

Alignment and Adjustment (Model 500)

Alignment and Adjustment

WARNING

Turn off and unplug the Mark V before performing any ALIGNMENT AND ADJUSTMENT procedure.

During Initial Setup, complete ALL of these procedures—and then re-check them at regular intervals.

You **MUST** use an accurate combination square for alignment and adjustment. To check that your square is accurate, select a board with at least one straight and true edge. Place the square against the good edge and draw a line across the width. Flop 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.

All the parts and accessories that support or guide the stock **MUST** be aligned either parallel with or perpendicular to the main spindle's plane of rotation. **During alignment and adjustment the sanding disc will represent the main spindle's plane of rotation.**

1. Prepare the sanding disc. In order for the sanding disc to accurately represent the main spindle's plane of rotation, you must first locate and mark the disc high spot. **Avoid** this high spot when performing the alignment and adjustment procedures.

NOTE

If your disc has the Velcro® system, use a saw blade instead of the disc. Follow the procedures just as you would for the disc. Do not position the square against the blade tips. This would result in improper alignment.

a. Clean the disc surface thoroughly with mineral spirits or turpentine. (If sandpaper is mounted, remove it.)

b. With the Mark V in the horizontal position, mount the sanding disc on the main spindle. Loosen the table tilt lock and position the table at '0'. Tighten the table tilt lock. Position the table 1" away from the disc. Adjust the table height so that half the disc is above the table surface.

c. Place the 5/32" Allen wrench on the table so that the long end contacts the outside edge of the disc. Hold the wrench down on the table with your right hand. As the disc turns, the high spot will gently push the wrench to the right. After 2-3 revolutions the wrench will position itself to touch the high spot only. (See Figure 1.)

NOTE

If the disc pulls away from the wrench more than 1/32" at any point, do not use the disc for checking alignment. Use a saw blade or another disc.

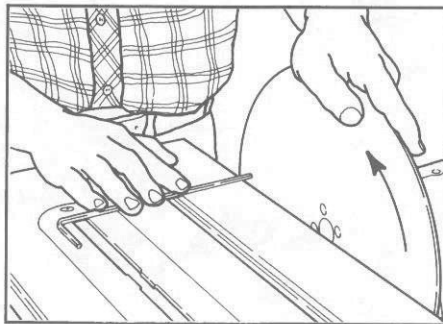


Figure 1. Finding the disc high spot.

d. Mark the high spot with an 'X' using a light-colored grease pencil. Draw a line from the high spot through the center to the opposite side. (See Figure 2.) Remove the disc from the spindle and set it aside.

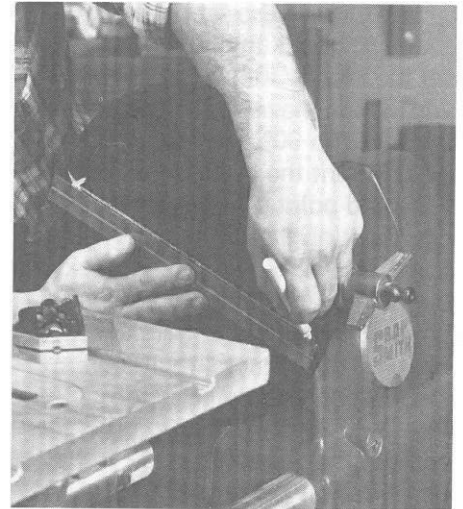


Figure 2. Marking the high spot.

2. Adjust the headrest lock. To check the headrest lock, grasp the way tubes near the way tube tie bar and pull up. If there is 'give' in the lock, unlock the handle and turn the shaft **clockwise** with a screwdriver. (See Figure 3.) If the lock is difficult to operate, the shaft is too tight. To loosen, unlock the handle and turn the shaft **counterclockwise**.

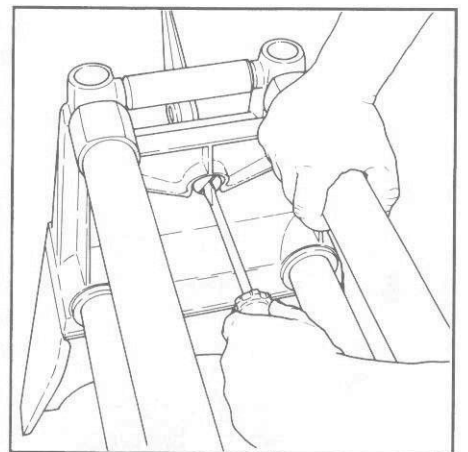


Figure 3. Adjusting the headrest lock.

3. Set the worktable positive stops. Stop bolts in the table and screws in the trunnion work with a plunger to act as positive stops to help you quickly adjust the table to **90° left**, **45° right** and **'0'**.

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a. Remove the table insert.

b. To check the **90° left stops**, set the Mark V in the vertical position and loosen the table tilt lock. Position the table to 90° and lock the tilt lock. Mount the drill chuck and a 1/2" brad-point bit on the main spindle. Position the bit above the table opening. Use the quill feed to extend the bit 1/2" into the table opening. Set a combination square against the bit. The square should contact the bit along its entire length. (See Figure 4.) Also, both stop bolts must contact their support tubes. If they don't, adjust the stops.

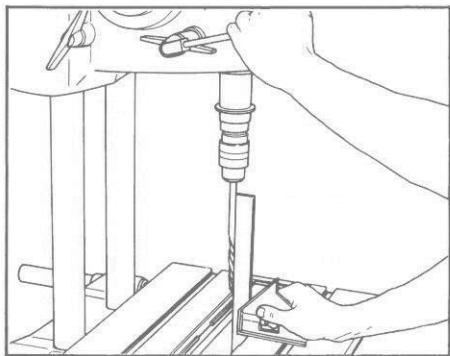


Figure 4. Checking the 90° left stops.

To **adjust** the 90° left stops, loosen the table tilt lock and tilt the table so that you can reach the stop bolts. Back out or turn in the two stops as needed. (See Figure 5.)

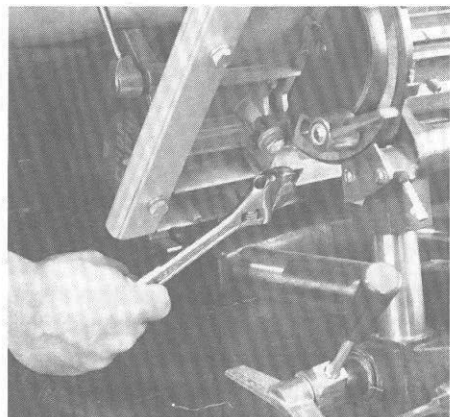


Figure 5. Back out or turn in the two stops as needed.

NOTE

The bolts will seem hard to turn. This is normal for prevailing torque type bolts.

Tilt the table back so that the stops contact their support tubes. Then recheck that the square contacts the entire length of the bit. Repeat the procedure until **both** stops contact their support tubes and the square contacts the entire length of the bit. Then remove the chuck and bit, and set the Mark V in the horizontal position.

c. To check the **45° right stop**, mount the sanding disc and position the marked line horizontal. Then loosen the tilt lock and tilt the table past the 45° right setting. Depress the plunger and tilt the table back toward that angle until the stop hits the plunger. Tighten the tilt lock, then check the angle. (See Figure 6.) If the angle is not 45°, the stop needs adjusting.

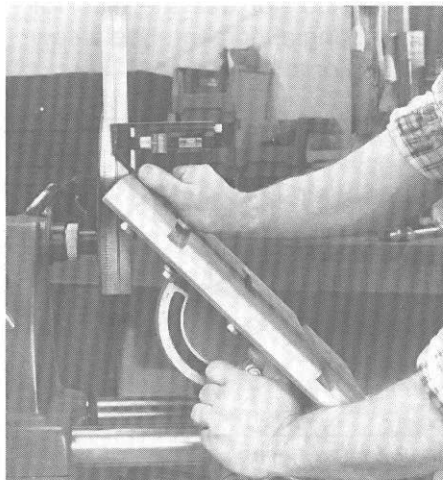


Figure 6. Checking the 45° right stop.

To **adjust** the 45° right stop, set the table to 45° right. Use a combination square to set the tilt of the table to precisely 45° right.

With a small blade screwdriver, back the 45° right stop out 2-3 turns.

(See Figure 7.) Depress the plunger under the table tilt indicator up towards the front trunnion, and hold it there with your finger. Slowly turn the 45° stop in until you feel it just touch the plunger. When you've finished, check that the 45° stop will stop the table tilt precisely at 45°.

NOTE

If you're using a drafting triangle to check the 45° right stop, you'll have to use a saw blade instead of the sanding disc. Position the table **over** the blade. When you make your measurement, be sure the triangle doesn't contact the set teeth of the blade.

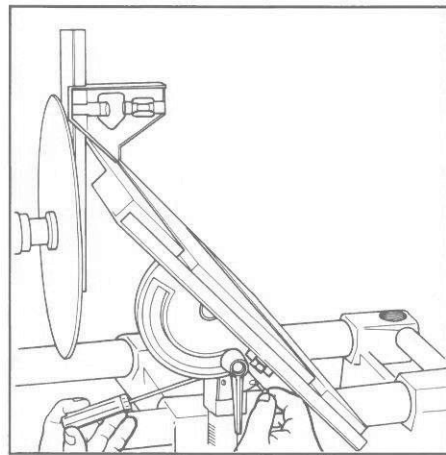


Figure 7. Adjusting the 45° right stop.

d. To check the **'0'** stop, position the line on the sanding disc so that it's horizontal. Loosen the table tilt lock and tilt the table past the '0' setting to the right. Depress the plunger and tilt the table back toward '0' until the stop hits the plunger. Tighten the tilt lock.

Place the base of your square on the table surface, with the scale resting against the disc. Check that the square is flush against both the table and disc. (See Figure 8.) If it's not, the stop needs adjusting.

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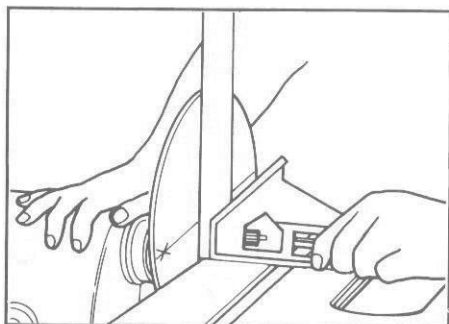


Figure 8. Checking the '0' stop.

To **adjust** the '0' table stop, set the table exactly perpendicular to the disc. With a small blade screwdriver, back the '0' stop out 2-3 turns. Depress the plunger under the table tilt indicator up towards the front trunnion, and hold it there with your finger. Slowly turn the '0' stop in until you feel it just touch the plunger. (See Figure 9.)



Figure 9. Adjusting the '0' stop.

Then check that the square is flush against both the table and the disc. If it's not, repeat the procedure.

4. Set the table tilt indicator.

Loosen the table tilt lock and position the table to the '0' stop. Secure the table tilt lock and check that the '0' mark on the indicator aligns with the '0' mark on the trunnion. If the marks are not aligned, reset the indicator. To reset, use a blade screwdriver to loosen the two screws

that hold the indicator to the tie bar. Then position the indicator to point to '0' on the trunnion. Tighten the screws. (See Figure 10.)

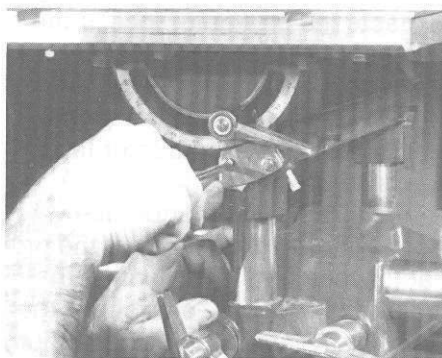


Figure 10. Setting the table tilt indicator.

5. Install the table insert in the table recess and start the screws. With a 5/32" Allen wrench, tighten the **rear** screw. The front of the insert will be sprung slightly above the table. Level the insert by placing your hand on the front of the insert and slowly turning the **front** screw until it draws the front of the insert flush with the worktable surface. (See Figure 11.) Then repeat for the rear screw.

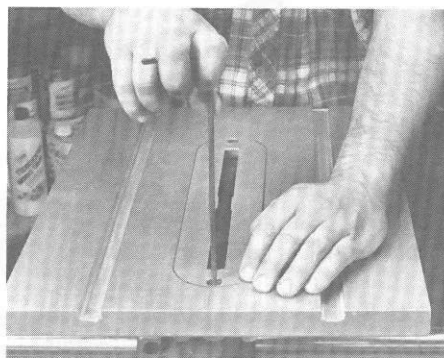


Figure 11. Installing the table insert.

6. Align the miter gauge slots.

The miter gauge slots must be parallel to the main spindle's plane of rotation.

a. To check the miter gauge slots, mount the sanding disc and position the marked line vertical. Using the

quill feed, extend the sanding disc until it touches the table. (See Figure 12.) The sides of the table are machined parallel with the miter gauge slots. If the sanding disc butts up flush against the left side of the table, the miter gauge slots are parallel to the main spindle's plane of rotation. If the disc contacts the table at just one point—front or back—the miter gauge slots need aligning.



Figure 12. Checking the miter gauge slots.

b. To align the slots, loosen the four bolts that hold the table to the trunnions at least 1/2 revolution. (See Figure 13.) Carefully shift the table in one direction or the other until the side of the table butts flush against the disc. Then tighten the bolts in rotation, 1/4 turn each, until all four are secure. Recheck the alignment of the miter gauge slots by extending the disc again.

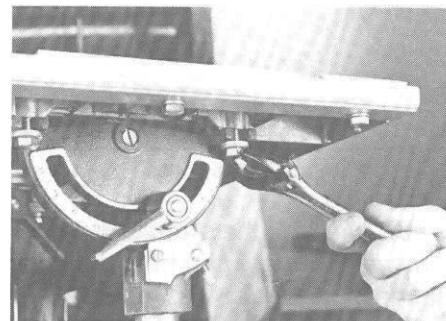


Figure 13. Loosen all four bolts.

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7. Adjust the miter gauge. The miter gauge needs three adjustments. The **glides** must be adjusted to keep the gauge from wobbling on the table. The **protractor face** must be positioned perpendicular to the main spindle's plane of rotation. And the **three positive stops** must be adjusted so that you can quickly set the gauge at 90°, 45° left and 45° right.

a. To check the **glides**, place the miter gauge in either slot. Grasp the gauge and see if it rocks front-to-back or side-to-side. Also, slide it back and forth in the slot to check if the protractor scrapes against the table. If the miter gauge rocks, or scrapes the table, adjust the glides.

To **adjust** the glides, remove the miter gauge from the slot and turn it over. With a medium blade screwdriver, screw the glides in or back them out (See Figure 14) so that the glides hold the protractor 1/64"-1/32" off the worktable and the miter gauge doesn't rock in the slots.

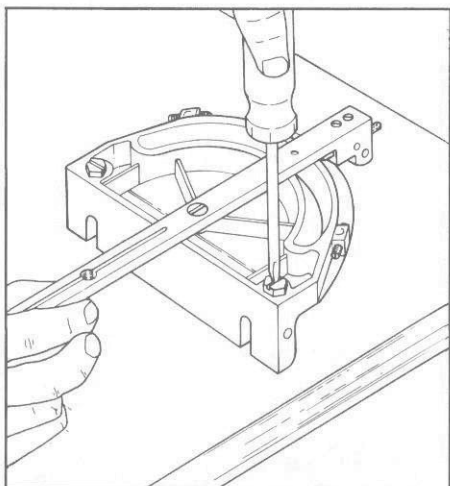


Figure 14. Adjusting the glides.

b. To check the **protractor face**, remove the safety grip from the miter gauge (if installed). The line drawn on the disc should be vertical. Mount the miter gauge in the left

slot, and position the angle at 90°. Place the base of a combination square against the sanding disc and slide the miter gauge forward or backward so that the straightedge contacts the protractor face. If the square rests flush against both the disc and the protractor face, the protractor is perpendicular to the disc. If it's not the protractor face needs adjusting.

To **adjust** the protractor face, loosen the lock knob, adjust the protractor face until it is flush with the straightedge. Then tighten the knob. (See Figure 15.) With a medium blade screwdriver, loosen the indicator and set it to 90°. Lock the indicator. (See Figure 16.)



Figure 15. Adjusting the protractor face.

c. To check the **positive stops**, depress the plunger and move the gauge past the 90° setting to the right then back until the stop hits the plunger. To check the 45° stops, loosen the lock knob, push in the plunger and adjust the scale to the desired stop. Tighten the knob, then use a combination square to check that the miter gauge is at the desired angle. If not, adjust the stops.

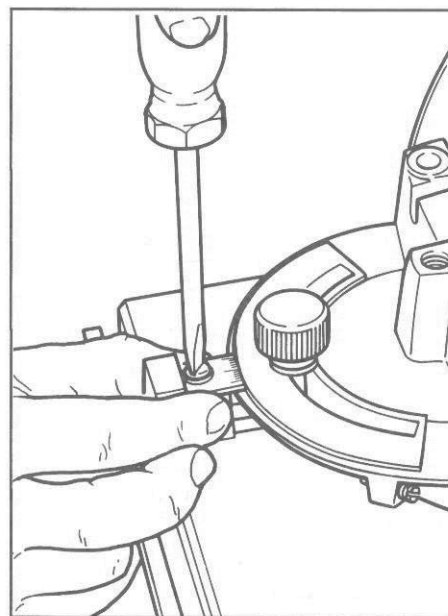


Figure 16. Setting the indicator to 90°.

Adjust the 90° stop first. Align the miter gauge at 90° and back the 90° stop out 2-3 turns. Depress the plunger, then turn the stop in until you feel it touch the plunger. (See Figure 17.) Check to see that the miter gauge stops at 90°.

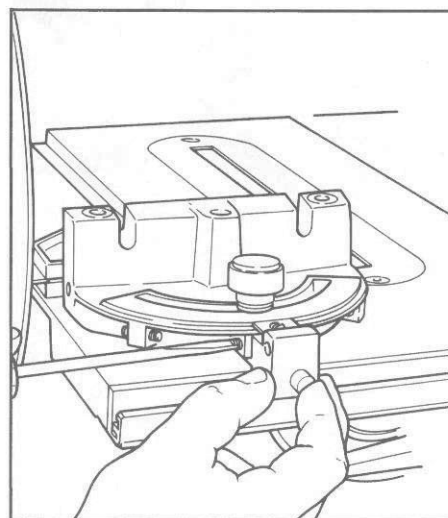


Figure 17. Adjusting the 90° stop.

Adjust the 45° left and 45° right stops in a similar manner. Use a combination square to set the gauge

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to 45° left, then 45° right. Depress the plunger, adjust the appropriate stop, then check.

8. Align the rip fence. For most woodworking operations, the rip fence must be parallel with the miter gauge slots.

a. To **check** the alignment of the rip fence, mount the rip fence on the table, near either miter gauge slot. (See Figure 18.) Make sure that the two setscrews in either side of the rip fence base are backed out so that they don't contact the table bar. Position the rip fence so that one side of the fence is flush with the edge of a miter gauge slot and tighten the lock knob. If the rip fence locks down parallel to the miter gauge slot, then it is also parallel to the main spindle's plane of rotation. If it's not, the rip fence needs aligning.

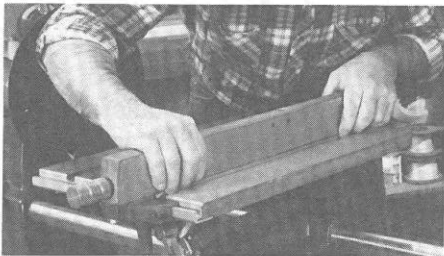


Figure 18. Checking the alignment of the rip fence.

b. To **align** the rip fence, loosen the two bolts that hold the rip fence to its base **without** loosening the lock knob. (See Figure 19.) When the bolts are loose, loosen the knob approximately 1/8 turn, align the fence parallel with the miter gauge slot, and tighten the knob. Be sure that the fence has remained parallel to the slot, then carefully tighten the bolts.

c. Check the alignment by loosening and tightening the knob several times to see if the rip fence remains parallel to the miter gauge slot.

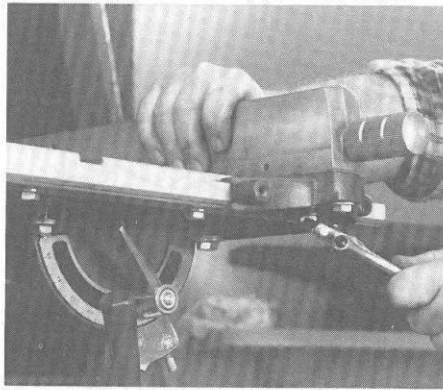


Figure 19. Loosen the two bolts that hold the fence to its base.

9. Align the extension table. The extension table bar must be parallel to and in line with the bar on the worktable. Also, the surface of the extension table must be even with the surface of the worktable.

a. To **check** the alignment of the extension table, mount the extension table in the base mount. Loosen the carriage lock and slide the carriage to the right until the tables touch. Tighten the carriage lock.

b. Using a straightedge to guide you, adjust the height of the worktable so that its front surface is even with the front surface of the extension table. (See Figure 20.) Move the straightedge to the back of the extension table and check that the rear extension table surface is even with the worktable surface. If it's not, shim and adjust the extension table.

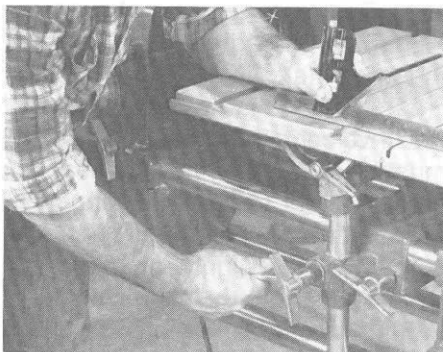


Figure 20. Checking the alignment of the extension table.

c. To **shim** and adjust the extension table, loosen (1-1/2 - 2 turns) all four of the bolts that hold the extension table to its base. (See Figure 21.) Then remove the two bolts on the **low** side of the extension table.

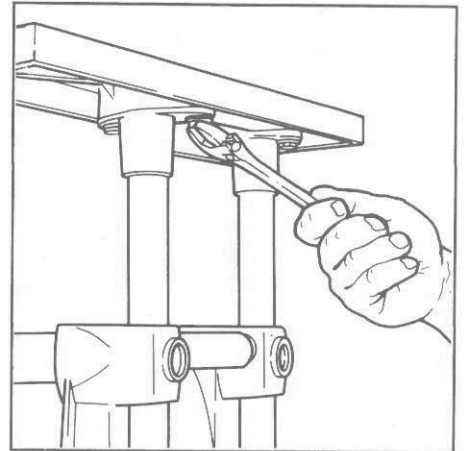


Figure 21. Loosen all four bolts.

Place enough shims in between the extension table and the base to raise the low side level with the surface of the worktable.

NOTE

The shim kit contains two sizes of shims. You'll use a combination of thicknesses to align the extension table with the worktable.

Replace and tighten all four bolts. Check your work—when the extension table is properly shimmed, you should be able to adjust the height of the worktable so that **both** the front and back of the extension table are even with the worktable surface.

d. To check that the extension table bar is lined up with the bar on the worktable, lay a straightedge across both bars. (See Figure 22.) The straightedge should rest flush against the extension table bar and the worktable bar. If it doesn't, adjust the extension table bar.

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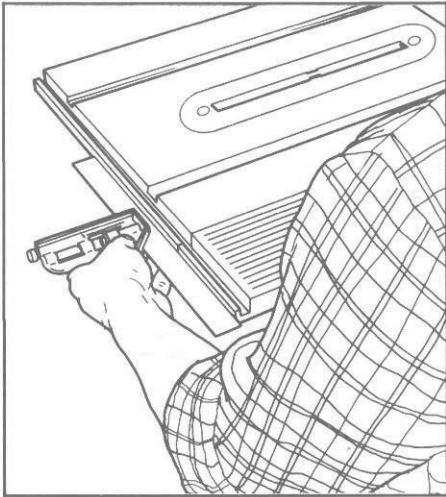


Figure 22. Checking that the extension table bar is lined up with the bar on the worktable.

e. To **adjust** the extension table bar, loosen the two bolts that hold the bar to the extension table. Use a straightedge to align the extension table bar with the bar on the worktable. Retighten the two bolts. Check the alignment with a straightedge.

10. Align the extension table on the left side of the power plant. To check the alignment, mount the extension table in the power mount. Loosen the locks and slide the power plant and worktable to the left. Tighten the locks. Lay a straightedge across the front surfaces of the tables. Adjust the extension table height so its surface is even with the worktable surface. Move the straightedge to the rear of the tables. If there is a gap between the worktable and the straightedge, the setscrew in the headrest needs adjusting.

To determine how much to adjust the setscrew, loosen the locks and slide the power plant and the worktable to the right. Loosen the headrest lock and raise the way tubes enough to place a washer on the rear pad of the headrest between the headrest and the way tube tie bar. (See Figure 23.)

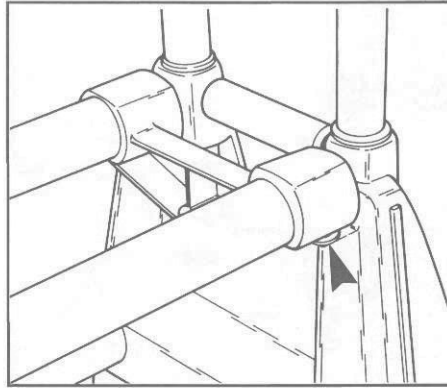


Figure 23. Place a washer on the rear pad.

NOTE

Any washer will do; the thickness is not critical. The washer will only be used to gauge how much the setscrew needs to be raised or lowered.

Lower the way tubes and lock the headrest lock. Move the power plant and worktable to the left and check the alignment of the tables. If the tables are not even add more washers or use thinner ones, whichever is needed. Repeat until the table surfaces are even. Adjust the setscrew in the headrest until it is the same height above the headrest pad as the thickness of the washers. By adjusting the setscrew you align the way tubes at the left end of the Mark V. This will make the extension table and worktable surfaces even. Check. If they are not even, repeat the procedure. Then remove the washer(s).

11. Align the lathe centers. Both the drive center and the cup center must be directly in-line with each other in order to properly support a spindle turning. (See Figure 24.)

To **check** the alignment, mount the drive center onto the main spindle. Mount the cup center into the tailstock and mount the tailstock into the base mount. Tighten the acces-

sory mount locks. Loosen the power plant lock and move the power plant to the right. Tighten the power plant lock. Using the quill, extend the drive center toward the cup center so the centers almost meet. Secure the quill lock. If the points of the centers are not directly in-line with each other, determine whether you need to adjust the centers top-to-bottom, front-to-back or both.

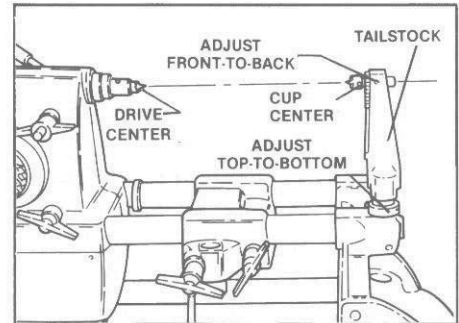


Figure 24. Aligning the lathe centers.

To **adjust** the centers **front-to-back** loosen the setscrew that locks the eccentric mount in the tailstock. Rotate the eccentric mount as needed to line up the cup center with the drive center, then tighten the setscrew.

To **adjust** the centers **top-to-bottom** loosen the accessory mount lock that holds the tailstock in the base mount. Then loosen the tailstock stop collars. Position the tailstock in the base mount so that the centers line up top-to-bottom, then tighten the accessory mount lock. Press the stop collars down firmly against the base mount and secure the collars.