

# 20" WOODTURNING LATHE

Model 3520A

Instruction Manual & Parts List

EDP # 0460221



# **POWERMATIC®**

(800) 248-0144  
[www.powermatic.com](http://www.powermatic.com)

This manual has been prepared for the owner and operators of a Powermatic Model 3520A Lathe. Its purpose, aside from machine operation, is to promote safety through the use of accepted correct operating and maintenance procedures. Completely read the safety and maintenance instructions before operating or servicing the machine. To obtain maximum life and efficiency from your lathe, and to aid in using the machine safely, read this manual thoroughly and follow all instructions carefully.

## **Warranty & Service**

The JET Group warrants every product it sells. If one of our tools needs service or repair, one of our Authorized Repair Stations located throughout the United States can give you quick service.

In most cases, any one of these JET Group Repair Stations can authorize warranty repair, assist you in obtaining parts, or perform routine maintenance and major repair on your JET, Performax or Powermatic tools.

For the name of an Authorized Repair Station in your area, please call 1-800-274-6848.

## **More Information**

Remember, the JET Group is consistently adding new products to the line. For complete, up-to-date product information, check with your local JET Group distributor.

## **JET Group Warranty**

The JET Group (including Performax and Powermatic brands) makes every effort to assure that its products meet high quality and durability standards and warrants to the original retail consumer/purchaser of our products that each product be free from defects in materials and workmanship as follow: 1 YEAR LIMITED WARRANTY ON ALL PRODUCTS UNLESS SPECIFIED OTHERWISE. This Warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, normal wear-and-tear, repair or alterations outside our facilities, or to a lack of maintenance.

THE JET GROUP LIMITS ALL IMPLIED WARRANTIES TO THE PERIOD SPECIFIED ABOVE, FROM THE DATE THE PRODUCT WAS PURCHASED AT RETAIL. EXCEPT AS STATED HEREIN, ANY IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS ARE EXCLUDED. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG THE IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THE JET GROUP SHALL IN NO EVENT BE LIABLE FOR DEATH, INJURIES TO PERSONS OR PROPERTY, OR FOR INCIDENTAL, CONTINGENT, SPECIAL, OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF OUR PRODUCTS. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

To take advantage of this warranty, the product or part must be returned for examination, postage prepaid, to an Authorized Repair Station designated by our office. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection discloses a defect, we will either repair or replace the product, or refund the purchase price if we cannot readily and quickly provide a repair or replacement, if you are willing to accept a refund. We will return repaired product or replacement at JET's expense, but if it is determined there is no defect, or that the defect resulted from causes not within the scope of JET's warranty, then the user must bear the cost of storing and returning the product. This warranty gives you specific legal rights; you may also have other rights which vary from state to state.

The JET Group sells through distributors only. Members of the JET Group reserve the right to effect at any time, without prior notice, those alterations to parts, fittings, and accessory equipment which they may deem necessary for any reason whatsoever.

# TABLE OF CONTENTS

Safety Instructions .....	4
Decal Instruction .....	5
Receiving .....	6
Installation .....	6
Power Connection .....	6
Inverter Drive System .....	6
Maintenance .....	6
Adjustments:	
Belt Adjustment .....	6
Tool Support.....	6
Spindle.....	7
Speed Range Adjustment .....	7
Table 1: Wood Turning Lathe Speeds.....	7
Specifications .....	7
Tools.....	8
Operating Instructions .....	8
Spindle Turning .....	8
Stock Selection .....	9
Mounting Stock .....	9
Cutting Techniques .....	10
Roughing Out.....	10
Beads .....	10
Coves.....	10
"V" Cuts .....	10
Parting Off .....	11
Sanding & Finishing.....	11
Face Plate & Bowl Turning .....	11
Mounting Stock .....	11
Faceplate or Chuck? .....	12
Wood Selection .....	12
Checks & Cracks .....	12
Distortion .....	12
Tools for Bowl Turning .....	12
Bowl Turning Techniques.....	12
To Shape Outside of Bowl .....	12
To Shape Interior of Bowl .....	13
Sanding & Finishing.....	13
Trouble-Shooting .....	14
Electrical Schematic .....	15
Parts Lists & Exploded Views:	
Stand & Bed Assembly .....	16-17
Headstock Assembly.....	18-19
Optional Accessories.....	20-23
Electrical Schematic: Remote On/Off Switch .....	24
AC Inverter Readings .....	25



## WOOD LATHE SAFETY INSTRUCTIONS

**Read, Understand and Follow** the safety and operating instructions found in this manual. Know the limitations and hazards associated with this wood lathe. A safety decal is placed on each machine as a reminder of basic safety practice.

**Grounding of the Lathe.** Make certain that the machine frame is electrically grounded and that a grounding lead is included in the incoming electrical service. In cases where a cord and plug are used, make certain that the grounding lug connects to a suitable ground. Follow the grounding procedure indicated by the National Electrical Code.

**Eye Safety.** Wear an approved safety shield, goggles, or glasses to protect the eyes when operating the wood lathe.

**Personal Protection.** Before operating the machine, remove tie, rings, watches, and other jewelry, and roll up sleeves above the elbows. Remove all loose clothing and confine long hair. Protective type foot wear should be worn and hearing protectors should be worn where noise exceeds the level of exposure allowed in section 1910.95 of the OSHA regulations. **DO NOT WEAR GLOVES.**

**Work Area.** Keep the floor around the machine clean and free of scrap material, saw dust, oil or grease to minimize the danger of tripping or slipping. Powermatic recommends the use of anti-skid floor strips on the floor area where the operator normally stands. Provide ample unobstructed floor area around the machine. Mark off the machine area. Make certain that the work area is well lighted and that a proper exhaust system is used to minimize dust.

**Guards.** Keep the machine guards in place, make certain they are operable, and use them at all times. **DO NOT** operate the machine with guards off.

**Don't Overreach.** Maintain a balanced stance and keep your body under control at all times. Do not overreach or use excessive force to perform any operation.

**Maintain Tools in Top Condition.** Keep tools sharp and clean for safe and best performance. Dull tools can grab in the work and be jerked from the operator's hands causing serious injury.

**Check the condition** of the stock to be turned. Make sure it is free of knots, warpage, checked ends, improperly made or cured glue joints and other conditions which can cause it to be thrown out of the lathe.

**Securely fasten spur centers** to the material being used.

**Check centers and center sockets** in the headstock and tailstock to be sure they are free of dirt or rust and oil lightly before inserting centers.

**Test each set-up** by revolving the work by hand to insure it clears the work rest and bed and check setup at the lowest speed before increasing it to the operating speed.

**Use the correct cutting tool** for the operation to be performed and keep all tools in a sharpened condition.

**Use low speeds for roughing and for long or large diameter work.** If vibration occurs, stop the machine and correct the cause. See Table 1, page 7 for speed recommendations.

**When sanding, remove the tool rest from the machine,** apply light pressure, and use a slow speed to avoid heat build up.

**When turning large diameter pieces, such as bowls,** always operate the lathe at low speeds. See Table 1 for speed recommendations.

**Never use dull turning tools** - sharp tools help to prevent the tool from grabbing in the work and being jerked from the operator's hands.

**Take measurements** on the part only with the spindle stopped.

**Do not attempt to engage the spindle lock pin** until the spindle has stopped. If leaving the machine area, turn it off and wait until the spindle stops before departing.

**Give the work you are doing your undivided attention.** Looking around, carrying on a conversation and "horseplay" are careless acts that can result in serious injury.

**Make no adjustments except speed change with the spindle rotating** and always disconnect machine from power source when performing maintenance to avoid accidental starting or electrical shock.

**Provide for adequate surrounding work space** and overhead non-glare lighting. Powermatic recommends the use of non-skid floor strips on the floor area where the operator normally stands and marking off a work area for each machine.

**Don't stand in line** with any large diameter part being turned or allow anyone else to do so.

**When stopping the lathe,** never grab the part or face plate to slow it down. Let the work coast to a stop.

**Use only Powermatic** or factory authorized replacement parts and accessories, otherwise the warranty and guarantee are null and void.

**Drugs, alcohol, medication.** Do not operate tool while under the influence of drugs, alcohol, or any medication.

**Do not use this Powermatic wood lathe for other than its intended use.** If used for other purposes, Powermatic disclaims any real or implied warranty and holds itself harmless from any injury that may result from that use.

**Health Hazards.** Some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- \* Lead from lead-based paint.
- \* Crystalline silica from bricks and cement and other masonry products.
- \* Arsenic and chromium from chemically-treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals, work in a well-ventilated area, and work with approved safety equipment, such as those dust masks that are specifically designed to filter out microscopic particles.

## SAFETY: DECAL INSTRUCTION



<b>DANGER</b>			
DO NOT EXCEED THESE RECOMMENDED SPEEDS SERIOUS INJURY CAN RESULT IF PARTS BEING TURNED ARE THROWN FROM THE LATHE.			
MAX. CH. WIDTH	ROUGHING RPM	GEN. CUTTING RPM	FINISHING RPM
UNDER 2	1500	5000	3000
2 TO 4	750	1500	2100
4 TO 6	500	1000	1400
6 TO 8	380	800	1200
8 TO 12	300	650	1000
12 TO 16	250	550	870
16 TO 20	220	500	770
20 TO 24	190	450	670
24 TO 30	170	400	600



## RECEIVING

Remove the lathe from the shipping container and check for damage. Report any damage to your distributor immediately. Accessories are packaged in a separate carton which will be on the shelf of the machine stand. Clean protective coating from the bed, spindles, work rest and face plate with kerosene or a good commercial solvent. Read the instruction manual thoroughly for assembly, maintenance, operation and safety instructions.

## INSTALLATION

Install the four leveling screws in the legs, adjust to a stable position and tighten the jam nuts to lock in place.

Insert the guard support rod in the guard mounting bracket at the rear of the headstock. Position a locking collar on each side of the mounting bracket so that the lock pin lines up with the holes in the guard pivot rod, one for guard position and one for load position. The spring loaded lock pin will hold the guard in each position.

### Power Connection

The lathe will operate on single phase or three phase 230 volt power supply. A three wire pigtail for use on 230 volt single phase power is attached to the inverter and may be hard wired to the power source or connected to a receptacle plug. Connect the 230 volt supply to the black and white leads and ground the green lead.

If three phase power is used, it will be necessary to replace the pigtail wire with a 12/4 wire and connect the three hot leads to the inverter at R, S and T as shown in the wiring diagram. Always connect the ground lead.

Before connecting to the power source make sure the on/off switch is in the off position and turn the speed dial counterclockwise. If the switch is in the on position when the power is connected, the inverter will trip out. If this happens, disconnect power, turn switch off, wait 30 seconds and then reconnect power.

**NOTICE: IF THERE IS A POWER OUTAGE WHILE OPERATING THE LATHE, TURN THE SWITCH TO THE OFF POSITION, DISCONNECT POWER SOURCE, WAIT 30 SECONDS THEN RECONNECT POWER SOURCE AND RESUME NORMAL OPERATION.**

### Inverter Drive System

The model 3520A lathe utilizes the latest technology in A.C. inverter drives to provide infinitely variable spindle speeds. The inverter controls the speed of the motor by varying the frequency of the voltage supplied to the motor. The inverter provides

an acceleration ramp that eliminates the shock of normal across the line starting. Also a braking feature eliminates long coasting periods when the lathe is turned off.

The 2 HP motor is specially designed for use with inverter drives, and is balanced to reduce noise and minimize vibration.

The A.C. Inverter does not require any programming, it is pre-programmed from the factory. The buttons on the face of the inverter should never be pushed at any time. Use only the controls on the front of the headstock.

## MAINTENANCE

Maintenance on the 3520A lathe should be performed at periodic intervals to insure that the machine is in proper working order, that all fasteners are tight, and the machine is in adjustment. The more use the machine is subjected to, the more often it should be inspected and maintained. Inspection and maintenance should be performed at least twice a year.



**CAUTION:** To prevent accidental starting or electrical shock, disconnect machine from power source before performing any maintenance.

Periodic cleaning of the lathe is important to keep the lathe in proper working order. The lathe bed should be cleaned and oiled periodically so that headstock, tailstock, and tool support will slide properly. With air hose periodically blow out headstock to keep saw dust and chips from collecting on belt and sheaves, and blow off dust and chips that collect on inverter (DO NOT DISASSEMBLE INVERTER TO CLEAN).

## ADJUSTMENTS

### Belt Adjustment

The drive belt sheaves are initially aligned at the factory, but if any service is performed that affects their alignment it is very important that they be realigned. To realign them, loosen the two set screws on the spindle sheave and slide it in the proper position. Use of a straight edge along the edge of both sheaves will simplify the positioning. When properly aligned, there should be no pulsing sounds or noise coming from the belt.

### Tool Support

The tool support, Fig. 5, is designed to allow adjustment for height, position on the bed, and angle to the work. Your 3520A lathe comes standard with the 14" tool support. Other supports are available - consult the "Optional Equipment" on page 20 through 23.

Periodically the tool rest should be disassembled and the parts cleaned and oiled to provide free movement of the parts to insure good clamp action.

### Spindle

The spindle bearing preload is set at the factory for general turning applications. There should be no "end play" of spindle looseness along its axis. If any looseness ever occurs it may be removed by tightening the bearing lock nut on the left end of the spindle. Be very careful not to overtighten the lock nut or the spindle bearings will overheat. It should be tightened just enough to remove the end play and the spindle should rotate very freely.

### Speed Range Adjustment

To provide the maximum horsepower to the spindle at the very slow speeds, set the drive belt in the low range.

To change speed ranges, open the access door in front of the headstock, loosen the pivot lock handle located in the motor tension slot, raise the motor up by lifting up on the motor plate handle and relock the lock handle to hold the motor up. There should be sufficient slack in the belt to reposition it to the other step. Loosen the tension lock handle and lower the motor to tension the belt. Do not overtension; a very light pressure on the motor plate handle is adequate to prevent belt slippage.

TABLE 1: WOOD TURNING LATHE SPEEDS

DIAMETER OF WORK	ROUGHING RPM	GENERAL CUTTING RPM	FINISHING RPM
Under 2"	1520	3000	3000
2 to 4"	760	1600	2480
4 to 6"	510	1080	1650
6 to 8"	380	810	1240
8 to 10"	300	650	1000
10 to 12"	255	540	830
12 to 14"	220	460	710
14 to 16"	190	400	620

## SPECIFICATIONS

(3520A Lathe)

Distance Between Centers .....	34-1/2"
Swing Over Bed .....	Full 20"
Overall Length .....	50"
Spindle Speeds .....	0-1200 / 0-3200 RPM
Motor .....	2HP, 220V
Lathe Power Requirements .....	220V, 3PH or 1PH
Spindle Thread Size .....	1-1/4" x 8 T.P.I.
Head/Tailstock Taper .....	#2 Morse
Height .....	44" (Adjustable)
Weight .....	650 lbs
Tailstock Quill Travel .....	Over 4"
3" Faceplate .....	standard
14" Toolrest .....	standard
Drive System .....	Poly V Belt, Inverter Drive
Spindle Lock .....	standard
Knock Out Rod .....	standard
Drive Center .....	standard
Ball Bearing (live) Center .....	standard

## TOOLS

If possible, select only quality, high speed steel turning tools. High speed tools hold an edge and last longer than ordinary carbon steel. As one becomes proficient in turning, a variety of specialty tools for specific applications can be acquired. The following tools provide the basics for most woodturning projects:

**Large Roughing Gouge** - 1" to 1-1/4", used to eliminate waste wood.

**Skews** - 1-1/2" and 1" or 1-1/4", used to make finishing cuts and details.

**Spindle Gouges** - 1/4", 3/8", 1/2", used to turn beads, coves and other details.

**Square Scraper** - 1/2", used to create square shoulders.

**Large Domed Scraper** - 1-1/2", used to reduce ridges on interior of bowls.

**Parting Tool** - 1/8", used to set diameters for sizing.

**Deep Fluted Bowl Gouge** - 1/4", 3/8" and 1/2", used for turning bowls & plates.

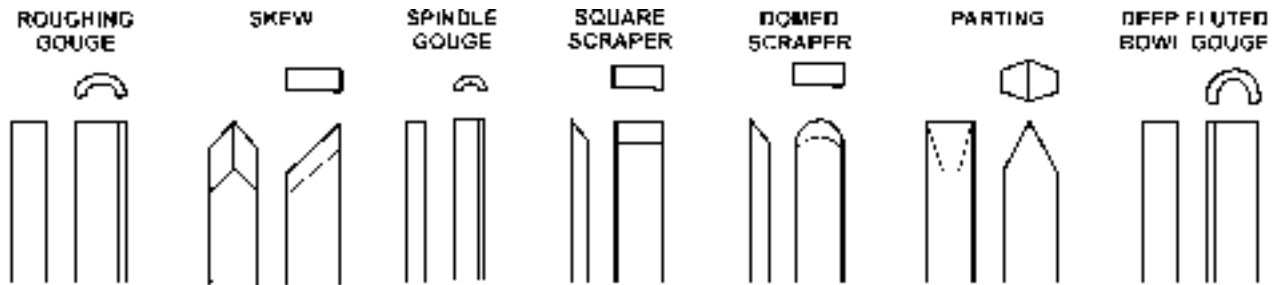


FIGURE 1

For safety and best performance, **keep tools sharp**. If a tool stops cutting or requires excessive pressure to make a cut, it needs to be sharpened. A number of brand name sharpening jigs and fixtures are available, however, a woodturner should learn to sharpen tools freehand. For best results, use a slow speed grinder (1800 rpm) fitted with a 60-grit wheel (for shaping) and a 100-grit wheel (for final sharpening and touchup). The grinder should be located near your lathe and at a comfortable height. A diamond dresser will keep the wheels true and eliminate glazing. Never allow the tool to rest in one place on the wheel, keep it moving and use a light touch.

Carbon steel tools can overheat easily and should be cooled frequently. If the edge turns blue, it has lost its temper and should be ground past the blue area. High-speed steel tools are not as likely to overheat, but can be damaged if allowed to get red hot. High speed steel tools should not be quenched for cooling. Honing with a diamond lap or slipstone will save trips to the grinder and keep the edge fresh.

## OPERATING INSTRUCTIONS

Before operating the lathe, check each time that everything is in proper working order:

1. Level your machine: use the adjustable levelers to help reduce vibration.
2. Check bearings: adjust only if endplay exists.
3. Check belts: should be snug but not overly tight.
4. Ways - keep clean, use steel wool and wax to prevent buildup of rust and finishes.
5. Toolrest - use mill file to remove nicks and dings.
6. Spindle tapers - should be clean and free of dust and chips for proper seating of tapers. Clean with scotchbrite or taper cleaner.
7. Tailstock - clean and lubricate ram and locking device.
8. Lighting - proper lighting is essential.
9. Dust extractor - to remove excess sanding dust.
10. Anti-fatigue mat - will help make long hours in front of the lathe more comfortable.

## SPINDLE TURNING

Spindle turning takes place between the centers of the lathe. It requires a spur or drive center in the headstock and a revolving or live center in the tailstock. A cup center rather than a cone center will reduce the risk of splitting the stock. Figure 2 shows the basic profile shapes in spindle turning.



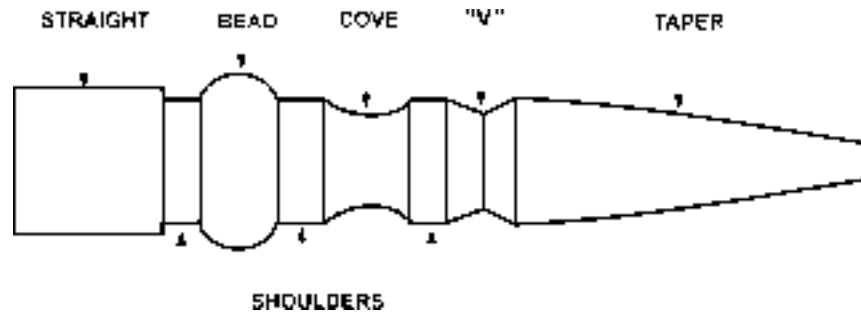


FIGURE 2

## STOCK SELECTION

Stock for spindles should be straight grained and free of checks, cracks, knots and other defects. It should be cut 1/8" to 1/4" larger than the finished diameter and may require additional length to remove ends if required. Larger stock should have the corners removed to produce an octagon making the piece easier to rough down to a cylinder.

1. With a combination square or plastic center finder, locate and mark center on each end of stock. Accuracy is not critical on full rounds but extremely important on stock where square sections are to remain. Put a dimple in the stock with an awl or nail, or use a spring-loaded automatic center punch.
2. Extremely hard woods may require kerfs cut into the spur drive end of stock, Figure 3, or may need to have the spur center driven into the stock with a wood mallet or dead blow hammer, Figure 4. **NOTE: Never use a steel face hammer and never drive stock onto spur while it is mounted in the lathe spindle.**

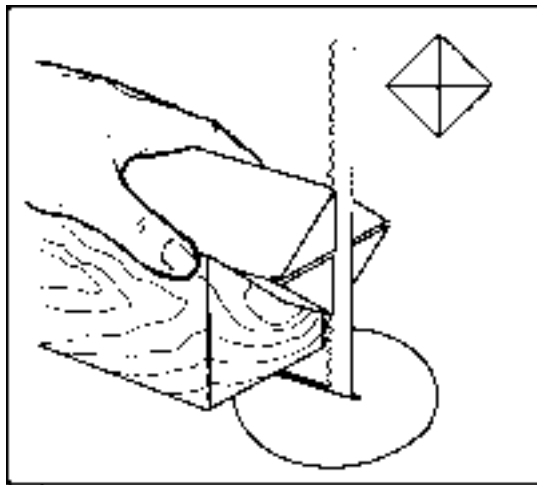


FIGURE 3

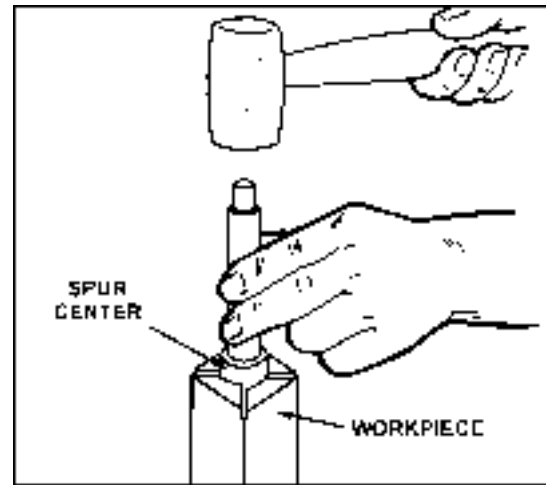


FIGURE 4

## MOUNTING STOCK

1. Install workpiece by inserting the attached spur center into the spindle taper on the headstock.
2. Bring tailstock into position, lock it to the bed, and advance the spindle with the handwheel in order to seat the cup center into the workpiece.
3. Move tool support into position. It should be parallel to the workpiece, just below the centerline and approximately 1/8" to 1/4" from the corners of the workpiece to be turned, as in Figure 5. Lock tool support to bed.
4. Rotate workpiece by hand to check for proper clearance.
5. Start lathe at lowest speed and bring it up to the appropriate RPM for the size of stock used (refer to chart on page 7).

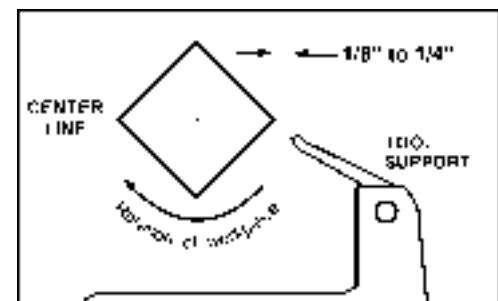


FIGURE 5

## CUTTING TECHNIQUES

### ROUGHING OUT:

1. Begin with a large roughing gouge. Place the tool on the tool support with the heel of the tool on the surface to be cut.
2. Slowly and gently raise tool handle until cutting edge comes into contact with the workpiece.

3. Beginning at the tailstock end of the workpiece, roll the flute (hollowed-out portion) of the tool in the direction of the cut, Figure 6. Make long sweeping cuts in a continuous motion to rough the piece down to a cylinder. Keep as much of the bevel of the tool as possible in contact with the workpiece to ensure control and avoid catches.

**NOTE: Always cut down-hill, or from large diameter to small diameter. Always work toward the end of a workpiece, never start cutting at the end.**

4. Once the workpiece is roughed down to a cylinder, smooth it with a large skew. Keep the skew handle perpendicular to the spindle and use only the center third of the cutting edge for a long smoothing cut (touching one of the points of the skew to the spinning workpiece may cause a catch and ruin the workpiece).

6. Add details to the workpiece with skew, parting tool, scraper or spindle gouge.

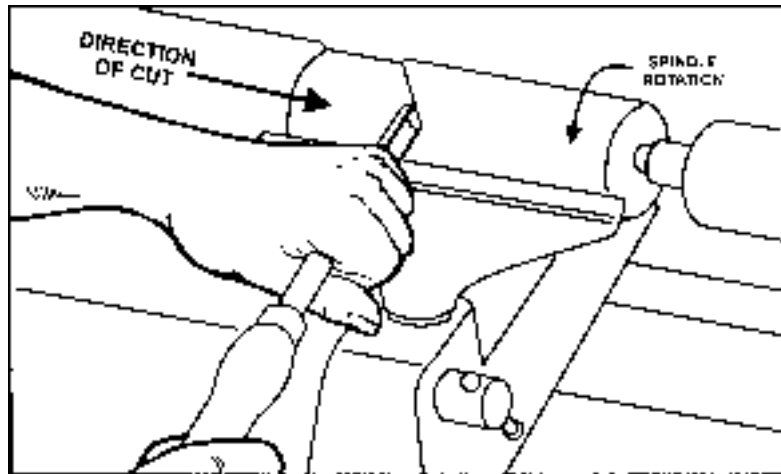


FIGURE 6

### BEADS:

1. Make a parting cut for what is to be a bead to the desired depth. Place the parting tool on the tool support and move tool forward to make the full bevel of the tool come in contact with the workpiece. Gently raise handle to make cut to the appropriate depth.
2. Repeat for other side of the bead.
3. Using a small skew or spindle gouge, start in the center between the two cuts and cut down each side to form the bead. Roll the tool in direction of cut.

### COVES:

1. Use a spindle gouge. With the flute of the tool at 90 degrees to the workpiece, touch the point of the tool to the workpiece and roll in towards the bottom of the cove, Figure 7. **Stop at the bottom; attempting to go up the opposite side may cause the tool to catch.**
2. Move the tool over the desired width of the cove.
3. With the flute facing the opposite direction, repeat step 1 for other side of cove. Stop at bottom of cut.

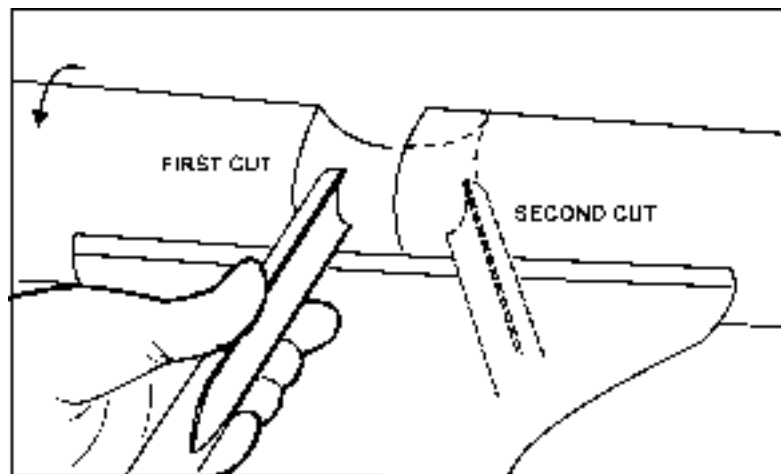


FIGURE 7

### "V" CUTS:

1. Use the long point of the skew. (NOTE: Do not press the long point of the skew directly into the workpiece to create the "V"; this will result in a burned or burnished "V" with fibers being rolled up at both sides.)
2. Lightly mark the center of the "V" with the tip of the skew.
3. Move the point of the skew to the right half of the desired width of your cut.
4. With the bevel parallel to the right side of the cut, raise the handle and push the tool in to the desired depth, Figure 8.
5. Repeat from the left side. The two cuts should meet at the bottom and leave a clean "V" cut.

- Additional cuts may be taken to add to either the depth or width of the cut.

#### PARTING OFF:

- Use parting tool.
- Adjust lathe speed to lower RPM for parting through a workpiece.
- Place tool on tool support and raise the handle until it starts to cut and continue to cut towards the center of the workpiece.
- Loosely hold on to the piece in one hand as it separates from the waste wood.

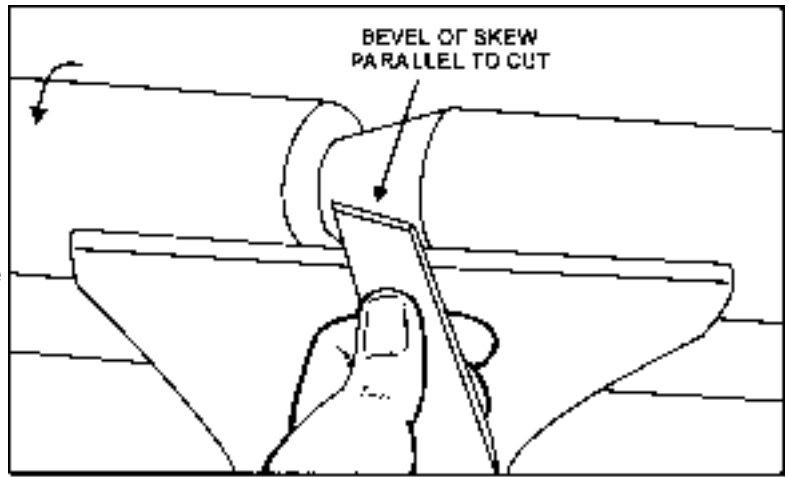


FIGURE 8

#### SANDING & FINISHING:

Leaving clean cuts will reduce the amount of sanding required. Adjust the lathe to a **low speed**, and begin with fine sandpaper (120 grit or finer). Coarser sandpaper will leave deep scratches that are difficult to remove, and dull crisp details on the spindle. Progress through each grit without skipping grits (e.g., do not jump from 120 grit to 220 grit). Fold the sandpaper into a pad; do not wrap sandpaper around your fingers or the workpiece.

To apply a finish, the workpiece can be left on the lathe. Turn off the lathe and use a brush or paper towel to apply the finish. Remove excess finish before restarting lathe. Allow to dry and sand again with 320 or 400 grit sandpaper. Apply second coat of finish and buff.

## FACE PLATE & BOWL TURNING

Face plate turning is normally done on the inboard side of the headstock over the bed. Larger workpieces must be turned on the outboard side (remove tailstock and tool support, and move headstock to opposite end of bed).

### MOUNTING STOCK

Use of a face plate is the most common method for holding a block of wood for turning bowls and plates:

- Select stock at least 1/8" to 1/4" larger than each dimension on the finished workpiece.
- Always select the largest diameter face plate that can be used for the workpiece to be turned.
- True one surface of the workpiece for mounting against the face plate.
- Using the face plate as a template, mark the location of the mounting holes, and drill pilot holes of the appropriate size. Face plates are drilled for No. 12 screws. (Phillips and square drive screws will hold up better than slotted screws. Steel metal screws are case hardened with deeper and sharper threads than wood screws.)

If the mounting screws on the face plate interfere with the workpiece, a glue or waste block can be used:

- Make a block the same diameter as the face plate, Figure 9. Both glue block and workpiece should have good flat surfaces for gluing.
- Glue the block to the workpiece. Avoid using brown paper or newspaper between the block and workpiece. It may work fine if you are using scrapers, but a slight catch with a bowl gouge can separate the two.

NOTE: When using a glue block, be careful with the adhesive you select. Dry workpieces can be bonded with ordinary white or yellow glue but must be clamped to ensure a good bond. Green workpieces require cyanoacrylate (super glue) or a urethane adhesive. Urethanes will require clamping.

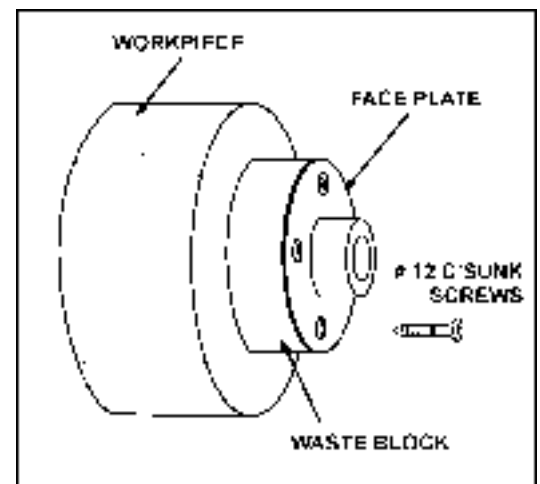


FIGURE 9

## **FACEPLATE OR CHUCK?**

While faceplates are the simplest, most reliable method of holding a block of wood for turning, chucks can also be used. As there are dozens of chucks to choose from, the woodturner should first consider all the different types of turning that will be done, and read reports or discuss with other turners who own chucks before making a decision. A chuck is not a requirement but is handy when working on more than one piece at a time. Rather than removing screws, you simply open the chuck and change workpieces. The most popular ones are four jaw scroll chucks with a variety of jaws to accommodate different size tenons. Most also come with a screw chuck as well.

## **WOOD SELECTION**

Firewood is the cheapest, most widely available stock to use while learning to turn bowls. Simply waste wood for a while practicing turning techniques. Develop skill with each tool before attempting to make a finished piece. It is best to start with dry wood, without worrying about drying or distortion. Once turning becomes comfortable, try green wood which cuts very easily. As the turner gains experience, he or she will find extraordinary grain and figure in the form of burls, crotches and bark inclusions.

## **CHECKS & CRACKS**

Green wood will check and crack. For best results, leave logs in as long lengths as you can handle. As the material starts to dry, surface cracks will develop on the ends of the log. Cut off two to three inches and you should find good, sound wood. Also cut the log in half along the pith to avoid having it in the finished piece. Most checks radiate from the pith. As you turn bowls from green wood, make sure you maintain a consistent wall thickness throughout the piece. Leaving a piece thick in some areas and thin in others will cause the wood to dry unevenly and promote checks and cracks.

## **DISTORTION**

Distortion is a problem associated with turning green wood. It will vary from one type of wood to the next. Typically, fruitwoods tend to distort more than others do. It also varies with the time of year the tree was cut and how the logs are stored.

## **TOOLS FOR BOWL TURNING**

The deep fluted bowl gouge is the most essential and versatile tool for most bowl and faceplate style turning. The bowl gouge is heavier and easier to control than other types of gouges. It also allows removal of wood much faster and with less vibration than other gouges. Most average sized bowl work can be accomplished with a 3/8" or 1/2" bowl gouge. A 1/4" bowl gouge is best suited for smaller bowls and light finishing cuts. Larger 3/4" and 1" bowl gouges are only used for extremely large pieces.

Large domed scrapers can also be used to help clean up the interior surfaces of bowls. A light touch with the scraper slightly tilted will eliminate some of the ridges occasionally left by an inexperienced bowl gouge.

## **BOWL TURNING TECHNIQUES**

### **TO SHAPE OUTSIDE OF BOWL:**

1. Odd shaped burls, crotches and other irregular shaped blanks require special preparation before mounting in a chuck or onto a faceplate. Remove the bark, if there is any, from what appears to be the center of the top of the workpiece.
2. Drive spur center into the top of the workpiece with a mallet or dead blow hammer.
3. Slip the spur center into the headstock taper and bring the tailstock with a live or ball bearing center into position. Lock the tailstock to the bed and advance the spindle in order to seat the cup center into the workpiece. Tighten the quill lock.
4. Position tool support below the centerline and about 1/4" from the workpiece. (NOTE: For larger outboard turning, an optional outboard turning stand is used to place the tool support; see your Powermatic dealer).
5. Turn workpiece by hand to ensure proper clearance.
6. Start lathe at lowest speed and bring it up to the maximum safe speed for the size of work to be turned (see chart, page 7). If the machine starts to vibrate, lower the speed until vibration stops.
7. Rough out the outside of the bowl with the 1/2" deep fluted bowl gouge, holding the tool firmly against your hip. For best control, use your whole body to move the gouge through the workpiece.
8. As bowl takes shape, work on the bottom (tailstock end) to accommodate attaching a face plate.
9. Turn a short tenon (about 1/8" long) the size of the hole in the faceplate, Figure 10. This will allow centering the workpiece when the faceplate is attached. (NOTE: If you plan to use a chuck, turn a tenon of the appropriate length and diameter to fit your chuck.)

10. Stop the lathe, remove workpiece and attach face plate or chuck (see "Mounting Stock" above).

11. Finish turning the outside of bowl with 1/2" or 3/8" bowl gouge. Leave additional material at base of bowl for support while turning interior. This will be removed later.

#### TO SHAPE INTERIOR OF BOWL:

1. Stop lathe and move tailstock away. Remove center from tailstock to prevent bumping it with elbow.

2. Adjust tool support in front of the bowl just below centerline, at a right angle to the lathe ways.

3. Rotate workpiece by hand to check clearance.

4. Face off top of bowl by making a light shearing cut across the top of workpiece, from rim to center.

5. Place 1/2" bowl gouge on toolrest at center of the workpiece with the flute facing top of bowl. The tool handle should be level and pointed toward four o'clock, Figure 11.

6. Use left hand to control cutting edge of gouge, while right hand swings tool handle around toward your body (see Figure 11). The flute should start out facing top of workpiece, and rotate upward as it moves deeper into the bowl to maintain a clean even curve.

As tool goes deeper into bowl, progressively work out toward rim. It may be necessary to turn the toolrest into the piece as you get deeper into the bowl. (NOTE: Try to make one, very light continuous movement from the rim to the bottom of the bowl to ensure a clean, sweeping curve through the piece. Should there be a few small ridges left, a light cut with a large domed scraper can even out the surface.)

7. Develop wall thickness at the rim and maintain it as you work deeper into the bowl (Once the piece is thin toward the bottom, you cannot make it thinner at the rim). When the interior is finished, move tool support to exterior to re-define bottom of bowl. (General rule of thumb: the base should be approximately 1/3 the overall diameter of the bowl).

8. Work the tight area around faceplate or chuck with 1/4" bowl gouge.

9. Begin the separation with a parting tool, but do not cut all the way through yet.

#### SANDING AND FINISHING:

1. Remove the toolrest and adjust lathe speed to approximately 500 RPM. High speed can build friction while sanding and cause heat check in some woods.

2. Begin with fine sandpaper (120 grit) and progress through each grit, using only light pressure. Coarser sandpaper tends to leave deep scratches that are hard to eliminate. Use power-sanding techniques to avoid concentric sanding marks around your finished piece. Avoid rounding over the rim and foot with sandpaper; try to keep details crisp. Finish sanding with 220 grit.

3. Remove sanding dust with tack rags or compressed air and, with lathe turned off, apply first coat of finish. Let stand for several minutes, wipe off excess. Allow to dry before sanding again with 320 or 400 grit sandpaper.

4. Turn lathe back on and continue the separation cut almost all the way through the base. Stop at about 3" and use a small fine tooth saw to separate the bowl from the waste.

5. Apply second finish coat and allow to dry before buffing.

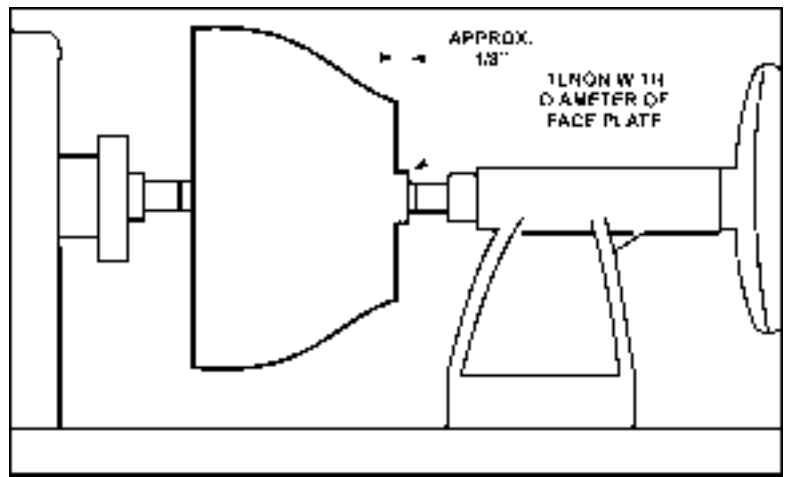


FIGURE 10

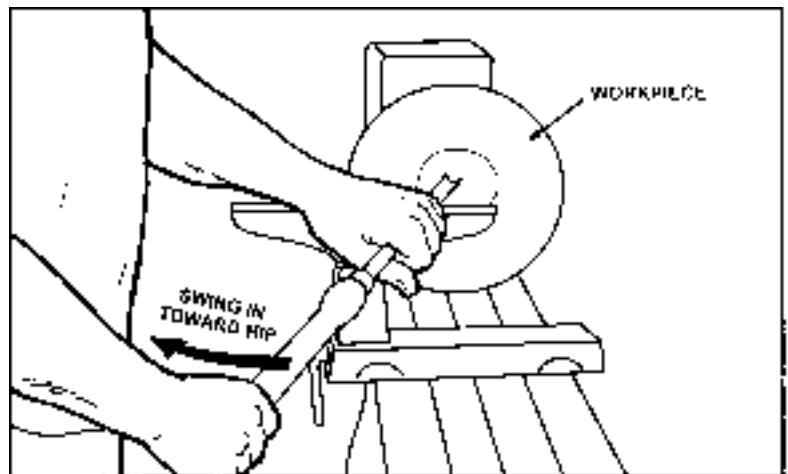
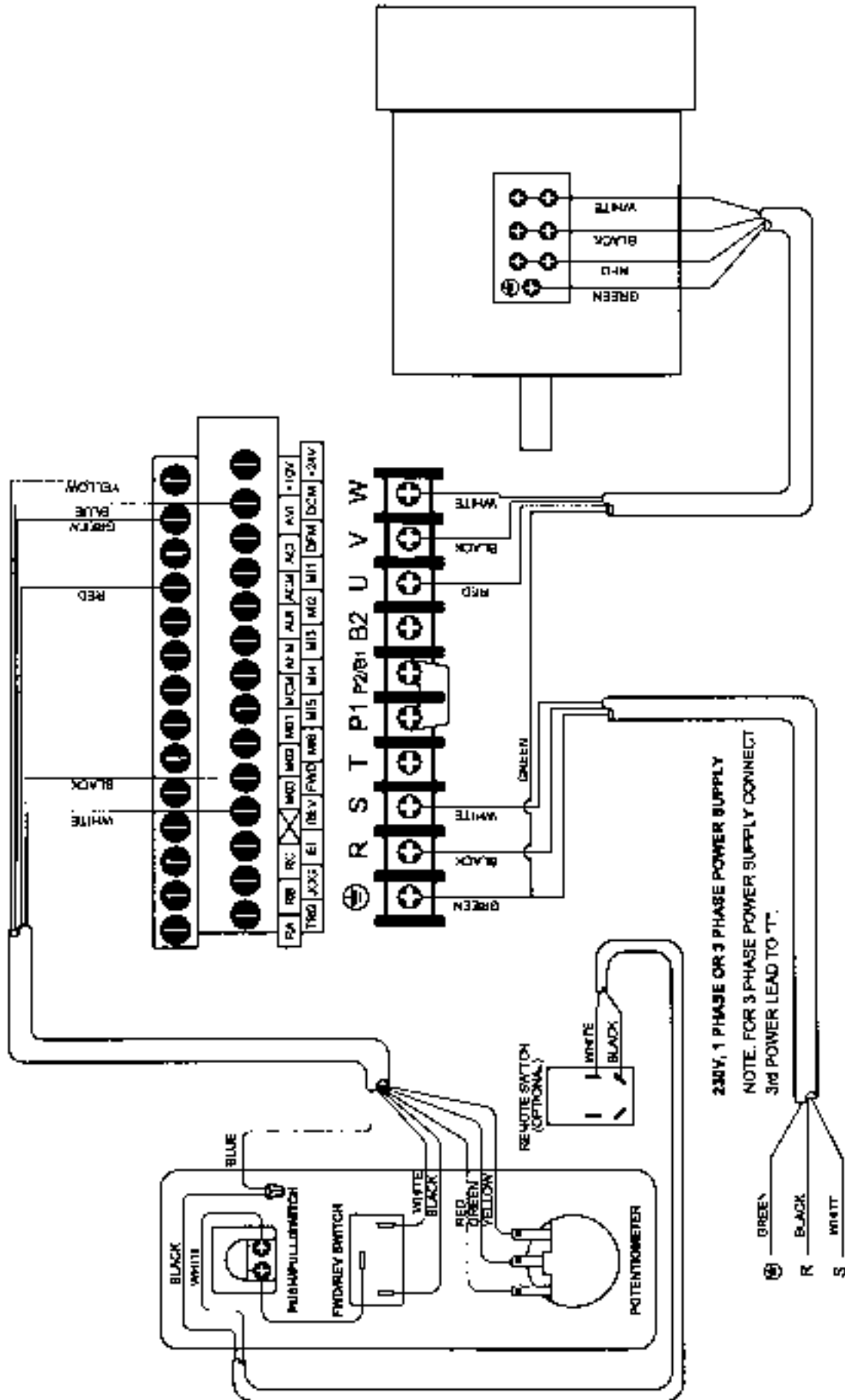


FIGURE 11

## Trouble-Shooting for Model 3520A Lathe

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>
Excessive vibration.	<ol style="list-style-type: none"> <li>1. Defective spindle bearings.</li> <li>2. Worm or defective belt.</li> <li>3. Defective motor.</li> <li>4. Workpiece warped, out-of-round, has major flaw, or was improperly prepared for turning.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace bearings.</li> <li>2. Replace belt.</li> <li>3. Replace motor.</li> <li>4. Correct problem by planing or sawing, or scrap workpiece.</li> </ol>
Motor or spindle stalls.	<ol style="list-style-type: none"> <li>1. Excessive cut.</li> <li>2. Defective motor.</li> <li>3. Excessive belt wear.</li> <li>4. Improper belt adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce cut depth.</li> <li>2. Replace motor.</li> <li>3. Replace belt.</li> <li>4. Readjust belt.</li> </ol>
Motor overheats.	<ol style="list-style-type: none"> <li>1. Motor overloaded.</li> <li>2. Improper cooling on motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct overload condition, such as reducing cut depth.</li> <li>2. Clean sawdust from fan and duct areas of motor.</li> </ol>
Motor starts slowly or fails to come up to speed.	<ol style="list-style-type: none"> <li>1. Low voltage.</li> <li>2. Defective motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Request voltage check from power company and correct low voltage condition.</li> <li>2. Replace motor.</li> </ol>
Motor fails to develop full power.	<ol style="list-style-type: none"> <li>1. Power line overloaded.</li> <li>2. Undersize wires in supply system.</li> <li>3. Low voltage.</li> <li>4. Defective motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct overload condition.</li> <li>2. Increase supply wire size.</li> <li>3. Request voltage check from power company and correct low voltage condition.</li> <li>4. Replace motor.</li> </ol>
Tools tend to grab or dig in.	<ol style="list-style-type: none"> <li>1. Dull tools.</li> <li>2. Tool support set too low.</li> <li>3. Tool support set too far from workpiece.</li> <li>4. Improper tool being used.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharpen tools.</li> <li>2. Reposition tool support height.</li> <li>3. Reposition tool support closer to workpiece.</li> <li>4. Use correct tool for operation.</li> </ol>
Lathe runs at one speed.	<ol style="list-style-type: none"> <li>1. Electronic AC inverter defective, not programmed properly or loose wiring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace electronic AC inverter, reprogram, or check wiring.</li> </ol>
Headstock moves when applying pressure with tailstock.	<ol style="list-style-type: none"> <li>1. Excessive pressure being applied by tailstock (more than 500 lbs. of force) NOTE: The screw action of the tailstock is capable of applying excessive pressure to workpiece and headstock. Apply only sufficient force by tailstock to hold workpiece securely in place. Excessive pressure can cause damage to machine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Slide headstock down the left side of the lathe against the stop then apply pressure to workpiece with tailstock.</li> </ol>

# ELECTRICAL SCHEMATIC: 3520A Lathe



## PARTS LIST: Stand & Bed Assembly (3520A Lathe)

### NO. PART NO. DESCRIPTION

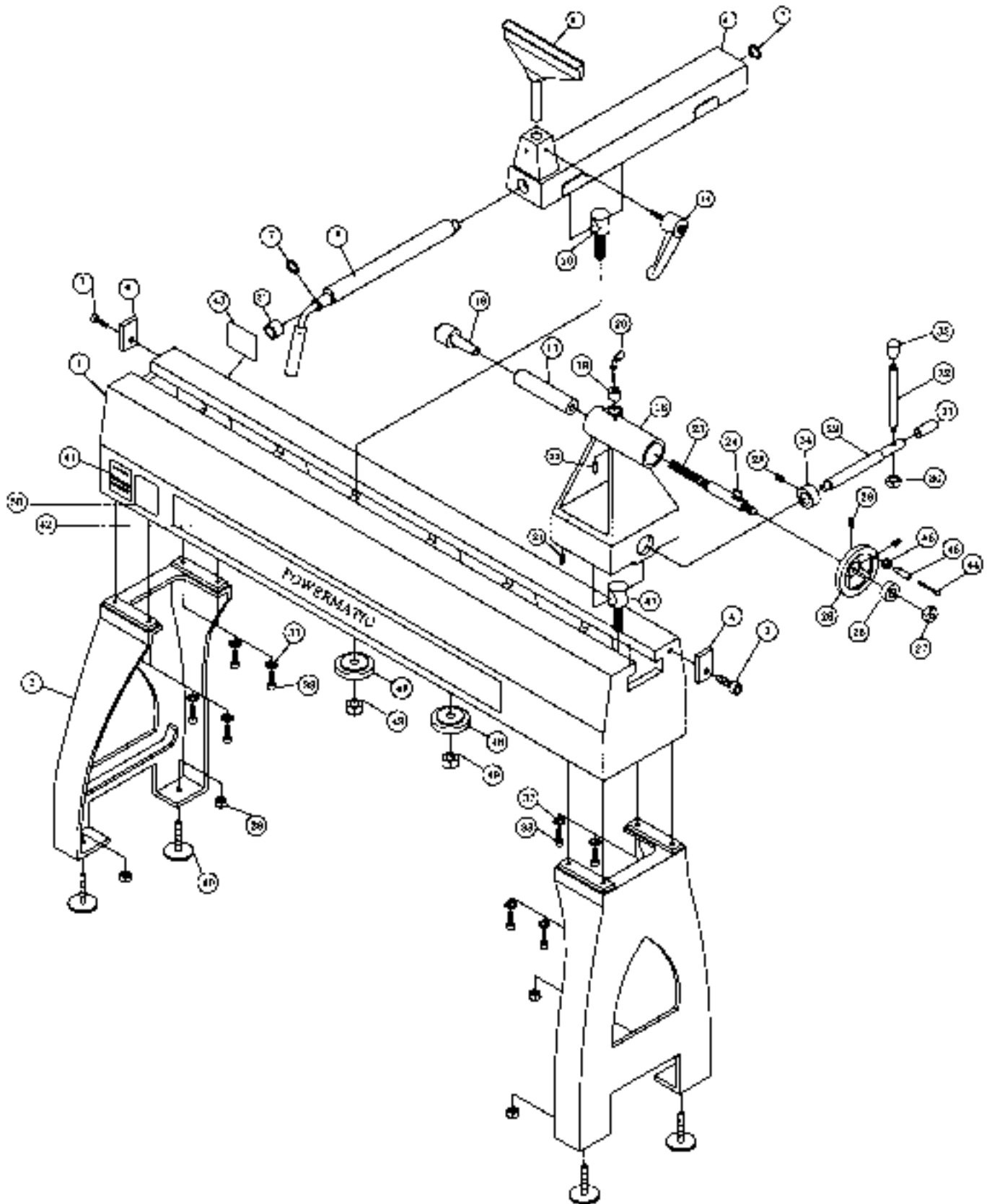
1	3047114	Bed
2	3423053	Leg, Lathe
3	6716012	Screw, Soc. Cap
4	3761159	Block, Stop
5	6294752	Base, Tool Support
6	6294742	Support, Tool 14"
7	6294756	Ring, Snap
8	6294757	Shaft, Tool Support Clamp
10	6294759	Bolt, Tool Support Clamp
14	6294763	Handle, Tool Rest
16	3799011	Tailstock
17	6294765	Quill, Tailstock
18	6294745	Center, Live
19	3728005	Sleeve, Quill Lock
20	3268001	Handle, Tailstock Quill
21	6760102	Screw, Soc. Set
22	6623086	Pin, Dowel
23	6294767	Screw, Quill Lead
24	6294768	Key
25	6064000	Bearing
26	3271049	Handwheel

### NO. PART NO. DESCRIPTION

27	6568010	Nut, Hex.
28	6715013	Screw, Soc. Set
29	3708012	Shaft, Tailstock Clamping
30	6294769	Nut, Hex.
31	6095038	Bushing
32	3268217	Handle, Tailstock
33	6430045	Knob, Black
34	3096003	Collar
37	6294772	Washer, Lock
38	6726023	Screw, Soc. Cap
39	6516009	Nut, Jam Hex.
40	6442000	Leveler, Reid
41	6294773	Label, Warning
42	6294774	Name Plate, Powermatic
43	6294775	Label, I.D.
44	6295751	Handle
47	3058001	Bolt, Tailstock Clamp
48	3092095	Clamp, Tailstock/Toolrest
49	6520009	Nut, Hex.
50	6294779	Label, Speed



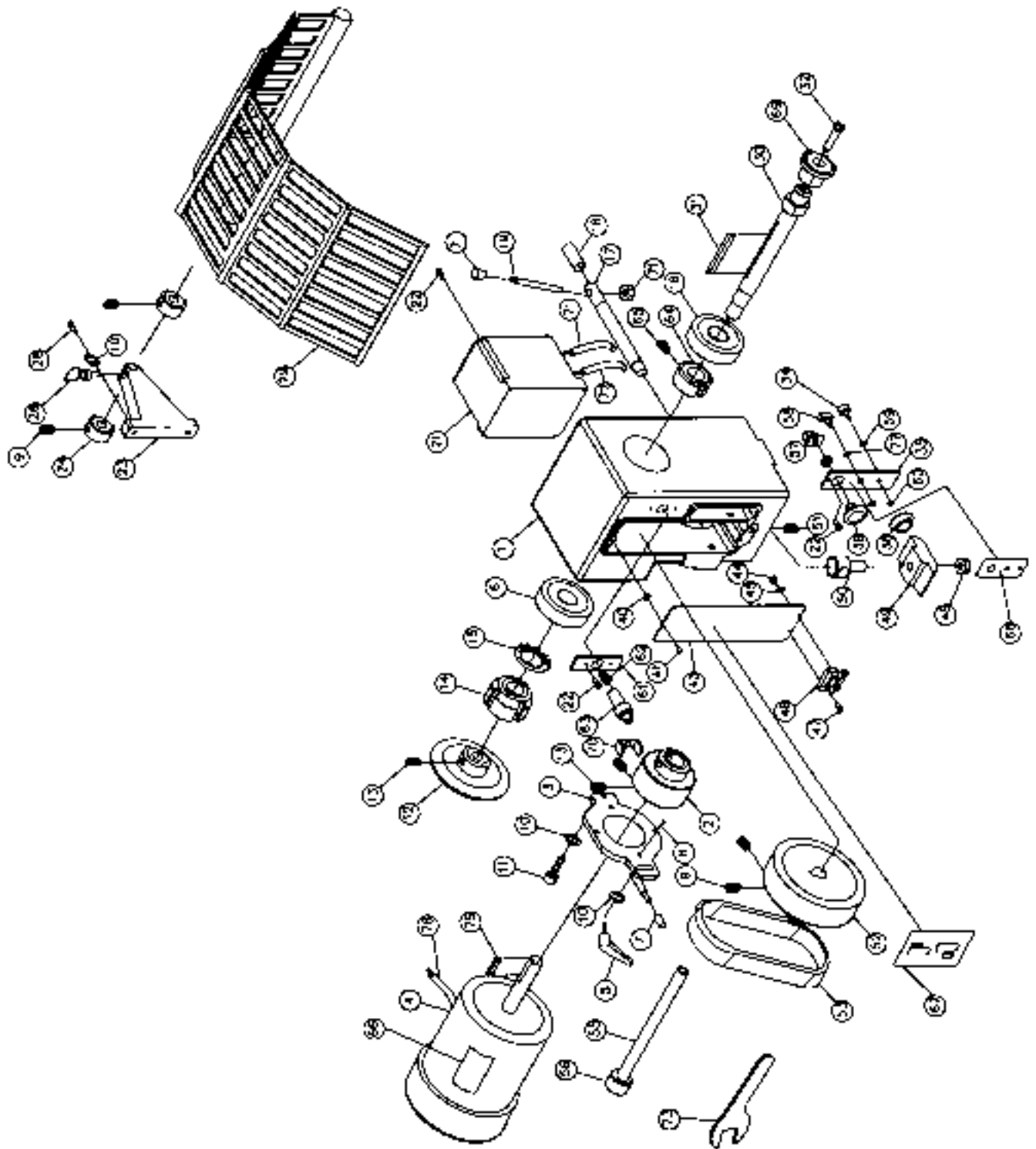
# EXPLODED VIEW: Stand & Bed Assembly (3520A Lathe)



## PARTS LIST: Headstock Assembly (3520A Lathe)

NO.	PART NO.	DESCRIPTION	NO.	PART NO.	DESCRIPTION
	2277128	Headstock Assembly	43	3578348	Panel, Door
1	6294792	Headstock	44	6508007	Nut
2	3719189	Sheave, Motor	45	6860704	Washer, Lock
3	2595036	Plate, Motor Assembly	46	6365012	Hinge, Door
4	6294793	Motor, 2 HP	47	6708019	Screw, Soc. Cap
5	6350031	Handle, Motor Plate Locking	48	6520009	Nut, Hex.
6	6060014	Bearing	49	3092093	Clamp, Head
7	6430045	Knob	50	3058001	Bolt, Tool Support Clamp
8	6716139	Screw, Motor Plate	51	6760102	Screw, Soc. Set
9	6714159	Screw, Soc. Set	52	3719188	Sheave, Spindle
10	6861300	Washer, Lock	53	6077228	Belt, Micro V
11	6716012	Screw, Soc. Cap	55	3670021	Rod, Knockout
12	3271081	Handwheel	56	3406201	Knob, Teardrop
13	6714160	Screw, Soc. Set		6294743	Rod Assy., Knockout (Items 55 & 56)
14	6549006	Nut, Bearing Lock	57	6083021	Block, Contact
15	6864006	Washer, Bearing Lock	58	6821492	Switch, FWD/REV
16	6060185	Bearing	59	6860800	Washer
17	3708013	Shaft, Headstock Clamping	60	6294782	Nut, Hex.
18	6095038	Bushing	61	3448048	Plate, Lock
19	3268219	Handle, Headstock	62	6813062	Spring, Compression
21	6294780	Inverter	63	3601006	Plunger, Spindle Lock
22	6760092	Screw, Soc. Cap	64	3097007	Collar, Locking
23	3064711	Bracket, Lathe Guard	65	6715015	Screw, Soc. Cap
24	6143004	Collar, Retaining	66	6294783	Label, Motor
26	6644005	Plunger	67	6294784	Label, Speed
28	6716012	Screw, Soc. Cap	68	6294785	Label, Control Panel
29	6294728	Assembly, Guard	69	6294736	Plate, 3" Face, 1-1/4-8
30	3749132	Spindle, Head	70	6294786	Bracket, Spindle Lock
31	3388100	Key, 5/16	71	6294787	Cord, Power
32	6294725	Center, Spur 1", MT2	72	6294788	Cord, Control
34	6643000	Pot, Control	73	6294744	Wrench, Face Plate
35	3578349	Panel, Control	75	6294789	Key, Motor
38	6430047	Knob, Control Panel	76	6294790	Cord, Motor
39	6294794	Switch, Push/Pull	77	6294791	Nut, Hex.
40	6601000	"O" Ring			
41	6294781	Knob, Lock			

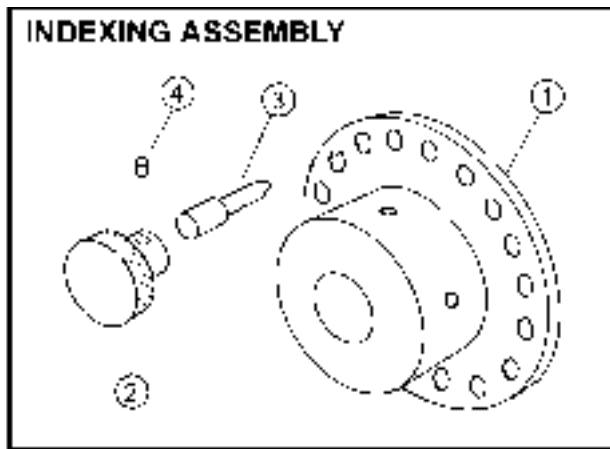
**EXPLODED VIEW: Headstock Assembly (3520A Lathe)**



# OPTIONAL EQUIPMENT (3520A Lathe)

## NO. PART NO. DESCRIPTION

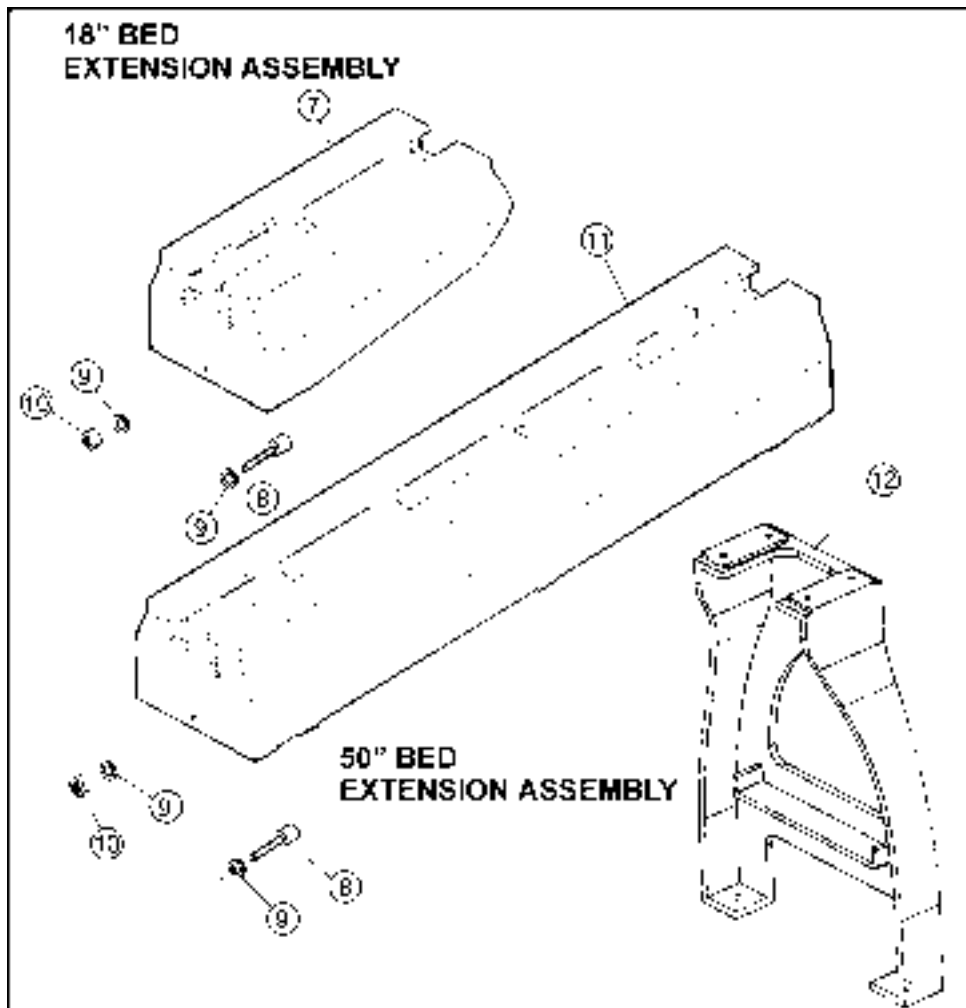
- 6294729 Indexing Assembly (Items 1 thru 4)
- 1 3097006 Collar, Indexing
- 2 3406005 Knob, Adjusting Screw
- 3 3585220 Pin, Indexing
- 4 6714139 Screw, Soc. Set 1/4-20 X 5/8
- 6294727 Extension, 18" Short Bed (Items 7 thru 10)
- 7 3186053 Bed, Short
- 8 6716035 Bolt, Socket
- 9 6861300 Washer, Lock
- 10 6516009 Nut, Hex.
- 6294726 Extension, 50" Full Bed (Items 8 thru 12)
- 8 6716035 Bolt, Socket
- 9 6861300 Washer, Lock
- 10 6516009 Nut, Hex.
- 11 3047114 Bed, Long
- 12 3423053 Leg, Lathe
- 13 6294735 Extension, 2" Spindle
- 14 6294734 Adapter, Spindle 1-1/4"-8 to 1-1/2"-8



**2" SPINDLE EXTENSION**



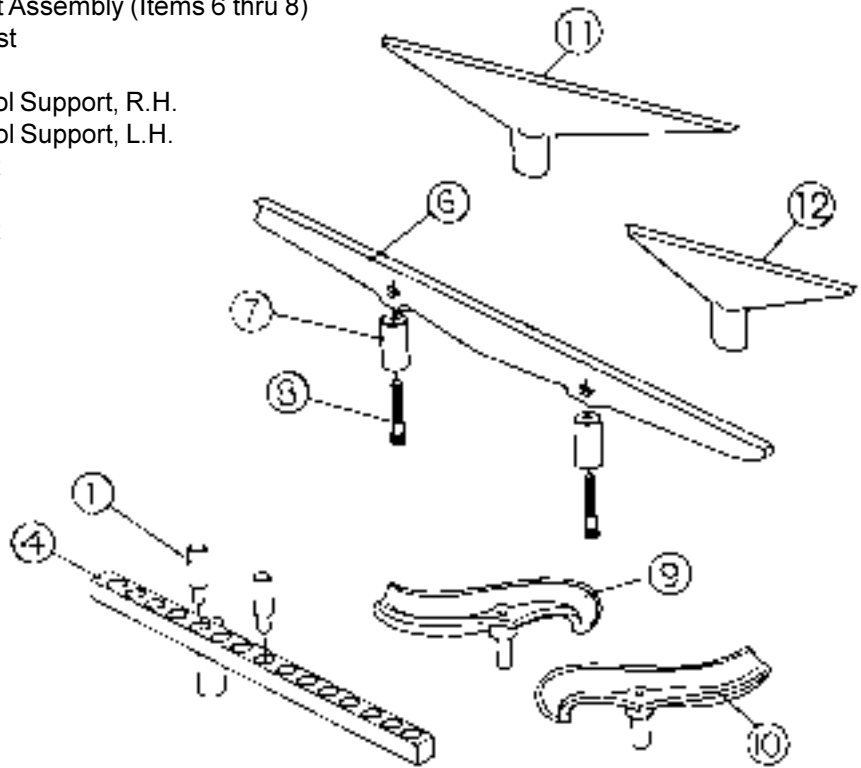
**SPINDLE ADAPTER**



## OPTIONAL EQUIPMENT (3520A Lathe)

### NO. PART NO. DESCRIPTION

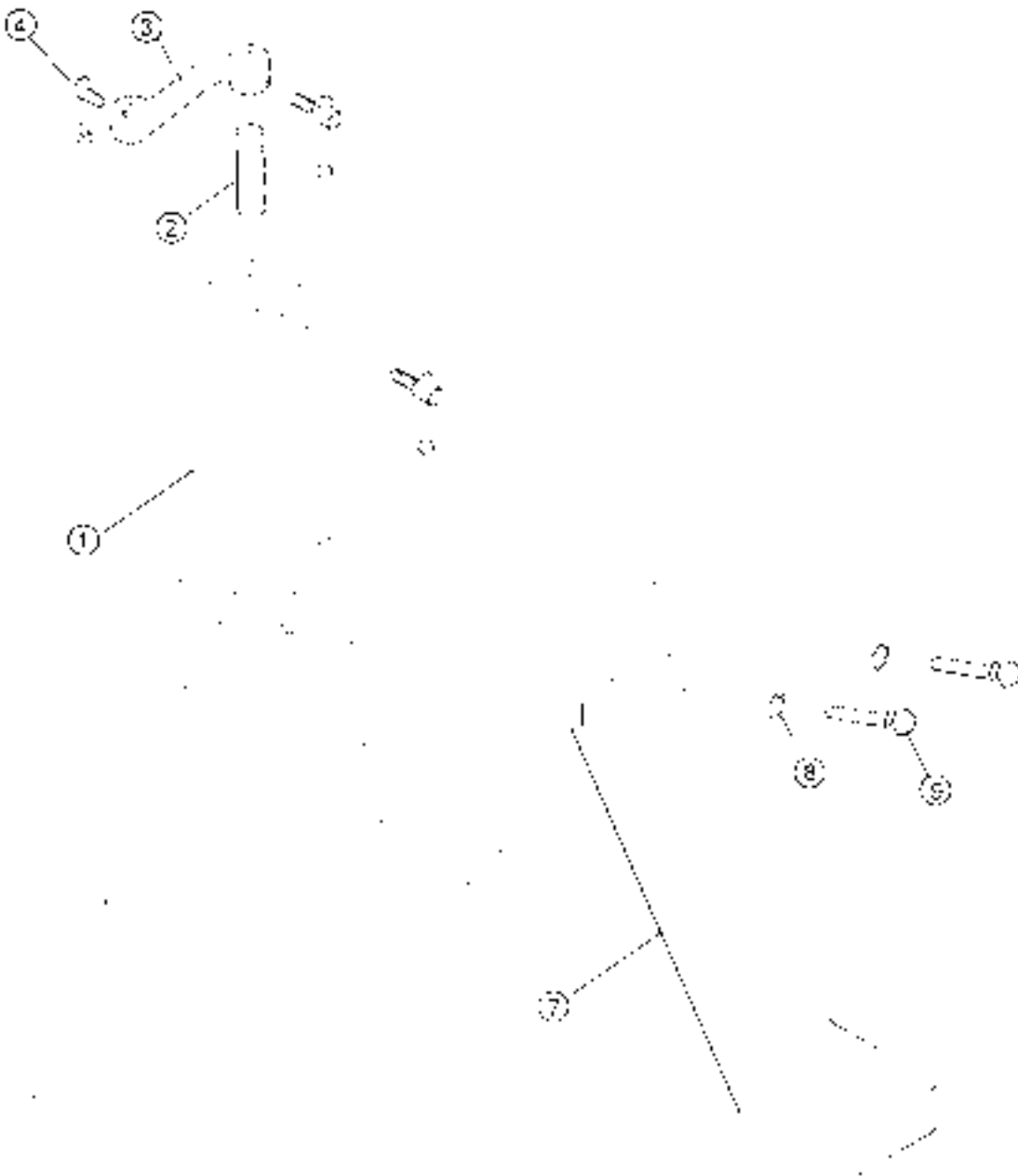
1	3585011	Tool Support Pin 5/8 X .495 X 3.50
2	6294745	Ball Brg. Tailstock Center (not shown)
4	6294730	12" Metal Spinning Tool Support
	6294731	26" Tool Support Assembly (Items 6 thru 8)
7	6294795	Tool Support Post
8	6716219	Screw, Soc. Hd.
9	6294740	Bowl Turning Tool Support, R.H.
10	6294751	Bowl Turning Tool Support, L.H.
11	6294741	16" Tool Support
12	6294739	6" Tool Support
	6294742	14" Tool Support



# OPTIONAL EQUIPMENT: Outboard Turning Stand (3520A Lathe)

## NO. PART NO. DESCRIPTION

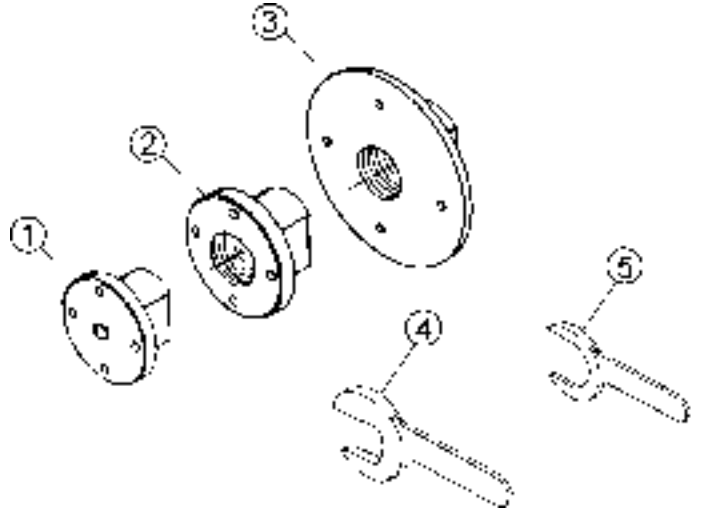
	6294732	Stand, Heavy Duty Outboard Turning
1	3042503	Base, Turning Stand
2	3584014	Pin, Offset Tool Support
3	3658005	Casting, Offset Tool Support
4	2695026	Screw Lock Assembly
7	3423055	Leg, Turning Stand Screw
8	6861700	5/8 Lock Washer
9	6769002	5/8 Bolt



## OPTIONAL EQUIPMENT (3520A Lathe)

### NO. PART NO. DESCRIPTION

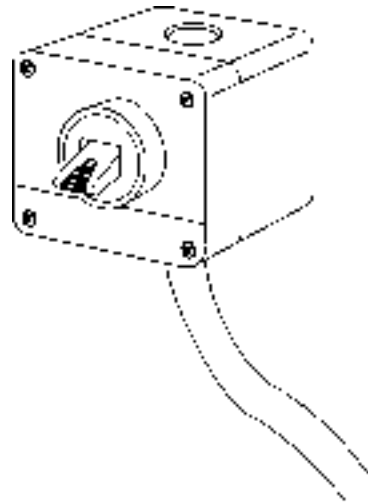
1	6294736	3" Face Plate, 1-1/4-8 (STD.)
2	6294737	4" Face Plate, 1-1/4-8 (OPT.)
3	6294738	7" Face Plate, 1-1/4-8 (OPT.)
4	6294744	Wrench, Face Plate
5	3868030	Wrench, Spindle



## OPTIONAL EQUIPMENT

### PART NO. DESCRIPTION

6294733	Switch, Remote ON/OFF
---------	-----------------------



## OPTIONAL EQUIPMENT

### PART NO. DESCRIPTION

2759090	Outboard Stand Assembly
6294725	Spur Center, 1"
6294728	Guard Assembly
6294743	Knock Out Rod

## **ELECTRICAL: Remote ON/OFF Switch (OPTIONAL)**

### **NOTE:**

The lathe can only operate when both the headstock and remote switches are in the "ON" position.

### **STEP 1:**

Disconnect all electrical power to lathe.

### **STEP 2:**

Remove the two screws from the control panel.  
Do NOT disconnect control panel from wiring harness.

### **STEP 3:**

Run the remote switch's wiring harness through the opening in the back of the headstock and out through the front of the headstock.

### **STEP 4:**

Connect the remote switch wiring harness to the back of the Push/Pull switch (Refer to the electrical schematic on page 15).

### **STEP 5:**

Reinstall the control panel to the headstock.  
From the back of the headstock, lightly pull out any excess wire that may be inside the headstock.

### **STEP 6:**

The magnetic back on the remote switch will allow the switch to be placed anywhere on the lathe.

### **STEP 7:**

Connect electrical power to the lathe and resume operation.



## AC INVERTER READINGS: Lathe Speed Chart

DIGITAL READOUT	SPINDLE SPEED	
	LOW RANGE	HIGH RANGE
5.9	54	143
10	91	242
15	136	364
20	182	485
25	227	606
30	273	727
35	318	848
40	364	970
45	409	1091
50	455	1212
55	500	1333
60	545	1455
65	591	1576
70	636	1697
75	682	1818
80	727	1939
85	773	2061
90	818	2182
95	864	2303
100	909	2424
105	955	2545
110	1000	2667
115	1045	2788
120	1091	2909
125	1136	3030
130	1182	3152
132	1200	3200



To order parts or reach our service department, please call our toll free number between 8:00 A.M. and 4:30 P.M. (CST), Monday through Friday. Having the Model Number and Serial Number of your machine available when you call will allow us to serve you quickly and accurately. Locating the EDP number of the part(s) required from your parts manual will also expedite your order.

Phone: (800) 248-0144

Fax: (800) 274-6840

If you are calling from Canada, please call 800-238-4746

E-mail: [powermatic@powermatic.com](mailto:powermatic@powermatic.com)

Website: [www.powermatic.com](http://www.powermatic.com)

# ***POWERMATIC***<sup>®</sup>

JET Equipment & Tools  
427 Sanford Road  
LaVergne, TN 37086  
Phone: (800) 248-0144  
Fax: (800) 274-6840  
E-mail: [powermatic@powermatic.com](mailto:powermatic@powermatic.com)  
Website: [www.powermatic.com](http://www.powermatic.com)