

Introduction

Your Shopsmith Lathe Duplicator accessory provides a simple and accurate way to produce duplicate spindles and bowls, making possible a new and precise method of lathe turning. The duplicator components are designed to mount on the Shopsmith Mark V Models 500 and 510 as well as on Mark II and Mark VII systems.

NOTE

- If you received your Mark V prior to November 1985, you own a Model 500.
- If you received your Mark V after November 1985, you own either a Model 500 or Model 510. Check the vent plate, located around the auxiliary spindle, for the Model Number of your Mark V.

Rather than using conventional lathe chisels, the Lathe Duplicator features a tool rest assembly which slides on a smooth table. You're in complete control of the tool rest assembly as you grasp its two handles and guide its follower along a template and its carbide cutter into your workpiece. The carbide cutter has an extremely long cutting life without sharpening.

A durable channel assembly provides an adjustable mounting track for two template support assemblies and a guard assembly. With the template centerline located directly over the workpiece centerline, the tool rest assembly is free to be moved around the table, following the template and producing an exact duplicate. The advantages of this configuration include the ability to turn bowls as well as spindles and to produce true undercuts. When duplicating spindles, use either a flat template or an existing spindle. For bowl turning, only a flat template can be used. If you wish, you can work without a template to develop skills in freehand turning.

As you operate the Lathe Duplicator, you must be responsible for knowing your own limitations as well as those of the duplicator. To avoid serious injury, constantly remind yourself to use the accessory correctly together with the proper safety equipment.

We wish you the best in all your woodworking endeavors. We know that your Shopsmith Lathe Duplicator will become an indispensable accessory in your workshop.

We know that you're eager to get started using your Lathe Duplicator, but please take time to read this manual before you begin. Then keep it handy for future reference.

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Safety

The Shopsmith Lathe Duplicator has many built-in safety features. But the effectiveness of these features depends on you. Power tool safety is no more than good common sense.

To protect yourself from injury:

- **READ, UNDERSTAND AND FOLLOW ALL the information in this Owners Manual WHENEVER you operate, set up, align, adjust, repair and maintain the Lathe Duplicator.**
- **Also, READ, UNDERSTAND AND FOLLOW ALL the information in the Owners Manual for the Mark V on which the Lathe Duplicator will be mounted.**

Throughout this manual, we list **WARNINGS, CAUTIONS, and NOTES.** We advise that when you come to one of these listings, please read and understand it fully. Their meanings are:

WARNING

A **WARNING** is given when failure to follow the directions could result in injury, loss of limb, or life.

CAUTION

A **CAUTION** is given when failure to follow the directions could result in temporary or permanent damage to the equipment.

NOTE

A **NOTE** is used to highlight an important procedure, practice or condition.

Eye Protection

Always wear eye protection when you use power tools. Use goggles, safety glasses or a face shield to protect your eyes.

- Goggles completely surround and protect your eyes. Many goggles will also fit over regular glasses. Be sure your goggles fit closely, but comfortably.

- Safety glasses don't fog as easily as goggles and can be worn all the time. Regular glasses normally have only impact resistant lenses. They are not safety glasses.
- A face shield protects your entire face, not just your eyes. And you can flip it up out of the way when you don't need it. A face shield can be used with regular glasses.

Ear Protection

Prolonged exposure to high intensity noise from high speed power tools can damage your hearing.

- Hearing protectors screen out noise levels that can damage ears. Wear hearing protectors when you're exposed to high intensity power tool noise for prolonged periods of time.

Sawdust and Chips

Sawdust and chips can be fire hazards and breathing sawdust can be a health hazard. Sawdust may cause you physical discomfort, especially if you have emphysema, asthma, or an allergic reaction. The sawdust from some woods can also be toxic.

- Wear a close-fitting dust mask if a significant amount of dust is released into the air. Clean or replace the filters in the mask regularly.
- Open a window or use a fan to ventilate your shop.

Guarding for Turning

Most shop accidents happen to woodworkers who believe they are too experienced to use the guards and

safety devices. Although proper use of guards and safety devices usually requires a small amount of additional setup, the security that you and your family obtain from them is well worth the effort. Don't take shortcuts. It doesn't pay.

- Keep the guard in place during duplicator operations. Also use the guard when doing conventional lathe turning on the Mark V.

Dress

Loose hair and clothing which could be entangled in rotating workpieces are very hazardous.

- Tuck long hair under a hat or tie it up. Do not wear ties, gloves, loose clothing or jewelry. Roll sleeves up above your elbows.

General Safety Rules for Power Tools

• **Know your power tool.** Read the owners manual carefully. Learn its application and limitations as well as the specific potential hazards peculiar to the tool.

• **Ground all tools** (unless double insulated). If tool is equipped with an approved 3-conductor cord and a 3-prong grounding type plug to fit the proper grounding type receptacle, the green conductor in the cord is the grounding wire. Never connect the green wire to a live terminal.

• **Wear proper eye and ear protection.** Also, wear a dust mask.

• **Keep guards in place.** Always keep guards in working order and in proper alignment and adjustment. Most injuries occur on unguarded power tools.

• **Remove adjusting keys and wrenches.** Form habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.

• **Wear proper apparel.** Do not wear loose clothing, ties, gloves, or jewelry. Roll sleeves up above your elbows, wear nonslip footwear, and tuck long hair under a hat.

• **Do not operate power tools if you are fatigued, taking medication, or under the influence of alcohol or drugs.**

• **Avoid dangerous environments.** Don't use power tools in damp, wet or explosive atmospheres.

• **Keep work areas well lit, clean, and free from clutter.**

• **Do not force the tool.** It will do the job better and safer at the rate for which it was designed.

• **Use the right tool.** Don't force a tool or accessory to do a job for which it was not designed.

• **Direction of feed.** Feed the workpiece into the cutter against the rotation of the cutter ONLY.

• **Check damaged parts.** A damaged guard or part should be properly repaired or replaced before further use. If a strange noise or vibration develops, immediately turn off the power, unplug the machine and correct the problem.

• **Secure workpieces.** Use clamps, fixtures, and other devices to hold workpieces when practical. It's safer than using your hands and it frees your hands to operate the tool.

• **Do not overreach.** Keep proper footing and balance at all times.

• **Turn off the tool and wait until it comes to a complete stop** before removing workpieces and scraps.

• **Do not try to stop the tool by grabbing the workpiece or any part of the tool.** Turn off the tool and let it come to a complete stop by itself.

• **Do not leave tool running unattended.** Turn power off. Don't leave tool until it comes to a complete stop.

• **Avoid unintentional starting.** Make sure the switch is in the "off" position before plugging in or unplugging the tool.

• **Disconnect tools.** Turn off and unplug tools before changing accessories and setups, making adjustments, and performing maintenance and repair.

• **Do not stand or lean on the tool.** You could fall onto the tool or it could tip over injuring you and/or damaging the tool.

• **Maintain tools.** Keep parts and tools sharp, clean and maintained according to the Owners Manual.

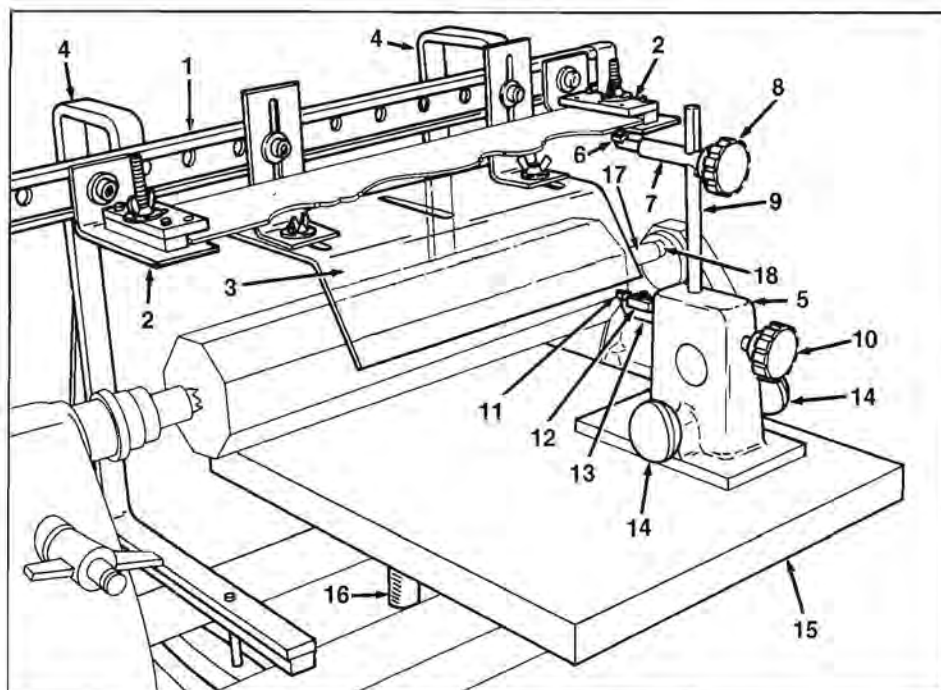
• **Make workshop childproof.** Use padlocks, master switches or remove starter keys.

• **Keep children away.** All visitors should stay a safe distance from power tools, and wear eye and ear protection.

• **Use recommended accessories.** Consult the owners manual for recommended accessories.

Safety Rules for the Shopsmith Lathe Duplicator

- Keep your hands, fingers and other parts of your body 2" away from the rotating workpiece until it is rounded. After it is rounded use caution when you get close to the rotating workpiece. Do not touch the workpiece as it turns.
- Keep the guard in place whenever you're performing turning operations. Position it not more than 1/2" from the workpiece.
- When turning glued-up stock, make sure glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.
- Wear proper apparel. Never wear jewelry, gloves, ties, loose clothing or clothing with long sleeves. Keep long hair tucked under a hat. Jewelry, gloves, ties, clothing and hair could become entangled in the workpiece.
- Do not exceed recommended speeds. Use the lowest speed setting when starting to turn a new workpiece.
- When mounting stock between the centers, the spurs of the drive center and the cup of the tailstock center must penetrate at least 1/16" into the stock. Do not use a drive center or tailstock center if the point is damaged. The stock could be thrown from the lathe.
- Wax or soap the end of the stock that mounts to the cup center. This lubrication helps keep the center from wearing into the stock and causing the stock to loosen on the lathe. The ball bearing live center is highly recommended for use with the Lathe Duplicator.
- When mounting stock to a faceplate, use #12 x 1-1/4" long screws. The screws must penetrate at least 1" into the stock. The surface of the workpiece that's against the faceplate must be smooth and true.
- Cut faceplate stock round and spindle stock that's more than 3" square into an octagon. This removes excess stock, minimizes imbalance, reduces vibration and makes turning large diameter stock safer and easier.
- Check the balance of the workpiece. Prior to mounting workpieces more than 3" in diameter, check and adjust the center of balance (dynamic center). Unbalanced workpieces could be thrown from the lathe.
- Do not turn on the power with the cutter or any part of the tool rest assembly against the workpiece. Turn on the machine and let it come up to speed before starting the cut.
- Do not stand in the path of rotation of the workpiece when you first turn on the machine. If the machine is set on the wrong speed or the workpiece is unbalanced or improperly mounted, the workpiece could be thrown from the lathe.
- Feed the cutter slowly into the workpiece. Use both hands to hold onto and control the tool rest assembly.
- Periodically, turn off the machine and check that the workpiece is held securely between the centers or on the faceplate.
- Do not lean across or reach underneath the lathe while it is running.
- Do not try to stop the lathe by grabbing the stock or any part of the machine. Turn off the power and let the lathe come to a complete stop by itself.
- Do not part the stock completely or turn the spindle down to such a small diameter that it snaps on the lathe. This can be extremely dangerous.
- Do not turn stock with splits, loose knots, or other defects that could cause the stock to break, splinter or come loose while turning. Never turn second-hand lumber. If you hit a nail or screw, you could be hit by pieces of metal.
- Remove the Lathe Duplicator from the Mark V before sanding or finishing a workpiece on the lathe.
- Use only recommended Shopsmith parts and accessories on your Lathe Duplicator. NEVER use non-Shopsmith replacement parts or accessories. They are not designed like Shopsmith parts. Using non-Shopsmith parts may create a hazardous condition and will void your warranty.
- Do not grind the cutters. The dust created by grinding the carbide can cause eye and skin irritation as well as respiratory system and internal organ damage. Replace worn cutters with new.
- Do not allow the cutter to come in contact with the parts of the Lathe Duplicator or Mark V. The cutter will cause damage to the parts and you could be hit by pieces of metal.



Getting to Know Your Shopsmith Lathe Duplicator

Your Shopsmith Lathe Duplicator is a versatile accessory. Become familiar with all of its parts and functions before you begin to use it.

Nomenclature

The functioning parts of the Lathe Duplicator are:

1. **Channel**—Holds the template support assemblies and the guard assembly.
2. **Template Support Assemblies**—Support either a flat template or an original spindle.
3. **Guard Assembly**—Serves as both a guard and a chip deflector.
4. **Support Brackets**—Clamp to the way tubes to support the channel.
5. **Tool Rest Assembly**—Contains the carbide cutter and follower. It slides on the table surface and is controlled by handles on each side of its heavy aluminum base.

6. **Follower**—Follows the template or spindle to be duplicated. Must be the same shape as the carbide cutter.

7. **Follower Support**—Supports the plastic follower and mounts to the follower upright.

8. **Follower Adjusting Knob**—Permits the follower support to be raised and lowered on the follower upright.

9. **Follower Upright**—Permits the follower support to be adjusted vertically.

10. **Cutter Adjusting Knob**—Permits the cutter support to be positioned a controlled amount in or out for alignment with the follower.

11. **Carbide Cutter**—Cuts the workpiece. Made of solid carbide, it has an extremely long life when cutting wood. It attaches to the cutter support.

12. **Cutter Guide**—Aligns the carbide cutter and also prevents its rotation during cutting.

13. **Cutter Support**—Supports the carbide cutter and the plastic cutter guide. Adjusts in or out of the tool rest.

14. **Handles**—Provide a positive grip that make it easy to guide the tool rest assembly.

15. **Table Assembly**—Provides a smooth surface for the tool rest assembly.

16. **Table Posts**—Permit the table assembly to be adjusted vertically in the carriage.

17. **Spacer**—Attaches to the live center enabling you to turn the full length of workpieces and to turn short spindles.

18. **Tailstock Live Center (Optional)**—Not included with the Lathe Duplicator. However it is recommended because it provides a frictionless center for spindle turning. Mounted in the tailstock, it replaces the cup center. A spacer supplied with the Lathe Duplicator increases the live center's length for turning the full length of workpieces and also for turning short spindles.

Specifications

The specifications of the Lathe Duplicator will give you an idea of its capabilities:

Capacities

- Maximum spindle length
 - 34" with cup center
 - 33-1/2" with live center and no spacer
 - 32" with live center and 1-1/2" long spacer
- Minimum spindle length
 - 6-1/4" with cup center
 - 5-3/4" with live center and no spacer
 - 4-1/4" with live center and one spacer
 - 2-3/4" with live center and two spacers
- Maximum spindle diameter—8" with a flat template, 4" with an original spindle
- Maximum bowl diameter—8" with a flat template
- Maximum depth of cut—2-1/4" (3-1/4" for light freehand cuts inside bowls)
- Maximum template length—36"
- Maximum template thickness—3/8"
- Minimum template thickness—1/4" (smaller templates only)

Weight—36.5 lb.

Height—47" (when mounted on Mark V)

Assembly and Setup

Assembly and Setup

NOTE

- Throughout the instructions, reference numbers appear in parentheses following the part name. These numbers correspond with reference numbers on the drawings in this section and the **Parts List** section.
- The assembly and setup instructions for the "Table and Table Support Assembly" are written primarily for Mark V Models 500 and 510. If your system is a Mark II, follow the instructions specified for Model 500; for a Mark VII, follow the instructions specified for Model 500 for mounting the table supports and Model 510 for mounting the table posts.

Before any operations can be performed, you must assemble some parts, set them up properly, and align them on the Mark V. Your safety and proper use of the Lathe Duplicator depend on your following the Assembly and Setup instructions exactly, especially those pertaining to your specific Mark V Model. If you're unsure as to which Model Mark V you own, refer to the **NOTE** on page 2.

Tools Supplied: 1/4", 5/16" and 7/64" Allen wrenches.

Tools and Supplies Required: 5/32" standard Mark V Allen wrench, 9/16" socket and socket wrench (or 9/16" wrench), accurate combination square, straightedge, mineral spirits and floor or furniture paste wax.

Mark V Setup

Set up the Mark V in the lathe mode according to the following procedures:

WARNING

Turn off and unplug the Mark V before you begin any setup procedures.

CAUTION

The following procedures assume that the worktable has been removed, that there is nothing mounted on any spindles of the machine and that all alignment and adjustment procedures specified in the Mark V Owners Manual have been completed.

1. **Attach the three new labels to the headstock.** Remove the three labels from the headstock and attach the three new labels at the positions shown. (See Figure 1.)
2. **Mount the drive center on the main spindle.** Slide the drive center all the way onto the spindle. With the 5/32" Allen wrench, tighten the set-screw in the base of the center so that the screw rests firmly against the flat of the spindle.
3. **Mount the tailstock and tailstock center.** Mount the tailstock in the base mount and tighten the accessory mount lock. Then insert the lathe cup center or live center assembly in the tailstock, so that it points toward the headstock.

WARNING

- If you're using the cup center, lubricate it with paste wax to keep it from burning and wearing into the wood causing the workpiece to loosen on the lathe.
- Do not use more than two spacers with the live center assembly.

NOTE

- The live center assembly is **strongly recommended** for use as the tailstock center. The ball bearing construction allows it to rotate with the workpiece. Thus it won't burn into the wood and cause loosening of the workpiece as may sometimes happen with the stationary cup center.

- A spacer is supplied with your Lathe Duplicator to extend the length of the live center assembly for turning the full length of the workpieces and turning short spindles. (See Figure 2.) If the live center assembly is difficult to separate, hold the reduced diameter end of the shaft in a vise and grasp the head with adjustable jaw pliers. Pad the jaws of both the vise and pliers to avoid marring the live center.

CAUTION

When you get ready to break down the lathe mode, you'll probably find the tailstock center is stuck in the tailstock because of the pressure needed to keep the tailstock workpiece securely between the centers. If this is the case, remove the tailstock from the machine. Lay the tailstock over the edge of a workbench so the eccentric mount is supported by the table and the center is hanging free. Tap the back side of the center with a nylon or rawhide mallet to pop it loose. Hold the center with your free hand so the center does not fall to the floor. **DON'T** hit the center with a metal hammer!

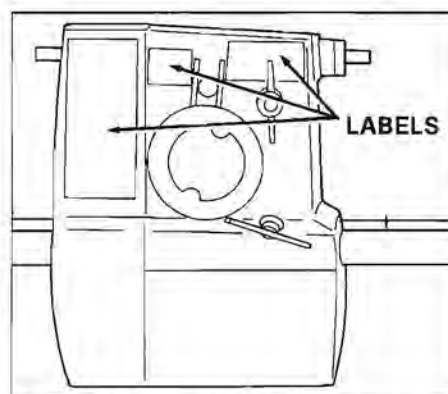


Figure 1. Attach the three new labels to the headstock.

Assembly and Setup

4. **Align the lathe centers.** (See Figure 3.) Align the drive center and the tailstock center. (Refer to the Mark V Owners Manual.)

CAUTION

Both the drive center and the tailstock center must be directly in line with each other in order to properly support a workpiece so that it can be turned.

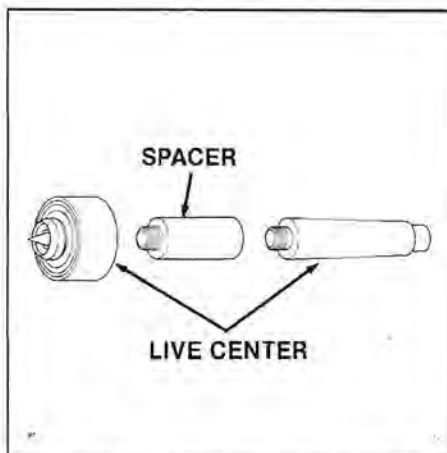


Figure 2. The spacer extends the length of the live center assembly.

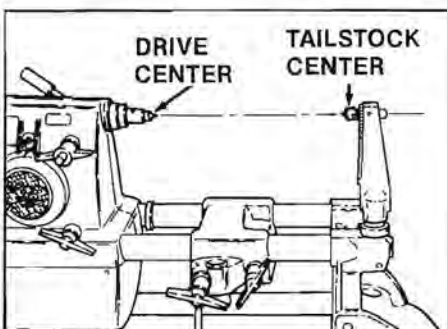


Figure 3. Both the drive center and tailstock center must be directly in line with each other in order to properly support a workpiece.

Tool Rest Assembly

Assemble the tool rest assembly according to the following procedures:

1. **Attach handles.** Screw handles (52) securely onto studs of tool rest base (37).
2. **Install the cutter support.** Insert the cylindrical end of the cutter support (58) into the tool rest base (37) until the position indicating groove is flush with the face of the base. Rotate the cutter support until the cutter-mounting flat of the cutter support is parallel with the base. Use the 5/32" Allen wrench to tighten the cutter positioning setscrew (42) until it firmly engages the V-groove of the cutter support, then back off 1/4 turn.

NOTE

Seating the cutter positioning setscrew in its groove in the cutter support will cause the position indicating groove to move slightly inward or outward from the face of the tool rest base. Loosening the setscrew 1/4 turn will allow rotation of the cutter support and approximately 1/16" in and out movement.

3. **Install the cutter adjusting knob.** Screw the cutter adjusting knob (51) into the base (37) until the end of its screw contacts the back of the cutter support (58).
4. **Install the follower upright.** With its flat at the top, and facing toward the back of the base, insert the follower upright (50) into the top hole of the base (37) until it contacts the cutter support (58). Use the 5/32" Allen wrench to tighten the setscrew (41) lightly against the follower upright.
5. **Install the follower adjusting knob and the follower support.** Install the setscrew (45) into the knob (44) with the cup point facing out of the knob. Thread the knob with setscrew installed into the follower support (46). Slide the follower support over the flat of the follower upright (50) and tighten the knob.

NOTE

Wiggle the follower support as you tighten the knob to properly seat the cup point of the screw against the flat of the follower upright. When properly assembled, the setscrew will remain in the knob when knob is loosened to adjust the follower.

6. **Install the carbide cutter and cutter guide.** Attach the triangle carbide cutter (57), with the bevel down, to the cutter support (58) with screw (56) finger tight. Any of the cutter's three points or flats may be positioned as shown in Figure 4. With the open slot end of the cutter guide (55) pressed firmly against a flat side of the carbide cutter, use the 7/64" Allen wrench to attach the cutter guide securely to the cutter support with screw (53) and washer (54). Then, securely tighten the screw (56) of the carbide cutter.

NOTE

Carbide cutters come in four shapes for a variety of purposes:

- **Triangle:** Universal cutter—rough shaping through medium detailing. (Included with the Lathe Duplicator.)
- **Round:** Initial shaping, graceful curves, cove cuts, dishing.
- **Diamond:** Fine beads, deep intricate details, V-grooves, sharp corners.
- **Square:** Square corners, grooves, straight cylinders, short dowels and plugs.

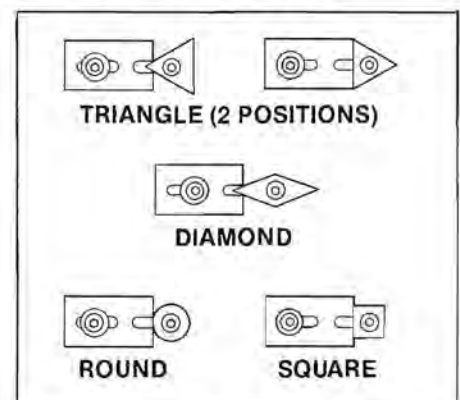


Figure 4. Mounting positions of carbide cutters and cutter guides.

Assembly and Setup

7. **Install the follower.** Remove the triangle follower (49) from the plastic molding strip. Attach it to the follower support (46) with a screw (47) and washer (48).

NOTE

- The profile of the follower must match the profile of the cutter.
- **SAVE the three extra followers.** You'll need them if you purchase the round, square and diamond cutters.

Table and Table Support Assembly

Assemble and set up the table and table support assembly according to the following procedures:

NOTE

In the inverted position, the outfeed end of the table assembly can be identified by the two screw holes which are closest to the edge.

1. **Attach the table supports to the table assembly.** (See Figure 5 for **Model 500**, Figure 6 for **Model 510**.) With the outfeed end of the table assembly (32) positioned as shown, attach the two table supports (34) to the table assembly with the four bolts (33) and washers (33A) positioned exactly as illustrated. Finger tighten the bolts just enough to allow the table supports to be moved.

NOTE

When positioned correctly, the distance between post hole centers of the table supports should be 12" for **Model 500**, 15-1/2" for **Model 510**.

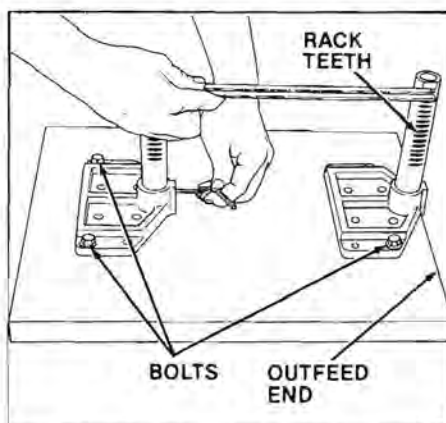


Figure 5. Table and table support assembly for Model 500.

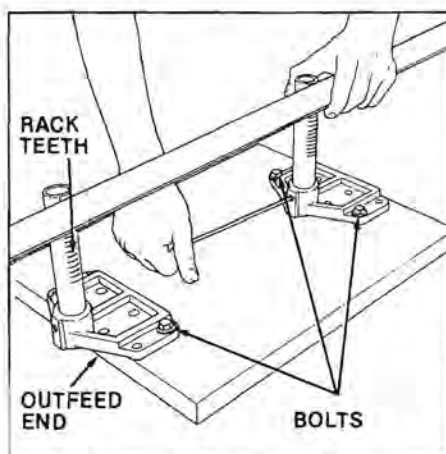


Figure 6. Table and table support assembly for Model 510.

2. **Install and align the table posts.** (See Figure 5 for **Model 500**, Figure 6 for **Model 510**.) Insert both table posts (35) into the table supports (34), with the rack teeth of the posts positioned as shown. Make sure the posts bottom out in the table supports. Align the flats of the table posts with a straightedge, then use the 5/32" Allen wrench to tighten setscrews (36) securely.

3. **Clean and wax the table posts.** Clean the table posts (35) with mineral spirits. Then, sparingly apply floor or furniture paste wax on the posts, and rub it out thoroughly. Use a toothbrush or other stiff brush to remove any wax residue from the rack teeth of the posts.

CAUTION

Use paste floor wax or paste furniture wax. Do not use car wax or spray furniture polish. The table posts need wax for both protection and lubrication. Car wax offers good protection for metal, but it's extremely hard and has little value as a lubricant. Furniture polish isn't hard enough. Paste floor wax or paste furniture wax protects and lubricates.

4. **Install the table assembly in the carriage.** Place the table posts in the carriage mounting holes so that the racks face toward the headstock (**Model 500**) or away from the headstock (**Model 510**). Then gently rock the table back and forth until you feel it settle in place and the pinions engage the racks. Raise and lower the table once to be sure the table raising mechanism operates smoothly. Lock the table height lock with the table near the top of travel.

CAUTION

DO NOT force the table up or down if the table raising mechanism binds. Carefully lift the table out of the carriage and inspect the racks and pinions for damage, dirt, or foreign materials. Also check that the table posts are inserted completely into the table supports. Correct any problem before you attempt to remount the table.

5. **Tighten the table supports.** With the carriage locked in place, use a 9/16" wrench to tighten the four table support mounting bolts (33). (See Figure 7.)

Assembly and Setup

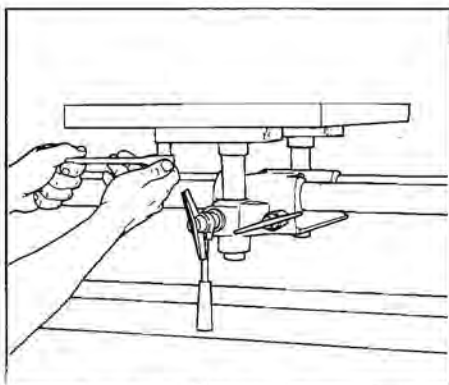


Figure 7. Tighten the four table support mounting bolts.

Template Support Assemblies

Assemble and set up the template support assemblies according to the following procedures:

1. Assemble the two template support assemblies. The two template support assemblies (1 thru 8) are preassembled. Remove the two screws (8) and washers (7) from each assembly. Use the removed screws and washers to attach each template support assembly to a bracket (9), making a left-hand and a right-hand template support assembly. When installed on the channel, the template centers must point toward each other. (See Figure 8.) Tighten the screws (8) finger tight. They will be tightened securely during alignment and adjustment.

2. Install the template support assemblies on the channel. Loosely assemble a screw (11), washer (12) and channel nut (10) (notched side toward bracket) to each template support bracket (9), then attach each template support assembly to the channel (13) at the approximate locations shown. (See Figure 9.) Each channel nut (10) can be engaged in the channel by turning the nut parallel to the channel slot, inserting it through the channel slot and then turning it clockwise to a perpendicular position. Another method of inserting the channel nut is to remove a cap (14) from the channel, engage the channel nut in the channel and then slide the assembly into position. After using either method, tighten both screws (11) finger tight.

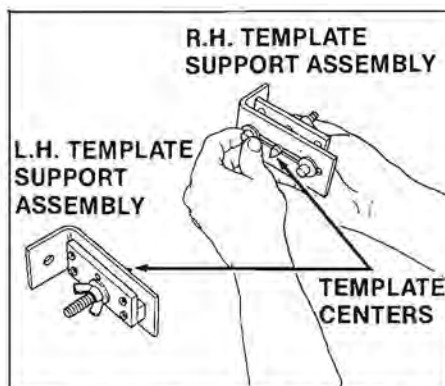


Figure 8. Attach each template support assembly to a bracket, making a left-hand and a right-hand template support assembly.

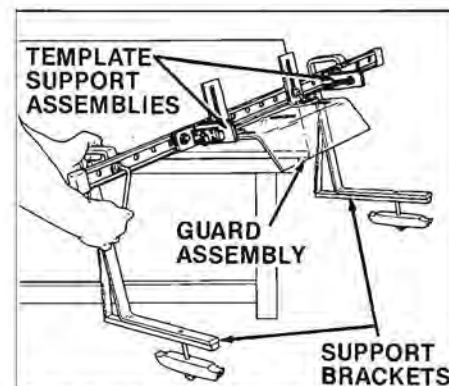
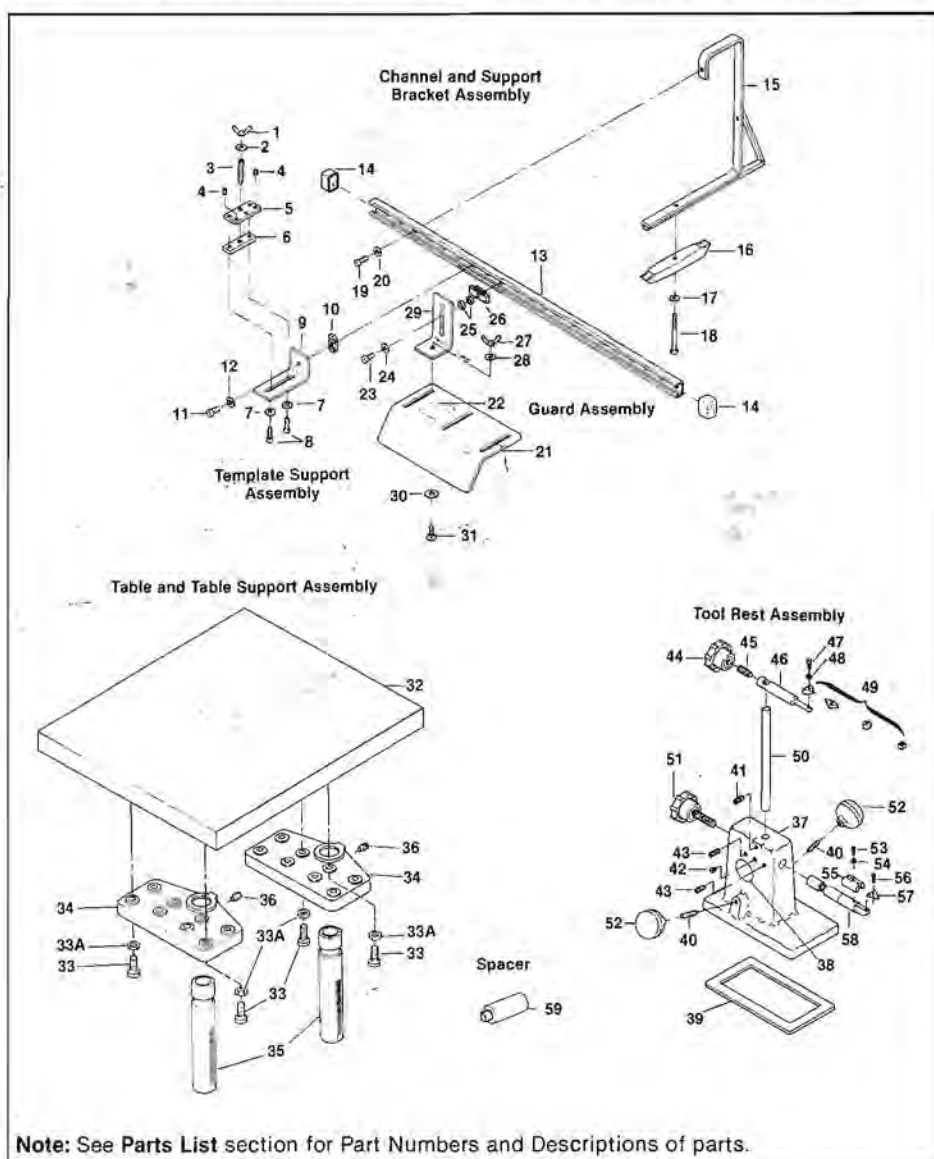


Figure 9. Attach the template support assemblies, the guard assembly, and the support brackets to the channel.



Note: See Parts List section for Part Numbers and Descriptions of parts.