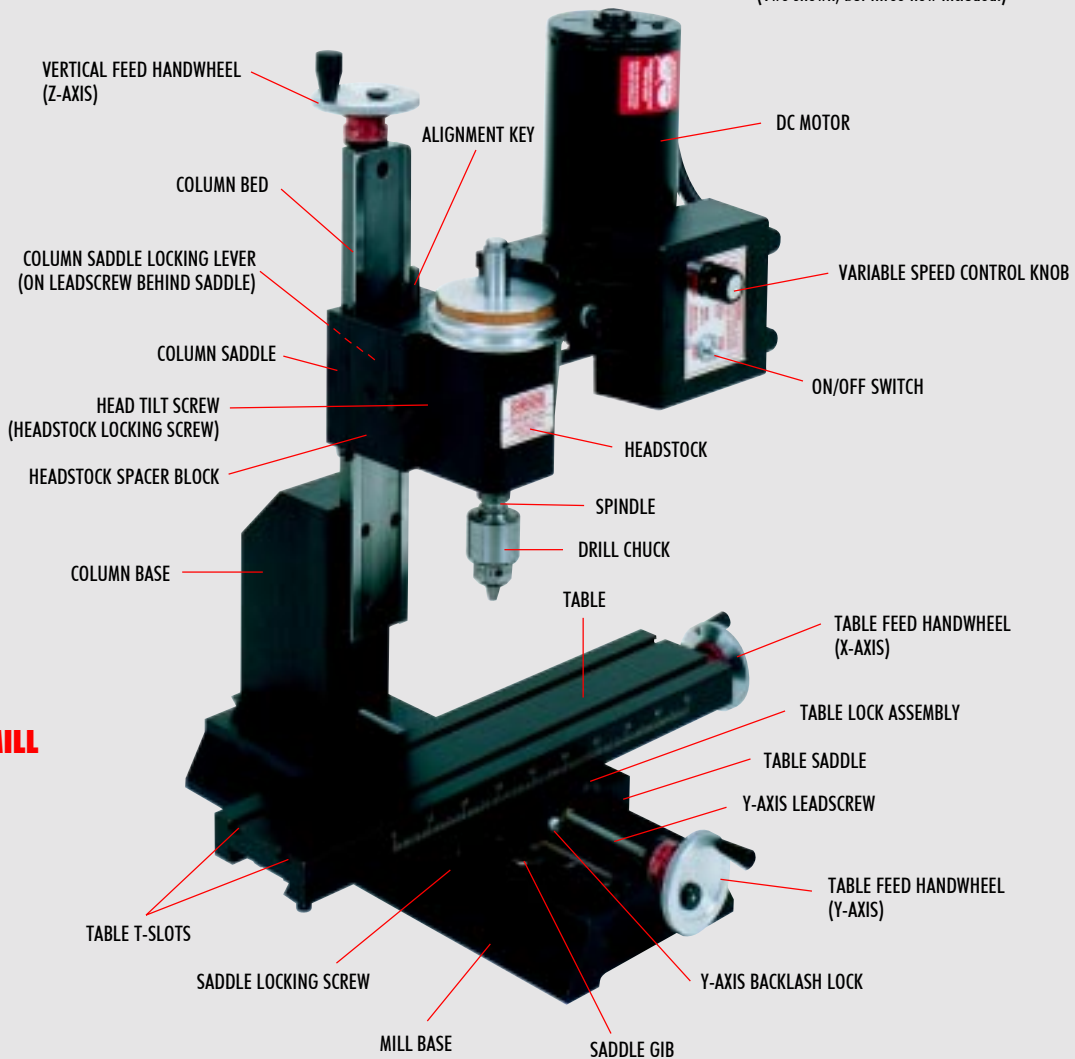


FIGURE 23—Parts terminology for the lathe and vertical milling machine. Some optional items are shown.



FIGURE 24—Collet pot chucks, 2100, 2101 and 2102

**COLLET POT CHUCKS—3/4", 1", and 1-1/4",
P/N 2100, P/N 2101 and P/N 2102**

(See Figure 24.) These collets can be easily machined and are especially designed to hold larger and odd shaped parts. A 1/8" (3.17mm) dowel pin is included with the collet to close on while the face is being machined. They are used with WW collet adapter and drawbar (P/N 1161).

NOTE: Collet pot chucks are designed to hold material only on the face end, not through the collet. Maximum gripping depth is 3/16" (4.8mm).

**1" (25.4mm) WW COLLET BLANK,
P/N 2083**



FIGURE 25—
WW collet blank

(See Figure 25.) To make it easy for you to make your own custom tool holder, we now provide a 1" diameter blank collet without hole or slots. It is made from free machining steel so you can drill and machine it to whatever shape you

need. The shaft is pre-machined and threaded to accept your WW collet holder.



FIGURE 26—The deluxe WW collet set organizes all your collets, pot chucks and collet accessories in a handsome, finger-jointed wooden box.

DELUXE WW COLLET SET, P/N 1162 (Metric P/N 1179)

(See Figure 26.) This set contains a complete selection of 17 (14 for the metric set) Sherline WW collets, including a blank, 3/4" and 1" pot chucks with 1/8" dowel pin, an adapter, drawbar and a knockout bar. It is packaged in an

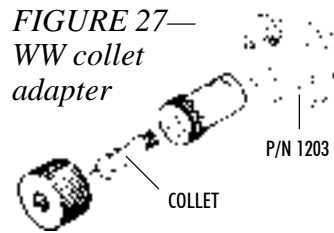
attractive wood box with a brass latch and hinges. A machined wood insert locates each part, plus a drawing in the lid reminds you where each part goes to keep things organized. Extra holes are provided should you want to add additional collets to suit your particular needs. This is a handsome and useful package for the serious miniature machinist.

"The quality of your products has always been outstanding, and very reasonably priced, all while being made right here in the U.S.A. I am a very satisfied customer."

Ken Kemski
Florida

**SHERLINE WW and 8mm WW COLLET ADAPTER, P/N 2085
and P/N 2086**

(See Figure 27.) Held in the adjustable tailstock tool holder, P/N 1203 (Not included, see Figure 28.), the collet adapter allows the use of WW collets in the lathe tailstock.



This means you can hold extremely small drills accurately on center. Drills of only a few thousandths of an inch are easily broken if not perfectly centered. Complete instructions are provided with the adapter

to help you "perfectly" align the headstock and tailstock of your Sherline lathe. When you consider the alternative is to spend thousands of dollars for a jeweler's lathe that is far less versatile, the time is well spent.



FIGURE 28—Adjustable tailstock tools make it possible to achieve "perfect" alignment between the headstock and the tool held in the tailstock. From left to right are the adjustable live center, adjustable drill chuck holder, adjustable custom tool holder and adjustable 1" die holder

ADJUSTABLE LIVE CENTER, P/N 1201

(See Figure 28.) A live center is held in the tailstock of a lathe and supports the unchucked end of the work while allowing it to rotate easily on a bearing, as opposed to a standard "dead" center that does not rotate. If the point of the center is not in perfect alignment with the shaft, or if the center mark on the part is not dead-on, the part will "run out" (vibrate or wobble), making precise machining impossible.

An adjustable live center allows you to precisely position the center point. The center is attached to one plate, while the shaft is part of another. Two slightly oversize holes in one side allow adjustment screws to be loosened, the center located and then locked down where you want it. In this manner, highly accurate centering can be achieved. If the ultimate in accuracy is your goal, the adjustable live center will help you achieve it.

ADJUSTABLE TAILSTOCK CHUCK HOLDER, P/N 1202

(See Figure 28.) Much like the adjustable live center, holding a tailstock chuck in perfect alignment without some method of adjusting it can be difficult or impossible. The adjustment screws and split design allow perfect centering for the chuck, should the quality of your work demand it. (Tailstock chuck not included.)

ADJUSTABLE TAILSTOCK CUSTOM TOOL HOLDER, P/N 1203

(See Figure 28.) By making your own custom split collet with a 5/8" outside diameter, this part can hold almost any tool you wish to adapt to it. A set screw tightens on the split collet to hold the tool in place. It is also used to hold the collet adapter, P/N 2085. The split face design with adjusting screws allows perfect centering of the tool's tip. Like the previous tools, it is designed for the machinist seeking every advantage in the quest for total accuracy.

ADJUSTABLE TAILSTOCK 1" DIE HOLDER, P/N 1206

(See Figure 28.) The 1" die holder utilizes the same split design to achieve centering accuracy. A 1" button die is held in the face plate, and shafts held in a chuck or collet in the lathe headstock spindle can be threaded. The tailstock is not tightened to the bed, so the die is free to feed itself onto the part as the part is rotated by hand with the spindle, preferably with the large handwheel from the thread-cutting attachment or the P/N 2049 spindle handwheel. Included is a 13/16" bushing that allows smaller dies of that size to be held as well.

QUICK-CHANGE TOOL POST AND HOLDERS, P/N 2250

(See Figure 29.) This accessory brings to your Sherline lathe the ability to change tools quickly and easily. It uses a dovetail design to locate removable holders in a fashion similar to that used in production machine shops. Included with the case hardened steel tool post are three interchangeable steel holders designed to hold a 1/4" cutting tool, a 3/8" diameter boring tool and a Sherline cutoff tool. (Tools sold separately.) An optional holder for inserted carbide tips is also available as P/N 2295. Each holder has a knurled brass knob that allows you to easily adjust the height of the tool tip. Changing tools is simply a matter of releasing the locking screw, sliding out one tool holder, sliding in another and re-locking. If you find your jobs require a lot of tool changes, this timesaving accessory will make your projects that much more of a pleasure.



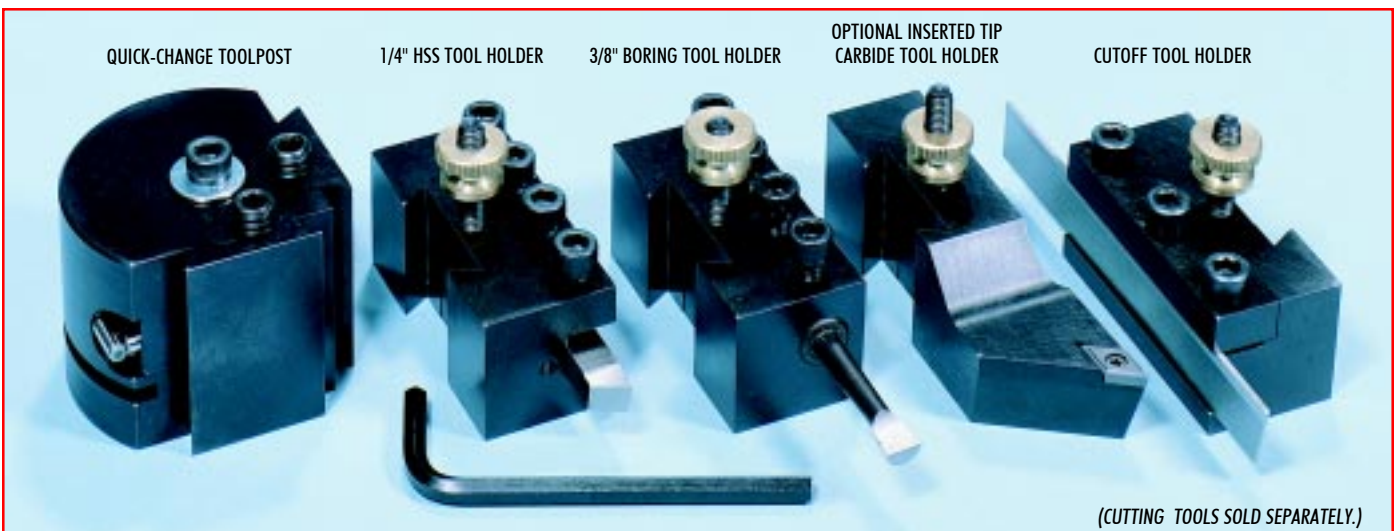
QUICK-CHANGE TOOL POST RISER, P/N 2251

(See Figure 30.) Now your Sherline quick-change tool post system can be used with the riser blocks in place when turning larger diameter parts. This 1.25" riser base brings the cutting tool up to the proper height when the headstock riser block is used on the lathe. It is made from solid steel with a black oxide finish to compliment the high quality of the quick-change tool holder components.

the lathe. It is made from solid steel with a black oxide finish to compliment the high quality of the quick-change tool holder components.

CROSSLIDE ACCESSORY PLATE, P/N 3017

(See Figure 31.) The table on the mill is thicker than the table on the lathe because of the greater forces transferred



(CUTTING TOOLS SOLD SEPARATELY.)

FIGURE 29—The quick-change tool post is shown with the three standard tool holders and the optional carbide inserted tip holder. The post and holders are all machined from steel and have a black oxide finish. Holders can be quickly changed while the tool post remains mounted to the crossslide table. The knurled brass knobs adjust tool height.



FIGURE 31—The crossslide accessory plate adds stiffness for milling operations.

to the table in milling and the requirement for stiffer setups. When using the vertical milling column on the lathe, the table can be “beefed up” with the addition of this plate, which adds 1/2" of thickness to the table. It also serves as a tooling plate that protects the surface of your lathe table from damage. The plate attaches to the table by means of four recessed cap screws and T-nuts. It should be

removed for lathe turning to maximize the diameter of part that can be turned and so that the standard tool post can be used.

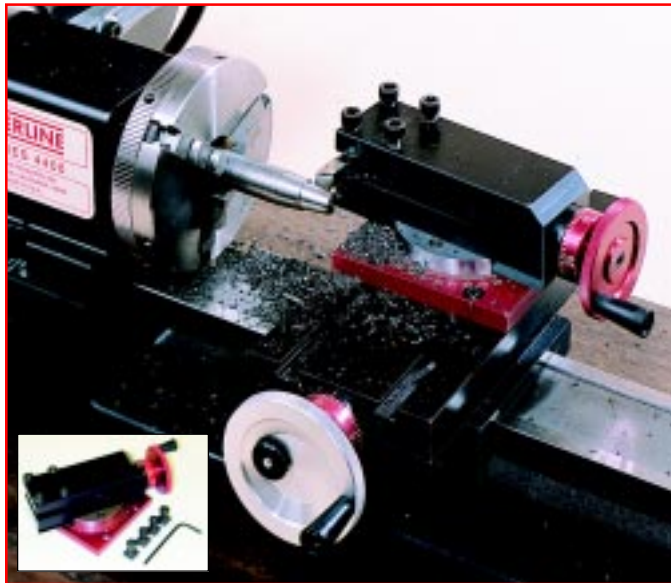


FIGURE 32—The compound slide offers another way to cut tapers on a Sherline lathe. Inset shows slide by itself.

COMPOUND SLIDE, P/N 1270 (METRIC P/N 1280)

(See Figure 32.) The compound slide offers a way to turn tapers and cut angles on a lathe without rotating the headstock. Four mounting holes are provided in the base for solid positioning on the crossslide. The base has a red anodized finish with laser engraved angle scales to make setting an angle easy. It utilizes a highly efficient locking ring design to lock it in position without having to overtighten the locking screws. A 1/4" cutting tool can be mounted across the front or on either side of the head.

Unlike compounds used on full-size, conventional lathes, this one was designed to be used from the “back” side of the table. This allows it to be designed in a more compact size and used without interference from the crossslide handwheel. The lathe tool is inserted in the holder “upside down” so the cutting tip faces downward. Because of the small size of the miniature lathe, operating the crossslide handwheel in this position is just as convenient.

NEW!

COMPOUND RISER, P/N 1272

(See Figure 33.) This approximately 1" thick block allows the compound slide to be mounted on the front part of the crossslide when the riser blocks are in place on the lathe.

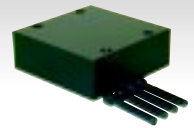


FIGURE 33

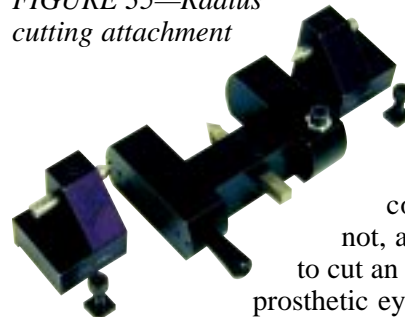


Figure 34—The radius cutting attachment can cut a convex or concave radius. Unlike most lathe operations, the tool is moved up and down rather than horizontally.

RADIUS CUTTING ATTACHMENT, P/N 2200

(See Figures 34 and 35.) The radius cutting attachment swings a tool through an arc to put a radius on the end of a part. The pivot points and tool position are adjustable, so it is capable of cutting either a concave or convex shape. It came about as a result of studying the method used to shape grinding wheels. Conventional thinking says that lathe tools should move parallel to the tool’s longitudinal axis or horizontally across it.

FIGURE 35—Radius cutting attachment



Once it was realized that the tool could also be pivoted vertically on this axis, the design of this tool became much easier to conceive. Believe it or

not, a technician with a need to cut an accurate radius to make prosthetic eyeballs got us started on putting this tool into production. Now anyone with a need to put a nice looking radius on the end of a part can benefit from the way this accessory makes it easy. It may not be something that a lot of people need, but it is typical of our commitment to serve *all* of our customers. If you need to (or just think it would be fun to) put a radius onto or into the end of a part, there is no easier way to do it than with this accessory. It can also cut a complete ball in a two-step operation covered in the instructions.

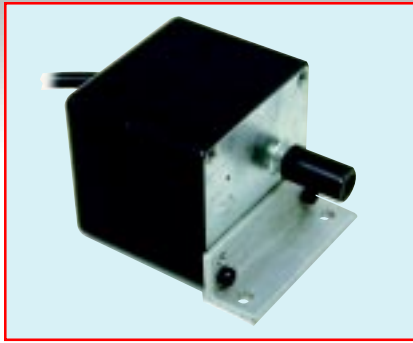


FIGURE 36—Power feed

**120V POWER FEED,
P/N 3001
(P/N 3011, 240 V)**

(See Figure 9 on Page 12 and Figure 36.) Reducing the diameter of a long shaft or a long part can be a tedious

task. Obtaining a good finish on such a part requires very steady movement of the cutting tool; something hard to achieve when feeding the tool by hand. For this reason, Sherline has developed a simple power feed attachment for the lathe. It consists of a constant speed gear motor complete with “ON” and “OFF” switch, a simple, easy-to-install mounting bracket and an engagement mechanism that permits quick disengagement of the motor so that you can hand-feed the cutter whenever you desire. The power feed is from right to left at a constant (nonadjustable) speed of approximately .9" (23mm) per minute. (It is not designed for use with the thread-cutting attachment.)



FIGURE 37—#0 Morse chuck adapter

**#0 MORSE to 3/4-16 CHUCK
ADAPTER, P/N 1230**

(See Figure 37.) This adapter fits into the #0 Morse taper of the tailstock to allow Sherline chucks with a 3/4-16 spindle thread to be mounted to the tailstock for holding tools or work. This is a simple and inexpensive way to increase the versatility of your lathe.

**VERTICAL MILLING TABLE, P/N 1185
(METRIC P/N 1184)**

(See Figure 38) The vertical milling table is another method of milling on the Sherline lathe instead of using the vertical milling column. For general milling we recommend the vertical milling column, but for specific setups you may find this accessory useful. Many books written for the hobbyist show this type of setup on larger lathes.



FIG. 38

This 9-cylinder radial engine is small (note size of dime in center) yet it is beautifully crafted. It is typical of the type of projects that can be produced with high quality miniature machine tools.

Built by Charles Herman, Jr. for the Third Annual Sherline Machinist's Challenge Contest



Need a small manual or CNC precision slide for a tooling setup? See Sherline's Industrial Products Division web site at www.sherlineIPD.com.

The Sherline vertical milling table is mounted on the lathe crossslide. Vertical table travel is 2.25" (57mm). This allows work to be moved up or down on the vertical milling table, back and forth with the crossslide, and in and out with the leadscrew, which covers all the axes needed for milling. This accessory takes two minutes or less to mount on a Sherline lathe. Many of our customers have also found uses for the vertical milling table on special machines that require a reasonably priced, small precision slide.

TAILSTOCK SPINDLE EXTENDER, P/N 1220

(See Figure 39.) (Note: This part is needed only on lathes made before July, 1996. The new cutout tailstock design eliminates the need for this part.) Certain setups on lathes with the old style tailstock are made easier by the use of the tailstock spindle extender, because it adds 1-1/2" to the reach of the tailstock spindle. By using the extender, a part being held between centers can be turned from end to end without having to move the tool post from one position to another to keep the crossslide saddle from hitting the tailstock. You will find other occasions as well where this simple tool pays for itself many times over in convenience.



FIGURE 39

"Once again I must tell you how happy I am with the lathe and accessories, and my friends and family are too, as I make toys and things for them."

Kieth Yundt
Canada

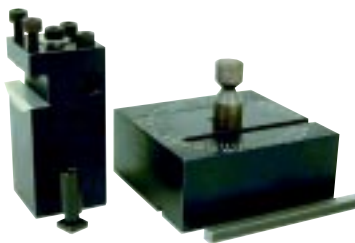


FIGURE 40—The riser block kit includes a 1/4" riser rocker toolpost and headstock riser block. A 3/8" riser toolpost, P/N 1289, is available separately.

**HEADSTOCK SPACER
BLOCK KIT, P/N 1291**

(See Figures 40 and 41.) A 3.5" (88.8mm) diameter part is the largest part that can be accommodated in the basic Sherline lathe. Yet, occasionally it may be necessary to work on something larger. The Sherline spacer block increases the maximum working diameter of the lathe to 6" (152mm). P/N 1291 includes a 1-1/4" (31.73mm) spacer block to fit under the lathe headstock and a riser rocker tool post that raises the cutting tool by a corresponding amount. This useful accessory greatly expands the capability of the lathe.

TAILSTOCK RISER BLOCK, P/N 1292

(See Figure 42.) For those customers interested in turning larger diameters between centers, the tailstock riser block will raise the tailstock to correspond with the spacer block

SHERLINE Machine and Accessory Packages

NEW!

Save money when you buy as a package deal!



Sherline's Ultimate Machine Shop Package...Set up a complete machine shop with just one purchase!

Buying tools as a package offers two advantages. First, we have made it easier by helping you with the selection of the most important items when setting up a shop. In addition, we have reduced the price of each package to save you some money compared to buying all the items individually. (Accessories are prepackaged for shipment, so we cannot make substitutions at the discounted price. Additional accessories may be purchase separately.)

The opposite page shows some of the lathe and mill packages available. The Ultimate Machine Shop package shown above includes our long bed lathe and deluxe mill plus all of the most important accessories most people choose when setting up a shop. The package can also be purchased with the 8-direction Model 2000 mill in place of the 5400-series mill. Here is what you get in the package:

Machine Tools

- P/N 4400/4410 3.5" x 17" lathe (See page 10)
- P/N 5400 deluxe mill (See page 28) or P/N 2000 8-direction mill (See page 29)

Lathe Accessories

- 1040 3.1" 3-Jaw self-centering chuck
- 1069 3/8" Jacobs drill chuck and key w/ #0 and #1 Morse arbors and drawbolt
- 1074 Steady rest
- 1191 Live center
- 3002 Cutoff tool and holder
- 3007 3-piece 1/4" HSS cutting tool set (RH, LH, Boring)

Mill Accessories

- 1297 Headstock spacer block (with 5400/5410 mill only)
- 3013 Step block hold-down set
- 3052 Fly cutter with 1/4" brazed-tip carbide cutting tool

- 3054 Boring head, inch (P/N 3049 metric boring head with metric orders)
- 3060 3-piece mill collet set w/ drawbolt
- 3063 Boring tool (5/16" min. hole, 1" max. depth)
- 3072 1/4" Jacobs drill chuck and key w/ #1 Morse arbor and drawbolt
- 3079 3/8" End mill holder
- 3551 Milling vise
- 3700 4" Rotary table
- 3750 Tilting angle table
- 7400 6-piece 3/8" shank double-ended, 2-flute end mill set

Save \$166.00 by buying as a package!

Other Accessories

- 3020 Sherline 5/32" hex T-driver
- 3021 3-piece center drill set
- 5327 Sherline Accessories Shop Guide accessory instruction book (186 pages)
- 5330 Safety glasses

P/N 6000 (inch) or P/N 6010 (metric)—Ultimate Machine Shop Package with P/N 5400/5410 mill

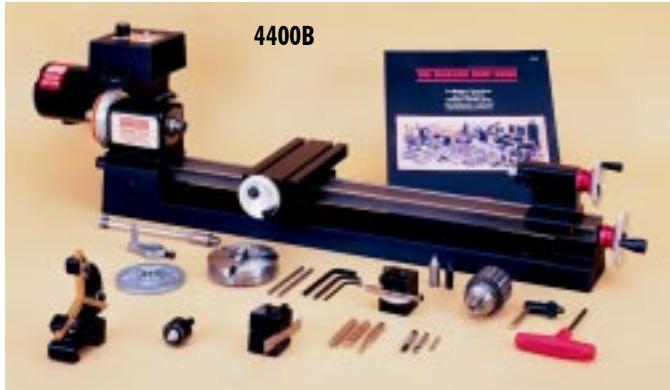
P/N 6200 (inch) or P/N 6210 (metric)—Ultimate Machine Shop Package with P/N 2000/2010 mill

(Note: The P/N 1297 headstock spacer block is not included with 2000/2010 mill, as the ram design offers adjustable throat distance, making it unnecessary.)

MORE SHERLINE MACHINE AND ACCESSORY PACKAGES

For many years Sherline's most popular seller has been the lathe "A" package that include a 3-jaw chuck and a tailstock drill chuck. 4000-series lathes come with a 2.5" 3-jaw chuck and a 1/4" drill chuck. 4400-series lathes come with a 3.1" 3-jaw chuck and a 3/8" tailstock chuck. (For more on the lathes and "A" packages, see pages 9 and 10.) We have now augmented these packages with a "B" and a "C" package for the lathes and an "A" package for the mills. The additional packages are detailed below.

Lathe "B" and "C" Packages...



Lathe "B" and "C" packages include your choice of Model 4000/4100 3.5" x 8" lathe or deluxe 4400/4410 3.5" x 17" lathe and the following accessories:

"B" Packages Include:

- 3-Jaw chuck (2.5" with 4000-series lathes, 3.1" with 4400-series lathes)
- Tailstock drill chuck (1/4" with 4000-series lathes, 3/8" with 4400-series lathes)
- 1074 Steady rest
- 1191 Live center
- 3002 Cutoff tool and holder
- 3007 3-piece 1/4" HSS cutting tool set (LH,RH, Boring)
- 3020 5/32" Sherline hex T-driver
- 3021 3-piece center drill set
- 5327 *Sherline Accessories Shop Guide* book (186 pages, B/W)

4000B/4100B (3.5" x 8" lathe) Save \$65.00

4400B/4410B (3.5" x 17" lathe) Save \$75.00

"C" Package includes all the above PLUS:

- 1270 Compound slide
- 3100 Thread cutting attachment

4000C/4100C (3.5" x 8" lathe) Save \$75.00

4400C/4410C (3.5" x 17" lathe) Save \$85.00

Milling Machine "A" Packages..



Mill "A" packages include your choice of 5000-series, 5400-series or 2000-series mill and the following accessories:

"A" Packages Include:

- 1072 1/4" drill chuck with key, arbor, drawbolt
- 3013 Step block hold-down set
- 3020 5/32" Sherline hex T-driver
- 3021 3-piece center drill set
- 3052 Fly cutter with 1/4" carbide cutting tool
- 3060 3-piece mill collet set with drawbolt
- 3079 3/8" end mill holder
- 3551 Milling vise
- 5327 *Sherline Accessories Shop Guide* book (186 pages, B/W)
- 7400 6-piece, 3/8" shank, double-ended, 2-flute end mill set

5000A/5100A (Standard mill with 10" base) Save \$45.00

5400A/5410A (Deluxe mill with 12" base) Save \$50.00

2000A/2010A (8-direction mill with 14" base) Save \$50.00

Looking for metal in small quantities or projects to build?
Find a list of suppliers at www.sherline.com/resource.htm.

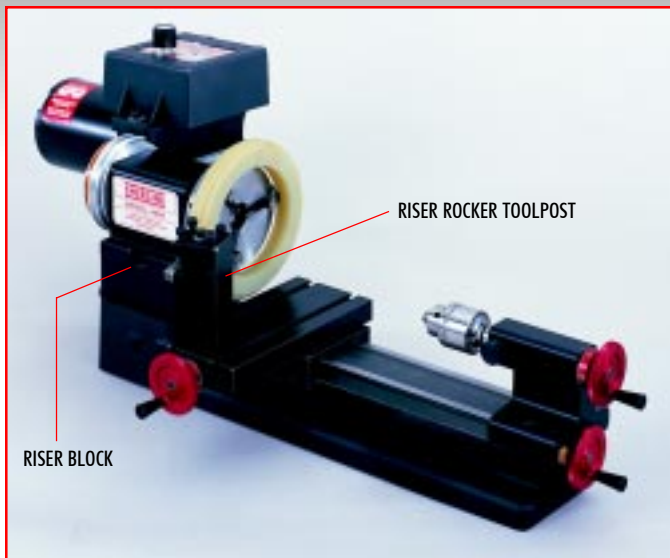


FIGURE 41—Larger parts up to 6" (152mm) in diameter can be turned on the lathe using the spacer block kit shown above.

kit (P/N 1291), allowing you an additional 1-1/4" (31.73mm) of clearance. The tailstock riser block is dovetailed to allow movement on the bed for holding various lengths of stock between centers.



FIGURE 42

STEADY REST RISER BLOCK, P/N 1290

(See Figure 43.) The steady rest (P/N 1074) can be used with the riser blocks in place by using the steady rest riser block to raise it to the same height as the headstock and tailstock. An example of where it might be used would be in turning a large diameter part that has a long shaft that needs to be steadied to keep it from wobbling.

FIGURE 43

NEW! CUTOFF TOOL RISER BLOCK, P/N 1296

(See Figure 44.) This accessory is not meant to imply that you can part off large stock, but many people leave their riser blocks in place when doing operations on small diameter stock, and this accessory allows you to use the cutoff tool without removing the riser blocks. It is used on the "back" side of the part with the blade upside down to reduce "chatter". The extra wide base adds to stability. (Cutoff tool and holder P/N 3002 are shown but sold separately.)



FIGURE 44

FIGURE 45

SPUR DRIVER, P/N 3035

(See Figure 45.) The spur driver is used in the headstock to drive wood when turning between centers, rather than using the 3-jaw chuck.



WOOD TOOL REST, P/N 3038 and P/N 3047

(See Figures 46 and 47.) The Sherline lathe is used by many hobbyists to turn wooden parts. In wood turning, the chisel-like tool is held by hand rather than in a tool holder as is used to cut metal. These adjustable 3" and 5" rests are placed near the work, and the cutting tool is rested on and moved across their surface to cut wood. The design of the

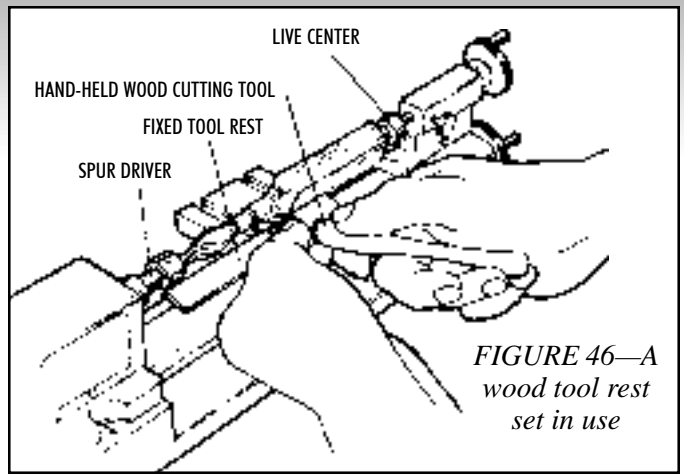


FIGURE 46—A wood tool rest set in use

tool rest support system allows great flexibility in adjustment for position. Socket head screw and T-nut fasteners are included for mounting the base to the crossslide.

By special request from a number of our wood turning customers, we offer a set of wood tool rests with extended bases (P/N 3047). These are designed to accommodate the additional height needed when using riser blocks (P/N 1291 and 1292) to work on larger diameter parts.



FIGURE 47—P/N 3038 3" and 5" tool rests and base

TOGGLE SWITCH DUST COVER, P/N 3015

(See Figure 48.) Working with brass or wood often generates a very fine dust that can work its way into the toggle switch, eventually causing the possibility of it working erratically or even shorting out. This special nut with a built-in seal replaces the standard mounting collar nut on the speed control on/off switch. The soft silicon collar slips over the head and shaft of the toggle switch and seals out fine dust to keep the inside of the switch as clean as new for years of reliable operation. This is an easy and inexpensive way to avoid possible headaches later on.



FIGURE 48

"Presently, I own a Sherline lathe and vertical milling machine. They are very versatile in every machining aspect and small enough to be kept in cupboards. Thank you, my hunt for a good compact lathe/mill machine is over."

S. Wan
Singapore

A CONTEST FOR MINIATURE MACHINING PROJECTS

Each April Sherline sponsors a contest called the "Sherline Machinist's Challenge". Entry is free and prize money is awarded. A special award is available for novices. Call or visit our web site at www.sherline.com/challen.htm for rules and an entry form.

KNURLING TOOL HOLDER, P/N 3004

(See Fig. 49.) Sherline's knurling system can add that "professional" look to your parts. Knurls are embossed into the surface of a part rather than cut. Straight knurls are often used on the end of a shaft that is to be pressed into another part. Straight or diamond knurl patterns are used to provide better grip on handwheels and thumbscrews.



FIGURE 49—Sherline knurling tool holder

The holder consists of a right and left side that evenly tighten down on your part, creating a knurled pattern. The holder is supplied with one set of spiral knurls that creates a diamond pattern. Other size knurls for diamond or straight patterns are also available as options. The tool will handle diameters up to 1" (25mm).

55° NEGATIVE RAKE INSERT TOOL HOLDER, P/N 7610

(See Figure 50.) If you have trouble grinding good tools or if you choose to work with difficult materials such as stainless steel, this tool holder will bring a great deal more enjoyment to your machining. Manufacturing it from 7075



FIGURE 50—Negative rake insert tool holder

aluminum, which is approximately twice as hard as regular T6 aluminum, insures a long life for the holder. The carbide insert is designed in such a way that it cuts like a positive rake cutter. Positive rake cutters don't require as much rigidity as negative rake cutters. This type of design allows the advantages of a negative rake cutter (four cutting edges per insert) without requiring the rigidity that can't be found in smaller, bench-type lathes.

Carbide cutters give good finishes on hard-to-machine materials such as cold rolled steel. (They will also work on aluminum, brass or leaded steels, and will last practically forever; however, the best finishes on those materials are still achieved with a good, sharp high-speed steel tool.) The holder comes with one four-sided carbide insert. Replacement cutters are available from Sherline (P/N 7612) as well as from other sources. Though not inexpensive, when you consider you are getting four cutting tools in one and are saving a lot of time in tool sharpening, it is really a pretty good deal.



FIGURE 51—The chip guard works on both the lathe and the mill to help keep your work area cleaner.

It is not recommended as a replacement for safety glasses, but rather as an additional safety feature. It also helps keep your work area cleaner by containing chips in a smaller space. If you work on your kitchen table, this accessory will be greatly appreciated by your family.



FIGURE 52—Once your machine is cleaned up, a fitted vinyl cover will help keep it that way until the next use.

LATHE DUST COVER, P/N 4150 (15"), P/N 4151 (24")

(See Figure 52.) Fitted 6-mil vinyl dust covers are available for the two different size lathes. They extend the life of your machine and keep it looking like new by keeping it clean and dust-free when not in use. The clear covers have a red Sherline logo printed on them. Add a professional touch to your workshop with these fitted covers.



FIGURE 53—Sherline offers arbors and adapters to add versatility to existing jeweler's lathes that take 8.0 mm and 10.0 mm "D" collets.

ATTENTION WATCHMAKERS AND CLOCKMAKERS...

(See Figure 53.) Sherline makes a number of accessories to make your job easier. Shown above are some of the chuck arbors, gear-cutting arbors and 10.0 mm collet pot chucks. In addition, we offer a selection of WW collets, a tailstock WW collet adapter (See Fig. 27, page 19) as well

as adapters that allow you to use our 3- and 4-jaw chucks on your jeweler's or watchmaker's lathe. Take advantage of the versatility of the Sherline system of tools and accessories. If you're looking for a new lathe or ways to make your old lathe more versatile, check out all that Sherline has to offer.

NOW AVAILABLE: 8.0 mm and 10.0 mm collet-to-live center adapters for your watchmaker's lathe. 8.0 mm—P/N 2106, 10.0 mm—P/N 2107.

W.R. SMITH T-REST, P/N 2110

(See Figure 54.) A T-rest is used by watchmakers to support a handheld cutting tool called a "graver". World-renowned watch- and clockmaker, William R. Smith has designed a T-rest especially for the Sherline lathe. It is of solid steel



FIGURE 54—The W.R. Smith T-rest turns your Sherline lathe into a first class clockmaker's lathe. The T-rest supports a handheld "graver", the traditional metal turning tool of watch- and clockmakers.

construction and clamps to the lathe's bed in seconds. If you are interested in watch or clock repair or construction but wanted a tool system more versatile and less expensive than a jeweler's lathe, this T-rest makes a Sherline lathe a most attractive choice.

DIGITAL READOUT/RPM GAGE FOR THE LATHE, P/N 8200

(See Figure 55.) A digital readout is now available to read the position of the two lathe axes while also providing continuous RPM readout. It allows you to read the position of the leadscrew and crossslide to three and one-half decimal places (.0005") and either axis can be reset to a zero reading at any time with the push of a button. Now you can dial in dimensions larger than .050" (1mm) without having to keep track of the number of handwheel rotations. If you use your lathe as a mill with the vertical milling column attachment, you can purchase a 3-axis DRO kit. If you add a 2-axis DRO to your lathe now and later purchase a vertical milling column, you can purchase a kit to add the third DRO handwheel and sensor at that time. New lathes can be ordered with the DRO already installed. See page 32 for more details on the similar DRO for the mill.

As a cost-saving measure, accommodation has also been made for owners of both a lathe and mill to use a single electronic display box for both machines. The input cables from the lathe can be unplugged and the readout box transferred from the lathe to the mill and vice versa. Depending on which machine you already have fitted with a DRO, ask for the upgrade for the other machine that allows you to use your existing box.

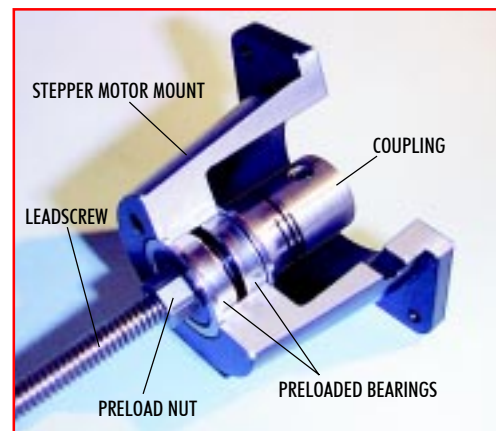


FIGURE 55—The digital readout indicates table position to within .0005" (.01mm) and also reads out spindle RPM.

CNC-READY LATHES

(See Figure 56.) For years, Sherline lathes have been retrofitted by various companies to add CNC controls. Rather than providing different hole patterns and mounts for each company, Sherline has now standardized the CNC mount by introducing our own design. Lathes and mills can now be purchased CNC-ready from Sherline or they can be purchased as complete, turnkey units with software, controllers and stepper motors from a number of suppliers. See our web site for a list of CNC suppliers.

If you are capable of building your own CNC system, any Sherline machine can also be ordered "CNC-ready" by simply adding the letters "CNC" to the end of the part number. For example, a CNC-ready model 4400A lathe would be P/N 4400A-CNC. All accessories and handwheels that would normally come with that machine are included, but they are configured with stepper motor mounts on the crossslide and leadscrew, ready for your stepper motor and controls. The mounts feature a flexible coupler that is connected to the leadscrew through two ball bearings that are preloaded to eliminate play. Whether you buy a machine directly from us or from one of our CNC suppliers, this new system offers a solid, high quality mount.

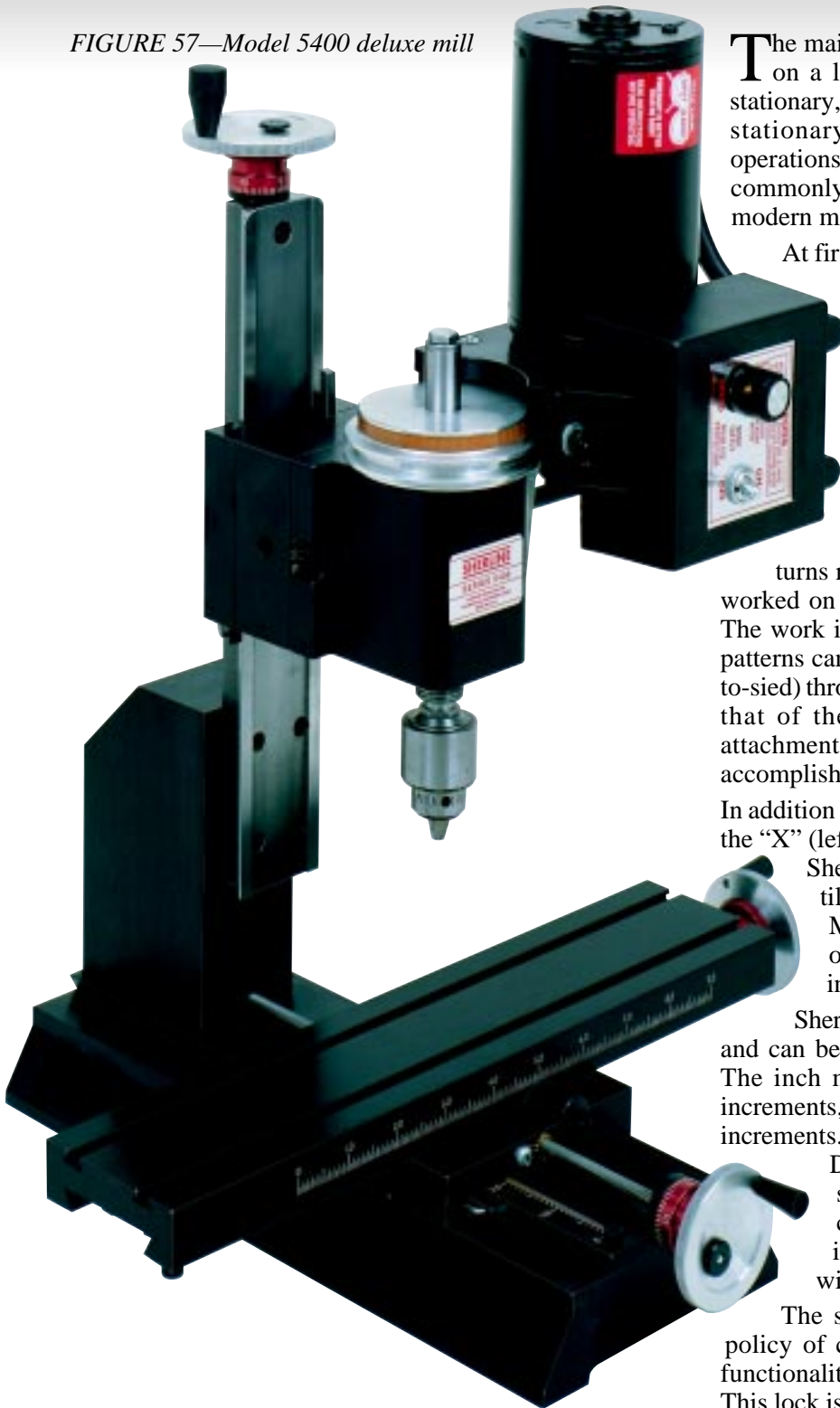


NOTE: CNC-ready machines require the installation of a dual-shaft stepper motor to which a handwheel is mounted before they can be operated manually.

FIGURE 56—A cutaway of the Sherline 23 size stepper motor mount shows the two ball bearing races. On the leadscrew end is a preload nut that allows you to eliminate end play in the bearings. On the other end is a dampened coupling that attaches to the shaft of the stepper motor.

SHERLINE VERTICAL MILLING MACHINES

FIGURE 57—Model 5400 deluxe mill



The main difference between a lathe and a mill is that on a lathe, the work turns and the cutting tool is stationary, while on a mill, the tool turns and the work is stationary. Because of the tremendous number of operations that can be performed on a vertical mill, it is commonly regarded as the most important tool in the modern machine shop...the workhorse of the industry.

At first glance, a vertical mill looks similar to a drill press, but there are some important differences; such as, a spindle that can take side loads as well as end loads and an accurate method of moving the work in relation to the spindle on all three axes. Sherline milling machines can perform all of the tasks and operations that a large commercial machine can perform. Operations such as fly cutting, precision drilling and boring are all routine tasks for the Sherline mill. Because the tool turns rather than the work, much larger parts can be worked on in a mill, and these parts need not be round. The work is securely held, thus extremely accurate hole patterns can be drilled or bored. The longer X-axis (side-to-side) travel also increases the machine's versatility over that of the lathe with the vertical milling column attachment. It is an extremely rigid, accurate tool that accomplishes tough machining jobs with ease.

In addition to the basic three axes of movement, known as the "X" (left/right), "Y" (in/out) and "Z" (up/down) axes, Sherline mills also offer a headstock that can be tilted to either side to mill angled surfaces. The Model 2000 mill offers four additional directions of adjustment for those who wish the ultimate in flexibility. (See Figure 60 on next page.)

Sherline milling machines are offered in four models and can be purchased in either inch or metric versions. The inch models have their feeds calibrated in .001" increments, while the metric model is calibrated in .01mm increments. The machines are equipped with a high-torque DC motor with variable speed control. This speed control is internally equipped with a converter that automatically adjusts between inputs of 100 VAC to 240 VAC, 50-60 Hz. without loss of torque.

The saddle locking lever is typical of Sherline's policy of constantly striving to improve the accuracy, functionality and value of our machines. (See Figure 58.) This lock is standard on all new mills and vertical milling columns. In keeping with our goal to make all accessories and improvements compatible with existing machines, any older Sherline mill can be upgraded to add the new saddle lock by purchasing upgrade kit P/N 4017U, which includes the locking lever and a new saddle nut.

The differences between the various models of the standard, deluxe and multi-direction mills are described in the following pages.



FIGURE 58—The saddle locking lever provides a positive lock for the Z-axis and is standard on all new (non-CNC-ready) Sherline mills.



FIGURE 59—Model 5000 mill

MODEL 5000 VERTICAL MILL (INCH)
MODEL 5100 (METRIC)

(See Figure 59.) The 5000-series mills feature a solid 10" (254mm) aluminum base, precision machined dovetailed slides with adjustable gibs, permanently lubricated spindle bearings, adjustable preload anti-backlash feed screws on the X-

and Y-axes, two 1-5/8" (41mm) laser engraved aluminum handwheels, one 2-1/2" (63mm) laser engraved handwheel with thrust bearings, Z-axis locking lever and many other features found only on the best commercial machines. This

All Sherline mills are now available "CNC-ready" with stepper motor mounts. Mills can also be ordered with Digital Readouts installed. See pages 32 and 42 for details.

milling machine, along with a Sherline lathe, will enable you to complete almost any appropriately sized job in your own machine shop.

MODEL 5500 VERTICAL MILL (INCH)
MODEL 5510 (METRIC)

The model 5500/5510 comes equipped with the same features and standard equipment as the model 5000/5100 but with the addition of upgraded adjustable "zero" handwheels. A 2" (51mm) adjustable "zero" handwheel is provided on the X- and Y-axes, while a 2-1/2" (63mm) adjustable "zero" handwheel with ball bearings is featured on the Z-axis column.

MODEL 5400 DELUXE VERTICAL MILL (INCH)
MODEL 5410 (METRIC)

(See Figure 57, page 28.) The deluxe 5400-series mills come equipped with all of Sherline's standard features upgraded to include a laser engraved 12" (305mm) solid aluminum base for 2" or additional Y-axis travel, laser engraved scales on the table and base, 2-1/2" (63mm) adjustable "zero" handwheel on the Z-axis and 2" (51mm) adjustable "zero" handwheels on the X- and Y-axes, a mill headstock spacer (P/N 1297) to provide more throat distance and a 1/4" drill chuck and drawbolt (P/N 3072).

MODEL 2000 8-DIRECTION VERTICAL MILL (INCH)
MODEL 2010 (METRIC)

(See Figure 60.) The 2000-series 8-direction mill was designed to take Sherline tools into the 21st century. Patterned after the movements of the industry standard for full-size mills, the Bridgeport® mill, the column has been redesigned to offer four additional directions of movement compared to other Sherline mills. A modified rotary column attachment allows the Z-axis column to tilt from side to side up to 90°. A laser engraved angle scale makes setting the tilt angle easy. As on the rotary column,

a clamping ring design locks the column securely at the desired angle. On the back side of this special rotary column attachment is a knuckle that

allows the top of the Z-axis column to be tilted either toward or away from the operator. Laser engraved scales indicate movement up to 90° in either direction on this axis.

In addition to the side-to-side and fore/aft tilt movements, the new column base offers a center pivot lock that allows the ram to be moved both in and out as well as swung from side to side. In/out travel is 5.50" and side-



FIGURE 60—Model 2000 8-direction mill

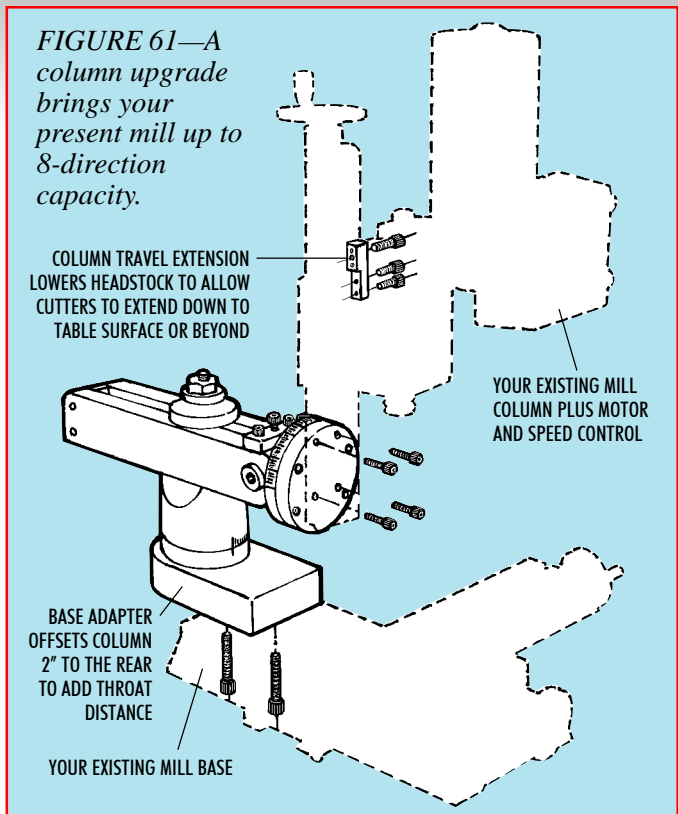
to-side motion is indicated by laser engraved scales showing up to 90° of movement either way. These four movements are in addition to the standard mill's X-, Y-, Z-axis travel and headstock rotation movement, giving a total of eight directions of movement or tilt. This much versatility puts the Sherline model 2000 mill in a class by itself in this size range. It is a fully functional shop mill that fits on a tabletop and stores on a closet shelf. When used with accessories like the tilting angle table and rotary table, the machining possibilities of the mill are limited only by part size and the extent of your imagination.

The 2000-series mill base has been extended an additional 2" over the Model 5400/5410, extending the Y-axis travel to 7.0" (178mm). This was done to accommodate the pivoting mechanisms and to take advantage of the increased arm movements. Like the deluxe Model 5400/5410 mills, all handwheels are resettable to zero at any time.

The 8-direction mill includes the same laser engraved scales on the base and table as the 5400-series deluxe mill package. Also included is a 1/4" Jacobs drill chuck and key. (The headstock spacer block is not included on the 2000-series mill, as the ram travel makes it unnecessary.)

**8-DIRECTION UPGRADE FOR 5000-SERIES MILLS
P/N 5650 (INCH), P/N 5660 (METRIC)**

(See Figure 61.) If you already own a 5000-series Sherline mill, or if you purchase one now with the thought of upgrading later, an upgrade package is available to convert



your mill to an 8-direction mill when you feel its additional capabilities would be useful for your projects. Included is an adapter base and all necessary attachment screws. Also included is the column travel extension that allows the headstock to be brought down closer to the table.

MILLING ACCESSORIES

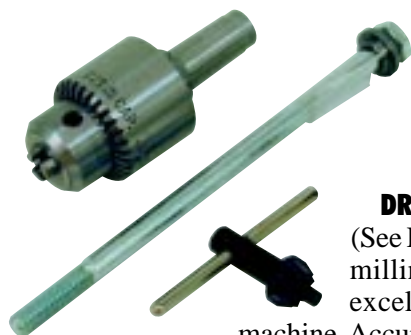


FIGURE 62—Drill chuck, drawbolt and key

(Included with 5400-series and 2000-series mills)

DRILL CHUCK, P/N 3072

(See Figure 62.) The Sherline milling machine makes an excellent precision drilling machine. Accurate positioning on both

the X- and Y-axes provides a simple way to locate holes, and, although the standard Sherline mill does not have a quill feed, the Z-axis feed screw does give you micrometer accuracy for depth control. The drill chuck is similar to the tailstock chuck used with the lathe in that it is a 1/32" (.79mm) to 1/4" (6.35mm) Jacobs chuck mounted on a #1 Morse arbor. The arbor has been drilled and tapped for a drawbolt, which prevents the arbor from working loose during use. The Sherline drill chuck comes complete with key, #1 Morse arbor, drawbolt and thrust washer.

A 5/32" Jacobs drill chuck is also available for use in the mill. P/N 1010 has a #1 Morse adapter pressed in and includes a drawbolt and washer. It is capable of holding drills as small as #80. (See photo of chucks on page 13.)

NOTE: These chucks are NOT designed for lateral loads and should not be used for holding end mill cutters. End mills should be held in a collet or end mill holder.

**BORING HEAD, P/N 3054 (Inch),
P/N 3049 (Metric)**

(See Figure 63.) It is hard to say what is the most important accessory for a milling machine. It really depends on the type of work you want to do, but certainly the boring head must rank highly in importance for any shop. What makes it so important is

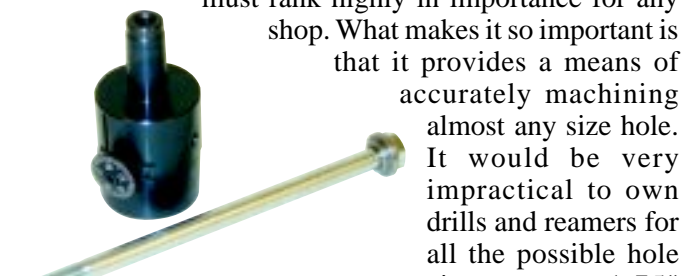


FIGURE 63—Boring head and drawbolt

that it provides a means of accurately machining almost any size hole. It would be very impractical to own drills and reamers for all the possible hole sizes up to 1.75" (44mm) in diameter. Another point to consider is the fact that larger diameter drills and reamers could not be adapted to fit on a miniature size machine tool. They are unnecessary too, because the boring head is infinitely adjustable so it can machine all of these holes.

It is also capable of machining stepped holes for seating bearings and internal grooves for lock rings. Boring tools cut like lathe boring tools with the difference being the tool moves rather than the work.

The Sherline boring head comes complete with drawbolt, thrust washer and a hex key for making adjustments; however, the cutting tool is not included. The boring head is designed for use with standard 3/8" (10mm) diameter shank boring tools. For best results, the length of the tools should be kept to a minimum. You will find that a short tool gives you less chatter and it will be easier to hold tolerances.



FIGURE 64—Boring tools

have a 3/8" (9.5mm) diameter shank. The cutting end (P/N 3061) is designed to work in a 1/4" (6.4mm) minimum hole with a maximum depth of .600" (15.2mm). P/N 3063 is designed to work in a 5/16" (7.9mm) minimum hole with a maximum depth of 1.00" (25mm). P/N 3064 is also 5/16" minimum but has a longer 1.5" reach. If desired, they can easily be ground down to work in a smaller hole.

**BORING TOOLS,
P/N 3061, 3063
and 3064**

(See Figure 64.) These high-speed steel cutting tools are designed for use with the Sherline boring head.

**ROTARY COLUMN
ATTACHMENT,
P/N 3500**

(See Figure 65.) The headstock on the Sherline mill can be rotated so that milling cutters can be used at an angle. However, once the spindle is pivoted, it no longer aligns with the movement of the Z-axis, and the handwheel can not be used to advance the spindle for drilling.

FIGURE 65—The rotary column attachment allows angle drilling to be done on the mill.

Parts to be angle-drilled must be mounted to the table at the proper angle, which is more difficult than mounting them flat. The rotary column attachment goes between the mill column and base to allow the entire column to be rotated to any angle up to 90° in either direction. Now the Z-axis handwheel advances the spindle along its axis, allowing angle drilling to be accomplished on parts mounted square to the table. A laser engraved collar and magnifying scribe lens make it easy to set angles accurately. No additional holes are required for retrofit. (Not required on 2000-series mills or multi-direction vertical milling columns, as it is already included in those packages.)



FIGURE 66—The tilting angle table makes many interesting setups possible on the mill. It allows you to hold a part on an angle so it can be drilled or milled without taking your column out of alignment.

TILTING ANGLE TABLE, P/N 3750

(See Figures 66 and 67.) This accessory offers a great variety of setup options. With the base mounted square to the mill table, parts mounted to the tilted table can be machined or drilled at precise angles. It can be set at any angle from 0° to 90°. The hole pattern in the table accepts Sherline's mill vise and rotary table. A threaded chuck mount is also included, which means parts from the lathe can have machining operations done on them without removing them from the chuck. They can then be put back on the lathe for further operations without re-centering.



FIGURE 67—The tilting angle table P/N 3750 allows a part to be held at an angle for milling or drilling.



FIGURE 68—A Sherline mill or lathe fitted with a digital readout makes keeping track of cut and feed calculations much easier. It reads out to .0005" (.01mm) and also provides a continuous spindle RPM display.

With the rotary table mounted to the table and tilted, many additional machining possibilities are opened up. The pre-drilled and tapped hole pattern is laid out so that when the rotary table is rotated to the 90° position, its center is the same height as the rotary table tailstock. This eliminates the need for the P/N 3701 right angle attachment.

DIGITAL READOUT/RPM GAGE, P/N 8100 (Inch), P/N 8160 (Metric)

(See Figure 68.) Most full-size shop mills are available with a digital readout, and now that option is available on Sherline mills too. They are popular because they make your life as a machinist easier. Readouts on the X- Y- and Z-axes can be reset to zero at any time with the push of a button. From there, as you move the handwheels, you can read the table position to 3-1/2 decimal places (.0005") on the digital readout. (Metric versions read to .01 mm.) You no longer need to count handwheel revolutions or make difficult calculations when cranking in a negative number.

While we were designing the electronics, we went the extra step to include an RPM readout, adding an additional function to the package. The sensors are easy to install and require no modification of your Sherline mill. A two-axis D.R.O. package is also available for the lathe as P/N 8200. A three-axis package for using the lathe with the vertical milling column can be purchased, or a third axis can be added later if you add the vertical milling column to your lathe. For those with both a lathe and a mill, the electronic readout box can be shared between both machines to offer a cost savings if you buy just the additional handwheels and cables for the second machine.

MILL CUTTER ARBORS

(See Figure 69.) If you need to hold 7/8" or 1" I.D. round cutters for milling or gear cutting, these arbors are designed

to hold them on your Sherline mill. They are steel arbors turned with a #1 Morse taper and provided with a drawbolt and washer for use in the Sherline headstock spindle. Each is available in a choice of standoff lengths of 3/4" (short) or 1-3/4" (long). You can see one in use holding a gear cutter in Figure 86 on page 37.

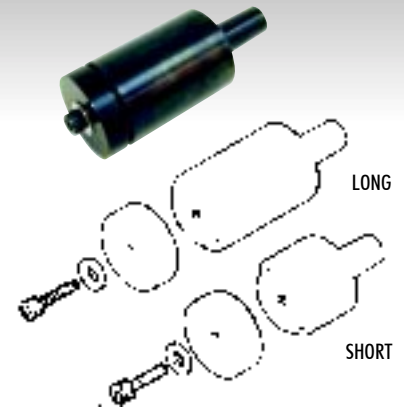


FIGURE 69—Mill arbor cutters hold 7/8" or 1" I.D. round milling cutters.

- Part numbers: 3230-7/8" (short) 3235-1" (short)
- 3231-7/8" (long) 3236-1" (long)

3/8" END MILL HOLDER, P/N 3079 (Other sizes available also)

(See Figure 70.) This easy-to-use end mill holder screws onto the threaded end of the mill spindle. End mills are held in place with a single set screw that tightens against the flat on the side of the cutter. Because of the ease of use of this type of cutter holder and the fact that it allows the use of longer or double-ended end mills, we have also made it available for 1/8" (P/N 6081), 3/16" (P/N 6080), 1/4" (P/N 6079) and 5/16" (P/N 3075) diameter cutters. For metric tools, we offer the most commonly used 10 mm end mill holder (P/N 3078) as well as 6.0 mm (P/N 3076) and 8 mm (P/N 3077) sizes.



FIGURE 70—End mill holder with Tommy bar for tightening..

In addition to end mills, special purpose cutters such as those designed for cutting key slots, dovetails and corner radii usually have 3/8" diameter shanks. The Sherline end mill holder will increase the versatility of your milling machine by enabling you to hold these popular cutters.

CAUTION! Always consider power and size limitations of your equipment when using larger cutters. You may want to reduce cutter speed.

"Your lathe has made it possible for us to complete the assembly and fabrication of many intricate parts that are critical to the function of the special machinery that we design and produce. In fact, the machine was used so much that we practically wore it out! Anyway, we are definitely satisfied with your company and its service to us. We probably will be buying the new series this year to accommodate and enhance our 'small tool' room."

Richard Proud, Engineering Company President
Illinois



FIGURE 71—Double-ended 3/8" end mills fit in the P/N 3079 end mill holder. They are available in a large variety of sizes and shapes. For strength and maximum rigidity, use the largest diameter cutter your job will allow.

3/8" END MILL SETS, P/N 7400 and P/N 7401

(See Figure 71.) Of all the end mills available to machinists, by far the most popular are those with a 3/8" shank. Because they are made and sold in great quantities, they are an economical alternative to the smaller but less often used miniature series end mills. They also offer the advantage of being double-ended, so you get twice the cutter for your money. Each has a flat on the side against which the set screw of the end mill holder is tightened to hold it in place. Sherline offers two sets of six double-ended cutters. Both sets include sizes 1/8", 5/32", 3/16", 1/4", 5/16" and 3/8". (Remember, when cutting in a pocket, the corner radius left by your cutter will be half the cutter diameter.) P/N 7400 is made up of 2-flute cutters, while P/N 7401 offers 4-flute cutters. The 2-flute cutters are recommended for softer materials like aluminum where they are less likely to become clogged. For cutting tougher metals like steel, 4-flute cutters are a good choice. Each set comes with a predrilled wooden block to protect and store your cutters.

CAUTION: Unlike a drill bit that looks similar, end mills are sharpened on the edges as well as the tip. These sharp edges demand a lot of respect when being handled and used! Also, to keep them sharp, store them in the block provided or individually protected in your toolbox.

MINIATURE END MILL SET, P/N 3080

(See Figure 72.) These small, single-ended end mills can be held in a mill collet or a 1/4" end mill holder. Their small size makes them useful where space is limited. The set is made up of the highest quality general-purpose 3-flute cutters manufactured in the miniature series. Sizes are 1/8", 3/16" and 1/4" diameter, all with 1/4" shanks. A plastic storage block is included.

End mills must run true in order to cut properly. Small end mills or miniature size end mills are very expensive and can be easily damaged if milling is attempted using a drill chuck to hold the end mill.



FIGURE 72—Miniature end mill set

Milling collets or an end mill holder are a must for proper operation of your mill!

NOTE: It is always a good idea to use cutting oil when working with end mills.

MILLING COLLETS, P/N 3060 (METRIC P/N 3090)

(See Figure 73.) Sherline milling collets are designed to be used with the Morse #1 internal taper that is standard on both the Sherline lathe and vertical mill. Because of the



FIGURE 73—Milling collets and drawbolt

shallow angle of the Morse #1 taper when the drawbolt is tightened, greater clamping force can be applied when compared to the clamping pressure of WW collets. Therefore, we recommend the use of these milling

collets for holding miniature size end mills (3/16" or 1/4" shank), #1 and smaller center drills or Dremel® bits (1/8" shank) and assorted other cutters. The Sherline milling collet set consists of a 1/8", 3/16" and 1/4" mill collets, a drawbolt and a thrust washer. (Metric sets include 3 mm, 4 mm and 6 mm sizes.) Other size collets in inch and metric sizes are also available through Sherline.

Cutting tools held by these collets must have a shank size within .001" of the manufactured size. Because of the shallow taper angle, these collets will not loosen from the spindle without backing the drawbolt off a couple of revolutions and tapping the drawbolt to free the collet.

4-JAW CHUCK HOLD-DOWN SET, P/N 3058

(See Figure 74.) This set consists of two clamps complete with screws and T-nuts and can be used to clamp the 4-jaw chuck to the milling table or lathe crossslide. The set provides a little more versatility than the chuck-to-T-slot adapter (P/N 1187) in that the chuck can be located almost anywhere on the table, and the part can be properly aligned with the axis of the machine. The clamps fit in a groove machined around the circumference of the 4-jaw chuck. They are the same as those furnished with the Sherline milling vise (P/N 3551), so they are not needed if you already own a vise.



FIGURE 74—4-jaw hold-down set

CHUCK-TO-T-SLOT ADAPTER, P/N 1187

(See Figure 75.) This simple adapter can be used with either the 3- or 4-jaw chuck and fastens the chuck securely to the milling table or lathe crossslide T-slots. It slides into the T-slot and the chuck is simply screwed down on it until it tightens against the table.



FIGURE 75

Toll Free Order Line: 1-800-541-0735
Technical Assistance: 1-760-727-5857



HOLD-DOWN SET, P/N 3012

(See Figure 76.) Sherline now offers two types of strap clamp hold-down sets. Strap clamps provide the most versatile method of clamping work to the mill table.

The basic hold-down set consists of two strap clamps complete with bolts, T-nuts, washers and a variety of lengths of socket head cap screws. These clamps are adjustable so that they can accommodate materials of

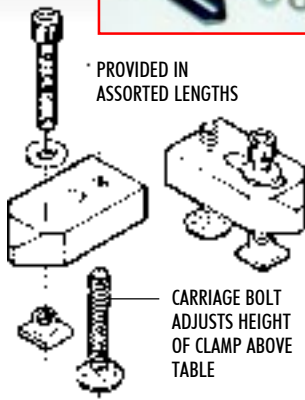


FIGURE 76

different thickness, and they can be used to hold parts of almost any shape.

STEP BLOCK HOLD-DOWN SET, P/N 3013

(See Figure 77.) This style clamp set has long been popular on full-size milling machines, and we now produce a nice set suitable for miniature machine tools. The step blocks are notched as are the back of the clamps to make it quick and easy to set your clamps to the proper height. A selection of threaded studs from 1" to 3-1/2" is provided to allow a variety of heights to be selected quickly. The nut and washer design is a nice touch too. The bottom of the nut is convex while the top of the washer has a matching concave surface. Even if the clamp isn't level, the washer will seat flat on top of it while applying even pressure. Also provided is a spare, unanodized third step block that you can cut down to make smaller size step blocks for low setups. At least one set of hold-down clamps should be considered a necessity for every milling machine owner.



Figure 77—A step block set offers a quick and versatile way to clamp parts to the mill table.

SLITTING SAW HOLDER, P/N 3065

(See Figure 78.) Jeweler's slitting saws are small, circular, metal cutting saw blades that are used for machining thin slots. The Sherline slitting saw holder is designed to mount jeweler's slitting saw blades with 1/2" diameter mounting



FIGURE 78—
Slitting saw holder
and drawbolt

holes. Sawblades are available through a large network of industrial suppliers. (See our "cutting tools price list" for sizes offered by Sherline.) The slitting saw

holder has a #1 Morse taper and mounts directly into the spindle. A drawbolt and thrust washer are also included.

NOTE: As with almost all metal cutting operations, a small amount of cutting fluid is helpful when using a slitting saw.

SHERLINE T-DRIVER, P/N 3020

(See Figure 79.) This tool is used in place of the standard 5/32" hex key that is furnished with your lathe or milling machine. The majority of adjustments on Sherline tools

and accessories are made with this size hex key. Its large black plastic handle is more comfortable and provides better leverage than the shorter standard key. Also, because of its larger size, it is easier to spot on your workbench when you want to use it. This T-driver will quickly become your most often-used tool.



FIGURE 79—The handy Sherline 5/32" hex T-driver is easy to find on your bench.

MILL XY BASE (See part numbers below)

(See Figure 80.) If you already own a vertical milling column (P/N 3050/3053, 3480/3485 or 3580/3585) for use with your lathe, but feel a sturdier base with a larger work area would be to your advantage, you may purchase the base of any of our vertical mills as an XY base. Your older

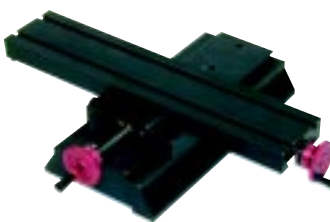


FIGURE 80—Mill XY base

vertical milling column can be returned to the factory to be remachined and used with an XY base rather than purchasing the entire vertical milling machine. (Call for price.) Vertical milling columns made after 1995 do not need to be

modified. This combination saves you the amount of money included in the cost of the vertical mill for the column, but gives you the same machine less headstock and motor/speed control. XY bases have also found their way into the industrial market and are used in various manufacturing setups. Part numbers for the available bases are as follows:

P/N 5200 (Inch) or 5210 (Metric)—10" XY base from model 5000/5100 mill. Travel: X=9.0" (228 mm), Y=3.0" (76 mm)

P/N 5220 (Inch) or 5225 (Metric)—10" XY base with adjustable "zero" handwheels from model 5500/5510 mill

P/N 5401 (Inch) or 5411 (Metric)—12" deluxe XY base with adjustable "zero" handwheels and laser engraved table and base from model 5400/5410 deluxe mill. X=9.0", Y=5.0"

P/N 5600 (Inch) or 5610 (Metric)—14" deluxe base w/ adjust. "zero" handwheels and laser engraved table and base from the model 2000/2010 8-direction mill. (Takes P/N 3580/3585 column.) Travel: X=9.0" (228 mm), Y=7.0" (178 mm)



FIGURE 81—Mill XYZ base

MILL XYZ BASE (See part numbers below)

(See Figure 81.) The Sherline vertical mill can be purchased without the headstock and motor/speed control. This allows lathe owners to swap the headstock and motor/speed control from their lathe to the mill in approximately 60 seconds. This package offers a savings of about 30% when compared to the price of our standard mill, and 10% compared to the cost of a vertical milling column and XY base.

Part numbers of the available XYZ bases are as follows:

P/N 5201 (Inch) or 5211 (Metric)—Standard 10" XYZ base from model 5000/5100 mill. Travel: X=9.0" (228 mm), Y= 3.0" (76 mm), Z=6.25" (159 mm)

P/N 5230 (Inch) or 5235 (Metric)—10" XYZ base with adjustable "zero" handwheels from model 5500/5510 mill

P/N 5420 (Inch) or 5430 (Metric)—12" deluxe XYZ base with adjustable "zero" handwheels and laser engraved table and base from model 5400/5410 deluxe mill. Travel: X=9.0" (228 mm), Y= 5.0" (127 mm), Z=6.25" (159 mm)

P/N 5625 (Inch) or 5630 (Metric)—14" XYZ base with 8-direction capability from the model 2000/2010 8-direction mill. Travel: X=9.0" (228 mm), Y=7.0" (178 mm), Z=5.38" (137 mm)



FIGURE 82—An indexing set offers an easy way to index simple hole patterns or do milling on 2, 3, 4, 6 or 8 sides.

INDEX BLOCK SET, P/N 2045

(See Figure 82.) For simple indexing jobs, we now offer a set of two blocks. Something similar to this has been around

in machine shops for years utilizing 5C collets, but we adapted this set to take all the tools and accessories that will fit the spindle of your Sherline tools. A hexagonal block allows indexing to three or six sides, and an octagonal block allows indexing to two, four or eight sides. By mounting your part on the block with a collet or chuck, the block is held in a mill vise on the table. Once located, the first operation is completed. Then the vise is loosened, the block is indexed to the next side, the vise is retightened and the next operation is completed. It is quite simple, but very effective for the most common patterns you will probably do repeatedly, such as the six flats on a hex nut. A drawbolt is available (P/N 11681) to hold WW collets in the #1 Morse taper. A 3/4-16 thread accepts Sherline chucks. Now you can do simple patterns without math and without even moving the mill table!

INDEXING ATTACHMENT, P/N 3200

(See Figure 83.) Many times a machinist is required to machine features into a part that are located in a radial rather than linear manner. Examples of such features are the flats on a nut, the teeth on a gear or the splines on a shaft. The Sherline indexing attachment is a unique design that provides an economical means of accurately rotating a part so that these kinds of features can be machined.

The attachment consists of an indexing head and a tailstock mounted on a 12" long dovetailed bed. Also included is a rack gear that is used to measure radial movement, a gear tooth cutter holder and a high-speed steel tool blank. The indexing head utilizes a spindle with a #1 Morse taper and a 3/4-16 male thread identical to the spindles on the Sherline lathe and milling machines. This enables the use of all the Sherline accessories such as the faceplate, 3- and 4-jaw chucks, Jacobs drill chuck, and centers with the indexer. A built-in mechanism detents the spindle every

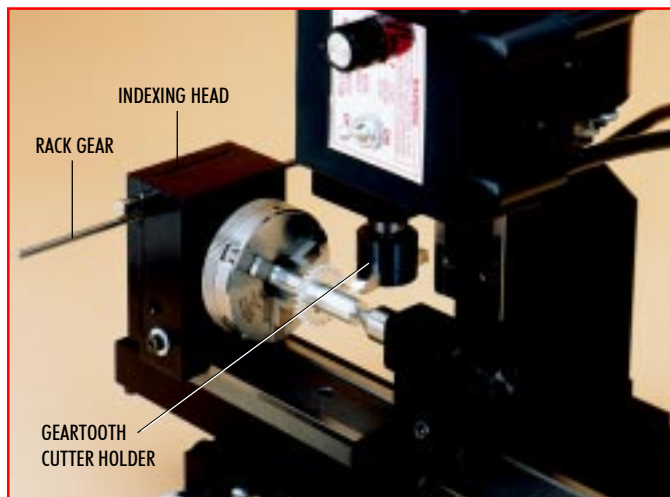


FIGURE 83—A toothed gear sprocket is being cut using the indexing attachment. The blank is being held in a 3-jaw chuck and supported at the other end by the tailstock. A special tool holder (see Figure 90), included with the indexing attachment, holds a standard 1/4" tool blank which has been custom ground to the shape required.

5°, and there is also a red laser engraved collar that indicates rotation in 1° increments. The rack gear mentioned previously provides a means of accurately positioning the spindle where positioning in other than 5° increments is required. The gear inserts into the indexing head and engages an index gear. This transfers the rotary motion of the spindle into linear motion that can be measured with the depth rod of a Vernier caliper. Simple calculations then permit accurate indexing to an infinite number of positions. The indexing attachment can be attached directly to the table of the Sherline milling machine as in Figure 83, or the indexing head can be used by itself in a horizontal position similar to a rotary table. The indexing attachment is not recommended for use on the Sherline lathe with the vertical milling column; however, with the use of shims to elevate the unit high enough to clear the crossslide handwheel, it can be done.

ROTARY TABLE, P/N 3700

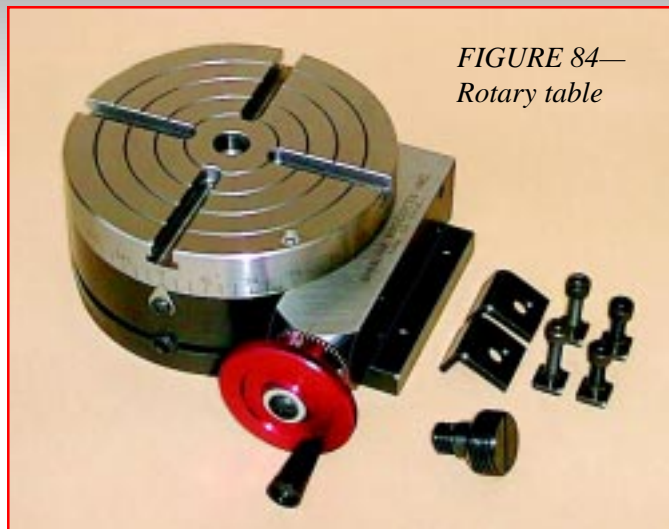
(See Figures 84, 85 and 86.) A rotary table used in conjunction with a mill allows a machinist to produce virtually any part he can design. The only limits are size, not complexity.

Sherline's rotary table is a precision piece of equipment that has been designed to work with Sherline's vertical milling machines; however, it can be used on any mill whenever the compact 4-inch size would be an advantage. The table is 2" (51 mm) high and 4" (102 mm) in diameter. The main components have been machined from solid bar stock steel, and the complete unit weighs seven pounds. The table has been engraved with a laser, giving sharp and precise lines every 5°, numbered every 15°. These lines



PROJECT: A competition robot for TV. Kritical Mass II is the second generation version of the robot that did well in competition on The Learning Channel's first "Robotica" series. The new version, sponsored by Sherline, will compete in Comedy Central's "Battlebots" series and has traveled to England to compete in the "Robot Wars" show with great success. The builder used a Model 2000-CNC Sherline mill to produce a number of the parts in the 25-pound drive units for this heavyweight machine.

Builder: Jeff Cesnik, Stephens City, VA



*FIGURE 84—
Rotary table*

are calibrated with the 72-tooth worm gear that is driven by the handwheel. The handwheel is divided into 50 parts, making each line on the handwheel 1/10°. This allows a circle to be divided into 3600 increments without interpolation. Seventy-two revolutions of the handwheel rotate the table one revolution.

The table T-slots are identical to those used on the Sherline mill and lathe, making the vast line of Sherline tooling available for use with this product. Two hold-down clamps and T-nuts are provided with the table. Also included is an adapter that allows Sherline's 3- and 4-jaw chucks to be mounted directly to the rotary table. An optional right angle attachment is available (P/N 3701) to mount the table in the vertical position to further increase its versatility. (See Figures 85 and 87.) With the table mounted vertically, an optional adjustable right angle tailstock (P/N 3702) can be mounted to the mill table. It is used to support and stabilize the other end of long work held in a chuck or otherwise attached to the rotary table. (See Figures 85 and 88.)

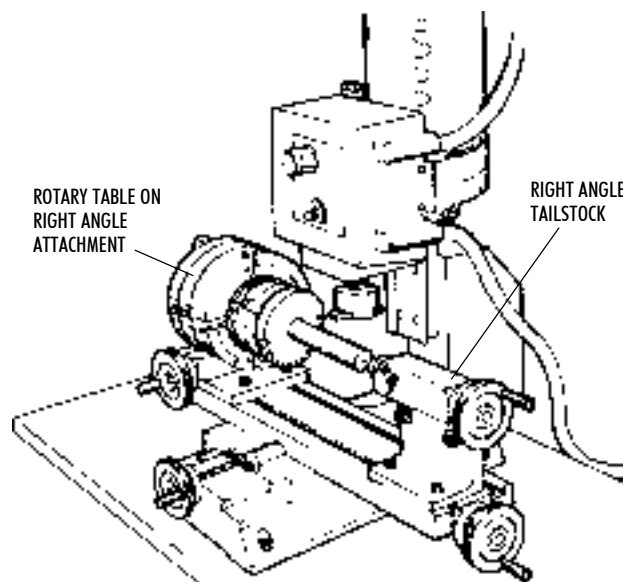


FIGURE 85 —Here is a sample setup to cut a gear using the rotary table mounted to the right angle attachment. An adjustable right angle tailstock steadies the other end of the long shaft. The teeth are being cut using a P/N 3217 gear tooth cutter holder.

Manual and CNC-ready versions

A manual version is shown here, but Sherline rotary tables can be ordered "CNC-ready" with a stepper motor mount already installed. You supply the 23 frame size stepper motor and CNC controls. Order P/N 3700-CNC.

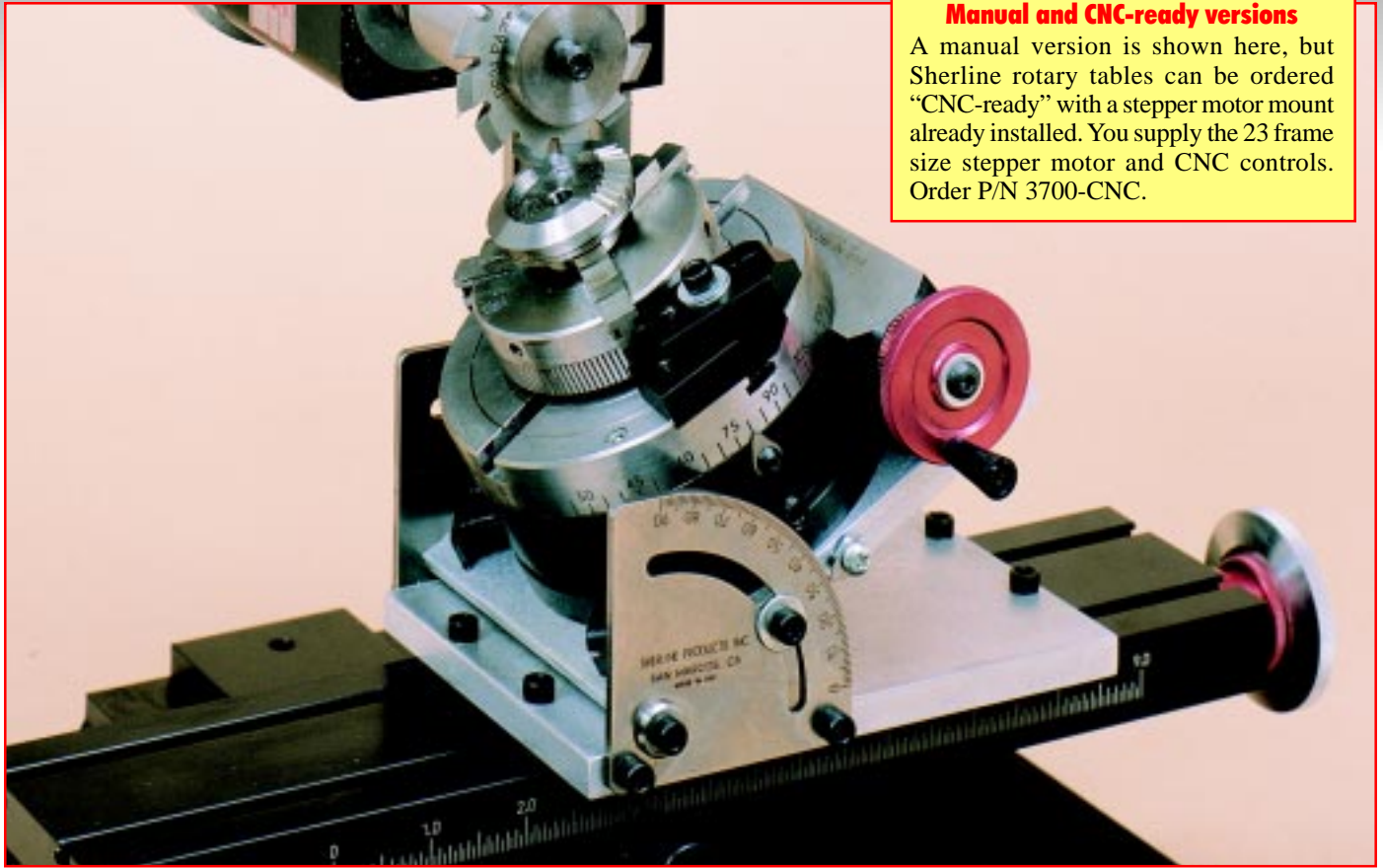


FIGURE 86—A rotary table is held at an angle on a tilting angle table (P/N 3750) to cut a bevel gear. The gear blank is held in a chuck which is clamped to the rotary table. A mill arbor in the spindle holds the specially shaped cutter. The headstock is rotated to the horizontal position using the horizontal milling attachment (P/N 6100). This setup demonstrates how accessories can be combined to produce sophisticated cuts on miniature machine tools.

The rotary table has a unique table locking mechanism that is positive and does not move the table as it is locked. To maintain accuracy and frictionless movements, ball bearings are used. Worm gears are factory greased and the drives sealed to keep out chips and dirt. An oiler is easily accessible to facilitate lubrication of the table. The appearance is instrument quality with a black oxide base, precision ground finishes and laser engraved markings.

As with all Sherline tools, the illustrated instructions are very useful. The 6-page manual covers the basics of rotary table use and takes the user through a typical project.

Any machinist who wants to take his capabilities to the ultimate levels should consider purchasing and learning to use a rotary table. The Sherline rotary table is an extremely precise and well-built piece of equipment that is sized to fit with our product line. It can also be useful on larger equipment when its compact size is called for.

RIGHT ANGLE ATTACHMENT, P/N 3701

(See Figures 85 and 87.) The rotary table is made even more versatile with the addition of the right angle attachment. This part has been designed to accurately align the rotary table in a vertical position while still maintaining rigidity.

(Note: The P/N 3750 tilting angle table can be used in place of this accessory



FIGURE 87

when tilted to the 90° position. See page 31.)



FIGURE 88

RIGHT ANGLE TAILSTOCK, P/N 3702

(See Figure 88.) The adjustable right angle tailstock supports the end of long stock held in the rotary table when it is in the vertical position. This allows you to accurately turn a part between centers. See also Figures 83 and 85 for typical examples of how it can be used.

SELF-CONTAINED CNC ROTARY TABLE INDEXER, P/N 8700

(See Figure 89.) Sherline has taken their accurate and reliable 4" rotary table into the 21st century with the addition of Computer Numeric Control. Clockmakers or anyone with a need to cut gears or other complicated radially symmetrical patterns will find this accessory takes all the headaches out of repetitive indexing operations.

You get everything you need including the 4" Sherline rotary table with installed stepper motor, microprocessor unit with numeric input keypad, 115 VAC power source and all necessary connecting cables. Operation is very simple. After entering the number of steps per revolution (or the number of degrees per step) on a simple numeric keypad, the table advances quickly and precisely to the next position at the touch of a single advance key. If an error is made, previous positions can be accurately recalled



FIGURE 89—For complex indexing jobs Sherline's 4" rotary table is the perfect platform for the application of CNC controls. Included is a programmable input unit that contains its own microprocessor, keypad and power supply.

by hitting another key. Basic resolution is 28,800 steps per revolution, $\pm 0.006^\circ$ per step. This allows the accurate machining of items like gears with odd numbers of teeth. Computations are made internally to a high degree of accuracy to avoid cumulative errors.

The CNC rotary indexer is a stand-alone unit. You get everything you need to make complex indexing jobs easy. In addition, the unit can be connected to an existing CNC control to act in conjunction with that system. An input signal triggers the programmed function. When it is complete, it signals back to continue the program. The unit can also be "daisy chained" with other units to trigger sequential actions. As with all Sherline accessories, complete instructions are included.

Rotary Indexer Specifications

Rotation speed—1°/sec to 50°/sec maximum (programmable)
 Resolution—28,800 steps per revolution ($\pm .006^\circ$ per step)
 Backlash compensation—Programmable
 Stepper motor—100+ oz-in, 400 steps per revolution
 Power supply—Input: 115 VAC 50/60 Hz, Output: 24V, 1 Watt

GEAR TOOTH CUTTER, P/N 3217

(See Figure 90.) The gear tooth cutter is included with the purchase of the indexing attachment and can also be purchased separately. It looks much like a small fly cutter and includes a 1/4" high-speed steel tool blank that you

can custom grind to the particular gear tooth shape you need. Figures 83 and 85 show the cutter in use in conjunction with the indexing attachment and rotary table. The #1 Morse taper on the shaft is held in the

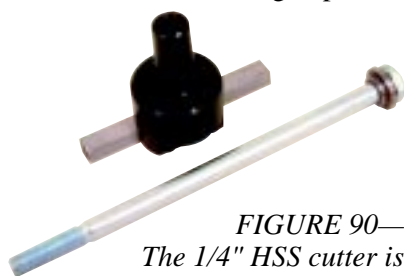


FIGURE 90—The 1/4" HSS cutter is custom ground to cut your desired gear tooth shape.

spindle with a drawbolt and thrust washer. This is an economical alternative to round commercial gear cutters.

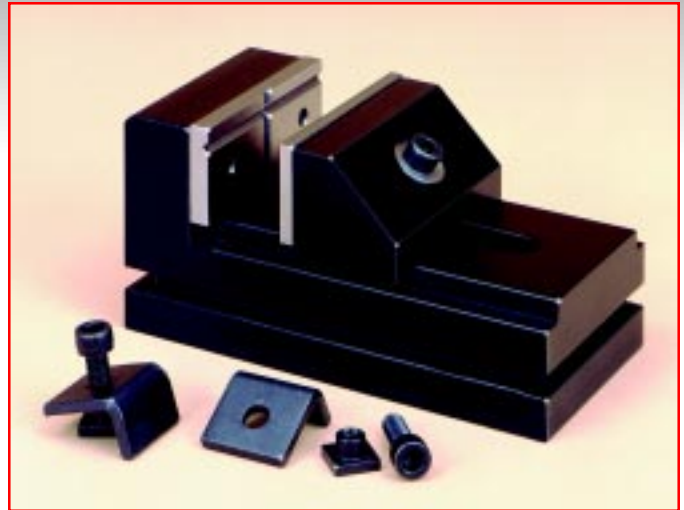
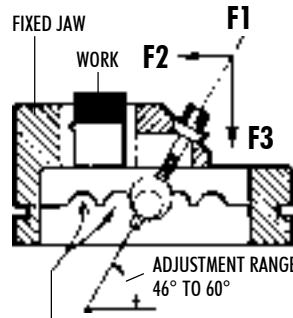


FIGURE 91—The Sherline mill vise and hold-downs.

MILLING VISE, P/N 3551

(See Figures 91 and 92.) The most convenient way to hold small parts for milling is with the milling vise. Milling vises are different from other machine vises in that they



APPROXIMATE ADJUSTMENT SLOTS

FIGURE 92—Vise pull-down feature. Tightening in direction F1 produces forces to both hold the part (F2) and keep the jaw from lifting (F3).

are designed to hold the movable jaw down while clamping, eliminating any chance for the jaw to lift. A cheap drill press vise is almost useless on a milling machine, because it can't be accurately aligned with the machine.

The Sherline milling vise is sized just right to be the perfect working companion to the Sherline milling machine. The jaws are 2.00" (50.8 mm) wide by 1.00" (25.4 mm) deep and open a full 2.00" (50.8 mm). The fixed jaw has both a horizontal and vertical "V" groove to facilitate holding

round bar stock. The vise includes two clamps for use in attaching it to the milling machine. These clamps are the same as the 4-jaw hold-down set (P/N 3058).

ROTATING MILL VISE BASE, P/N 3570

(See Figure 93.) When mounting the mill vise to the table, this base will allow the vise to be rotated to any angle. The red anodized base is laser engraved with angle measurements in 1° increments all the way around. A

"My steam engines are machined from castings to a tolerance of .0005". They are not toys, but precise machines... it requires a precision tool to do this—Sherline does it best—for far less than the \$2000 to \$5000 industrial machines. Sherline is compact and portable as well. An added bonus is the accessory line available for special jobs."

James Horvath, M.D.
Ohio

Visit www.sherline.com/new.htm to find new accessories added since this catalog was printed.

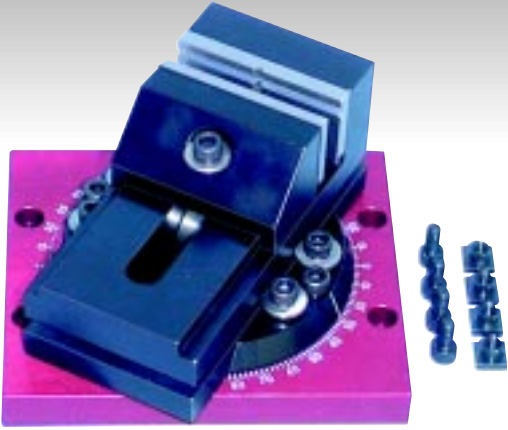


FIGURE 93—The rotating vise base provides a way to pivot the vise on an arc or in a circle for drilling hole patterns or milling flats.

witness mark is engraved on the side of the rotating collar that holds the vise. The locking washers can be loosened, which allows the vise to slide forward and back in the fixture for further adjustment. A locking ring underneath pulls the collar down onto the base to lock it securely when the two hold-down screws are tightened. The low profile tooling plate base only raises the height of the vise 1/2". Four T-nuts and hold-down bolts are included.

The rotating vise base eliminates clamping and unclamping the vise to produce angles. Once mounted square to the table, the vise can be positioned using the laser engraved protractor scale as a guide for setting the angle. Properly positioned, the rotating base can even be used as a simple rotary table to drill small radial hole patterns or to machine repetitive flats.

If you do not already have a vise and are considering purchasing both a vise and a rotating base, they can be purchased together at a price that offers a savings compared to buying the two individually. The part number for the vise and base together is P/N 3575.

HORIZONTAL MILLING CONVERSION, P/N 6100

(See Figures 94, 95 and 96.) An easy way to increase the size of work that can be machined on your Sherline mill is the addition of the horizontal milling conversion. By

allowing the vertical column to be mounted in various positions in relation to the table, and with the headstock and spindle rotated 90° into the horizontal position, a tremendous variety of machining possibilities are opened up. Plus, the mill can remain

mounted to the conversion base and still operate in its conventional vertical mode as well, providing a very sturdy and vibration-free base.

With the work mounted perpendicular to the table, position "A" (Figure 95) allows an area of up to 9" by 6" to be

machined without moving the work—a very large work area for a machine of this size! (The right angle attachment, P/N 3701 can be very useful for this purpose.) A second set of holes allows the spindle to be moved further back so longer tools such as drills or a boring tool can be used. In position "B" (Figure 96), the table is reversed and the column rotated 90° to the table to take advantage of the long X-axis travel (which becomes the Y-axis in this configuration). This position could offer an advantage when drilling a deep hole, for example.

A 3/4" thick sheet of aluminum 10-1/2" by 12-1/2" is machined and drilled to accept the base on your mill's vertical column. The headstock is rotated 90°, and the unit is remounted to predrilled holes in various positions on the conversion plate. The mill's vertical column base should be modified by cutting off 2" from its height to lower the spindle in relation to the table.* (Machines made prior to 1993 will also require a 90° keyway on the Saddle.) This allows the spindle center to go below the top of the table, meaning you can machine the edge of material overhanging the table. The cutoff piece from the column is machined flat and re-tapped to be used as a spacer block to return the mill to its normal height.

*Instructions are provided for you to make this modification yourself if you already have a cutoff saw and a mill you can use, or we can make the modification for you if you return your vertical column to us. Call for pricing and details. The modification is listed as P/N 6101.

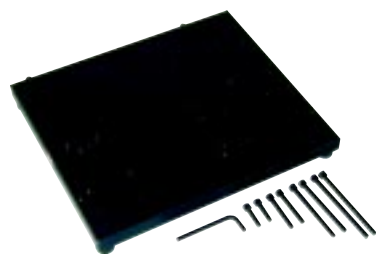
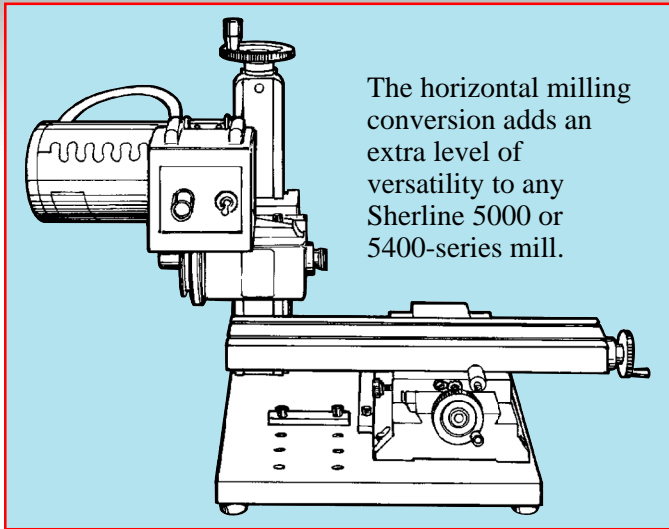


FIGURE 94—Components of the horizontal milling conversion



FIGURE 95—The horizontal milling conversion allows the column of the vertical milling machine to be repositioned in various ways on a specially machined base in order to provide greater versatility in set-up and increase the machinable area of the parts being worked on. Position "A" shown above takes advantage of the long 9" side-to-side X-axis travel. Another position 2-1/4" further from the table is useful for drilling operations. Shown to the left of the milling conversion baseplate is the base of the Z-axis column, which has been cut off to allow a lower positioning of the headstock in relation to the table.



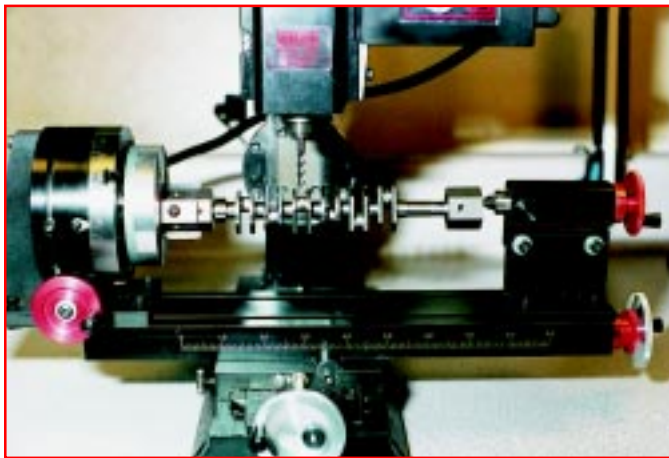
The horizontal milling conversion adds an extra level of versatility to any Sherline 5000 or 5400-series mill.

FIGURE 96—In position “B”, the long 9” X-axis travel now becomes the Y-axis. This can be useful when working on the end of a long part.

Alignment bars are provided with the conversion so that once the base and column are mounted and squared up, they can be quickly and accurately remounted in the future. Three alignment bars, a hex wrench and all necessary socket head screws are provided to set up the mill in all of the possible configurations. The alignment bars and conversion plate have a black anodized finish and the plate is mounted on four rubber feet for quiet operation. Complete instructions are provided.

The horizontal milling conversion is a great way to easily work on larger parts with your Sherline mill. The versatility it adds to the machine makes it a very worthwhile addition to your miniature machine shop.

NOTE: The horizontal milling conversion was not designed to be used with the 2000-series 8-direction mills. The additional flexibility and versatility of that mill makes this attachment unnecessary.



Project: 1/4 scale Porsche 6-cylinder engine. Here the crankshaft is being milled from a billet of steel. A hexagonal fixture was designed to offset the shaft to each of the six required positions to turn the journals. The shaft is rotated using the rotary table. A right angle tailstock supports the other end of the shaft while an end mill removes the metal.
 Builder and photo: P. A. Weiss, Escondido, CA

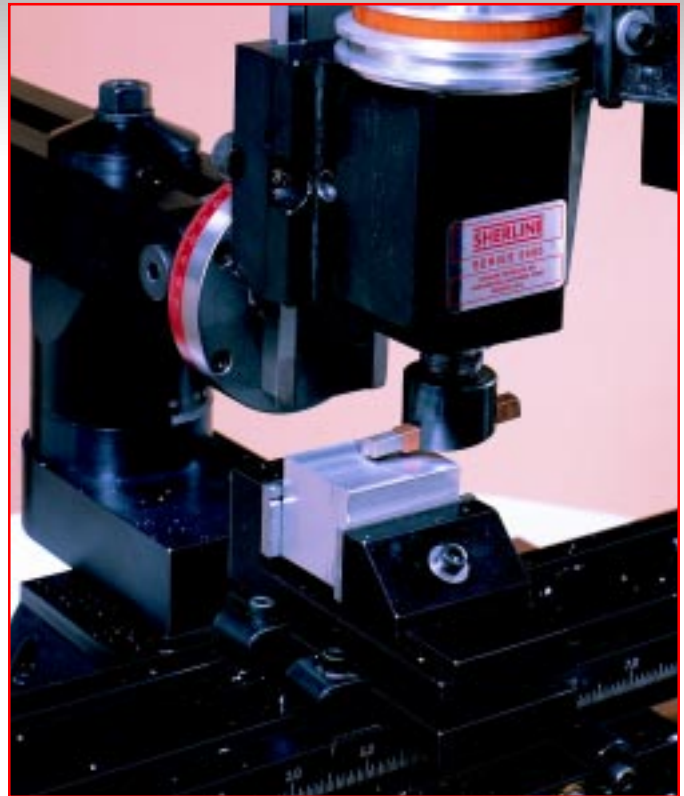


FIGURE 97—Fly cutting is an excellent way of producing a flat surface quickly. This Model 5400 mill has been converted to 8-direction capacity with a P/N 5650 column upgrade. The adapter base can be seen in the background.

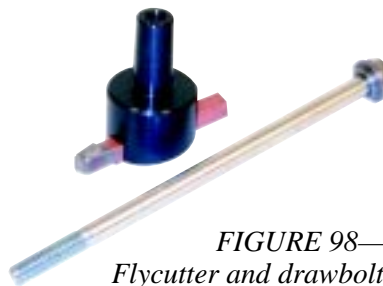


FIGURE 98—Flycutter and drawbolt

FLY CUTTER, P/N 3052

(See Figures 97 and 98.) Fly cutters are used primarily for machining large, flat surface areas. The fly cutter is a single-point cutting tool similar to a lathe tool mounted in a special holder. The cutter can

be adjusted to cut up to a 2.00" (51 mm) diameter and is easily capable of taking a .010" (.25 mm) deep cut in aluminum at this diameter.

The Sherline fly cutter comes complete with the holder, a drawbolt, thrust washer and a left-hand carbide cutting tool. It is a worthwhile addition to any shop.

REMINDER—As with all other machine operations, safety glasses are a must when fly cutting. The parts being machined must be held very securely.

CARBIDE INSERTED TIP FLY CUTTER, P/N 7620

(See Figure 99.) This fly cutter offers several advantages over the standard high-speed steel fly cutter. Inserted carbide tips will last much longer without sharpening, plus they provide an excellent finish on hard-to-machine

Toll Free Order Line: 1-800-541-0735
Technical Assistance: 1-760-727-5857

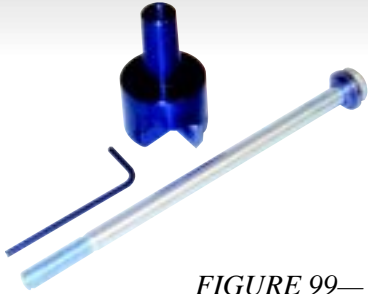


FIGURE 99—
Carbide Insert Fly Cutter
with drawbolt and Torx key

materials like cold-rolled and stainless steel. The cutter path is 1-1/8" (28.6 mm) wide. The cutter shape allows it to cut a straight shoulder on a part—something that cannot be done with the standard fly cutter. Once you use this tool, you will understand why

80% or more of the metal removed in modern machine shops is removed with carbide insert tools.

The cutter comes with one 2-edged carbide insert, a Torx attachment screw, a drawbolt and washer plus a T-15 Torx wrench. Additional inserts are available through Sherline as P/N 7622.

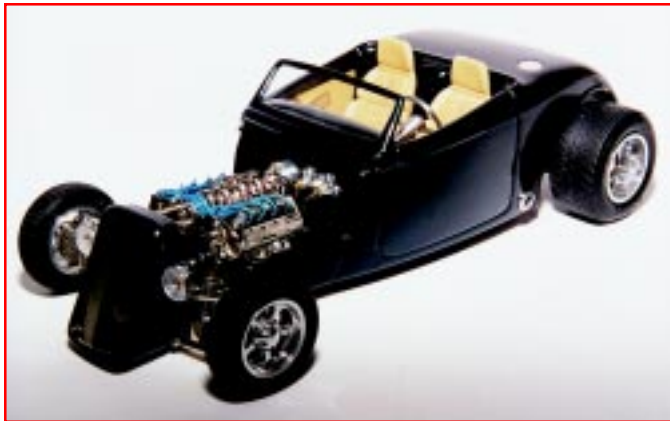


FIGURE 100—*Mill headstock spacer block, precision-ground alignment key and set screw*

MILL HEADSTOCK SPACER BLOCK, P/N 1297

(See Fig. 100.) On the mill, having the option to extend the headstock further out can sometimes allow surfaces to be machined that could not other-

wise be reached without breaking down the setup and re-clamping the part. The spacer moves the spindle out an additional 1-1/4" (31.8 mm). In many cases, it is much easier to increase your machinable surface area by using this spacer than to re-clamp the part. Precisely machined keyways keep the headstock accurately aligned.



Augie Hiscano of Miami, Florida won the 1999 Salt Lake City national model car contest "Best Hot Rod" and "Best of Show" trophies with this model. Aside from a few highly modified original plastic body parts, the 1/25 scale Ford hot rod is almost entirely scratch-built from metal.

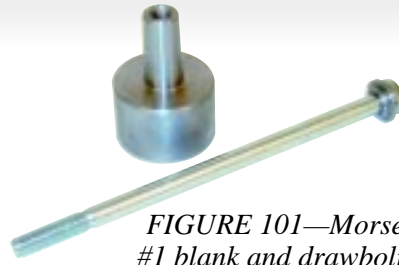


FIGURE 101—*Morse #1 blank and drawbolt*

MORSE #1 BLANK, P/N 3055

(See Figure 101.) The Morse #1 blank is made from free-machining steel and is available so that you can make your own custom tool holders.

The proper #1 Morse taper is already machined onto the tapered end. You need only turn, drill, tap or slot the blank to fit your special tooling needs. Included with the blank is an instruction sheet showing some common uses with dimensions for making a fly cutter, a slitting saw holder and an end mill holder.

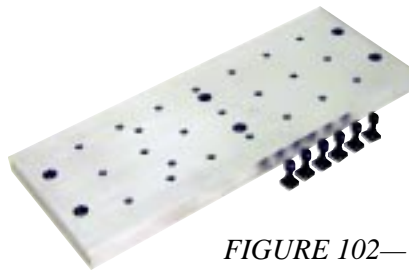


FIGURE 102—*Mill tooling plate*

MILL TOOLING PLATE, P/N 3560

(See Figure 102.) Like those used on our large production machines, the mill tooling plate solves two problems. It not only protects your mill's table from damage, but it also

provides an inexpensive, modifiable surface for clamping work that is as flat as the machine's original table. The best way to hold a part more securely is to add more clamping points rather than over-tightening the points you already have. The mill tooling plate allows you to easily do this.

Like a lathe faceplate, the mill tooling plate should be looked at as somewhat disposable. It has a hole pattern predrilled to make it easy to clamp down the Sherline mill vise or the rotary table, but you should feel free to drill whatever additional holes are needed to meet your particular needs. The plate is made from cast aluminum, which is milled to 1/2" thick. Though not quite as strong as extruded grades, it is very stable and free from internal stresses so it will not warp when you drill additional holes. The surface is not anodized, as it is intended to be drilled and machined to suit your unique part holding needs.

"Having worked with a manual 10" lathe for a few years now, I didn't see how such a small machine could work with the 2" diameter material I was hoping to work with. After using it for a week and a half it has surpassed my wildest dreams of usability. It is more powerful than I ever would have suspected, it leaves a beautiful finish and is highly accurate. The machine has worked so well that I am not only using it for prototypes but for a small production run as well!"

Jordan Blessing, President
ScopeTronix Astronomy Products, Florida

The tooling plate comes with six 10-32 socket head screws and six T-nuts for mounting. The mounting screw holes are countersunk to keep the working surface free of obstructions. All other holes are drilled and tapped for 10-32 screws.

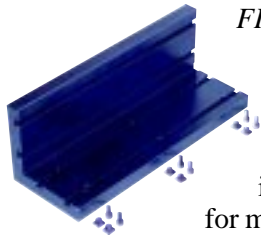


FIGURE 103—The 90° angle plate can hold a part perpendicular to the table, even if the bottom is not flat.

90° ANGLE PLATE, P/N 3559

(See Figure 103.) This angle plate is a very useful work-holding fixture for milling. It can be used to hold parts on either surface. Parts can also be held from two directions at once. It has large 3" x 3" x 10" machined mounting surfaces with two T-slots running full length on each. It is made from extruded aluminum with a black anodized finish. Provided with the plate are six 10-32 mounting screws and T-nuts.

SENSITIVE DRILLING ATTACHMENT, P/N 1012 NEW!

(See Figures 104 and 105.) This spring supported chuck gives you the proper “feel” for hand feeding when drilling



FIG. 104

small holes while also speeding up the process. The shaft fits inside the spindle and the mount threads onto the spindle thread in seconds. A 5/32" Jacobs drill chuck is pushed down by hand using a knurled collar that rides on ball bearings. A spring inside the shaft



FIG. 105—The chuck is lowered using the collar.

returns the chuck to the retracted position when pressure is released. This is an excellent way to drill small holes that offers precise control of the feed with plenty of feel for the cut when the precision of the Z-axis handwheel is not needed for depth control.

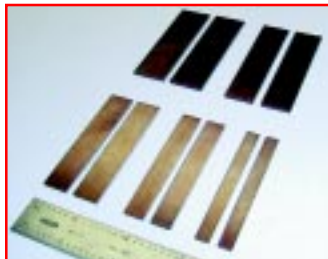


FIGURE 106—This set of parallels is perfectly sized for use with miniature machine tools.

(Scale not included.)

MACHINIST'S PARALLELS, P/N 7505

(See Figure 106.) Parallels are pairs of very accurate spacers of known height. They can be used in many ways, but are typically used to raise a part a known distance while keeping it parallel to the table surface. This set is 2-1/2" long and 1/16" thick. There are five pairs of ground steel bars in heights of 1/4", 3/8", 1/2", 5/8" and 3/4".



NOTE: CNC-ready machines require the installation of a dual-shaft stepper motor to which a handwheel is mounted before they can be operated manually.

FIGURE 107—Sherline offers CNC-ready mills with stepper motor mounts factory installed. Just add your own 23 frame size stepper motors and computer hardware/software or buy a turnkey setup from one of our CNC dealers.

CNC-READY MILLS AND ROTARY TABLE

(See Figure 107.) All Sherline mills, lathes and the rotary table are now available with stepper motor mounts factory installed. The new stepper motor mounts were designed to help the numerous companies that offer complete retrofits of Sherline tools with CNC controls. If you have the capability of fitting stepper motors and developing your own computer software and hardware to put together a CNC system, you can purchase the CNC-ready machines directly from us. If you prefer to purchase a complete, ready-to-run CNC system utilizing our machines, see our web site or call for a list of CNC suppliers. See page 27 for more details on the design of our new stepper motor mounts. To order any machine CNC-ready, simply specify the model number plus the letters “CNC”. For example, the CNC-ready version of the model 5400 mill would be ordered as P/N 5400-CNC. Stepper motors can also be ordered directly from Sherline.



Project: Coast Guard ship model deck details. Wheels, block and tackle and many other small fittings were made easier through the use of miniature machine tools.

Builder: Frederick Pope, Ft. Meyers, FL

**WW and 8.0 mm COLLET FIXTURES,
P/N 1164 and P/N 1165**

(See Figure 108.) The collet fixture was designed to be mounted either on the surface of the rotary table or on the mill table. A knurled ring allows WW collets to be tightened without the use of a drawbolt from the back. This is particularly useful for clockmakers for gearcutting on a gear blank that has a pinion shaft attached that can be held in a collet. A bushing is provided that fits into the center hole of the rotary table and helps locate the fixture on center. T-nuts and attaching screws are also provided for clamping the fixture in place in the rotary table or mill table T-slots.



FIGURE 108

“I have been using my Sherline lathe and milling machine for five years, and they have become an invaluable part of my model shop. The variety of attachments offered makes it possible to accomplish just about any machining operation on a wide range of model work.

The model ships I build are scratch built and require accurately machined parts (i.e. gears, pulley, deck guns, winches, port lights, antennas, hinges, etc.). I have machined parts from many different materials, such as aluminum, brass, steel, stainless steel, wood and plastic with excellent results. Both machines are strongly built and accurate. I am consistently able to hold tolerances of .001" and, with care, .0005".

I highly recommend Sherline machines.”

Phil Mattson, Master Model Builder
California



In Phil Mattson’s workshop, the Sherline lathe is always ready to turn out another small part for his ship models.

WW collets vary somewhat in size depending on manufacturer. This adapter holds those collets made by Sherline with a .312-.313 body size and .275-40 thread, which we refer to as WW collets. Other common "WW" collets have a body size of .314-.315 which we refer to as 8.0 mm collets. A fixture for these collets is also available as P/N 1165. It looks identical except that it is identified by a groove machined around the body. If you are using a brand of collets other than Sherline, measure the body diameter with a micrometer before deciding which collet fixture to order.

**VINYL DUST COVER, VERTICAL MILLS,
P/N 5150 and P/N 5151**

A fitted 6-mil vinyl dust cover is available for your Sherline milling machine. Keeping dust off your machine when it is not in use will not only extend its life, but will also keep it looking like new while adding a professional touch to your workshop. P/N 5150 fits the 5000- and 5400-series mills. P/N 5151 is sized for the 2000-series mill.

TABLETOP MACHINING, by Joe Martin, P/N 5301

(See Figure 109.) Sherline’s owner, Joe Martin, has written a book that gives you not just the “hows”, but also the “whys” of machining practices.



FIGURE 109

Being a hobbyist himself as well as a manufacturer, Joe is familiar with the needs of both the home shop machinist and the commercial production facility. His insights offer a unique and practical perspective on the equipment and processes of machining at both extremes... from intricate miniature machining projects to full size shop production tools and practices.

“Sherline has proven to me to be a great company in so many ways. Not only are your machines excellent to work with, but your commitment to furthering the model engineering hobby has been outstanding. Very few companies are interested in anything more than turning a profit, and it is refreshing to find one that does so much more.”

Ron Colonna
Pennsylvania

shows the technically perfect way to do things rather than the simple, practical methods everyone really uses. This book should be required reading for all newly graduated engineers. For those wishing to design and build their first metal parts, it is a perfect starting point. Naturally, Sherline tools are featured throughout in the examples, but the rules of machining apply to equipment and projects of all sizes. Information is given on selecting materials; using a lathe and a mill; measuring tools; cutting tools; using accessories for threading, indexing and gear-cutting; setting up a home shop and more. Several simple projects are provided for beginning machinists. A photo gallery of superb miniature projects will inspire you and show what these small but mighty machines can really do. A history of Sherline tools is written from the point of view of giving you some guidance if you've ever thought of taking a product of your own to market. This is a high quality book that will be equally at home on your coffee table or shop workbench. The book has received many positive reviews from magazine editors and home shop machinists alike. It is now in its third printing.

· 8-1/2" x 11", softbound with "lay-flat" binding, full color, 352 pages, 400+ color photos, 200+ illustrations.

HOME SHOP MACHINIST'S HANDBOOK
by Doug Briney, P/N 5300

(See Figure 110.) Doug Briney's book is a complete guide for the amateur machinist. It is especially valuable to the Sherline tool owner because it not only covers all aspects of machine shop work, it features the Sherline lathe and milling machine in its illustrations and text. Its projects were all designed specifically for fabrication on Sherline equipment. This book is a valuable asset to anyone's library, from beginner to experienced machinist.

FIGURE 110

· 7-3/4" x 9-1/4", softbound, black and white, 285 pages.

SHERLINE ACCESSORIES SHOP GUIDE, P/N 5327

Instruction sheets for all Sherline accessories are reproduced in one handy book. Learn about how an accessory works before you decide to order it. The illustrated, information-packed instruction sheets contain a wealth of useful machining knowledge. Learn about boring, thread-cutting, knurling, the indexing attachment, using a rotary table and much more. Also included are "help sheets" covering topics like grinding your own lathe tools, using carbide tipped tools, adjusting gibs, converting a machine from inch to metric and more. It is a lot of useful information in a small package.

FIGURE 111

· 8-1/2" x 11", softbound, black and white, 186 pages



FIGURE 112—Set includes plans and a materials list.

STEAM ENGINE VIDEO by Rudy Kouhopt, P/N 5328

(See Figure 112.) Rudy Kouhopt, long-time editor at *Home Shop Machinist Magazine*, has put together a complete set of video instructions that take you from start to finish in building a small steam engine. The VHS two-video set runs 3 hours and 38 minutes and offers a wealth of information on machining. You get a set of dimensioned plans which detail each individual part, plus you also get a complete bill of materials showing you which raw materials you will need to assemble before starting.

SHOP SECRETS—MEASURING TOOLS
by Mike Rehmus, P/N 5329 **NEW!**

(See Figure 113.) Mike Rehmus is both an expert videographer as well as an experienced machinist. This professionally produced 2-hour VHS video shows and tells you what you need to know about using measurement tools to make accurate parts.



FIG. 113

"It has been very rewarding accomplishing this project (see photo of Stirling hot air engines below), and I have learned enough at this point to make other small devices and parts for my camera equipment that would have been impossible to obtain anywhere. The ability to make metal parts and thread anything I want any way I want are advantages I always knew existed, but I never thought it would be so much fun! I wish I would've gotten into this game long ago, I could have saved a lot of time and aggravation repairing stuff, and I've missed a lot of enjoyment, too."

Tim Schroeder, Professional Photographer
Michigan



Project: Five identical Stirling hot air engines. Tim built this as his first project and made five of each part to improve his machining skills faster.

Builder and photo: Tim Schroeder, St. Joseph, MI



FREQUENTLY ASKED QUESTIONS ABOUT SHERLINE TOOLS

By Joe Martin, President and owner, Sherline Products Inc.

Joe Martin turns a complex experimental shape using a combination of accessories on the Sherline mill. Mr. Martin is an experienced toolmaker as well as an expert modeler. As owner of Sherline Products, he works daily with both the large industrial machines that make Sherline tools as well as the miniature machine tools themselves.

Q: How accurate are Sherline tools?

A: I can easily turn a diameter close to the chuck on the lathe within .0002" (two-tenths of a thousandth of an inch). Does this mean the machine is built to that tolerance? No, but it does mean the leadscrew is accurate, the cutting tool is proper and the diameter I am cutting is large enough not to deflect.

Most problems associated with making very tight tolerance parts are not caused by the machines but rather are the result of the level of craftsmanship of the operator. As your technique improves, you'll find your machine keeps making better and better parts. It is not uncommon for a good craftsman to be able to make parts accurate to within a thousandth of an inch or less on our tools. Headstock/tailstock alignment is within .003" when it leaves the factory. Adjustable tailstock tool holders are available to align the headstock and tailstock "dead on" if you need it.

The tools we make are as accurate as you can build them without expensive grinding and heat treating. We have over a million dollars invested in state-of-the-art CNC machine tools and tooling to mass-produce accurate parts. To increase the accuracy less than 1% would increase the cost by a factor of ten. This simply wouldn't be cost effective for our average customer. To go from our under \$500 lathe to a lathe of similar size costing over \$4000 yields a machine that is only slightly more accurate.

Q: What is backlash and how much do the leadscrews have?

A: Backlash is the play in the engagement of the leadscrew threads that allows a few thousandths of an inch to be turned on the handwheel before the leadscrew starts to turn when changing directions. This is a fact of life on any machine tool and is accounted for by always making your cuts in the same direction and keeping track of which way you turned the handwheel last. Backlash is usually about .003 to .005" (.08mm to .12mm). The X- and Y-axis leadscrews on the mill have a backlash adjustment, but it is still recommended that it be set to about .003".

Q: What kind of materials can I machine?

A: There are almost no limits to the kind of materials you can machine. Anything from wood or plastic to exotic materials like stainless steel or titanium can be cut as long as the part is appropriately sized, can be safely and firmly held and the proper cutting tool and speed are used.

Q: How big a part can I work on?

A: The Lathe is capable of turning a 3.5" (90 mm) part over the bed or 1.875" (45 mm) over the crossslide. A 1.25" riser block kit increases that to 6" (152 mm) over the bed or 3" (76 mm) over the crossslide. A .405" (10 mm) diameter hole through the headstock allows long material of up to that size to be fed through and worked on. The standard lathe has 8" (200 mm) between centers and the long bed lathe has 17" (430 mm) between centers. That gives you the physical limitations of the machine, but what does the hardness of the material you are working with do to

those numbers in the real world? If the materials you plan to work with are free-machining (aluminum, brass and free-machining steel), you will be pleased with a Sherline lathe if the average part you make is approximately 1" in diameter. For hard materials like stainless, your average part size should be around 3/4" in diameter or less. Wood and plastic are so easy to machine that only the physical size limitations of the machine need be considered. That doesn't mean you can't machine a 3" flywheel, but if you are planning to consistently make parts of that size, you will probably be happier with a larger machine and more horsepower. Removing large amounts of metal on a small machine takes time. If you have plenty of time, the size of the part is less critical. Users of any machine are happier with its performance when they are not consistently pushing the limits of its capabilities.

The vertical milling machine is capable of holding much larger parts than the lathe, because the part is held and only the tool turns. It also has a much longer table throw (X-axis). A deluxe version is available which offers an additional 2" of travel on the Y-axis compared to the standard mill. With the addition of the horizontal milling conversion, surfaces up to 6" x 9" can be machined without moving the part. This is a very large machinable area for a tool of this compact size. The 2000-series 8-direction mills open up even more machining possibilities.

Q: What is the power of the motor and the speed range?

A: The 90-Volt DC motor offers far more torque than the 1/2 HP AC/DC motors we used to use. (It is also much smoother and quieter.) The electronic speed control adjusts automatically for any voltage worldwide from 100 to 240 VAC, 50 or 60 Hz. An electronic circuit in the speed control unit compensates for load, keeping the RPM constant during cuts. The electronically controlled speed range of 70 to 2800 RPM requires no changes of gears or belts to achieve. For even higher torque at low speeds when turning large parts, a second drive belt position is available on the motor drive and headstock pulleys. (By the way, to buy just a DC motor and speed control of this quality elsewhere could cost more than the entire model 4000 lathe!)

Q: How heavy a cut can I make on the Lathe?

A: This depends mostly on the diameter and type of material you are attempting to cut. It is also dependent on the sharpness of your cutter and the firmness of your setup. For aluminum, you should expect to be able to take cuts of up to .060" (1.5 mm) on 3/4" diameter stock, while stainless steel of the same size would require taking no more than .015" (.4 mm) with each pass. On free-machining steel you could take that same .015" cut on a 3" (76 mm) diameter piece. Heavy cuts at high RPM or feeding the tool too slowly will cause the tool to "chatter". Rule #1 in any machining operation is: **"If the tool chatters, reduce speed (RPM), reduce depth of cut and increase the rate of feed."**

Q: Do I have to be an expert machinist to use Sherline tools?

A: No. In fact, a good craftsman who has never cut metal before will often do better than a professional machinist on small tools. Machinists who normally work on big, expensive machines often tend to push a smaller machine too hard. Sherline tools were designed to be operated by people with a "common sense" knowledge of mechanics. We also provide the most complete instructions in the industry. With our tools, accessories and instructions, plus a willingness to take the time to make good parts, you have everything you need to enjoy the world of miniature machining.

TECHNICAL SPECIFICATIONS



Model 4000/4100 short bed lathe (rear)
Model 4400/4410 long bed lathe (front)



Model 5000/5100 vertical mill



Model 5400/5410 deluxe vertical mill



(Left) Model 2000/2010 8-direction deluxe vertical mill

LATHES

	4000 (4100)	4400 (4410)
Swing over bed	3.50" (90mm)	3.50" (90mm)
Swing over carriage	1.88" (48mm)	1.88" (48mm)
Distance between centers	8.00" (200mm)	17.00" (430mm)
Hole through spindle	.405" (10mm)	.405" (10mm)
Spindle nose thread	3/4-16 T.P.I.	3/4-16 T.P.I.
Spindle nose taper	#1 Morse	#1 Morse
Travel of crosslide	4.25" (110mm)	4.25" (110mm)
Tailstock spindle taper	#0 Morse	#0 Morse
Protractor graduations	0° to 45° by 5°	0° to 45° by 5°
Handwheel graduations	.001" (.01mm)	.001" (.01mm)
Electronically controlled spindle speed range	70 to 2800 RPM	70 to 2800 RPM
Length overall*	23" (584mm)	32.5" (826mm)
Width overall*	10.25" (260mm)	10.55" (267mm)
Height overall*	8" (203mm)	8.5" (216mm)
Shipping weight	24 lb. (10.9 kg)	30 lb. (13.6 kg)

VERTICAL MILLS

	5000 (5100)	5400 (5410)	2000 (2010)
Max. clearance, table to spindle	8.00" (203 mm)	8.00" (203 mm)	9.00" (229 mm)
Throat (no spacer)	2.25" (50 mm)	2.25" (50 mm)	(Adjustable)
(w/ headstock spacer)	(optional)	3.50" (90 mm)	(Adjustable)
Travel, X-axis	9.00" (228 mm)	9.00" (228 mm)	9.00" (228 mm)
Travel, Y-axis	3.00" (76 mm)	5.00" (127 mm)	7.00" (178 mm)
Travel, Z-axis	6.25" (159 mm)	6.25" (159 mm)	5.38" (137 mm)
Hole through spindle	.405" (10 mm)	.405" (10 mm)	.405" (10 mm)
Spindle nose thread	3/4-16 T.P.I.	3/4-16 T.P.I.	3/4-16 T.P.I.
Spindle nose taper	#1 Morse	#1 Morse	#1 Morse
Handwheel graduations	.001" (.01 mm)	.001" (.01 mm)	.001" (.01 mm)
Electronically controlled spindle speed range	70 to 2800 RPM	70 to 2800 RPM	70 to 2800 RPM
Width overall*	14.75" (375 mm)	15.00" (381 mm)	15.00" (381 mm)
Depth overall*	11.75" (298 mm)	14.00" (356 mm)	22.25" (565 mm)
Height overall (Max.)*	20.75" (527 mm)	20.75" (527 mm)	23.38" (568 mm)
Table size	2.75" x 13.00" (70 mm x 330 mm)	2.75" x 13.00" (70 mm x 330 mm)	2.75" x 13.00" (70 mm x 330 mm)
Hold-down provision	2 T-slots	2 T-slots	2 T-slots
Shipping weight	33 lb (15.0 kg)	36 lb (16.3 kg)	38 lb (17.2 kg)
Movements in addition to X-, Y- and Z-axes	Headstock rotation (90° L/R)	Headstock rotation (90° L/R)	Headstock rotation (90° L/R), Column rotation (90° L/R), Column pivot (90° Fwd/Bk), Column swing (90° L/R), Column travel (In/Out) 5.5" (140 mm)

MOTOR SPECIFICATIONS

Input voltage—100 to 240 VAC, 50 to 60 Hz
Output to motor—90 VDC
Current draw—.5 to 15 amps depending on load
No-load output shaft speed—6000 RPM (no pulley)

NOTE: Motor and speed control are available separately. Part numbers are as follows:

P/N 3305—DC Motor and Speed Control

P/N 3306—Headstock, DC Motor, Speed Control

SPINDLE SPECIFICATIONS

Endplay—.0002" (.005 mm)
(factory adjustment of preload)
Runout—.0002" or less at nose, .0005" (.013 mm) or less at 3" (76 mm) out
Bearings—Two 20 mm lifetime lubricated bearings with adjustable preload

*All overall dimensions include motor and speed control.



The Sherline shop floor, showing just a few of the CNC production tools used to manufacture the Sherline tool line.

**SHERLINE...
QUALITY
MACHINE TOOLS
AND
ACCESSORIES
SINCE 1974**



Sherline's modern 65,000 square foot manufacturing facility is located in Vista, California. If you would like to see how we produce our high quality tools at such a reasonable price, we invite you to visit our factory. You will see state-of-the-art equipment, including computer-controlled machining centers and laser engravers producing the extremely accurate parts that make up our lathes, mills and accessories. Vista is located approximately 35 miles North of San Diego. We welcome the opportunity to show you our plant and answer any questions you may have. Our showroom display includes our entire product line as well as a selection of miniature projects and vintage tools.



The #66 Sherline-sponsored IndyCar was built in 1974—the year Sherline was first incorporated. The designer and builder, Frank Fiore, was an airline machinist and the last man who worked for an hourly wage to attempt to have one of his cars qualify at the Indianapolis Motor Speedway. The car is now owned and driven by Joe Martin who is a member of the SCCA, the Vintage Automobile Racing Association (VARA) and the Vintage IndyCar Association.

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