

20" WOODTURNING LATHE

Model 3520A

Instruction Manual & Parts List

M-0460221



POWERMATIC[®]

(800) 248-0144

www.powermatic.com

This manual has been prepared for the owner and operators of a Powermatic Model 3520A Lathe. Its purpose, aside from proper 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.

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WMH Tool 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 WMH Tool Group Repair Stations can authorize warranty repair, assist you in obtaining parts, or perform routine maintenance and major repair on your JET, Performax, Powermatic or Wilton tools.

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SAFETY RULES

As with all machines, there is a certain amount of hazard involved with the use of this lathe. Use the machine with the respect and caution demanded where safety precautions are concerned. When normal safety precautions are overlooked or ignored, personal injury to the operator can result.

Read, understand and follow the safety and operating instructions found in this manual. Know the limitations and hazards associated with this machine. A warning decal is placed on each machine as a reminder of basic safety practice.

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

Eye safety. Wear an approved safety shield, goggles, or glasses to protect eyes. (NOTE: Common eyeglasses are only impact-resistant, they are not safety glasses.)

Personal protection. Before operating the machine, remove tie, rings, watch and other jewelry and roll up sleeves above the elbows. Remove all loose outer clothing and confine long hair. Protective type footwear should be used. Where the noise exceeds the level of exposure allowed in Section 1910.95 of the OSHA Regulations, use hearing protective devices. Do not wear gloves.

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 on page 9 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.

Familiarize yourself with the following safety notices used in this manual:



CAUTION: (This means that if precautions are not heeded, it may result in minor or moderate injury and/or possible machine damage)



WARNING: (This means that if precautions are not heeded, it could result in serious injury or possibly even death).

SAFETY: DECALS

Familiarize yourself with the location and content of this decal on your machine.



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SPECIFICATIONS: 3520A Lathe

Table with standard extensions.....	28" x 38"
Distance Between Centers.....	34-1/2"
Swing Over Bed	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
Hole through Tail Stock Spindle.....	3/8"
Hole through Head Stock Spindle	5/8"
Footprint of stand.....	50" L x 24" W

NOTE: The above specifications were current at the time this manual was published, but because of our policy of continuous improvement, Powermatic reserves the right to change specifications without notice and without incurring obligations.

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, level 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.



WARNING: 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 (shown in Figure 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" list on page 24.

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. Be sure that the Poly-V grooves of the belt seat properly in the corresponding groove of the pulley. 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
16" to 20"	175	325	500
20" to 24"	175	260	400

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.

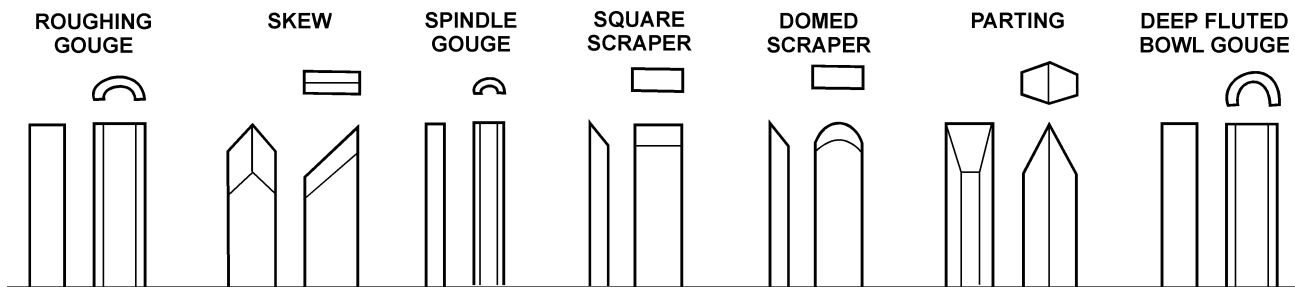


FIGURE 1

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.

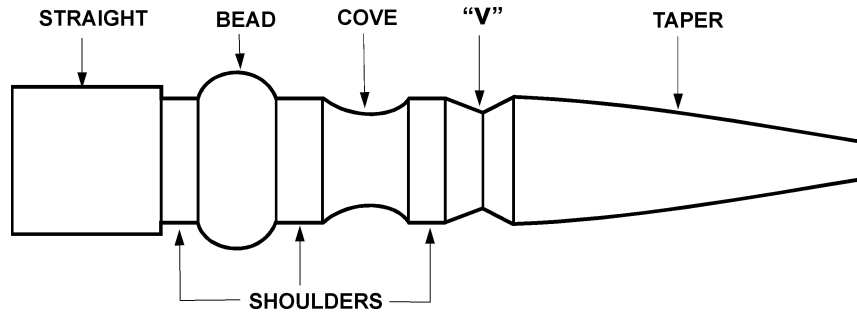


FIGURE 2

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.**

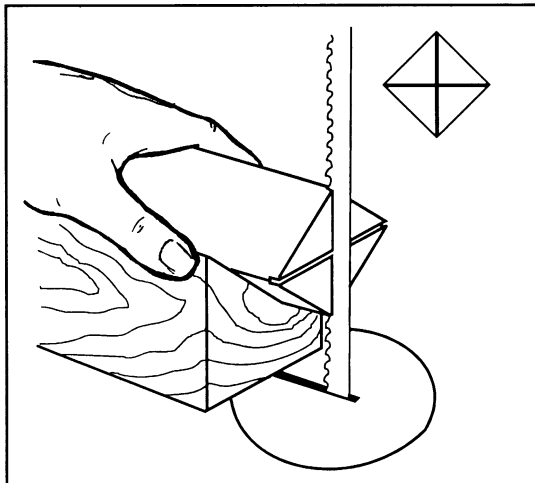


FIGURE 3

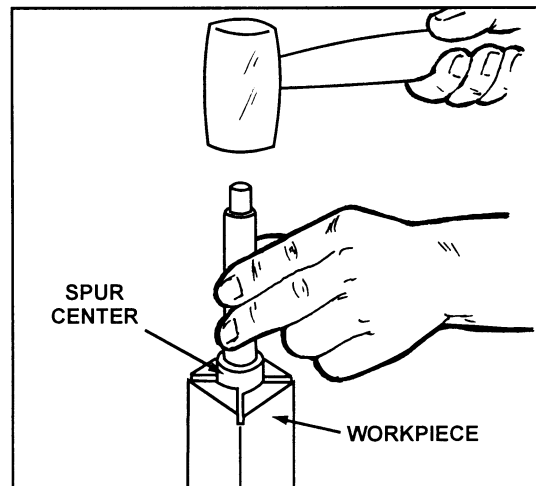


FIGURE 4

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.

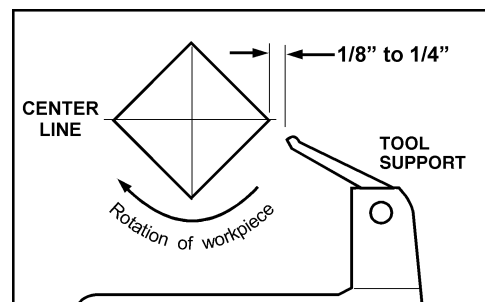


FIGURE 5

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 table on page 9).

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.

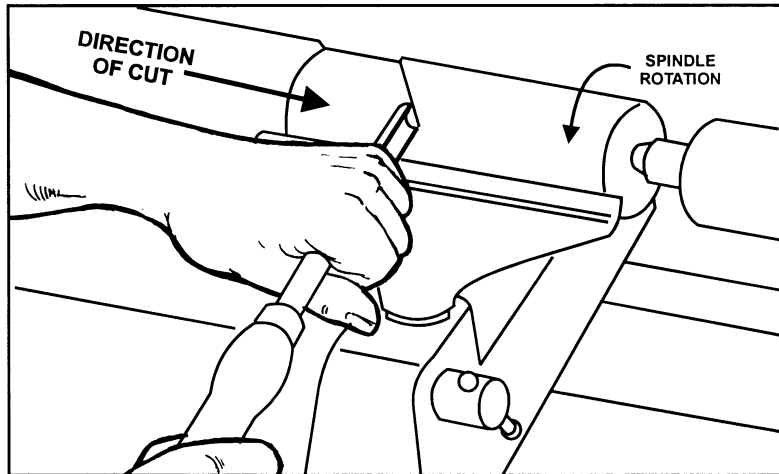


FIGURE 6

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.

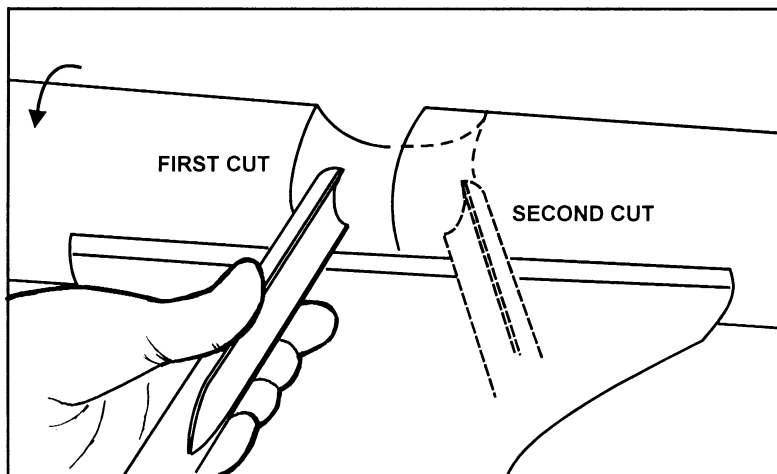


FIGURE 7

"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, as shown in Figure 8.
5. Repeat from the left side. The two cuts should meet at the bottom and leave a clean "V" cut.
6. Additional cuts may be taken to add to either the depth or width of the cut.

PARTING OFF:

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

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.

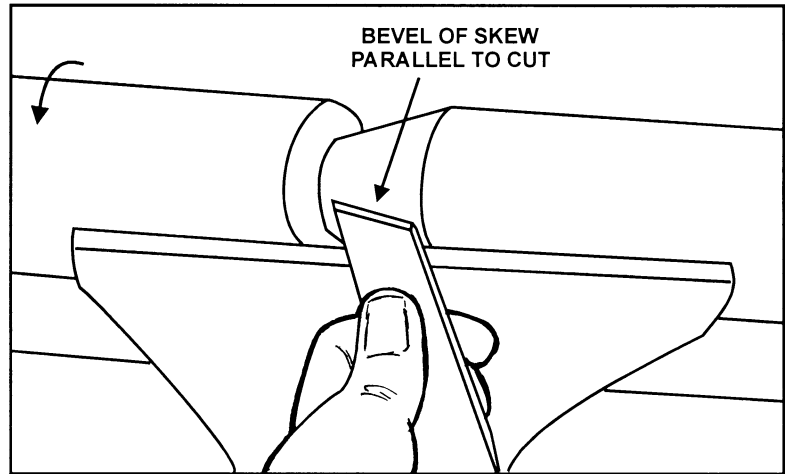


FIGURE 8

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:

1. Select stock at least 1/8" to 1/4" larger than each dimension on the finished workpiece.
2. Always select the largest diameter face plate that can be used for the workpiece to be turned.
3. True one surface of the workpiece for mounting against the face plate.
4. 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. Sheel 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:

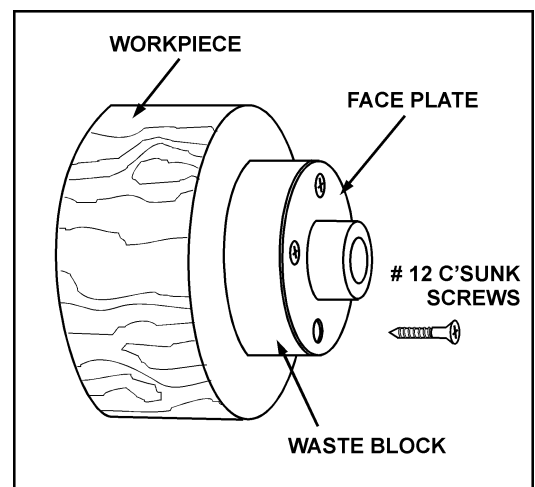


FIGURE 9

5. Make a block the same diameter as the face plate, Figure 9. Both glue block and workpiece should have good flat surfaces for gluing.

6. 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).

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 on page 9). 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, as shown in 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.

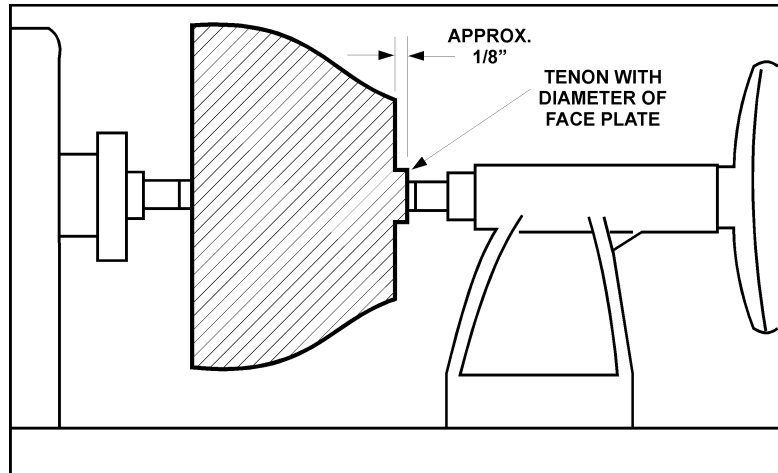


FIGURE 10

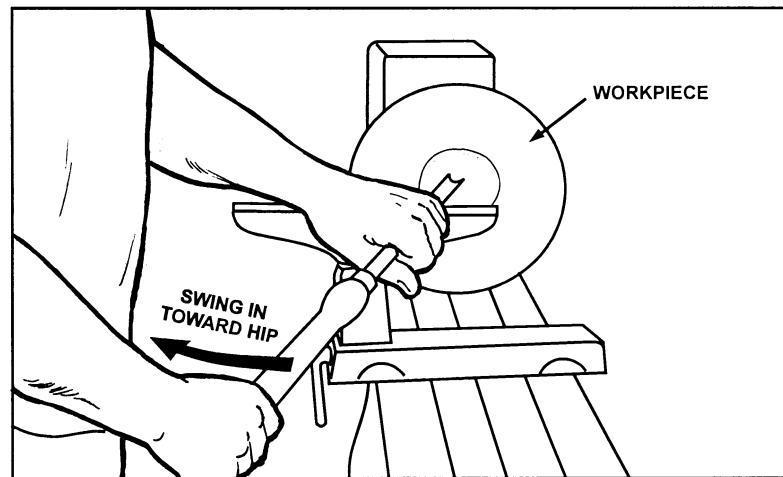


FIGURE 11

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.

TROUBLE-SHOOTING (3520A Lathe)

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

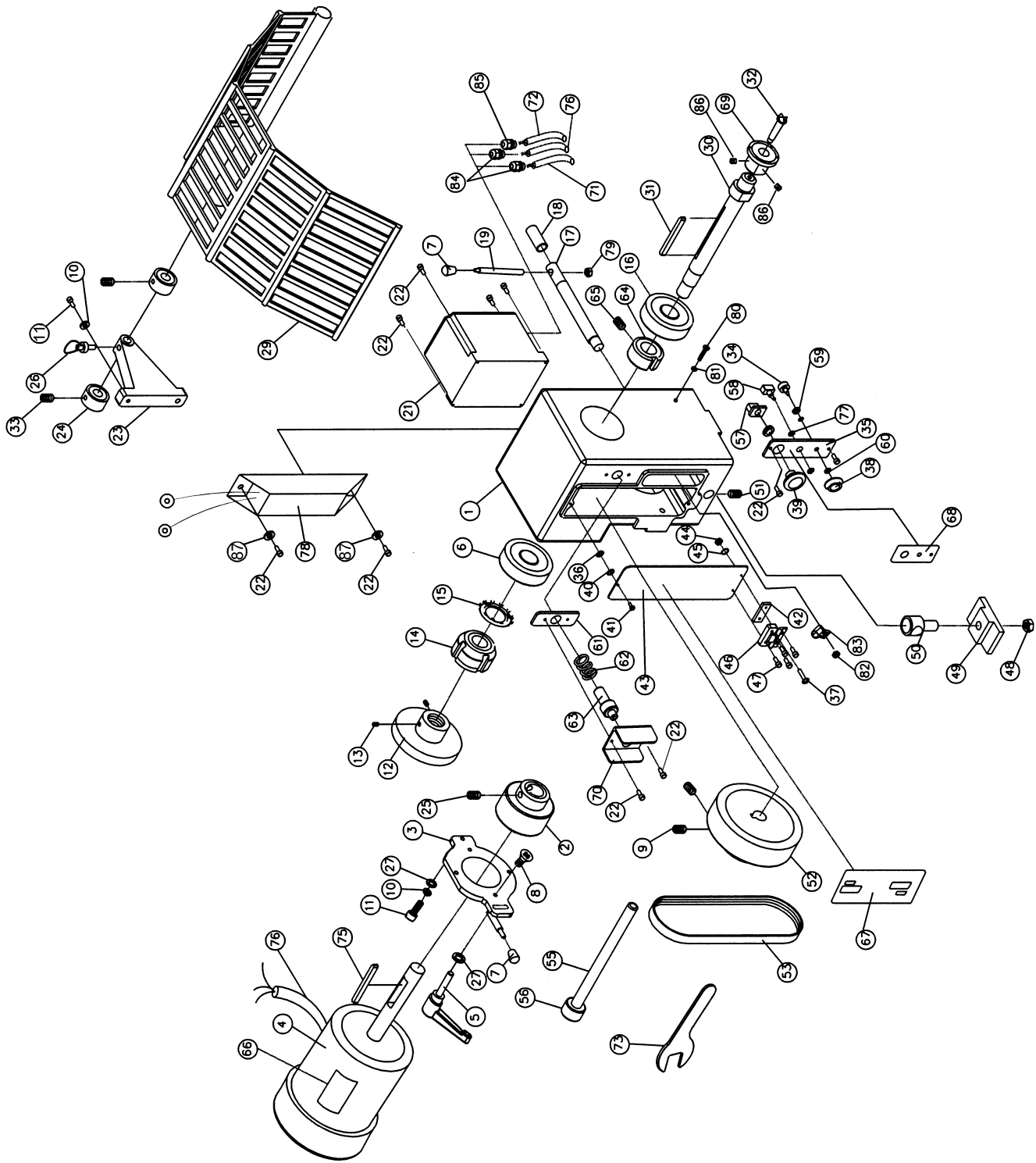
PARTS LIST: Headstock Assembly (3520A Lathe)

No.	Part No.	Description	Quantity
	2277128	Headstock Assembly	1
1	6294792	Headstock	1
2	3719189	Motor Sheave	1
3	2595036	Motor Assembly Plate	1
4	6294793	Motor, 2HP, 220V, 60Hz	1
5	6350031	Motor Plate Locking Handle	1
6	6060014	Bearing.....	1
7	6430045	Knob.....	2
8	6716139	Flat Head Socket Screw, 3/8-16 x 1	4
9	6714159	Socket Set Screw, 1/4-20 x 3/8.....	2
10	6861300	Lock Washer, 3/8.....	3
11	6716012	Socket Head Cap Screw, 3/8-16 x 1	3
12	3271081	Handwheel.....	1
13	6714160	Slotted Head Steel Set Screw, 1/4-20 x 1/4	2
14	6549006	Bearing Lock Nut.....	1
15	6864006	Bearing Lock Washer	1
16	6060185	Bearing.....	1
17	3708013	Headstock Clamping Shaft	1
18	6095038	Bushing	1
19	3268219	Headstock Handle	1
21	6294780	Inverter (Programmed 3520A)	1
22	6760070	Socket Head Cap Screw, 10/32 x 5/8.....	10
23	3064711	Lathe Guard Bracket.....	1
24	6143004	Retaining Collar.....	2
25	6714003	Socket Set Screw, 1/4-20 x 3/8.....	2
26	6644005	Plunger.....	1
27	6296165	Flat Washer, 3/8 x 3/4 x 1/16 Thk.....	2
29	6294728	Guard Assembly	1
30	6295930	Head Spindle.....	1
31	3388100	Key, 5/16	1
32	6294725	Spur Center 1", MT2.....	1
33	TS-0270011	Socket Set Screw, 5/16-18 x 1/4	2
34	6295915	Control Pot	1
35	3578349	Control Panel.....	1
36	6295923	Clamp Washer.....	1
37	TS-0810012	Pan Head Screw, #10-32 x 1/4	1
38	6430047	Control Panel Knob.....	1
39	6294794	Push/Pull Switch.....	1
40	6601000	"O" Ring	1
41	6294781	Lock Knob	1
42	6295911	Pad.....	1
43	3578348	Door Panel	1
44	6508007	Nut	2
45	6860704	Lock Washer	2
46	6365012	Door Hinge	1
47	6708019	Socket Head Cap Screw, 8/32 x 5/8.....	4
48	6520009	Flex Lock Nut, 5/8-11	1
49	3092093	Head Clamp	1
50	3058001	Tool Support Clamp Bolt.....	1
51	6760102	Socket Set Screw, 10/32 x 1	1
52	3719188	Spindle Sheave	1
53	6077228	Micro V Belt.....	1
	6294743	Knockout Rod Assembly (Items 55 & 56).....	1
55	3670021	Knockout Rod.....	1
56	3406201	Teardrop Knob.....	1
57	6083021	Contact Block	1

PARTS LIST: Headstock Assembly (3520A Lathe) continued

No.	Part No.	Description	Quantity
58	6821492	FWD/REV Switch.....	1
59	6860800	Plain Flat Washer, #10.....	1
60	6294782	Hex Nut.....	1
61	3448048	Lock Plate.....	1
62	6813062	Compression Spring.....	1
63	3601006	Spindle Lock Plunger.....	1
64	3097007	Locking Collar.....	1
65	6715015	Socket Head Set Screw, 5/16-18 x 1/4.....	2
66	6294783	Motor Label.....	1
67	6294784	Speed Label.....	1
68	6294785	Control Panel Label.....	1
69	6294736	3" Face Plate, 1-1/4-8.....	1
70	6294786	Spindle Lock Bracket.....	1
71	6294787	Power Cord.....	1
72	6294788	Control Cord.....	1
73	6294744	Face Plate Wrench.....	1
75	6294789	Motor Key.....	1
76	6294790	Motor Cord.....	1
77	6294791	Hex Nut.....	2
78	6295733	Brake Resistor.....	1
79	TS-0640091	Nylon Lock Hex Nut, 3/8-16.....	1
80	TS-1502071	Socket Head Cap Screw, M5 x 30.....	1
81	TS-1550031	Flat Washer, M5.....	1
82	TS-1540031	Nut, M5.....	1
83	6295912	Clamp.....	1
84	6295913	Clamp PG16.....	2
85	6295914	Clamp PG11.....	1
86	6295796	Nylon Set Screw, 1/4-20 x 3/8.....	2
87	6860802	Lock Washer, #10.....	2

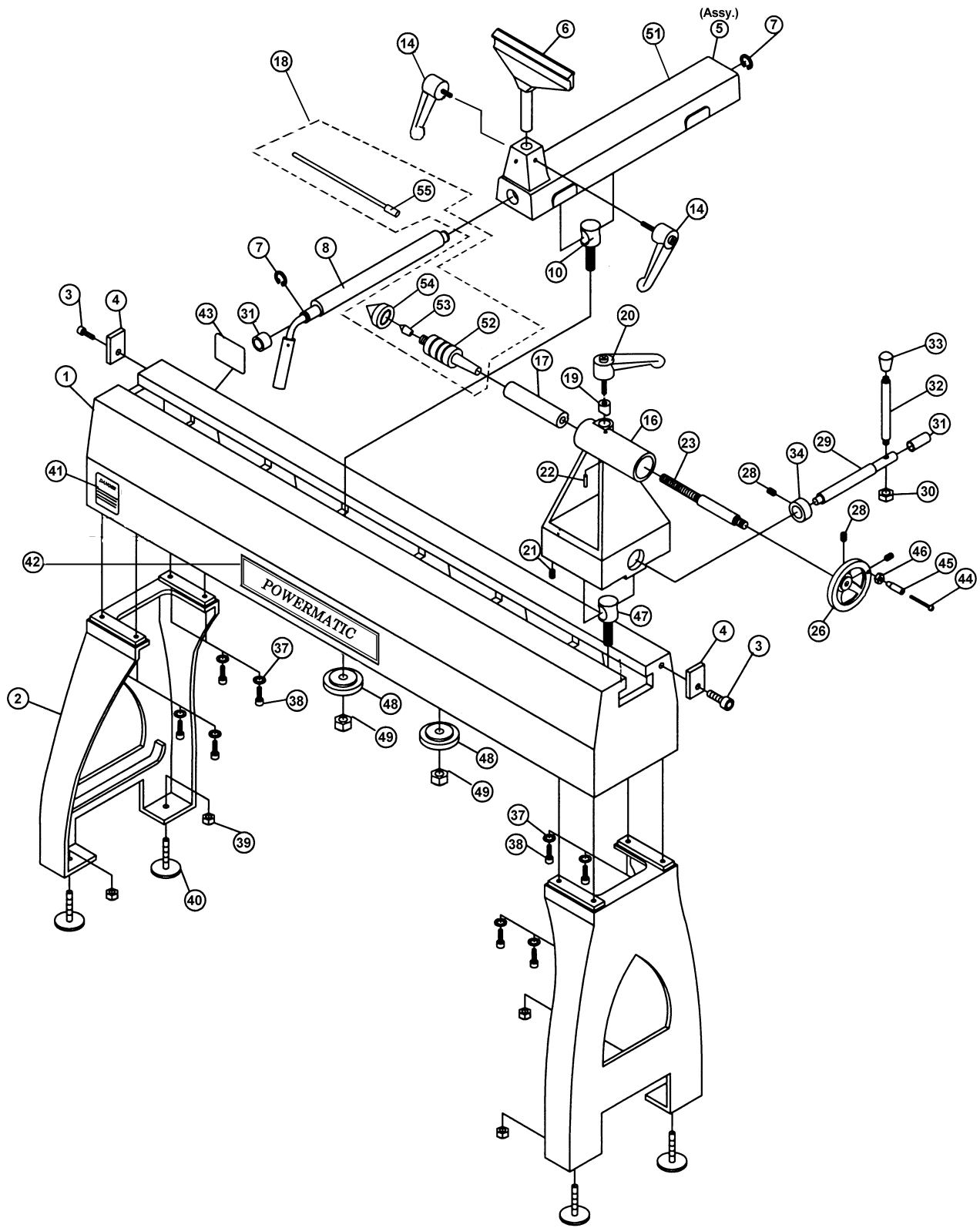
Headstock Assembly (3520A Lathe)



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

No.	Part No.	Description	Quantity
1	6295920	Bed	1
2	3423053	Lathe Leg	2
3	6716012	Socket Head Cap Screw.....	2
4	3761159	Stop Block.....	2
5	6294752	Tool Support Assembly (Consists of items 7, 8, 10, 14, 31, 48, 49, 51).....	1
6	6294742	Tool Support 14"	1
7	6294756	Snap Ring	2
8	6294757	Tool Support Clamp Shaft	1
10	6294759	Tool Support Clamp Bolt	1
14	6294763	Tool Rest Handle.....	2
16	6295907	Tailstock.....	1
17	6295908	Tailstock Quill	1
18	6295902	Live Center Assembly (Consists of items 52, 53, 54, 55)	1
19	3728005	Quill Lock Sleeve	1
20	6295910	Tailstock Quill Handle	1
21	6760102	Socket Set Screw, 10/32 x 1.....	1
22	6623086	Dowel Pin.....	1
23	6295909	Quill Lead Screw	1
26	6295918	Handwheel	1
28	6715013	Socket Set Screw, 5/16-18 x 3/8.....	3
29	3708012	Tailstock Clamping Shaft.....	1
30	6294769	Hex Nut.....	1
31	6095038	Bushing.....	2
32	3268217	Tailstock Handle.....	1
33	6430045	Black Knob.....	1
34	3096003	Collar	1
37	6294772	Lock Washer	8
38	6295792	Socket Head Cap Screw, 3/8-16 x 1-1/4.....	8
39	6516009	Hex Jam Nut Plain, 3/8-16	4
40	6442000	Reid Leveler.....	4
41	6294773	Warning Label.....	1
42	6294774	Powermatic Name Plate.....	1
43	6294775	I.D. Label	1
44	6295751	Handle	1
47	3058001	Tailstock Clamp Bolt	1
48	3092095	Tailstock/Toolrest Clamp.....	2
49	6520009	Flex Lock Nut, 5/8-11	2
51	6295899	Tool Support Base.....	1
52	6295903	Live Center Body.....	1
53	6295904	Live Center Tip.....	1
54	6295905	Live Center Cap	1
55	6295906	Live Center Rod	1

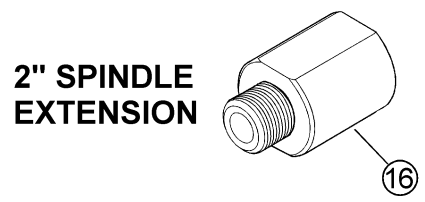
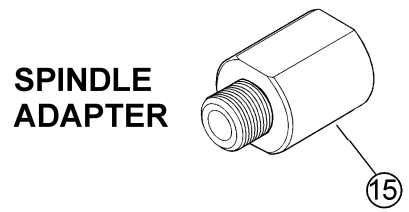
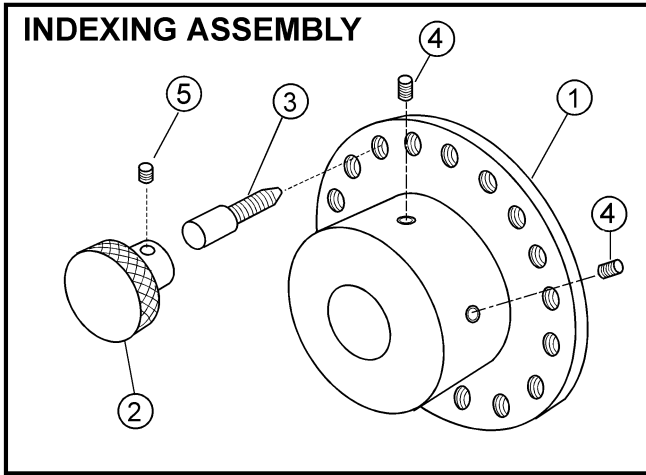
Stand & Bed Assembly (3520A Lathe)



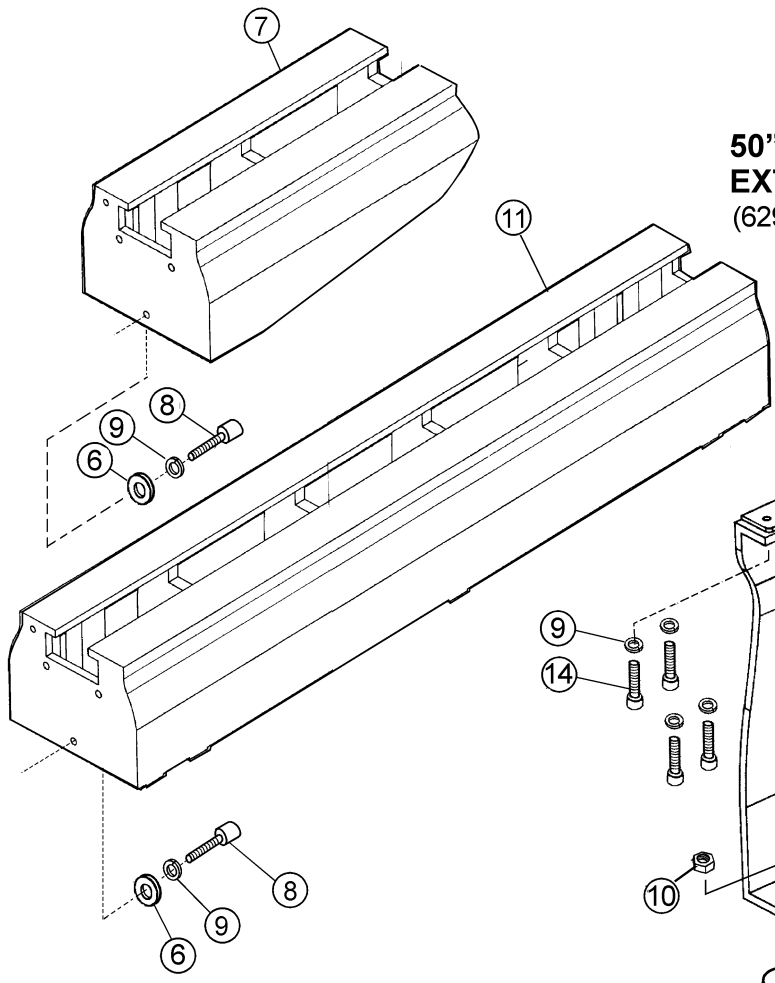
OPTIONAL ACCESSORIES: Indexer & Bed Extensions (3520A Lathe)

No.	Part No.	Description	Quantity
	6294729	Indexing Assembly (Items 1 thru 5)	
1	3097006	Indexing Collar.....	1
2	3406005	Adjusting Screw Knob.....	1
3	3585220	Indexing Pin.....	1
4	6714139	Socket Set Screw, 1/4-20 X 5/8.....	2
5	TS-0267021	Socket Set Screw, 1/4-20 x 1/4.....	1
	6294727	18" Short Bed Extension (Items 6 thru 9)	
6	TS-0680041	Flat Washer, 3/8.....	3
7	6295921	Short Bed.....	1
8	6716017	Socket Head Cap Screw, 3/8-16 x 1-3/4.....	3
9	6861300	Lock Washer, 3/8.....	3
	6294726	50" Full Bed Extension (Items 6 & 8 thru 14)	
6	TS-0680041	Flat Washer, 3/8.....	3
8	6716017	Socket Head Cap Screw, 3/8-16 x 1-3/4.....	3
9	6861300	Lock Washer, 3/8.....	7
10	6516009	Plain Hex Jam Nut, 3/8-16.....	2
11	6295920	Long Bed.....	1
12	3423053	Lathe Leg.....	1
13	6442000	Leveler.....	2
14	6716015	Socket Head Cap Screw, 3/8-16 x 1-1/2.....	4
15	6294734	Spindle Adapter, 1-1/4"-8 to 1-1/2"-8	
16	6294735	2" Spindle Extension	

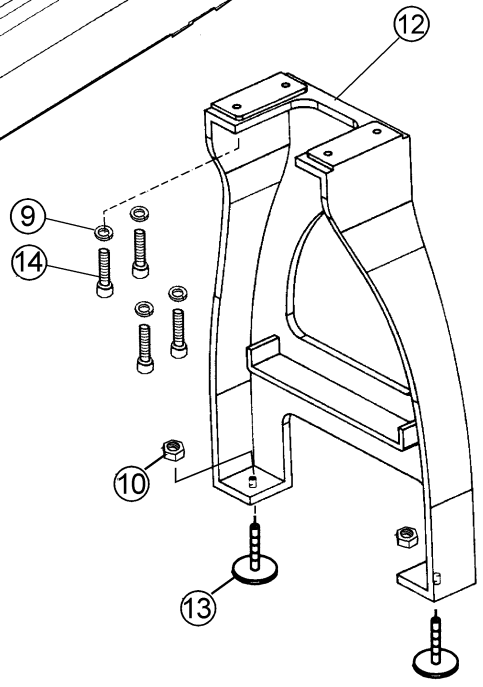
OPTIONAL ACCESSORIES: **Indexer & Bed Extensions (3520A Lathe)**



18" BED EXTENSION ASSEMBLY (6294727)

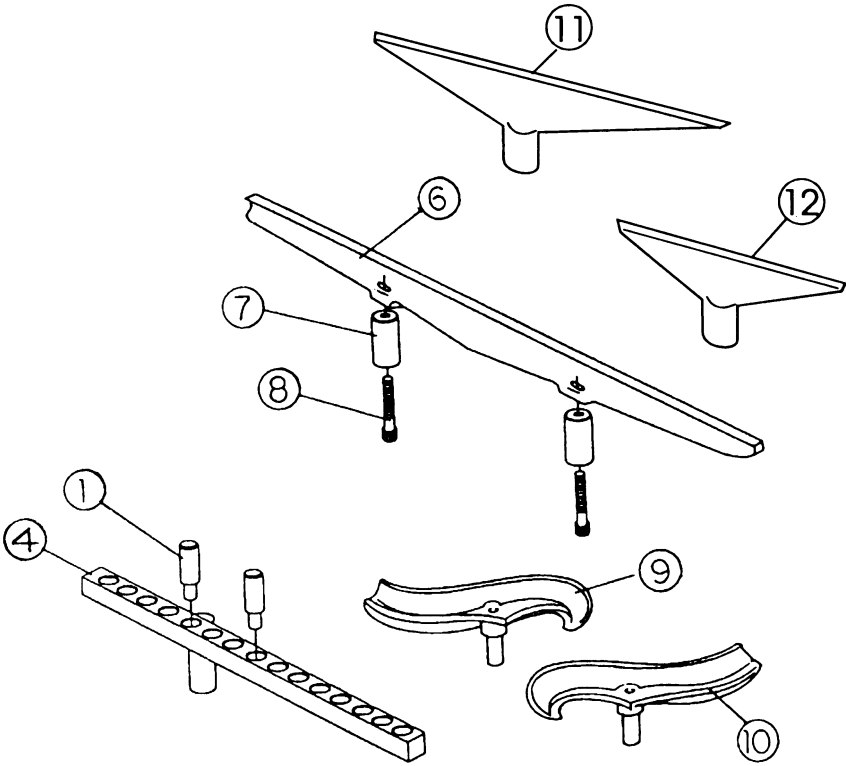


50" BED EXTENSION ASSEMBLY (6294726)



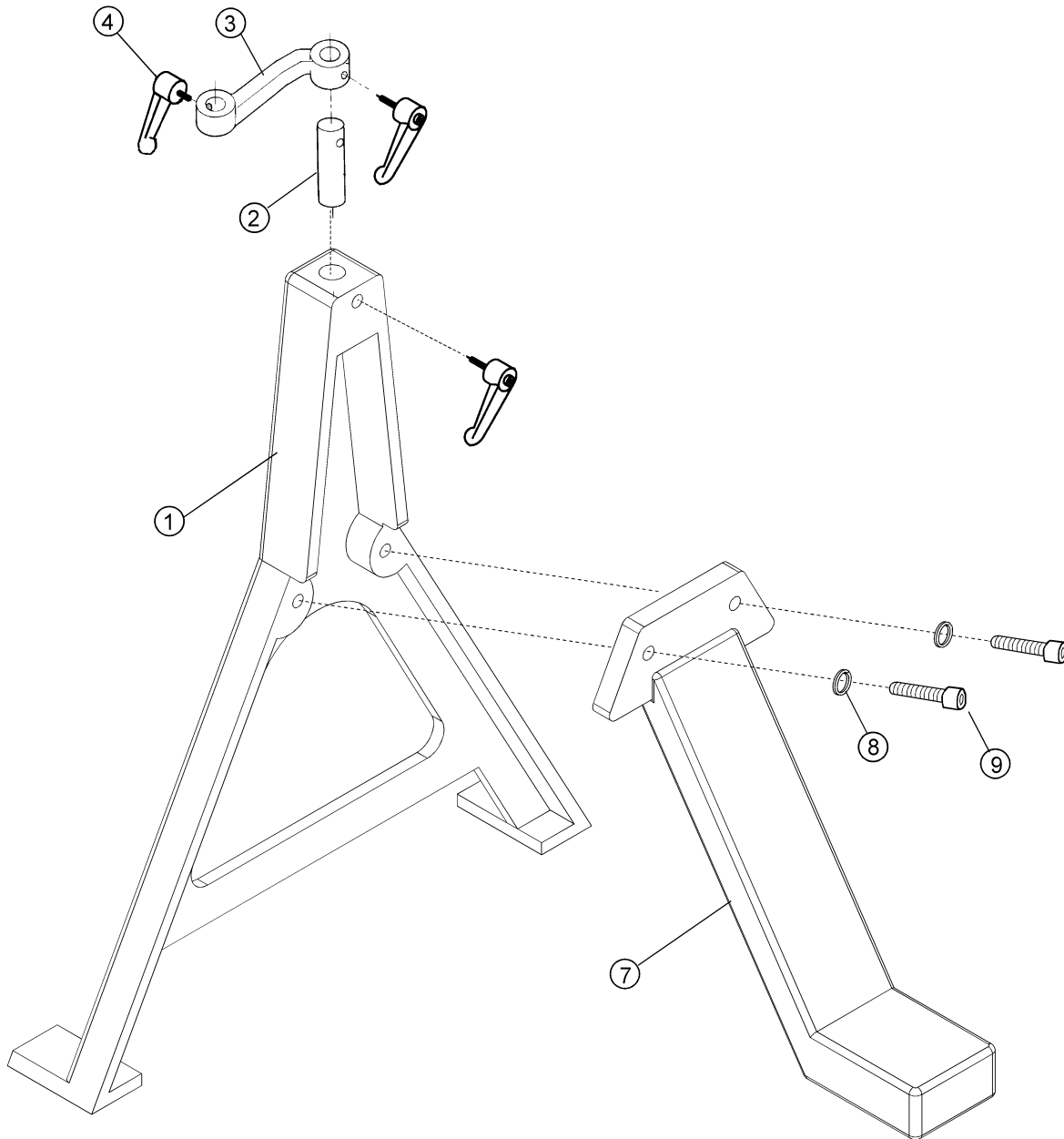
OPTIONAL ACCESSORIES: Tool Supports (3520A Lathe)

No.	Part No.	Description
1	3585011	Tool Support Pin 5/8 X .495 X 3.50
2	6294745	Ball Bearing Tailstock Center (not shown)
4	6294730	12" Metal Spinning Tool Support Assembly (Items 1 and 4)
	6294731	26" Tool Support Assembly (Items 6 thru 8)
7	6294795	Tool Support Post
8	6716219	Socket Head Cap Screw, 3/8-16 x 6-1/4
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 ACCESSORY: **Outboard Turning Stand (3520A Lathe)**

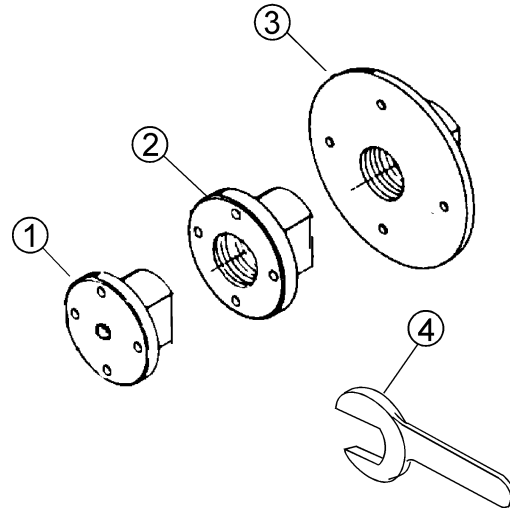
No.	Part No.	Description
	6294732	Heavy Duty Outboard Turning Stand (Items 1 thru 9)
1	3042503	Turning Stand Base
2	6295897	Offset Tool Support Pin, 1.00 dia.
3	6295898	Offset Tool Support Casting 1.00 hole
4	2695026	Screw Lock Assembly
7	3423055	Turning Stand Screw Leg
8	6861700	Lock Washer, 5/8
9	6769002	Socket Head Cap Screw, 5/8-18 x 2



OPTIONAL ACCESSORIES (3520A Lathe)

No.	Part No.	Description
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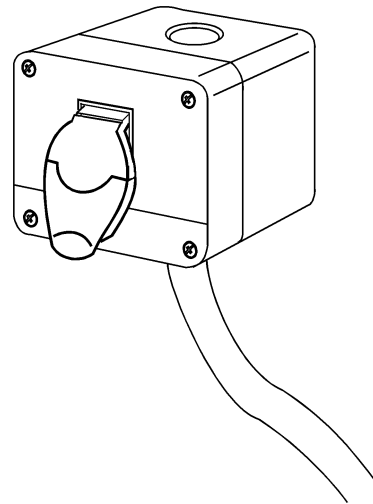
1	6294736	3" Face Plate, 1-1/4-8 (STD.)
2	6294737	4" Face Plate, 1-1/4-8 (OPT.)
3	6294738	7" Face Plate, 1-1/4-8 (OPT.)
4	6294744	Face Plate Wrench



OPTIONAL ACCESSORY

Part No.	Description
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6294733	Remote ON/OFF Switch
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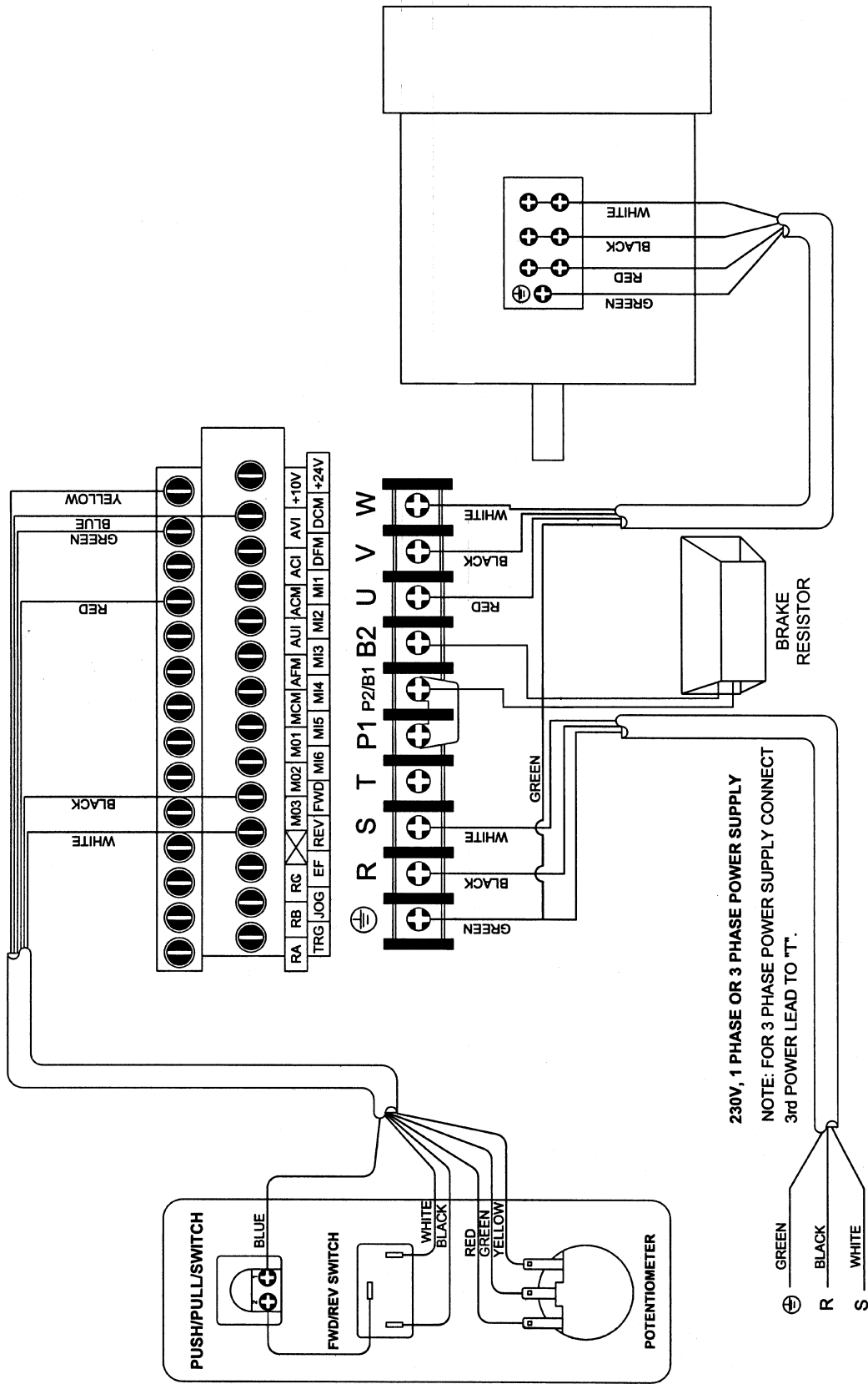
OPTIONAL ACCESSORIES

Part No.	Description
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6294725	Spur Center, 1"
6294728	Guard Assembly
6294743	Knock Out Rod

ELECTRICAL SCHEMATIC: 3520A Lathe

ELECTRICAL SCHEMATIC



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 29).

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:

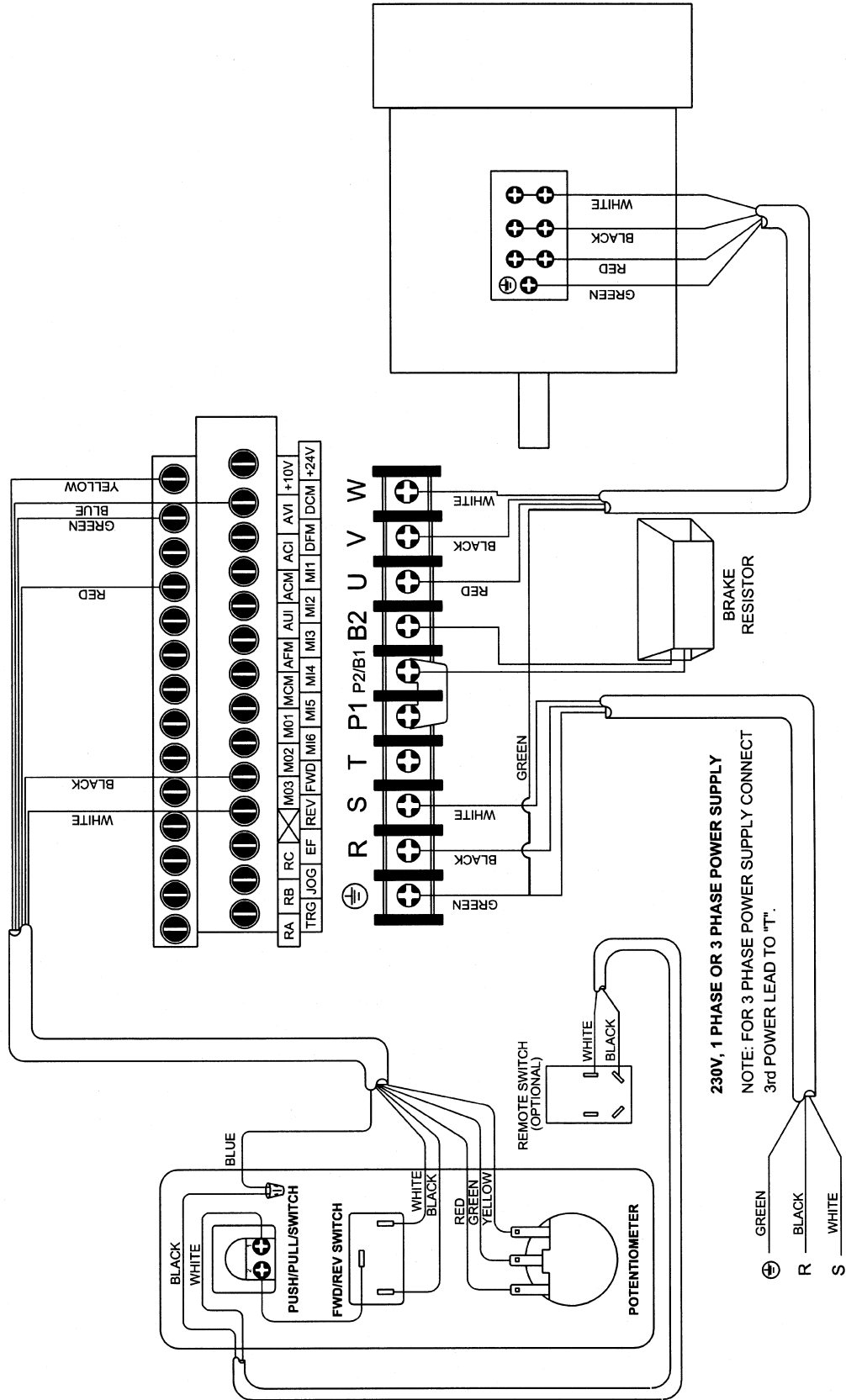
The magnetic back on the remote switch will allow the switch to be placed anywhere on the lathe.

STEP 7:

Connect electrical power to the lathe and resume operation.

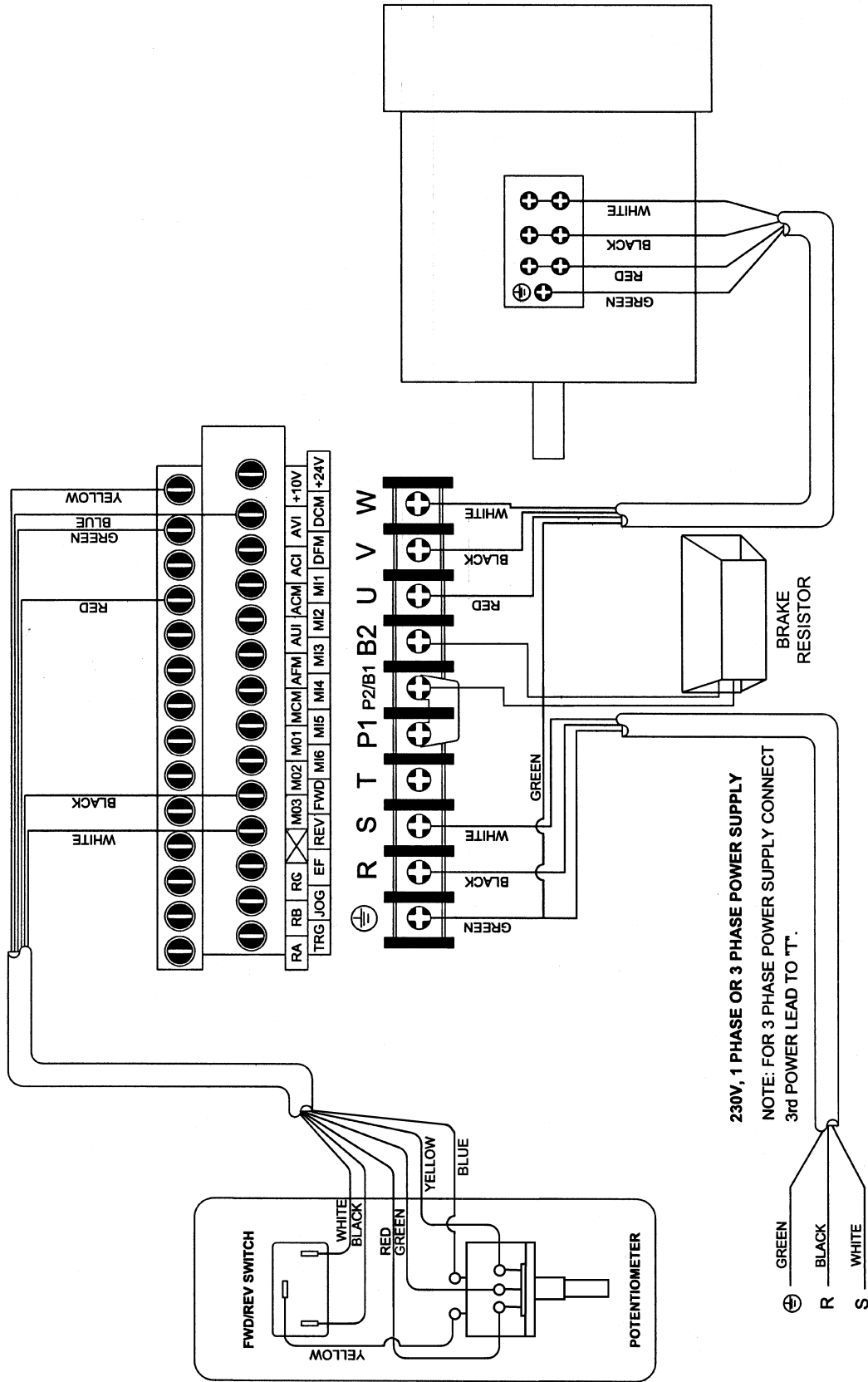
ELECTRICAL SCHEMATIC: 3520A Lathe with Remote Switch (Optional)

ELECTRICAL SCHEMATIC

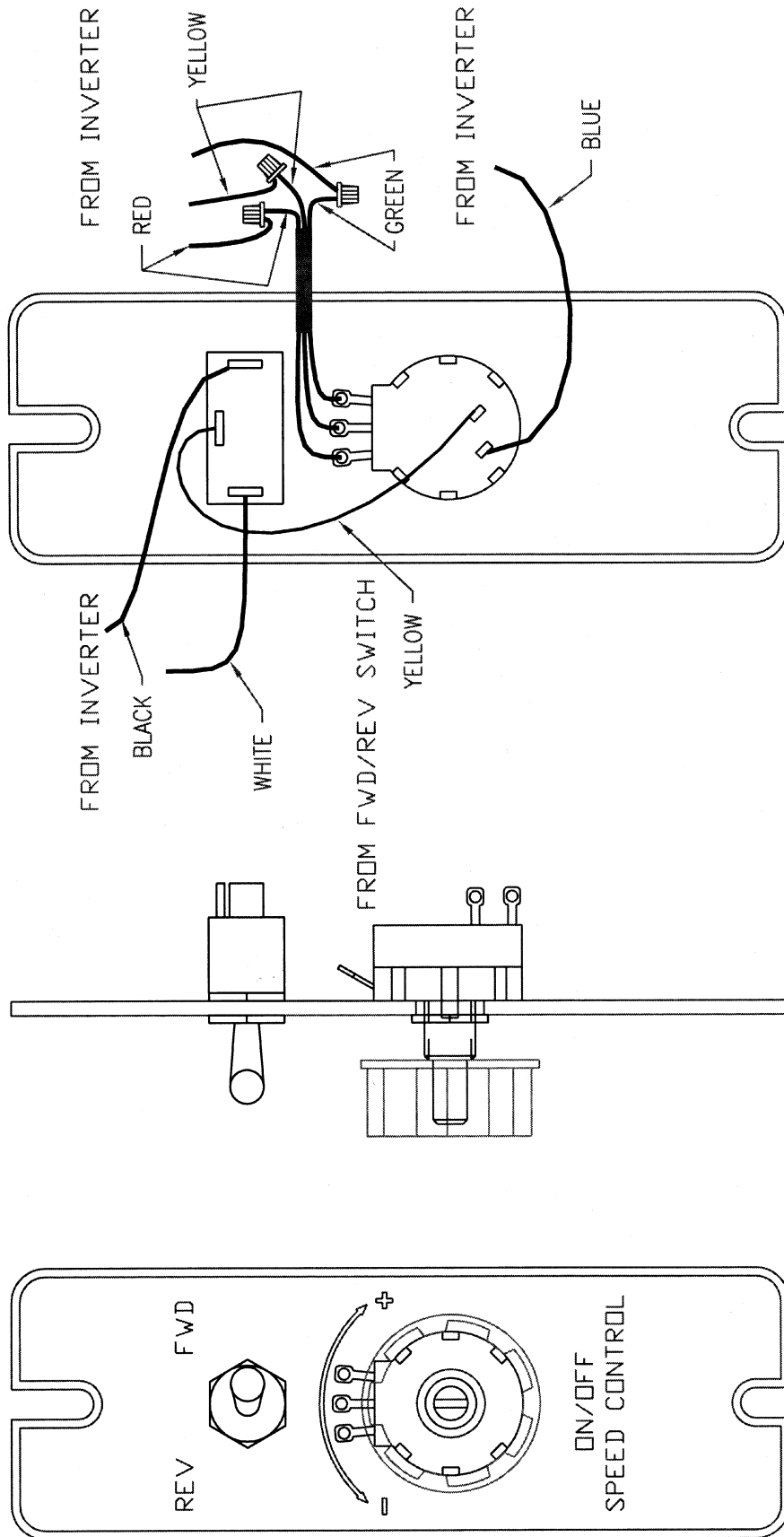


ELECTRICAL SCHEMATIC: 3520A School Lathe (#1352002)

ELECTRICAL SCHEMATIC



ELECTRICAL SCHEMATIC: 3520A School Lathe - 2330009 Kit



AC INVERTER READINGS: Lathe Speed Chart

DIGITAL READOUT	SPINDLE SPEED	
	LOW RANGE	HIGH RANGE
5	45	120
10	90	240
15	135	360
20	180	480
25	225	600
30	270	720
35	315	840
40	360	960
45	405	1080
50	450	1210
55	495	1330
60	540	1450
65	585	1570
70	630	1690
75	675	1815
80	720	1935
85	765	2055
90	810	2175
95	855	2295
100	900	2420
105	950	2540
110	1000	2660
115	1050	2780
120	1100	2900
125	1150	3025

Instructions for Mounting Indexing Assembly (Optional Accessory)

1. Remove the handwheel. Loosen the two set screws and slide the handwheel off.
2. If your lathe was purchased before January 1998, you must drill a 1/4" hole into the headstock so that the indexer will work properly. Before the 1/4" hole can be drilled you must first make sure that the 1/4" hole will line up with the holes in the indexer. To do this you will need a small center punch that can be placed through one of the tapped holes in the indexer. Install the indexer onto the spindle. Slide the indexer up to the headstock leaving approximately an 1/8" gap between the face of the indexer and the headstock. (The hub of the indexer, which has the two set screw holes, should be pointing away from the headstock.) Using one of the tapped holes in the indexer as a guide, place the center punch through one of the holes in the indexer. With a hammer, strike the end of the center punch making a mark on the headstock.
3. Remove the indexer from the spindle.
4. Using a 1/4" drill bit, drill a hole at the mark made by the center punch.
5. Install the indexer onto the spindle. Slide the indexer up to the headstock leaving approximately an 1/8" gap between the face of the indexer and the headstock.
6. Locate one of the set screws on the indexer over the keyway slot on the spindle. Tighten securely both set screws.
7. Install indexing pin into the indexer by screwing it into one of the tapped holes. The indexing pin knob should be turned until the indexing pin engages the 1/4" drilled hole. Tighten indexing pin securely.
8. **Remove indexing pin from indexer before operating lathe!**

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 stock number of the part(s) required from your parts manual will also expedite your order.

Phone No.: (800) 248-0144

Fax No. (800) 274-6840

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

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