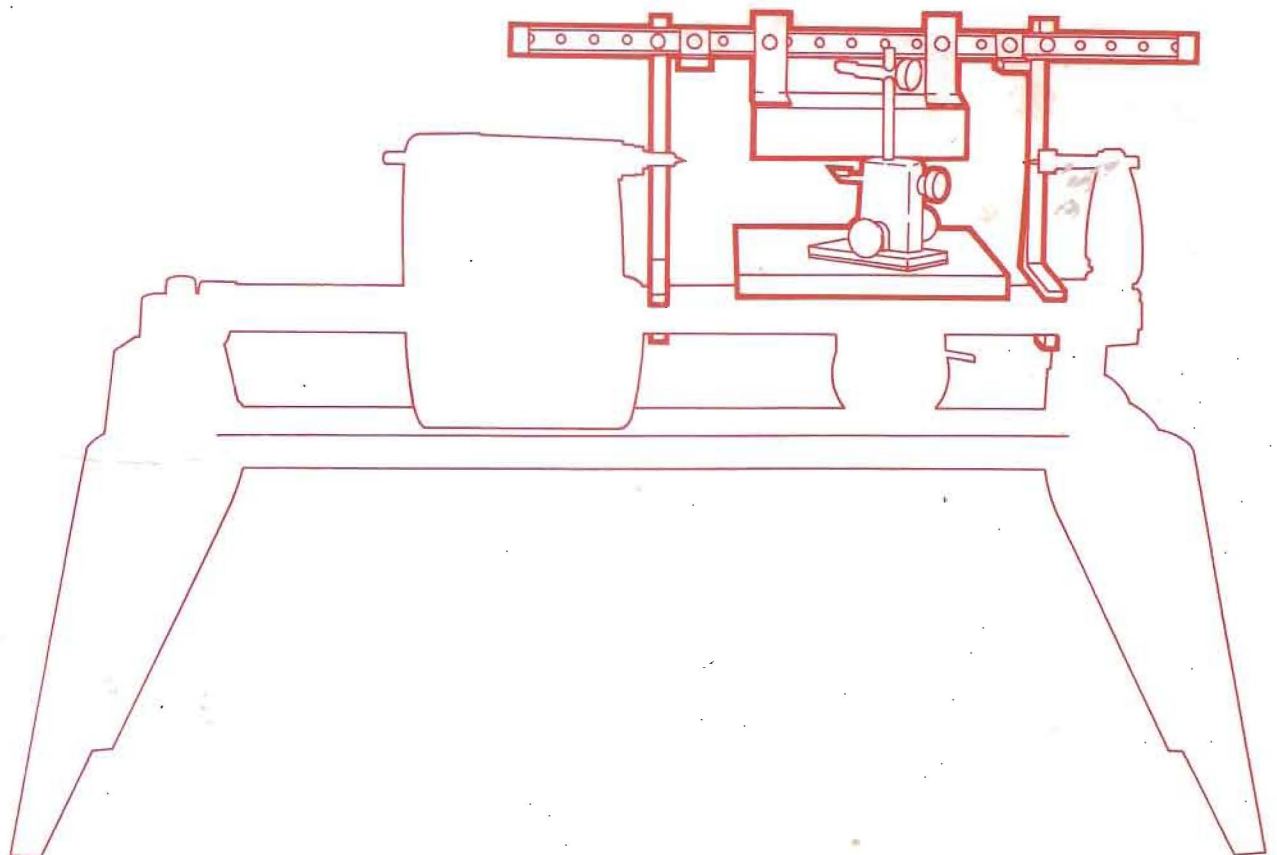




# Lathe Duplicator

555209



## Introduction

Your Shopsmith Lathe Duplicate 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 Duplicate 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 Duplicate, 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 Duplicate will become an indispensable accessory in your workshop.

We know that you're eager to get started using your Lathe Duplicate, 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 Duplicate 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 Duplicate.**
- **Also, READ, UNDERSTAND AND FOLLOW ALL the information in the Owners Manual for the Mark V on which the Lathe Duplicate 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.

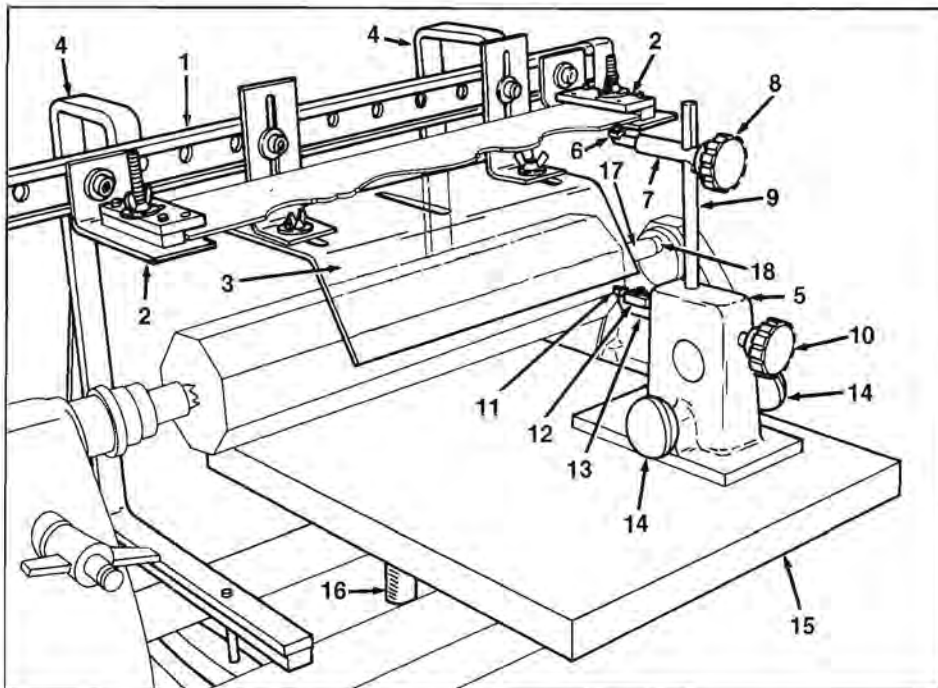
- **Make workshop childproof.** Use padlocks, master switches or remove starter keys.

- **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!

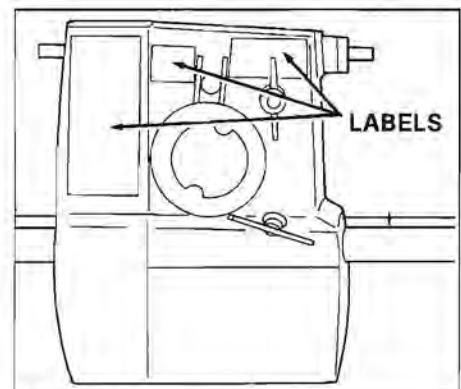


Figure 1. Attach the three new labels to the headstock.

# 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.

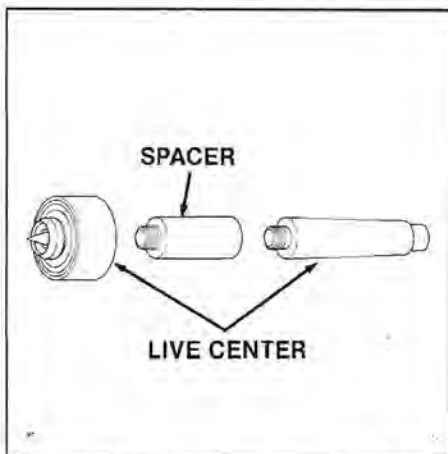


Figure 2. The spacer extends the length of the live center assembly.

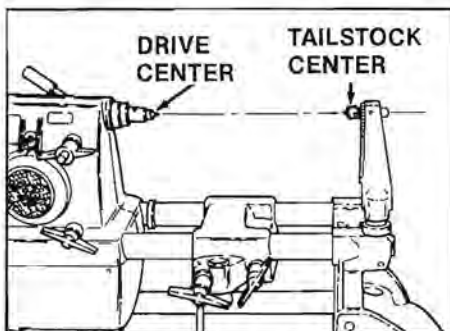


Figure 3. Both the drive center and tailstock center must be directly in line with each other in order to properly support a workpiece.

## 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.

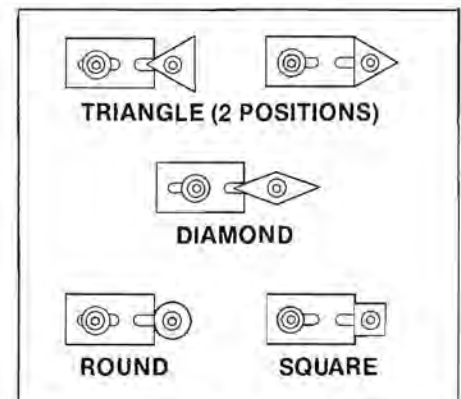


Figure 4. Mounting positions of carbide cutters and cutter guides.

# 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**.

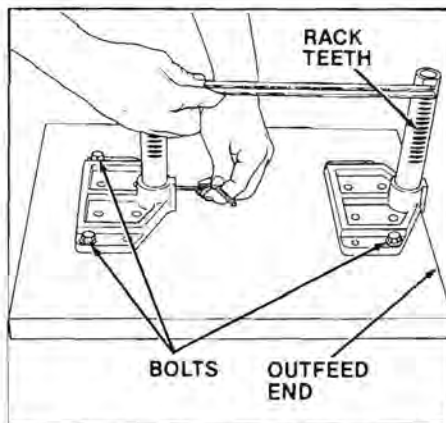


Figure 5. Table and table support assembly for Model 500.

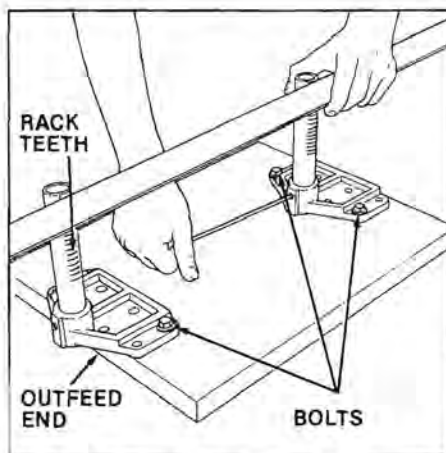


Figure 6. Table and table support assembly for Model 510.

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

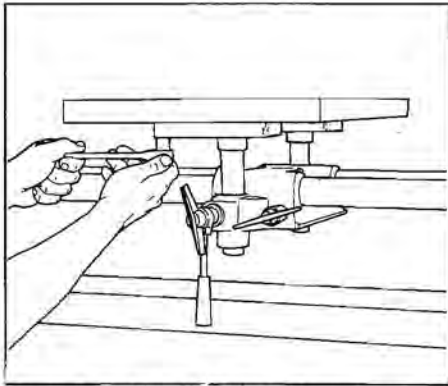


Figure 7. Tighten the four table support mounting bolts.

## 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.

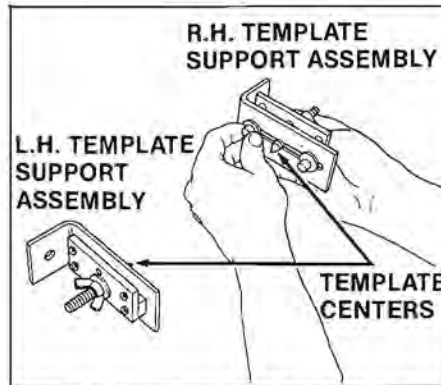


Figure 8. Attach each template support assembly to a bracket, making a left-hand and a right-hand template support assembly.

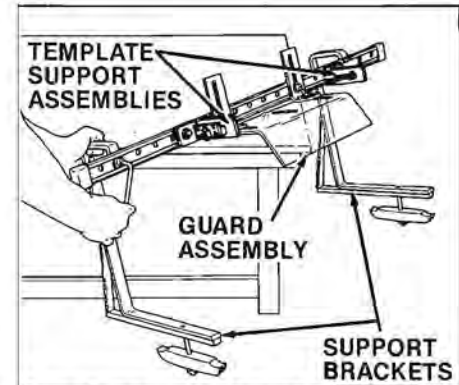
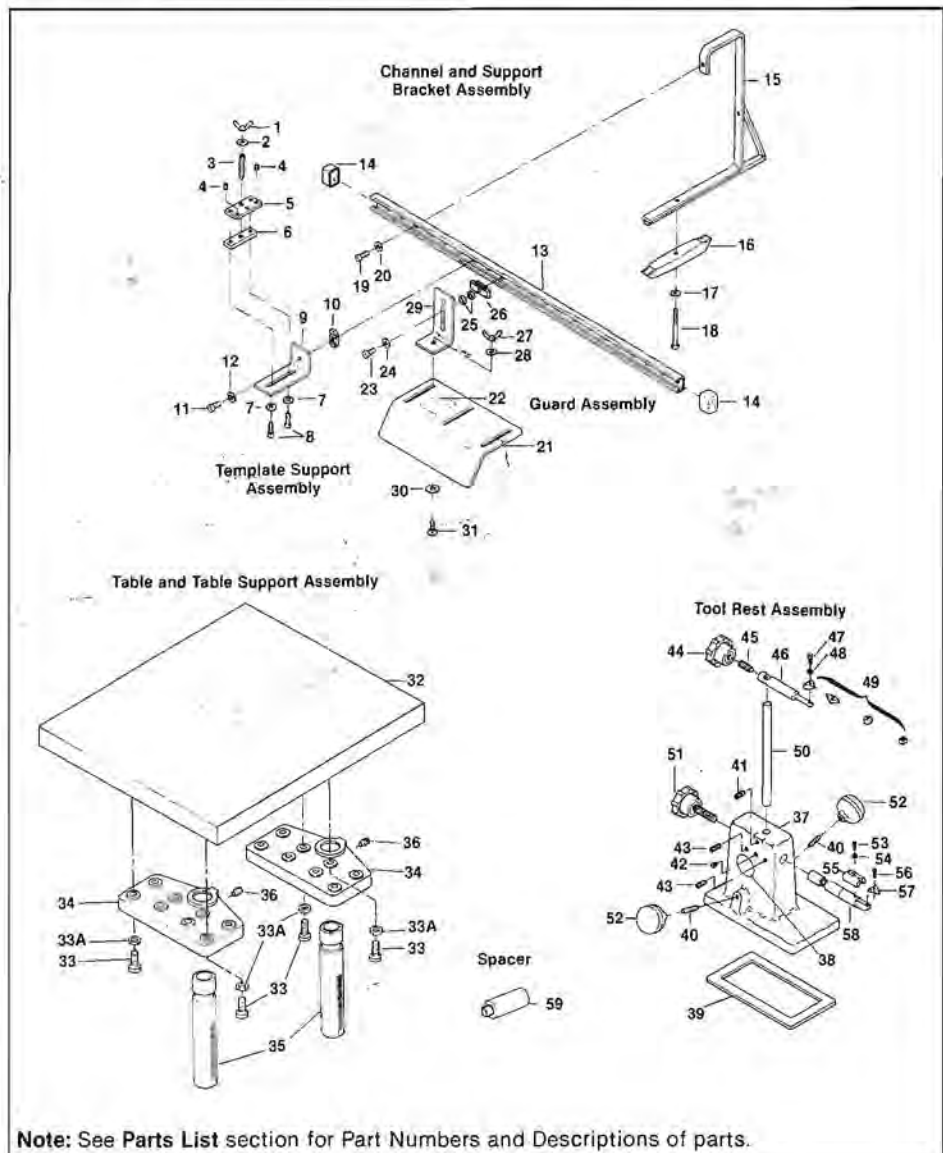


Figure 9. Attach the template support assemblies, the guard assembly, and the support brackets to the channel.



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

# Assembly and Setup

## Guard Assembly

Assemble and set up the guard assembly according to the following procedures:

- 1. Attach the brackets to the guard.** Attach the two brackets (29) to the guard (21) with the carriage bolts (31), washers (30), washers (28) and wing nuts (27). With the hardware at the back of the guard's two outer slots, tighten the wing nuts finger tight.
- 2. Install the guard assembly on the channel.** In the slot of each bracket (29), loosely assemble a screw (23), washer (24), two special washers (25) and a T-nut (26). Insert the edge of the T-nut into the channel first, then pivot the T-nut and push it down into the channel. Raise the guard all the way up the bracket and use a 5/16" Allen wrench to tighten the screw (23).

## Channel and Support Bracket Assembly

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

- 1. Install the two support brackets and clamps.** (See Figure 9.) Place the channel (13) with the guard and template support assemblies attached across a corner of your workbench. Use the 5/16" Allen wrench to attach the support brackets (15) to the channel with screws (19) and washers (20) at the **third** hole from each end of the channel. Secure a clamp (16) to each support bracket (15) with a screw (18) and washer (17).

### NOTE

The placement of the left-hand support bracket on the channel is for maximum spindle capacity. Depending on the operation being performed, it should be moved to the right as required to provide more rigid support.

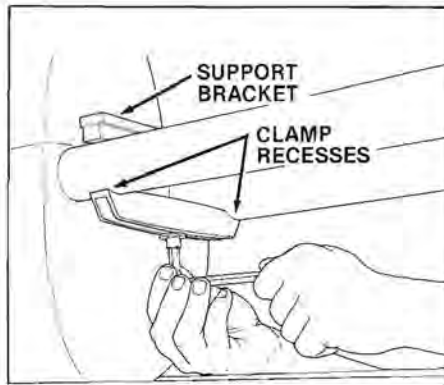


Figure 10. Securely tighten the clamp screws, making certain the clamps are in line with the support brackets and that the clamp recesses are fully engaging the way tubes.

- 2. Position the headstock and table assembly.** Move the headstock to the full left position and move the table assembly to midway between the headstock and tailstock.
- 3. Mount the channel and support bracket assembly on the way tubes.**

### WARNING

**Have a helper hold the channel and support bracket assembly upright while you tighten the clamps and hardware.**

With the clamps (16) turned to pass between the way tubes, set the assembly on the way tubes between the headstock and tailstock. Engage the curved recesses of each clamp against the underside of the way tubes and finger tighten each screw (18).

With the support brackets (15) square with the channel (13) and seated flat on the way tubes, securely tighten the bracket screws (19) with the 5/16" Allen wrench. Then securely tighten the clamp screws (18), making certain the clamps are in line with the support brackets and that the clamp recesses are fully engaging the way tubes. (See Figure 10.)

### CAUTION

- Do not overtighten clamps. Overtightening will damage the way tubes.
- Proper engagement and alignment of the clamps is essential for accurate front-to-back centering of the assembly.

## Alignment and Adjustment

### NOTE

When you've completed all the *Assembly and Setup* instructions, perform all the procedures in the *Alignment and Adjustment* section before attempting to operate your Lathe Duplicator.

# Alignment and Adjustment

## Alignment and Adjustment

After you've completed the **Assembly and Setup** instructions, perform all the instructions in this **Alignment and Adjustment** section before operating the Lathe Duplicator.

Also, whenever you remount the Lathe Duplicator on the Mark V be sure to check the "Table to Lathe Centers Parallelism," "Template Centers Alignment," and "Follower to Cutter Alignment."

### CAUTION

The precise alignment of the Lathe Duplicator is critical for exact duplication. If the alignment is not done properly, you'll waste time and materials, and find duplicating extremely frustrating.

Before you begin any alignment procedures, make sure your square is accurate. (See Figure 1.) Select a wide scrap board with at least one straight edge. Place the square against the edge of the board and draw a line across the width. Flip the square over and hold it against the same edge and draw another line next to the first one. If the lines are parallel, your square is accurate.

## Cutter Support Alignment

Align the cutter support according to the following procedures:

1. **Remove the follower support.** Loosen knob (44) and remove the follower support (46) from the follower upright (50).
2. **Move the cutter guide.** Loosen the cutter guide cap screw (53) with the 7/64" Allen wrench, and slide the cutter guide (55) back toward the base (37).
3. **Align the cutter support.** Loosen the two cutter support setscrews (43) using the 5/32" Allen wrench. Make sure the cutter positioning setscrew (42) is lightly seated in the groove of the

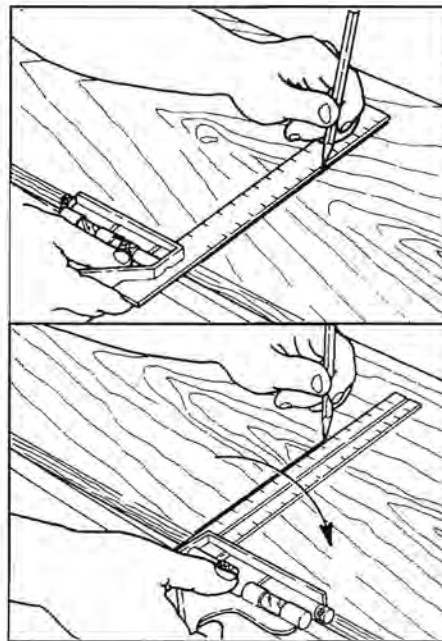


Figure 1. Test your square for "squareness."

cutter support (58). Place an accurate combination square (58) against the base (37) and one of the cutter support side flats. Adjust the cutter support so the side flat is against the square. Tighten the two cutter support setscrews (43). (See Figure 2.) Replace the follower support on the follower upright and reposition the cutter guide.

### NOTE

Because of possible unevenness on the top surface of the base, it may be difficult to achieve perfect squareness with both side flats. Therefore, indicate off one side flat only.

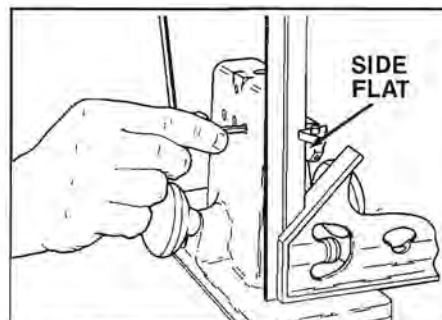


Figure 2. Align the cutter support.

## Table to Lathe Centers Parallelism

Align the table assembly parallel to the drive and tailstock centers according to the following procedures:

### NOTE

Be sure locks are secure, and the table surface and the bottom surface of the tool rest base are clean.

1. **Align the carbide cutter with the drive center.** Move the table assembly next to the headstock. Position the carbide cutter facing the drive center. Adjust the table height so that the upper surface of the cutter tip almost touches and is in line with the tip of the drive center. (See Figure 3.) Lock the table at this height.

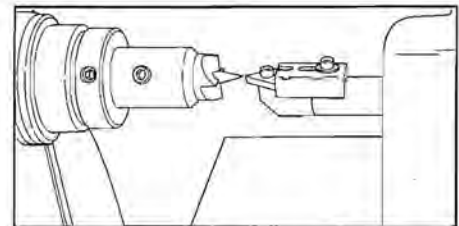


Figure 3. Align the carbide cutter with the drive center.

2. **Check the alignment of the carbide cutter with the tailstock center.** Move the table next to the tailstock. With the tip of the carbide cutter almost touching the tip of the tailstock center, check that the upper surface of the cutter tip is in line with the tip of the center. (See Figure 4.) If the tips are not aligned properly, raise or lower the tailstock as required to achieve alignment. Lock the tailstock. The top surface of the table assembly is now parallel to the drive and tailstock centers.

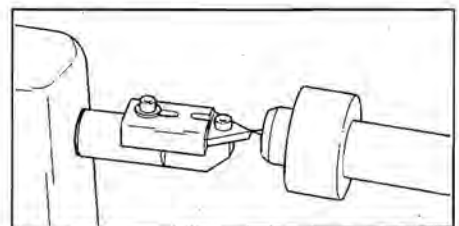


Figure 4. Check the alignment of the carbide cutter with the tailstock center.

# Alignment and Adjustment

## Template Centers Alignment

Align the template centers according to the following procedures:

**1. Align the left-hand template center with the drive center.** Move the table assembly next to the headstock and lock the carriage. Table height should be previously adjusted so the top of the cutter is level with drive center. Loosen the template bracket screw (11) with a 5/16" Allen wrench and the two template clamp screws (8) with a 1/4" Allen wrench.

Position an accurate combination square so that its front edge just contacts the tip of the drive center. Carefully move the template support assembly forward on the channel until the tip of the template center just contacts the front edge of the square. Tighten screw (11). (See Figure 5.)

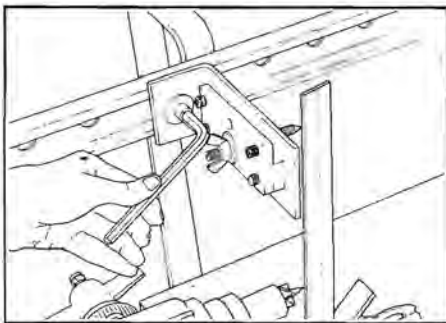


Figure 5. Use a combination square to align the left-hand template center with the drive center.

Reposition the square so that its front edge just contacts the front edge of the drive center tip. Adjust the template support assembly so that the front edge of the template center tip just touches the front edge of the square. With the square still touching the edge of both center tips, tighten the two screws (8). (See Figure 6.)

**2. Check the alignment at the back edge of both center tips.** Use the square to check the alignment at the back edge of both tips. (See Figure 7.) If there is a gap between the tip of the template

center (3) and the square, the square is probably not accurate. Recheck the front edge alignment again. If both tip edges still touch the square, loosen both screws (8) and adjust the template center until an equal gap is obtained on both sides of the tip. Tighten the screws securely.

**3. Align the right-hand template center with the tailstock center.** Move the table assembly next to the tailstock and lock the carriage. Then repeat the procedures of Steps 1 and 2 to align the right-hand template center with the tailstock center.

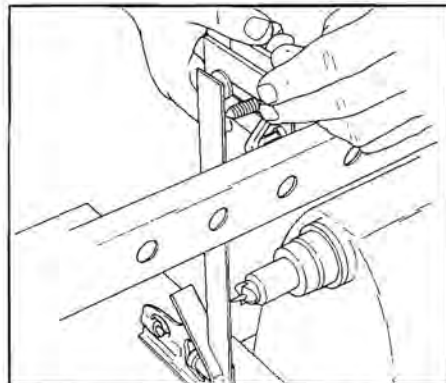


Figure 6. Use a combination square to align the edges of the tips of the left-hand template center with the drive center.

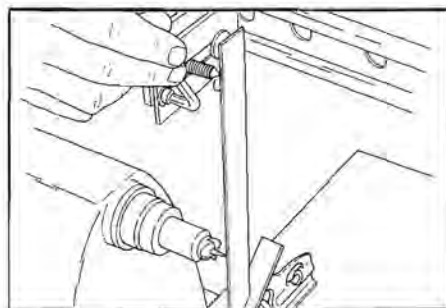


Figure 7. Check the back edge alignment of both tips.

## Follower to Cutter Alignment

Align the follower to the cutter according to the following procedures:

**1. Align the follower with the cutter.** (See Figure 8.) Position the carbide

cutter so its tip is touching the tip of the tailstock center. Loosen the follower knob (44) and adjust the height of the follower support (46) so that the tip of the follower is level with the tip of the template center (3). Tighten the knob while wiggling the follower back and forth. Use the 5/32" Allen wrench to loosen the follower upright setscrew (41). Pivot the follower upright (50) until the tip of the follower is exactly in-line with the template center when the tip of the carbide cutter is touching the tip of the tailstock center. Then, tighten setscrew (41) securely. If the follower and the cutter do not touch their respective centers, loosen the two cutter support setscrews (43) using a 5/32" Allen wrench. Also loosen the cutter positioning setscrew (42) 1/2-1 turn. Place a combination square against the base (37) and one of the cutter support side flats. Adjust the cutter support so the side flat is against the square and both the cutter and follower touch their respective centers. Tighten setscrews (42 and 43).

### NOTE

When the follower support is moved up or down, knob screw pressure against the flat of the follower upright will maintain follower alignment. Be sure to wiggle the follower support back and forth as you tighten the knob. This will properly seat the cup point of the knob screw against the flat of the follower upright.

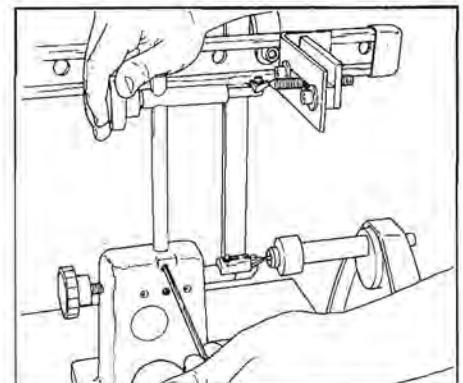


Figure 8. Align the follower with the cutter.

## Templates

To duplicate turnings, you'll need a template to follow. For a spindle turning use either a flat template or an original spindle. (See Figure 1.) If doing a faceplate turning (bowls or cups, etc.), you must use a flat template only. Figure 2 shows a spindle template and the finished product. A faceplate template and a side view of its product are shown in Figure 3.

### NOTE

You can design your own templates or find template patterns in woodworking books and magazines.

When designing a template, keep in mind the capabilities of the carbide cutter(s) you own. To avoid problems while you're turning your project, it's a good practice to use a detached follower to check your full size paper pattern to be sure that the cutter will work for all contours. For example, if your template has a deep slot or V-groove, will the cutter point go in far enough? If your workpiece has a square in the design, be sure that your template is designed so that the cutter doesn't contact the rotating corners of the square section.

Use a suitable marking device to draw the full size profile on the template material or on white paper rubber cemented to the material. If paper is used, it can be removed after cutting out the template or left on. Each template must have a permanently marked centerline and one or two end lines to indicate the ends of the workpiece. (See Figures 2 and 3.) The template ends to be clamped should be straight and square.

Cut out your templates on a bandsaw using the 1/8" or 1/4" blade. Sand the sawn edges **smoothly** using the pattern files on the jigsaw, hand files, emery board and/or sandpaper. Your completed turning will be no better than the template that it's copied from and you won't want rough spots to be duplicated.

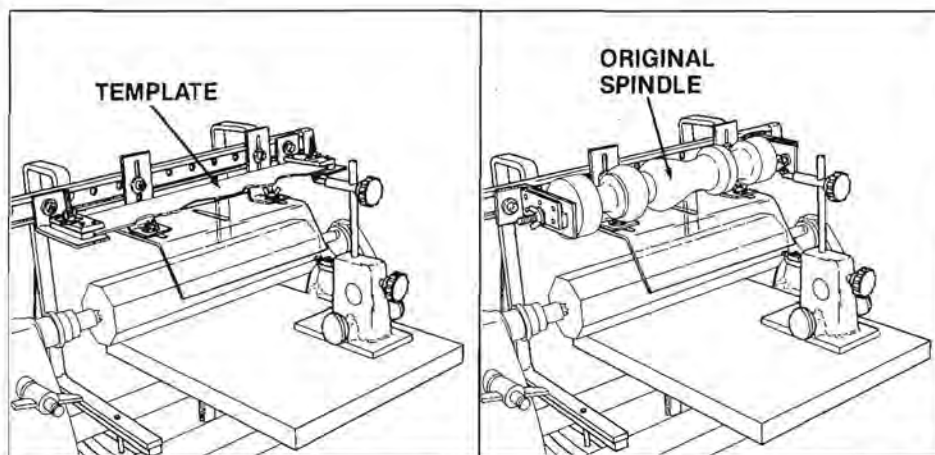


Figure 1. To make duplicate spindles, use a template or an original spindle.

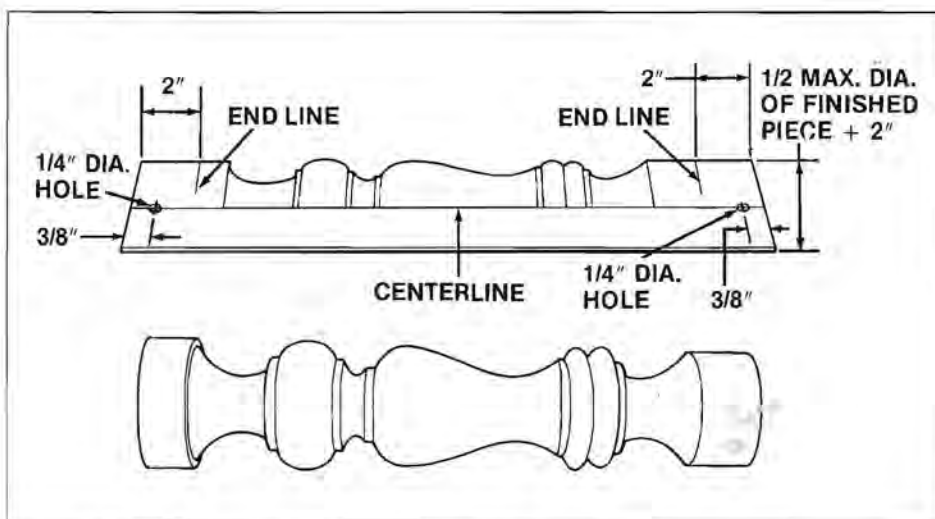


Figure 2. A spindle template and its finished product.

### NOTE

To help achieve proper template alignment, drill two 1/4" diameter holes on the centerline, 3/8" from each end of a spindle template (See Figure 2). And drill one 1/4" diameter hole on the centerline, 3/8" from the edge of a faceplate template (See Figure 3). A 1/4" dowel placed through the hole(s) in the template clamp(s) and into the template hole(s) will align the template exactly.

## Template Materials

The best materials for your templates are tempered hardboard, thin closed-grain hardwoods (such as maple or cherry) and clear or smoked sheet acrylics. Maximum template length is 36". Material thickness may vary from 1/4" for short templates to 3/8" for longer templates. Clear sheet acrylic templates have one advantage over those made of other materials: they will allow overhead light to shine through, illuminating the workpiece.

# Templates

## Making Spindle Templates

The spindle template should be 4" longer than the finished product (a 2" extension from each end line). For spindle diameters of up to and including 4", the width of the template should be half the maximum diameter of the workpiece plus 2". (See Figure 2.) For spindle diameters of from over 4" to 8", the back (straight) edge of the template can be no more than 2" from the template centerline. The front (profile) edge can protrude 2"-4" outward from the centerline. Drawing perpendicular lines from the start or end of the spindle contours to the centerline is optional, but they may help you to better visualize the finished spindle profile.

If you're making a template for table legs with a square at the top, be sure to measure the distance from the center of the stock to one corner of the square. This dimension must be incorporated into your template to keep from cutting off the corners.

When turning long spindles with repeat symmetrical designs from the ends to the middle, you can get by with a half template. Just turn one half of the workpiece, "flip" it end for end and then turn the other half.

Pieces longer than lathe capacity, such as bedposts or clothes trees, can be made in sections. Design a template for each section so that the sections will join in an inconspicuous location such as at a V-groove or where two beads meet.

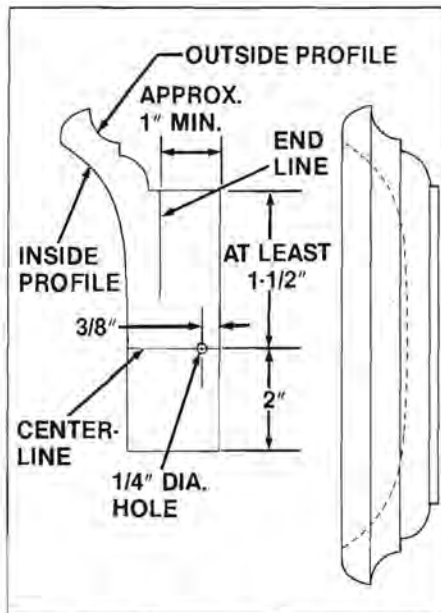


Figure 3. A faceplate template and a side view of its finished product.

## Making Faceplate Templates

As shown in Figure 3, the faceplate template has both the inside and outside profiles. Only one end line is required to indicate the outside bottom of the bowl. The 1" dimension from the end line allows for full insertion into the template support assembly. The 1-1/2" and 2" dimensions from the centerline allow both template clamping setscrews to secure the template.

For thin-walled (less than 1/4") cups or bowls, you can make a stronger, less fragile template by working from two centerlines—one for the outside profile and one for the inside. (See Figure 4.)

Another method of making a bowl template is to cut a 1/4" wide section through the center of an existing wooden bowl. When glued to a suitable piece of wood for mounting, it makes an excellent template. You'll lose your original bowl but then you can make as many duplicates as you like.

To cut both profiles without remounting the stock, there may be times when you'll need separate internal and external templates. This will be determined by your setup, the optional accessories you're using and how the stock is mounted to the faceplate.

When you're ready for mass production of bowls, specialty chucks are available which mount to a pin on or recess in the workpiece. For such work, you'll need a chuck mounting template (to cut the pin or recess) and a profile template. In addition to quick mounting and release times, these specialty chucks allow you to produce thinner bottomed bowls without mounting screw holes.

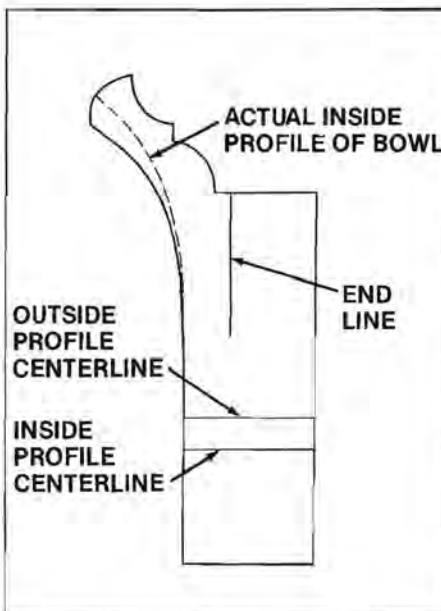


Figure 4. Template for a thin-walled bowl.

## Safety First

### WARNING

Most lathe accidents are caused by: improperly mounted workpieces, unbalanced workpieces and improper speed settings. Each of these factors can cause a workpiece to be thrown from the lathe. To protect yourself from injury:

- READ, UNDERSTAND AND FOLLOW ALL the information given in the Safety section before you perform lathe operations.
- You must also READ, UNDERSTAND AND FOLLOW ALL the safety information in the Owners Manual for the Mark V on which the Lathe Duplicator is to be mounted.

## Using the Lathe Duplicator

### CAUTION

Be sure that you've performed all the procedures in the "Assembly and Setup" and the "Alignment and Adjustment" sections before using the Lathe Duplicator.

You'll need to go through a learning process during your first several projects. Read this **Operations** section, then begin practicing with simple projects such as the one provided at the end of this section. The two full size pattern layouts go together to make an attractive candleholder. The project will give you experience in both spindle and faceplate turning.

The quality of the cut in lathe turning is determined by five factors:

1. The sharpness of the cutter.
2. The right type of cutter for the job.
3. The lathe speed specified for the operation. The faster the speed, the better the cut. Do not exceed the maximum rpm recommended.

## Lathe Turning Speed Chart\*

Size of Stock	Rounding	Shaping	Sanding
Up to 2" dia.	C (950 RPM)	F (1300 RPM)	K (2050 RPM)
2" to 4" dia.	B (850 RPM)	E (1150 RPM)	J (1900 RPM)
4" to 6" dia.	A (750 RPM)	D (1050 RPM)	H (1600 RPM)
Over 6" dia.	Slow (700 RPM)	A (750 RPM)	B (850 RPM)

\*For Mark V's with 230 v., 50/60 hz. motors, refer to your Mark V Owners Manual for recommended speeds

4. The aggressiveness of the way you use the cutter. Use a light touch for initial rounding, a more aggressive touch when rough shaping and a light touch for detailing.

5. The height of the cutter:

- Cutting above the stock centerline will usually result in a poor cut by tearing the wood.
- Cutting on the stock centerline generally gives the best results, especially at the start of each operation.
- Cutting from 1/32" to 1/16" below the stock centerline sometimes is better for certain types of wood.

## Lathe Speeds

Before you begin any lathe operation, set the Mark V to run at the correct speed.

### WARNING

**Never operate the machine in excess of the recommended speed for the diameter of the workpiece.**

The correct speed is determined by the size of the stock you're turning; the operation you're performing—whether you're rounding, shaping, sanding or finishing; and the type of wood you're turning. Use faster speeds as you progress from rounding to shaping to sanding. Also use faster speeds with smaller stock. The larger the workpiece, the slower the lathe speed.

## Stock Selection and Preparation

### WARNING

- Make sure the workpiece does not have 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.
- If you're turning glued-up stock, make sure the glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.
- For spindles, always cut stock that's more than 3" square into an octagon using the bandsaw. This removes excess stock, minimizes imbalance, reduces vibration and makes turning safer and easier.
- For faceplate stock, always cut the stock round using a bandsaw. This removes excess stock, minimizes imbalance, reduces vibration and makes turning the workpiece safer and easier.
- However your stock is mounted to the faceplate, the mounting surface(s) must be true and smooth. Use a hand plane or belt sander for small stock. When making several bowls from larger stock, run it through a thickness planer before cutting it into circles.

# Operations

## NOTE

- If turning has small diameter ends, increase stock length to keep cutter from contacting centers.
- If stock has paraffin on the ends, cut off the ends.

Balance is extremely important for glued-up stock, especially long stock and stock that is 3" or more in diameter. If you're gluing together different types of wood, arrange the wood symmetrically. Use one type of wood in the center and the same amount of a different type of wood on the sides. Glue the stock oversize to allow for balance removal.

Examine each piece of wood carefully, even if from the same type of tree. Check the density of the annual rings. Wood with dark annual rings spaced close together is heavier than wood with dark rings spaced farther apart.

To check the balance of your spindle or faceplate workpiece, first locate the centers at each end by drawing two diagonal lines from corner to corner. Drive a standard 8 penny nail straight into each center. Use suitable string to hang the stock in a level position from the front bench tube of the Mark V. The ends of the string should be looped around the nails. (See Figure 1.) Gravity will pull the heavy side down. Use a jointer, bandsaw or hand plane to remove no more than 1/32" at a time from the heavy side until the stock remains stationary when rotated to three positions 90 degrees apart. Locate the lathe centers or the center of the faceplate in the nail holes.

## Spindle Turning

You can turn duplicate spindles by using a flat spindle template or by using an original spindle such as a chair rung or an antique table leg for the pattern. (See Figures 2 and 3.)

Set up for spindle turning according to the following procedures:

## NOTE

Initial setup of the channel and support bracket assembly was for maximum spindle capacity. For shorter pieces, the left-hand support bracket must be moved to the right to allow movement of the headstock toward the tailstock. The following procedure assumes that a less than maximum length spindle is to be turned.

- 1. Remove the left-hand support bracket assembly.** Slide the guard (21) to the right end of the channel (13). Use the 5/16" Allen wrench to loosen the left-hand clamp screw (18) enough to disengage the clamp (16) from the way tubes. Remove the screw (19) and washer (20) attaching the support bracket (15) to the channel. Remove the support bracket assembly and set it aside. Support the left-hand end of the channel with your hand.
- 2. Position the headstock.** Position the headstock so that the centers are about 1" farther apart than the length of the workpiece, and lock the headstock in position.
- 3. Remount the left-hand support bracket assembly.** Place the support bracket assembly to the right of the headstock to a position which will not interfere with the final position of the headstock nor with proper positioning of the left-hand template support assembly. Install the support bracket screw (19) and washer (20) finger tight, then properly align and engage the clamp (16) on the way tubes. Tighten screw (19) securely. Then, tighten screw (18) securely.

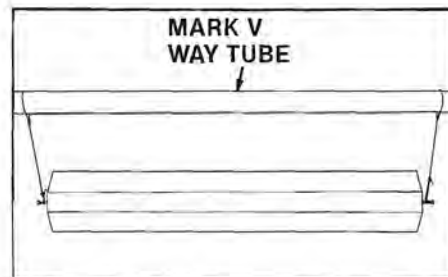


Figure 1. Check the balance of your workpiece.

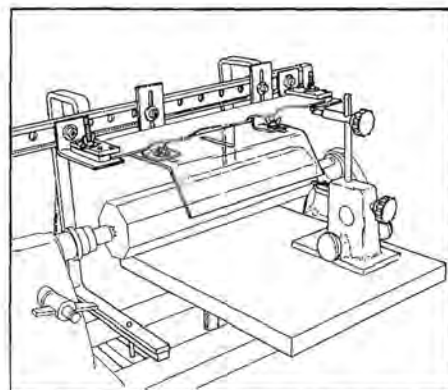


Figure 2. Setup for spindle turning with a template.

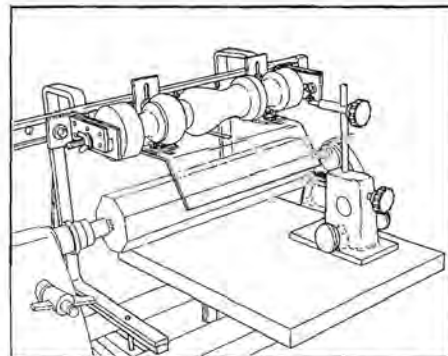


Figure 3. Setup for spindle turning with an original spindle.



## Mounting a Spindle Workpiece

Mounting a workpiece on the lathe is an extremely important operation. Improperly mounted stock is dangerous and difficult to turn. To properly mount a workpiece on the Mark V, follow this procedure:

### WARNING

- If you're turning glued-up stock, make sure the glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.
- Make sure the workpiece does not have splits, loose knots, or other defects.
- Always cut stock that's more than 3" square into an octagon using the bandsaw.

### NOTE

To properly support a spindle workpiece so that it can be duplicated, both the drive center and the tailstock center must be directly in-line with each other. (Refer to your Mark V Owners Manual to align the lathe centers.)

### 1. Find the center of the workpiece.

To mount stock between the lathe centers, first find the center of the stock. With a straightedge, draw two intersecting diagonal lines corner to corner on each end of the workpiece. (See Figure 4.) These two lines intersect at the center of the stock.

**2. Seat the lathe centers.** Position the points of the drive center and cup center at the center marks on the workpiece. Then hit the centers sharply with a plastic or rawhide mallet. (See Figure 5.)

### CAUTION

- To avoid damaging the live center bearing, always use the cup center for this procedure. The hole left by the cup center will accommodate the live center.
- To avoid damaging the centers, do not hit them with a metal hammer. Use a rawhide or plastic mallet.

When properly seated, the drive center will leave a hole and four slots where the spurs bit into the wood. The cup center will leave a hole and a small circle. (See Figure 6.)

### WARNING

When mounting stock between the centers, the spurs of the drive center and the cup of the cup center must penetrate at least 1/16" into the stock. Do not use a drive center, cup center or live center if the point is damaged. The stock could be thrown from the machine.

### NOTE

If you're working with hardwood or stock that's less than 1-1/2" diameter, drill 1/8" diameter holes 1/2" deep in both ends of the workpiece, and/or saw diagonal kerfs 1/8" deep. This will help seat the lathe centers and keep the stock from splitting when the centers are driven into it.

### 3. Mount the lathe centers on the Mark V.

Mount the drive center on the main spindle and the cup center or live center in the tailstock.

**4. Set the Mark V at the proper speed.** Set the Mark V at the proper speed and run it briefly.

**5. Mount the workpiece.** Hold the end of the stock against the tailstock center, then extend the quill and mount the other end on the drive center.

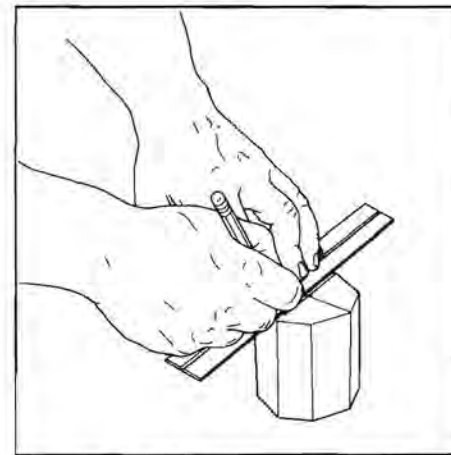


Figure 4. To find the center of a workpiece, draw two intersecting diagonal lines corner to corner on each end of the workpiece.

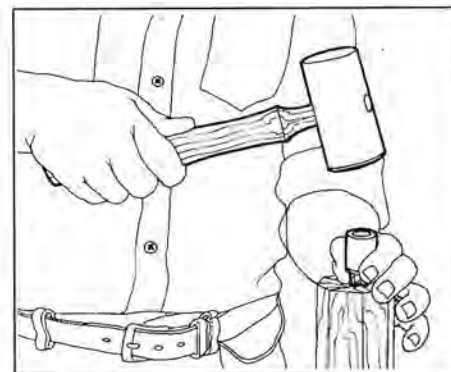


Figure 5. With a mallet, seat the drive center in one end of the workpiece and the cup center in the other.

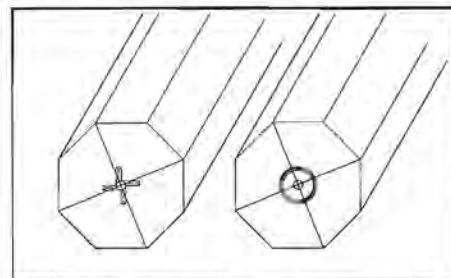


Figure 6. When properly seated, the drive center will leave a hole and four slots in the wood, as shown on the left; and the cup center will leave a hole and a circle, as shown on the right. The centers must penetrate at least 1/16" into the stock.

# Operations

Press hard against the quill feed lever to be sure the tips of the drive center and lathe center are engaged, then lock the quill in place.

## WARNING

If you're using a cup center, generously wax or soap the end of the stock that mounts to the cup center. This lubrication helps keep the cup center from wearing into the stock and causing the stock to loosen on the lathe.

## NOTE

- Use as little quill extension as possible.
- If you've mounted a live center in the tailstock, its ball bearing construction will permit more headstock pressure than the non-rotating cup center.

## Mounting a Spindle Template

Accurate mounting of your spindle template is essential to prevent inaccurate diameters, improper positioning profiles or unwanted tapering. To properly mount a spindle template, follow this procedure:

**1. Adjust the right-hand template support assembly.** Loosen the bracket mounting screw (11). Use a ruler and the tool rest assembly to position the template support assembly so that the front edge of the template clamp (5) is 1-1/4" back from the cup of the tailstock center. (See Figure 7.) With the top edge of the template support bracket parallel to the channel, tighten the screw (11) securely.

## NOTE

The template will go 3/4" into the template clamp slot. This will align the template end line, which is 2" from the end of the template, with the end of the workpiece. If additional stock is left on the

workpiece which you intend to cut off, adjust the template support bracket an appropriate amount toward the square.

**2. Mount the template.** Loosen the mounting screw (11) of the left-hand template support assembly. Insert the template between clamp (5) and bracket (9) of the right-hand template support assembly, then move the left-hand template support assembly to accept the other end of the template. Both ends of the template should butt up squarely against the spacers (6). Use the 5/16" Allen wrench to tighten the left-hand screw (11), keeping the top of the support bracket (9) parallel to the channel.

**3. Align the template.** Align the template holes with the centering hole in each template clamp (5). (See Figure 8.) To align the template easily and exactly, insert a 1/4" dowel through the centering hole in each clamp (5) to engage the template hole. Use the 5/32" Allen wrench to tighten the two rear setscrews (4), one in each template clamp.

## Mounting an Original Spindle

If you're using an original spindle such as a chair rung or antique table leg as a template, mount it according to the following procedures:

**1. Rotate the template support assemblies.** Rotate the template support brackets 90° so that the template centers (3) are in-line with and pointing toward each other.

**2. Mount the original spindle.** Engage the center hole of the original spindle with the right-hand template center (3). Then move the left-hand template support over to engage its template center in the other end of the original spindle. Loosen the two wing nuts (1), then use a medium, flat-bladed screwdriver in the slotted end of each template center to turn the centers in to secure the spindle. Tighten the wing nuts.

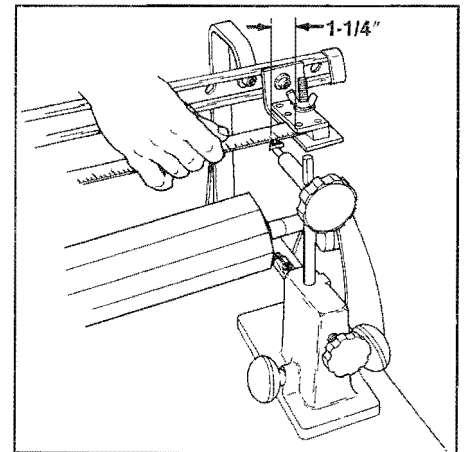


Figure 7. Adjust the right-hand template support assembly.

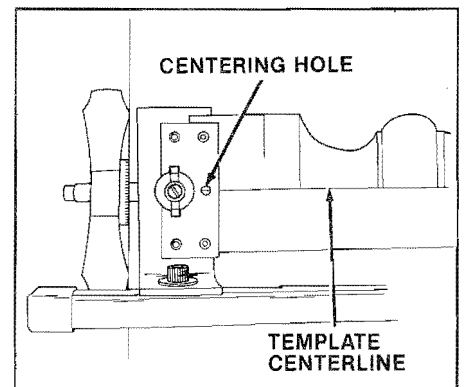


Figure 8. Align the template

## NOTE

- The template centers must penetrate the center holes of the original spindle at least 1/8" with enough pressure to keep the spindle from rotating.
- The ends of the original spindle must be flush with the ends of the workpiece. After mounting the workpiece, readjust the template centers as required to shift the original spindle into end-to-end alignment with the workpiece.
- If you are duplicating an original spindle with square corners, then you MUST position the original spindle with the square corners pointing at the follower.

## Duplicating a Spindle

Duplicate a spindle according to the following procedures:

### WARNING

- Keep the guard in place whenever you're performing turning operations.
- Do not exceed recommended speeds.
- Periodically turn off the Mark V and check that the workpiece remains securely mounted.
- Do not allow the cutter to come in contact with parts of the duplicator or Mark V.

1. **Position the guard assembly.** Place the tool rest assembly on the table in a cutting position, then adjust the guard to be as close as possible to the workpiece without interfering with the rotation of the workpiece or the movement of the tool rest assembly underneath it.

### WARNING

Keep the guard in place during all turning operations.

2. **Make a five-point check.** All five locks—headstock, carriage, table height, quill, tailstock—must be secure.
3. **Move the table and guard.** Move the table and guard to the right-hand end of the workpiece. Lock the table.
4. **Adjust the height of the follower if required.** The follower should be positioned so it's at the center of the template edge or at the center of the original spindle. If adjustment is required, loosen the follower adjusting knob (44) and lower or raise the follower support. Retighten the knob securely. Wiggle the follower as the knob is tightened to properly seat it.
5. **Develop a firm grip on the tool rest assembly.** Before turning on the lathe, determine the best method

of gripping the tool rest assembly. Depending on your hand size, you may find it necessary to grip each knob with all five fingers or to grip each knob with four fingers with your thumbs wrapped around the back of the tool rest.

### WARNING

When gripping the tool rest assembly, do not extend your fingers beyond the front face of the tool rest base.

6. **Round off the workpiece.** Check that the proper speed has been set, then turn on the Mark V. Roughly round off the corners of the workpiece by cutting small areas at a time. (See Figure 9.) Start at the right-hand end of the workpiece. When each small area becomes round, you will feel less vibration and hear a change in the noise level.

After the first area is rounded, cut subsequent small areas from left to right (from the octagon surface to the rounded surface). When you are turning a long workpiece and the part of the workpiece that's over the table is rounded, turn off the machine and move the table and the guard to the left. Brush off the table and tool rest, then check that the workpiece is still mounted securely. Turn on the machine and, to reduce vibration, finish off the rounding procedure by working from the left-hand end of the workpiece.

Increase the speed dial setting from rounding to shaping, and then turn off the machine.

7. **Offset the carbide cutter.** Because the follower will be guided against the template to make the rough shaping cut, the carbide cutter must be backed off from 1/64" to 1/32" from its aligned position to leave enough extra stock for final detail shaping.

Loosen the two setscrews (43) which secure the cutter support (58). Then loosen the position indicating setscrew (42) 1/4 turn. Back off the adjusting knob (51) one-half turn to allow the

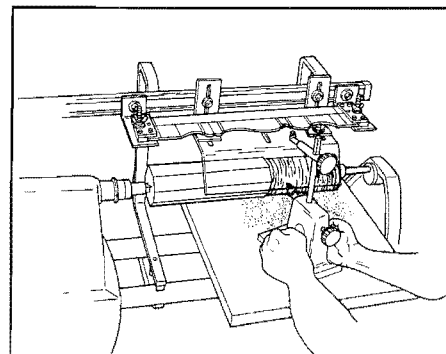


Figure 9. Roughly round off the corners of the workpiece by cutting small areas at a time.

cutter support to be moved back 1/32" (a one-quarter turn will allow 1/64" movement). Move the cutter support back until it contacts the stud of the cutter adjusting knob.

Align the cutter support according to "Cutter Support Alignment" in the **Alignment and Adjustment** section. When tightening the cutter support setscrews (43) during adjustment, **press the cutter support against the adjusting knob stud** instead of using the position indicating setscrew (42) in the groove of the cutter support.

### NOTE

Because of the cutter offset, you'll be cutting away less stock than on your template. But when you work down an edge like a cove or around a bead, the cutter offset does not compensate for side-to-side adjustment. So if you go straight in, down a shoulder, the follower will go to the exact position (final dimension). To avoid this, keep the follower perpendicular to the profile area of the template. (See Figure 10.)

After you've become experienced in handling the tool rest assembly, backing off the carbide cutter won't be necessary. You'll be able to guide the follower near the pattern without making contact, down to a final gap of about 1/32".

# Operations

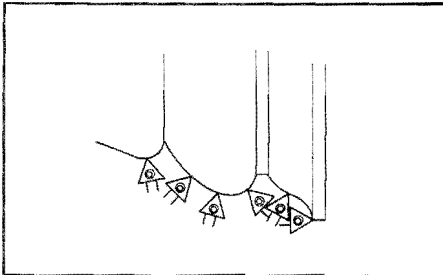


Figure 10. Keep the follower perpendicular to the profile area of the template.

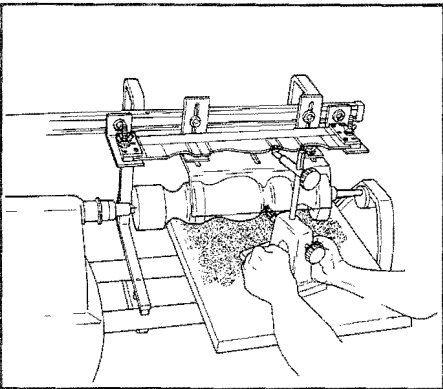


Figure 11. When the follower makes gentle contact with all the large contours of the template, rough shaping is completed.

**8. Rough shape the workpiece.** Move the table and guard to either end of the workpiece. Lock the table. Check that the proper speed has been set, then turn on the Mark V.

Start cutting the larger diameters first, then work on the smaller diameters. Don't force the cutter into the stock. Work it in gradually, using a back and forth motion in one small area at a time. If cutting a V-groove, work into it—don't go straight in.

Turn off the machine, then move the table and guard to the other end if necessary to finish the rough shaping. Brush off the table and tool rest, and check that the workpiece is still mounted securely before turning on the machine again.

When the follower makes gentle contact with all the large contours of the template, rough shaping is completed. (See Figure 11.) Increase the speed dial setting for detail shaping, and then turn off the machine.

**9. Reposition the cutter support.** Loosen the two setscrews (43) which secure the cutter support (58). Then readjust the cutter support flats according to "Cutter Support Alignment" in the **Alignment and Adjustment** section.

## NOTE

If you used a thick carbide cutter for rounding and rough shaping, and you change to a thinner cutter for detail shaping, you'll need to raise the table slightly to center the thinner cutter on the workpiece centerline and lower the follower support to center the follower on the template edge or the original spindle centerline.

**10. Detail shape the workpiece.** Move the table and guard to either end of the workpiece. Lock the table. Check that the proper speed has been set then, turn on the Mark V.

## NOTE

Because detailing cuts are less "aggressive," you'll need to quickly switch attention between the cutter and the follower to maintain uniform spacing between the follower and template and to watch the cutter's action.

Cut in much the same manner as you did in rough shaping, except cut "downhill" when turning the transition from the square of the spindle to a round profile.

When shaping beads and coves, cut in an "uphill" direction. (See Figure 12.)

Turn off the machine, then move the table and guard to the other end to finish the detail shaping. Brush off the table and tool rest, and check that the workpiece is still mounted

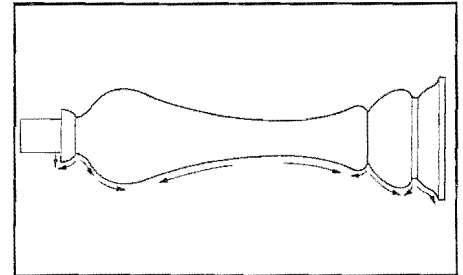


Figure 12. When shaping beads and coves, cut in an "uphill" direction.

securely before turning on the machine again.

When the follower makes contact with all the contours of the template, detail shaping is completed. (See Figure 13.) Turn off the machine and inspect your finished piece.

## Spindle Turning Tips

- To turn a straight cylinder, use a straightedge as your template. Mounting it off center at one end will give you a tapered cylinder.
- If your spindle will have a pin which needs to fit a hole diameter **exactly**, first turn a trial piece. Check the diameter and readjust the template if necessary. Such a piece requires a very precise template setup. Cut beyond the pin length to allow for cutoff.
- If you're using two different cutters for extensive production runs, round off and rough shape all your spindles at one time. Then change cutters to do the detail shaping of all. Or you can use two tool rest assemblies, each set up for a different cutter, to turn out one spindle at a time without cutter changeover delays.
- Do not push the follower against the template. Use a very light touch to follow the template and make final cuts.
- Practice makes perfect. Expect to make some mistakes. Practice on scrap stock before attempting a project with expensive hardwood.

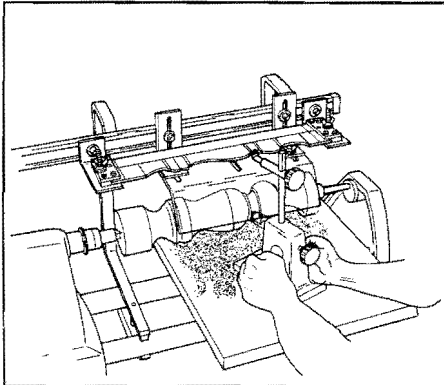


Figure 13. When the follower makes contact with all the contours of the template, detail shaping is completed.

## Faceplate Turning

You can duplicate faceplate turnings by using a flat faceplate template. (See Figure 14.)

Set up for faceplate turning according to the following procedures:

### NOTE

Initial setup of the channel and support bracket assembly was for maximum spindle capacity. For faceplate turning, the left-hand support bracket assembly, the left-hand template support assembly and the headstock must be repositioned. The right-hand support bracket remains in the third hole from the right. The tailstock and right-hand template support assembly are not used.

1. Remove the tailstock assembly to provide an unobstructed area for faceplate turning.
2. Remove the right-hand template support assembly. Loosen screw (11) and remove the right-hand template support assembly.
3. Move the table to the right as far as it will go, then lock it in position.
4. Reposition the left-hand support bracket and the headstock. Use the 5/16" Allen wrench to loosen the left-hand clamp screw (18) enough to

disengage the clamp (16) from the way tubes. Remove the screw (19) and washer (20) attaching the support bracket (15) to the channel (13).

Move the headstock until it almost touches the table, then lock it in place.

Remount the left-hand support bracket in the ninth hole from the right with screw (19) and washer (20). Fingertighten screw (19). Properly align and engage the clamp (16) on the way tubes. Tighten the screw (19) and washer (20) securely, then tighten the clamp screw (18) securely.

## Mounting a Faceplate Workpiece

Mounting a workpiece on the lathe is an extremely important operation. **Improperly mounted stock is dangerous and difficult to turn.** To properly mount a workpiece on the Mark V, follow this procedure:

### WARNING

- If you're turning glued-up stock, make sure the glue joints are strong. Glue the stock and leave it clamped for at least 24 hours prior to turning.
- Make sure the workpiece does not have splits, loose knots, or other defects.
- Always cut the workpiece round using a bandsaw.
- The surface of the workpiece that mounts against the faceplate must be flat and smooth.

### NOTE

If you don't want screw holes in the bottom of your finished project, mount the workpiece to a spacer block, then mount this block to the faceplate. Select a piece of stock at least 1" thick and cut it round about the same diameter as the faceplate you'll be using. Find the center of this spacer block, then glue the block to the workpiece, face-to-face with the centers aligned with each other.

Put a piece of newspaper in between the spacer block and the workpiece when you glue them up—later on, this paper will make it easier for you to use a chisel to part the block from the workpiece. **Leave clamped at least 24 hours.** (See Figure 15.)

1. Find the center of the workpiece. Use a center finder and pencil to mark two or more intersecting lines to locate the center.
2. Mount the workpiece to the faceplate with three #12 x 1-1/4" round head wood screws. Make sure the screws are sunk into the workpiece at least 1" deep. For large, bulky turnings or when mounting a faceplate onto end grain use longer screws.

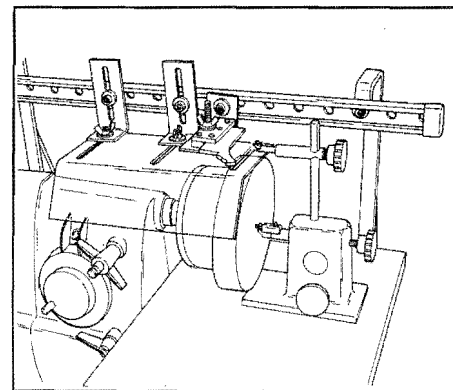


Figure 14. Setup for faceplate turning with a flat template.

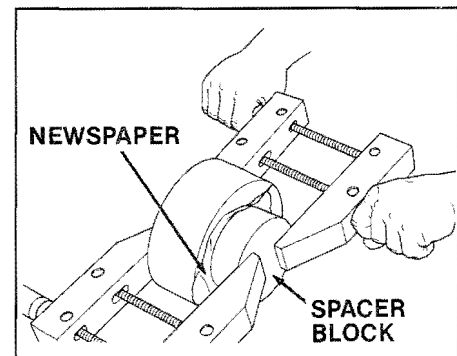


Figure 15. Glue a spacer block to your workpiece.

# Operations

## NOTE

When making extensive production runs, three or four faceplates work better than one. Turn each piece, then sand and finish all together. Or you could use a specialty chuck that's designed for quick mounting and release of the stock.

**3. Set the Mark V at the proper speed** and run it briefly.

**4. Mount the faceplate** (with the workpiece attached) on the main spindle. Extend the quill as needed to provide better access to the back of the workpiece. Lock the quill. Also set the quill depth lock at the maximum depth position for protection in case the quill lock is accidentally loosened.

## Mounting a Faceplate Template

Accurate mounting of your faceplate template is essential to prevent inaccurate diameters or improper positioning of profiles or unwanted tapering. To properly mount a faceplate template, follow this procedure:

**1. Mount the template.** Insert the template between clamp (5) and bracket (9). The end of the template should butt up squarely against the spacer (6). Align the template hole with the centering hole in the template clamp (5). Insert a 1/4" dowel through both holes to align the template exactly. Use the 5/32" Allen wrench to tighten the two setscrews (4), clamping in the template securely.

**2. Adjust the left-hand template support assembly.** Loosen screw (11), then move the assembly until the end line marked on the template is directly over the end of the workpiece. With the top of the template support bracket parallel to the channel, tighten the screw (11) securely.

## Duplicating a Faceplate Turning

Duplicate a faceplate turning according to the following procedures:

## WARNING

- Keep the guard in place whenever you're performing turning operations.
- Do not exceed recommended speeds.
- Periodically turn off the Mark V and check that the workpiece remains securely mounted.
- Do not allow the cutter to come in contact with parts of the duplicator or Mark V.

**1. Position the guard assembly.** Attach the right-hand bracket (29) to the middle slot of the guard. Place the tool rest assembly on the table. Then adjust the guard to be as close as possible to the workpiece without interfering with the rotation of the workpiece or the movement of the tool rest assembly underneath it.

**2. Make a five-point check.** Headstock, carriage, table height, quill, quill depth locks must be secure.

**3. Adjust the height of the follower.** The follower should be positioned so it's at the center of the template edge. If adjustment is required, loosen the follower adjusting knob (44) and lower or raise the follower support. Retighten the knob securely. Wiggle the follower as the knob is being tightened to properly seat it.

**4. Develop a firm grip on the tool rest assembly.** Depending on your hand size, you may find it necessary to grip each knob with all five fingers or to grip each knob with four fingers with your thumbs wrapped around the back of the tool rest.

## WARNING

When gripping the tool rest assembly, do not extend your fingers beyond the front face of the base.

**5. Round off the workpiece.** Check that the proper speed has been set, then turn on the Mark V. Roughly round off the outside edges of the workpiece by cutting small areas at a time. When each small area becomes round, you will feel less vibration

and hear a change in the noise level. After the outside edge is rounded, straighten the face.

Increase the speed dial setting from rounding to shaping, and then turn off the machine.

**6. Offset the carbide cutter** according to Step 7 of "Duplicating a Spindle."

**7. Rough shape the outside profile first.** (See Figure 16.) Turn the outside profile first. Cut your beads and coves "uphill" in the same manner as you would for spindle turning.

When the follower makes gentle contact with all the large contours of the template, rough shaping of the outside profile is completed. Turn off the machine.

**8. Rough shape the inside profile.** If you're using a dual-centerline template for a thin-walled bowl or cup, re-center the template for the inside profile. If using two separate templates, change to the inside profile template.

## WARNING

- Before you turn on the Mark V, place the cutter against the workpiece and turn the workpiece by hand. The workpiece MUST NOT contact the tool rest base.
- Cut only on the downward motion side of the workpiece.

Work on the inside profile from the tailstock end. (See Figure 17.) When the inside profile is rough shaped, turn off the machine.

**9. Reposition the cutter support** according to Step 9 of "Duplicating a Spindle."

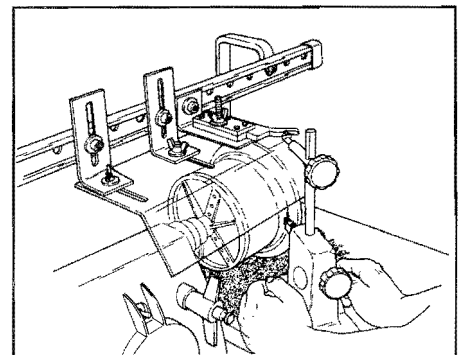


Figure 16. Rough shape the outside profile first.

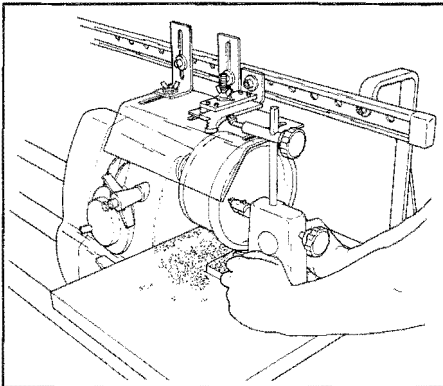


Figure 17. Rough shape the inside profile from the tailstock end.

**10. Detail shape the workpiece.** Check that the proper speed has been set, then turn on the Mark V. Cut in much the same manner as you did in rough shaping, except cut “downhill” when shaping from the top of a sharp shoulder to a round profile.

When both profiles have been detailed, turn off the machine and inspect your finished piece.

## Freehand Turning

You can perform freehand spindle and faceplate turning using the tool rest assembly. No template is required. Set up basically the same as for duplicating. Since you are not using a template, remove the template support assemblies from the channel, and the follower support and upright from the tool rest assembly. Keep the channel and support bracket assembly, table and table support assembly, and the guard assembly in place. To freehand turn, follow the applicable procedures in “Duplicating a Spindle” and “Duplicating a Faceplate.”

## Sanding and Finishing

It's much easier to sand and finish a spindle or faceplate turning on the lathe than it is to remove it and hand sand or finish it. Place a cloth over the way tubes to protect them from grit and finish.

### WARNING

- Remove ALL Lathe Duplicator components before sanding and finishing a turning on the lathe.
- Never use a rag with frayed edges and never wrap sandpaper, steel wool or a rag around a turning when sanding and finishing. Your fingers could be pulled in between them and the rotating turning.

## Sanding

**1. Make your sandpaper convenient and safe to use.** For each grit to be used, fold and tear an 8-1/2" x 11" sandpaper sheet into quarters. Then fold each quarter piece longways into thirds. This convenient size is rigid but will bend to the shape of the turning and its thickness will protect your fingers from heat build-up and paper wear-through. Each piece provides three working surfaces and twelve edges to sand in sharp profile areas.

**2. Sand the turning.** Turn on the Mark V and slightly increase the speed according to the speed chart. Starting with new coarse sandpaper (100 grit), begin to sand the turning using light pressure. Next, go over the piece again with old (used) 100 grit sandpaper.

Finish off the sanding with new fine sandpaper (150 grit) and then old (used) 150 grit sandpaper.

To achieve a smoother surface or to lessen sanding time, dismount the spindle, turn it end-for end and sand it in the opposite direction. When remounting the spindle be sure to put enough pressure on the quill to engage both the drive center and the tailstock center.

To reverse the rotation of a faceplate turning, mount the faceplate and turning on the auxiliary spindle of the Mark V.

Repeat the sanding process until the workpiece is the desired smoothness.

### NOTE

If sanding open grain wood such as walnut or oak, wet the wood slightly between sandpaper changes to raise the grain. Allow a few minutes for the water to dry before continuing the sanding.

## Finishing

### WARNING

If you're finishing a turning that will be used to hold food products, select a NON-TOXIC natural oil finish. DO NOT mix in a stain.

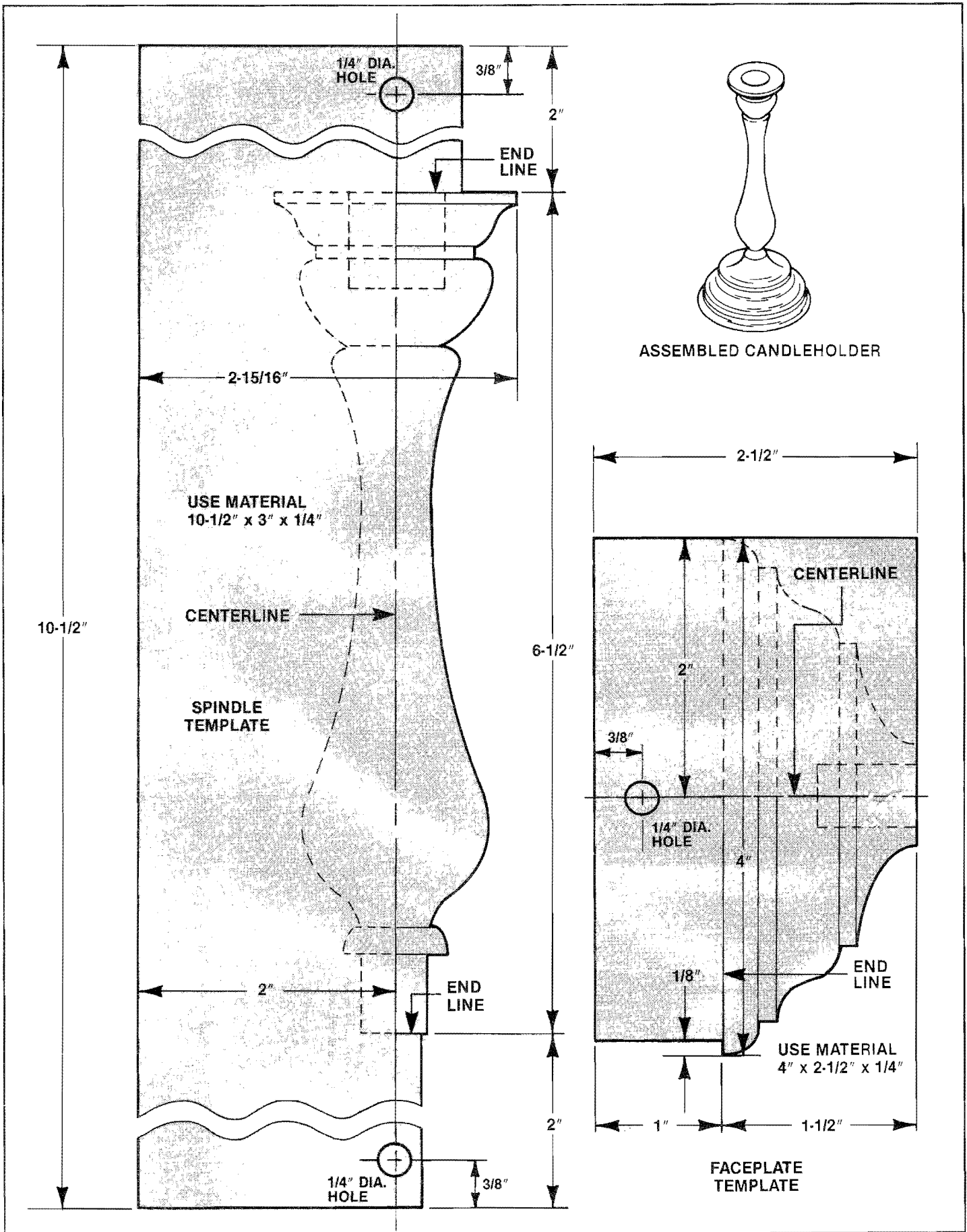
### NOTE

- Use a very low speed when applying finish to your turning to prevent the finish from being thrown all over.
- Don't use a polyurethane finish for the technique below because it will dry too quickly to be workable.
- If your turning has areas to be glued to another part of your project, mask these areas with masking tape.

**1. Apply the finish.** Select a natural oil finish or prepare an oil finish with a stain mixed in. Soak a rag and a piece of slightly used fine wet/dry sandpaper in the finish. Turn on the Mark V. Use the rag to apply the finish to the turning. Then sand the finish. Repeat, adding more finish until a mixture of sanding dust and finish appears over the entire turning. Rub this paste with your hands and let it set for a minute or two until it becomes sticky. Then buff the turning and let it dry. Apply additional coats of finish, but do not sand.

### NOTE

This procedure is much like going to the next finer grit sandpaper as the sanding dust in the mixture further polishes your turning while the oil-saturated sawdust fills in and seals the grain.





## The Candleholder

Now that you've performed the **Assembly and Setup** and the **Alignment and Adjustment** procedures and read the **Operations** section, you may want to make this practice project. You'll learn how to set up the duplicator, make templates and perform both spindle and faceplate turning.

The following procedures assume that you've assembled, set up, aligned and adjusted the duplicator accurately, and read the **Operations** section thoroughly. Also that the Mark V is set up and aligned properly. All of this is critical for exact duplication.

### Preparation

**1. Make the templates.** Refer to the **Templates** section.

**2. Prepare the stock.** Refer to "Stock Selection and Preparation."

For the spindle workpiece, use stock 2" x 2" x 7". This is 1/2" longer than the finished spindle in order to keep the cutter from hitting the drive center and to face off the tailstock end of the turning. Use the bandsaw to cut the stock into an octagon.

For the faceplate workpiece, use stock 1-3/4" x 4-3/8" x 4-3/8". Use the bandsaw to cut the stock to 4-1/4" diameter. Use a 3/16" bit to drill the mounting holes for the 3-3/4" faceplate. Then, use 1-1/4" long, #12 screws to mount the stock through the three inner holes in the faceplate.

### Turning the Spindle

**1. Set up the duplicator** for spindle turning according to the following procedures. (See Figure 18.)

- Mount the channel support brackets in the 3rd and 9th hole from the right-hand end of the channel.
- Mount the template support assemblies just to the right of both channel support brackets.
- Mount both of the guard brackets in between the left template support

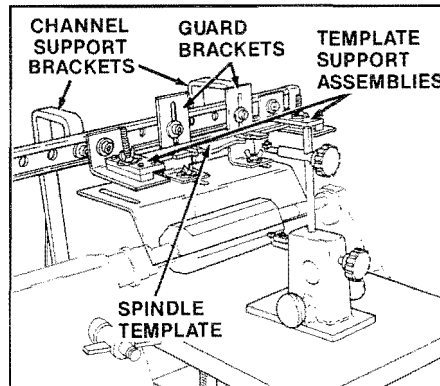


Figure 18. Spindle Setup.

assembly and the right channel support bracket.

**d.** Attach the guard to the brackets using the center and the right mounting slots.

**2. Mount the workpiece.** Refer to "Mounting a Spindle Workpiece."

**3. Mount the template.** Refer to "Mounting a Spindle Template." Align the template over the stock.

**4. Turn the spindle.** Refer to "Duplicating a Spindle." During rough shaping, be sure to check for the exact diameter of the pin according to the following procedures.

- Turn a cylinder at the pin position. Turn off the Mark V.
- Position the point of the cutter against the cylinder and the follower pointing at the template.
- Measure the distance from the tip of the follower to the template centerline. Double this measurement. Then measure the diameter of the cylinder. Both measurements should be the same. If the cylinder diameter is larger than the centerline measurement, move the template back. If smaller, move the template forward.

### Turning the Faceplate

**1. Set up the duplicator** for faceplate turning according to the following procedures: (See Figure 19.)

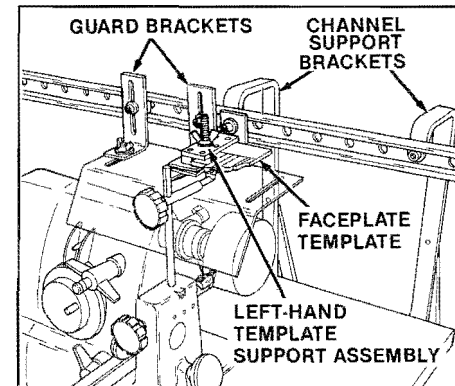


Figure 19. Faceplate Setup.

**a.** Remove the tailstock and tailstock center from the Mark V and the right-hand template support assembly from the channel.

**b.** Mount both guard brackets to the left of the left-hand channel support bracket.

**c.** Attach the guard to the guard brackets using the left and center mounting slots.

**2. Mount the workpiece.** Refer to "Mounting a Faceplate Workpiece."

**3. Mount the template.** Refer to "Mounting a Faceplate Template." Extend the quill approximately 1-1/8" to properly align the workpiece under the template. Use the tool rest assembly to align the bottom left side of the workpiece with the left side profile of the template.

**4. Turn the faceplate.** Refer to "Duplicating a Faceplate Turning." After detail shaping, use the tailstock chuck arbor with the drill chuck and a 1/2" bit to drill the 3/4" deep spindle pin hole.

### Sand, Finish, and Assemble

**1. Sand and finish** the spindle and faceplate turnings on the lathe. Refer to "Sanding and Finishing."

**2. Glue the spindle** in the base. Let glue dry at least 24 hours, then use the drill press to drill the 3/4" dia. x 3/4" deep hole in the top of the spindle.

# Maintenance

## Caring for the Lathe Duplicator

Your Shopsmith Lathe Duplicator is designed to deliver years of reliable service with a minimum of maintenance. Like other tools, its components will function better and safer if you maintain them properly.

## Cleaning

As you work, sawdust, wood chips, shavings, pitch and resin will accumulate on the duplicator components and this residue can affect your projects.

As needed, clean the duplicator components with your shop vacuum. Use the brush and crevice tool attachments.

Also, remove pitch and resin from the table and guard with a mild soap and water solution.

## Waxing

Every 6 months, after a thorough cleaning of the duplicator components, sparingly apply floor or furniture paste wax on the table posts. Buff the wax thoroughly, then 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.
- Do not allow paste wax to get on any plastic part. Some waxes will react negatively with plastic.

## Cutters

### WARNING

The cutters are solid carbide and will stay sharp for a long period of time. In the event that the cutters dull, DO NOT attempt to regrind them. 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. They are economically priced.

## Storage

Store the Lathe Duplicator components away from unusually humid or corrosive conditions. By loosening the support bracket screws, the channel and support bracket assembly (with the template support and guard assemblies attached) can be folded into a relatively flat unit for storage such as hanging it from two suitable wall hooks. (See Figure 1.)

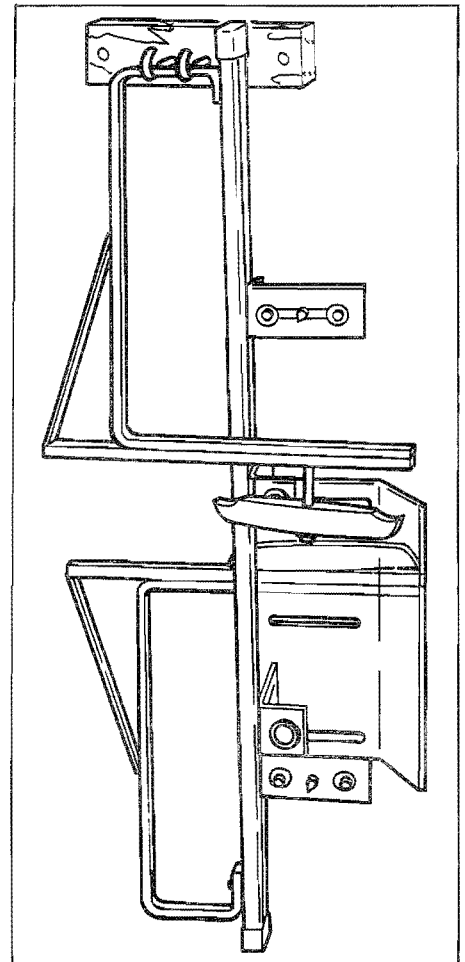


Figure 1. The channel and support bracket assembly (with template support and guard assemblies attached) can be folded and hung on a wall.

## Troubleshooting Guide

Lathe Duplicator problems usually have simple solutions—under normal use, you should rarely have to service a component. Most problems can be corrected by maintenance, alignment, adjustment, or a change in work habits.

To help diagnose and remedy any problem that may arise when using your Shopsmith Lathe Duplicator, use this guide:

Problem	Possible Cause	Solution
Quality of cut is poor (rough or torn surface).	Cutter is above centerline of workpiece.	Lower table to bring cutter down to centerline; or down to 1/16" maximum below centerline for certain types of wood.
	Lathe speed too low.	Check speed chart and increase speed.
	Cutter is dull.	Replace the cutter.
	Cutting too aggressively.	Use lighter touch.
Inexact diameters.	Improper alignment of lathe centers to template centers or follower to cutter.	Check alignment and adjust if required.
	Wrong follower used.	Change to follower with same shape as cutter.
	Way tube clamp not positioned correctly.	Check that recessed ends of both clamps engage way tubes properly. Reposition if required.
	Alignment was not checked when remounting duplicator.	Check alignment and adjust if required.
Good cut on one end of turning but poor cut on other end.	Lathe centers not parallel to table.	Check table to lathe centers parallelism. Align if required.
	Way tube clamp not positioned correctly.	Check that recessed ends of both clamps engage way tubes properly. Reposition if required.
Tapered cut.	Template not centered properly or centerline not drawn squarely on template.	Straighten template on centers or redraw centerline on template.
	Way tube clamp not positioned correctly.	Check that recessed ends of both clamps engage way tubes properly. Reposition if required.
Excessive vibration (whip and chatter) when turning thin spindles.	Cutter is below centerline of workpiece.	Raise table so that cutter is on centerline.
	Cutting too aggressively.	Use lighter touch.
Excessive vibration when turning larger spindles or bowls.	Workpiece centers located wrong or wood is unbalanced.	Check for proper centers and balance. Relocate center(s) or cut off stock until workpiece is balanced.

# Parts List

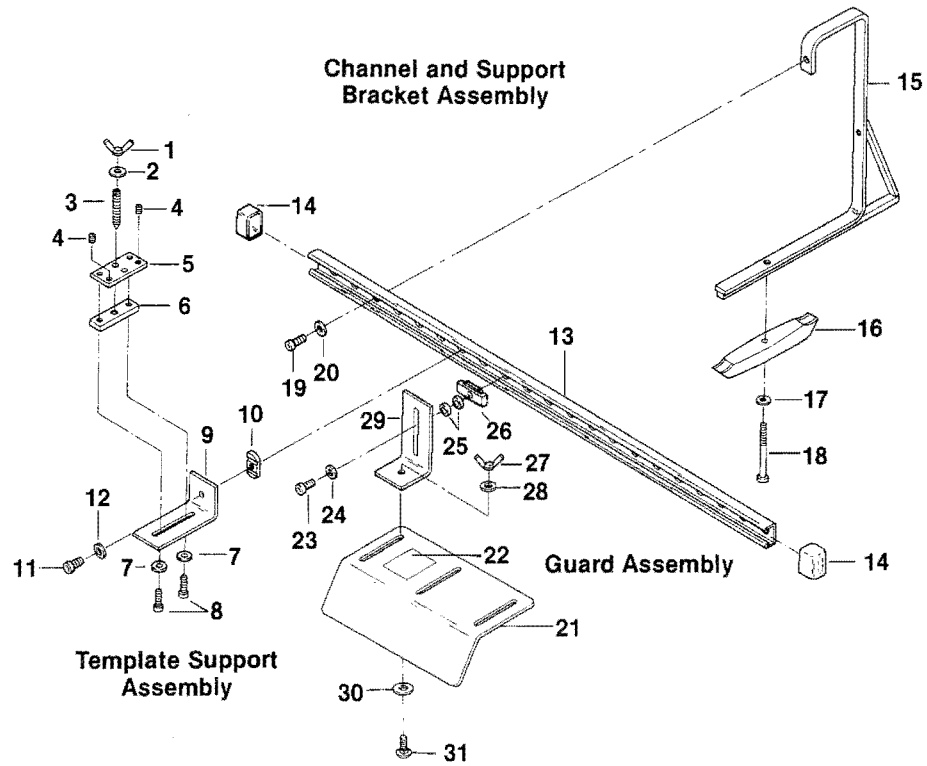
## Parts List for the Shopsmith Lathe Duplicator—555209

This is a list of replacement parts for the Shopsmith Lathe Duplicator. When you need parts, you can order either the individual parts or the entire assembly, depending on your needs. Call Customer Services for price information and to place your order.

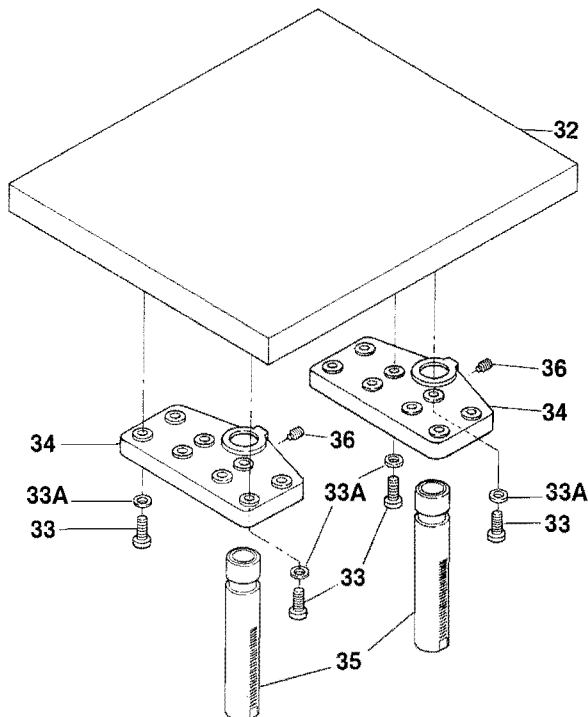
Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
—	514716	Template Support Assembly (Incl. 1-8)		35	513904	Table Post	2
1	513600	. Wing Nut, 3/8"-16	2	36	514748	Setscrew, 5/16"-18 x 1/2"	2
2	120394	. Flat Washer, 3/8"	2	37	514713	Tool Rest Base Assembly (Incl. 38-43)	1
3	514747	. Template Center, 3/8"-16 x 3" Slot Head Screw	2	38	513808	. Label	2
4	514748	. Setscrew, 5/16"-18 x 1/2"	4	39	514698	. Tool Rest Foot (Incl. pressure sensitive adhesive)	1
5	514706	. Template Clamp	2	40	514746	. Cup Point Setscrew, 5/16"-18 x 1"	2
6	514705	. Template Spacer	2	41	514748	. Setscrew, 5/16"-18 x 1/2"	1
7	120393	. Flat Washer, 5/16"	4	42	139367	. Setscrew, 5/16"-18 x 1/4"	1
8	514745	. Socket Head Cap Screw, 5/16"-18 x 1"	4	43	514748	. Setscrew, 5/16"-18 x 1/2"	2
9	514708	Bracket	2	44	514740-01	Follower Adjusting Knob	1
10	514702	Channel Nut, 3/8"-16	2	45	514746	Cup Point Setscrew, 5/16"-18 x 1"	1
11	514744	Socket Head Cap Screw, 3/8"-16 x 7/8"	2	46	514707	Follower Support	1
12	120394	Flat Washer, 3/8"	2	47	514742	Socket Head Cap Screw, #6-32 x 3/8"	1
13	514715	Channel Assembly (Incl. 14)	1	48	514750	Flat Washer, #6	1
14	514701	. Cap	2	49	514699	Followers (Set of 4 shapes)	1
15	514712	Support Bracket	2	50	514709	Follower Upright	1
16	513356	Clamp	2	51	514740-02	Cutter Adjusting Knob with Stud	1
17	120394	Flat Washer, 3/8"	2	52	514238	Handle	2
18	514743	Socket Head Cap Screw, 3/8"-16 x 3-3/4"	2	53	514742	Socket Head Cap Screw, #6-32 x 3/8"	1
19	514744	Socket Head Cap Screw, 3/8"-16 x 7/8"	2	54	514750	Flat Washer, #6	1
20	120394	Flat Washer, 3/8"	2	55	514719	Cutter Guide	1
21	514777	Guard (Incl. 22)	1	56	514742	Socket Head Cap Screw, #6-32 x 3/8"	1
22	514776	. Label	1	57	555211	Triangle Carbide Cutter, 60°	1
23	514744	Socket Head Cap Screw, 3/8"-16 x 7/8"	2	58	514710	Cutter Support	1
24	120394	Flat Washer, 3/8"	2	59	514704	Spacer, 1-1/2" Long	1
25	501633	Special Washer, 3/8"	4	*	513686-06	Allen Wrench, 1/4" Short	1
26	514491	T-Nut, 3/8"-16	2	*	513686-08	Allen Wrench, 5/16" Long	1
27	513600	Wing Nut, 3/8"-16	2	*	513686-09	Allen Wrench, 7/64" Long	1
28	120394	Flat Washer, 3/8"	2	*	PL-5117	Lathe Duplicator Owners Manual	1
29	514708	Bracket	2	*	501359	Mark V Warning Label	1
30	120396	Flat Washer, 1/2"	2	*	513104	Mark V Caution Label	1
31	514749	Carriage Bolt, 3/8"-16 x 1"	2	*	514427	Mark V Lathe Speed Label	1
32	514763	Table Assembly (Incl. 33, 33A)	1	<b>Optional Accessories</b>			
33	514744	. Socket Head Cap Screw, 3/8"-16 x 7/8"	4	—	555210	Round Carbide Cutter, 1/2"	
33A	120394	. Flat Washer, 3/8"	4	—	555212	Square Carbide Cutter, 3/8"	
34	514697	Table Support	2	—	555213	Diamond Carbide Cutter, 35°	
				—	505602	Tailstock Live Center	

\*Included with Lathe Duplicator, but not shown.

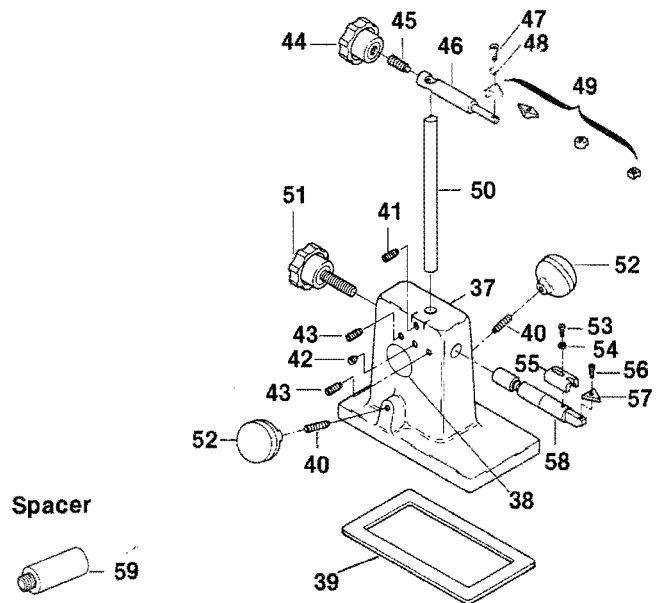
# Parts List



**Table and Table Support Assembly**



**Tool Rest Assembly**





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## Serving Your Needs

Your Shopsmith equipment is covered by the **Shopsmith Gold Medal Buyer Protection Plan**. This plan includes a 30-day money-back guarantee, a full one-year warranty, and a lifetime reconditioning program.

## 30-Day Money-Back Guarantee

We guarantee your complete satisfaction! You can try the equipment for 30 days at no risk before you decide whether to keep it or not. Use it to make as many projects as you like. Compare it, feature for feature, with other equipment. Then, if the equipment isn't everything we say, call Customer Services and we'll advise you how to return it for a prompt and complete refund. We'll even pay for shipping.

## Full One-Year Warranty

Your equipment is guaranteed against all defects in parts and workmanship for ONE FULL YEAR from the date of receipt. Here are the details:

Shopsmith warrants to the owner of Shopsmith woodworking equipment that the equipment will be free of manufacturing defects in materials and workmanship for a period of one year from the date of receipt. All claims must be submitted in writing within one month after expiration of the one-year warranty period. Shopsmith shall, by repair of, or at its option replacement, remedy any defect or malfunction covered by this warranty. This warranty excludes and does not cover defects, malfunctions, or failures of your Shopsmith equipment which are caused by damage while in your possession or that of a previous owner or by unreasonable use, including your failure or the failure of any previous owner to provide reasonable and necessary maintenance.

Personal injury or property damage may result if equipment is interchanged with non-Shopsmith brand equipment. Therefore, Shopsmith, Inc. disclaims all liability and excludes all warranties of merchantability and fitness for a particular purpose if this equipment is used with a non-Shopsmith brand unit.

THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IN NO EVENT SHALL SHOPSMITH BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES. Some states do not allow the exclusion or limitation of consequential or incidental damages, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

## Lifetime Reconditioning Program

Our equipment is designed for years of constant, rugged, uninterrupted operation. However, to insure the continued usefulness of your unit, we offer a unique Lifetime Reconditioning Program.

At any time, regardless of the age of your equipment, you can send it to us (round trip shipping at owner's expense), and we'll rebuild it and touch up the paint. We'll replace wearing parts such as bearings, seals, and belts. Your reconditioned equipment will come back to you with a new 90-day full warranty. Reconditioning or repair will be done for a cost that will not exceed one-third of the current list price of the equipment at the time of repair. If parts other than normal wearing parts need replacement, an estimate will be submitted to the owner for approval.

## Warranted Service

To repair or replace a part in the equipment while it's still under warranty, call Customer Services.

Depending on the part you need or the type of repair, you may be able to replace or repair it yourself. If you are unable to do the repair yourself, Customer Services will instruct you where to send the part or your equipment. If the warranty is applicable, the part will be repaired at no charge.

## Out-of-Warranty Service

If your equipment is out of warranty and needs service, call Customer Services for instructions on how you can have the part repaired at our Factory or Store for a fee. Customer Services will help you diagnose the problem, give you an estimate of the

cost, and instruct you where to send the part or equipment for repair.

Shopsmith Stores carry a limited number of replacement parts and can perform some repairs. Call ahead to see if they can provide the part or the service you need.

## How to Order Parts

To order replacement parts, first consult the **Parts List**. Then write or call for current price information.

## How to Return Parts

Should you need to return the equipment, call Customer Services for packing and shipping information.

## Customer Services

**Where to Write**—Send inquiries to:  
**Shopsmith, Inc.**  
**Customer Services**  
**3931 Image Drive**  
**Dayton, Ohio 45414**

**Where to Phone**—Shopsmith maintains toll-free telephone numbers during normal business hours.

**For service call:**  
**1-800-762-7555** (Continental U.S., Hawaii, Alaska, Puerto Rico and U.S. Virgin Islands)  
**1-513-898-6070** (Dayton OH area and Canada)

**To place an order call:**  
**1-800-543-7586** (Continental U.S., Hawaii, Alaska, Puerto Rico and U.S. Virgin Islands)  
**1-513-898-6070** (Dayton OH area and Canada)

When you write or call, tell us your **Customer Number** and the **Date Code** of your equipment. (Your customer number appears on the invoice and the mailing labels of the literature we send you. The date code is stamped on the equipment.) Please write the numbers in the space provided here.

**Customer No.** \_\_\_\_\_

**Date Code** \_\_\_\_\_

## Shopsmith Inc.

3931 Image Drive  
Dayton, Ohio 45414

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Patents pending on the design of the  
Shopsmith Lathe Duplicator.

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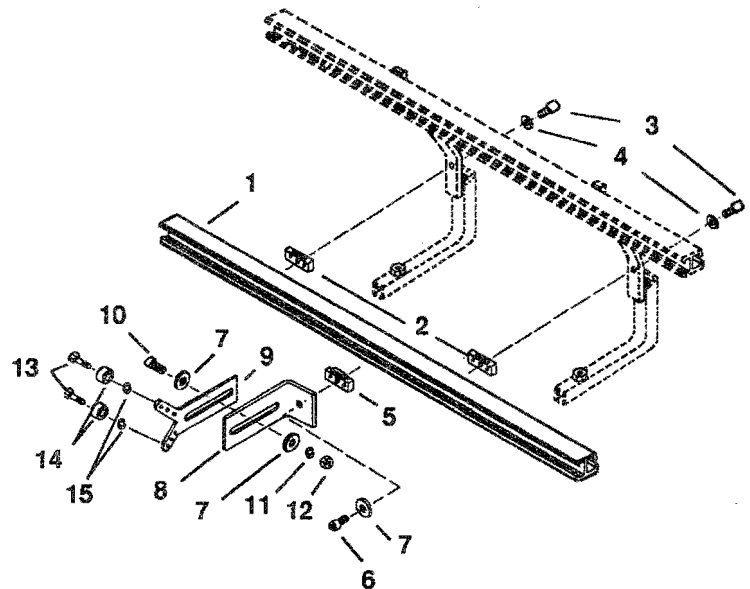




# Steady Rest for the Lathe Duplicator

## PARTS LIST

Ref. No.	Part No.	Description	Qty.
1	517938	Channel	1
2	515542	T-Nut, 1/4-20	2
3	513201	Socket Head Cap Screw, 1/4"-20 x 3/4", black finish	2
4	502333	Flat Washer, 1/4"	2
5	514491	T-Nut, 3/8"-16	1
6	514940	Socket Head Cap Screw, 3/8"-16 x 5/8"	1
7	120394	Flat Washer, 3/8"	3
8	514708	Bracket	1
9	515281	Y-Support Bracket	1
10	514744	Socket Head Cap Screw, 3/8"-16 x 7/8"	1
11	120382	Lock Washer, 3/8"	1
12	120377	Hex Nut, 3/8"-16	1
13	515282	Shoulder Screw	2
14	514007	Ball Bearing	2
15	120380	Lock Washer	2



The Lathe Steady Rest attaches to the Shopsmith Lathe Duplicator. It reduces "whip" and vibration of a spindle as it rotates against a lathe chisel. The result is a safer and smoother cut. Use the Steady Rest with spindle stock measuring from 3/16" to 3-1/2" in diameter. Follow the instructions below:

### Tools Required:

- 5/16" Allen wrench
- 3/8" wrench

### INSTALL THE CHANNEL

1. Set up your Lathe Duplicator according to its instruction manual.

2. Slide a T-nut (2) into the channel (1). Attach the T-nut to the Lathe Duplicator's support bracket with a black cap screw (3) and flat washer (4), as demonstrated in Fig. 1. Do the same for the other side of the channel. When attached, the Lathe Duplicator should look like Fig. 2.

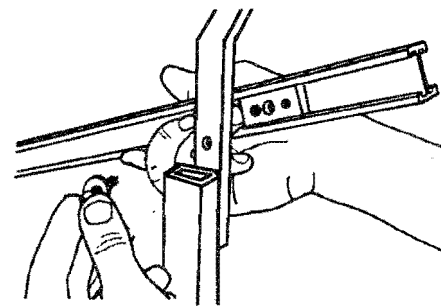


Fig. 1

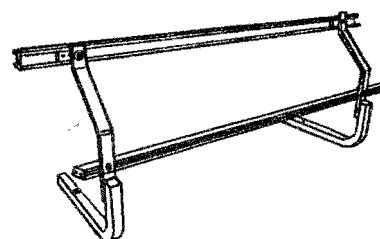


Fig. 2

### ATTACH THE BRACKET

3. Place a 3/8" washer (7) on a 5/8" long cap screw (6). Thread the screw through the bracket (8) and into the 3/8" T-nut (5), as seen in Fig. 3. Do not tighten yet.

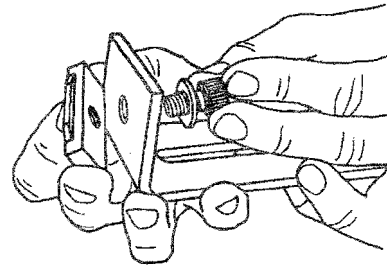


Fig. 3

4. Slide the T-Nut into the front side of the channel, as shown in Fig. 4. Make sure the bracket's slotted side faces to the left.

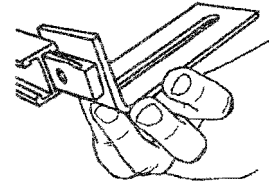


Fig. 4

### ATTACH THE Y-SUPPORT BRACKET

5. See Fig. 5. Place a flat washer (7) on a 7/8" long cap screw (10) and insert the screw through the Y-support (9) and the bracket (8). Attach it with a flat washer (7), lock washer (11) and a hex nut (12).

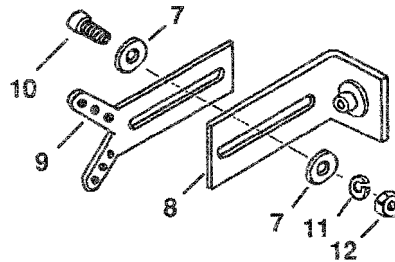


Fig. 5

6. Thread shoulder screws (13) through ball bearings (14) and lock washers (15), then into the Y-bracket support (9), as illustrated in Fig. 6.

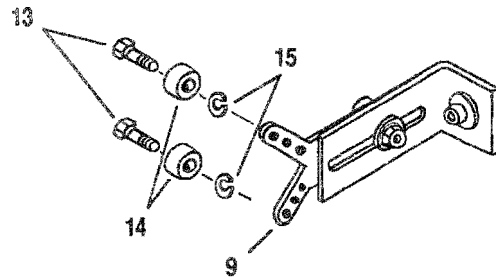


Fig. 6

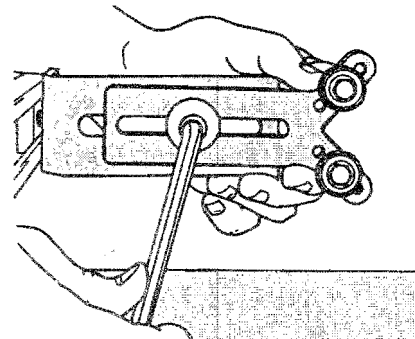


Fig. 7

# Operations

## WARNING

- Follow all the information in the your Mark V and Lathe Duplicator instruction manuals when you use the Steady Rest.
- Do not mount the Steady Rest to the channel until after the spindle stock has already been rounded.
- The lathe turning speed must be set at "Slow" before positioning the Steady Rest bearings against the stock.
- When turning thin spindle stock, do not place the Steady Rest so that the support bearings press against and bend the stock. If the stock is bent, it could snap and be thrown from the lathe. Also, if the stock is bent, the final profile of the spindle will be reduced in diameter.
- Remove the Steady Rest from the channel before you start to turn additional spindles.
- Before sanding the spindle on the lathe, remove from the Mark V the Lathe Duplicator with the Steady Rest channel attached.
- Maximum diameter of a spindle used with the Steady Rest is 3-1/2".

### ***Follow these instructions each time you use the Steady Rest with the Lathe Duplicator:***

1. Prepare the spindle stock according to the Lathe Duplicator instruction manual. Round the stock into a cylinder. Shape the largest diameter profile nearest the center of the stock. The largest diameter profile must be as smooth as possible because this is where the bearings will contact the spindle. Any rough spots will cause the stock to vibrate against the Steady Rest and will affect the quality of the cut.
2. Turn the Mark V speed to "Slow." Then turn off and unplug the Mark V.
3. Install the Steady Rest on its channel (1). Position the Steady Rest's bearings at the turned profile on the stock, then use a 5/16" Allen wrench to tighten down the bracket (8) in the channel, as illustrated in Fig. 8.

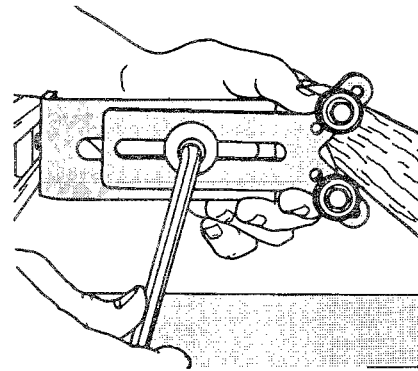
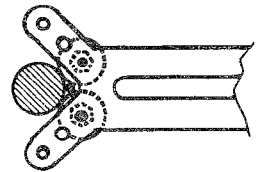


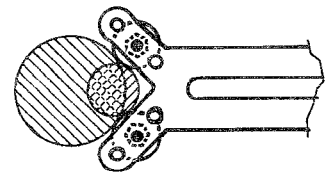
Fig. 8

### DIAMETER RANGE FOR EACH SET OF HOLES

3/16" to 1"



1" to 2"



2" to 3-1/2"

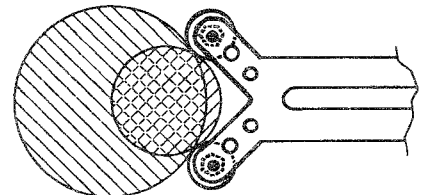


Fig. 9

4. Adjust the bearings to fit the diameter of the spindle stock. See Fig. 9 (above) for which holes to use for the size spindle. Apply light pressure against the stock, then use the 5/16" Allen wrench to tighten the cap screw (10) attaching the Y-support to the bracket (8).

5. Test the setting of the bearings by plugging in the Mark V (with the speed dial still set at "Slow,") and quickly turn the Mark V on, then off. Check the spindle. If the corners of the bearings are marking the stock, loosen the Y-support's cap screw (10) and re-adjust the bearings against spindle. Repeat this step to re-check, until the bearings do not mark the spindle. However, a slight polishing of the stock will happen where the bearings roll against it. This is normal. The polished surface will be removed during sanding.

**6. Turn on the Mark V and set it at the proper speed** referred to in the Lathe Turning Speed Chart, found in both the Mark V and Lathe Duplicator instruction manual.

**7. Perform normal operations with the Lathe Duplicator and Steady Rest, as demonstrated in Fig. 10.** Shape the profile of the spindle. When turning long spindles, keep the Steady Rest at its original position and reposition the Lathe Duplicator table and the tool rest, as needed. There are exceptions to this guideline, especially for long, very small diameter stock— then it may be necessary to reposition the Steady Rest bearings along the spindle as it is turned.

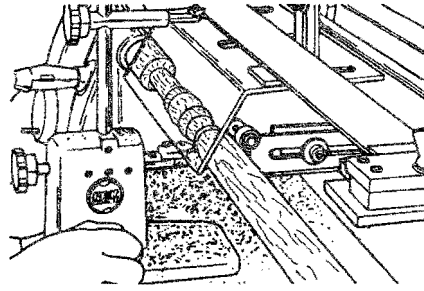


Fig. 10

**8. After completing the spindle, turn the speed dial to "Slow" and turn off the Mark V.**

**9. Use the 5/16" Allen wrench to loosen the bracket and remove the Steady Rest from its channel.** (Leave the channel permanently attached to the Lathe Duplicator.)

**10. Continue sanding and finishing the spindle.**



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**Note:** If you have further questions or need help, visit the Shopsmith or Woodworking Unlimited store in your area, or call Customer Services: Toll Free 1-800-762-7555. (In Canada, 1-416-858-2400.)

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