CHAPTER 5

SCUTTLE REPAIR

5-1. SCUTTLE REMOVAL.

If routine maintenance is not sufficient to restore a watertight scuttle to watertight or operating condition, repair or replace defective parts. (Refer to chapter 2 for inspection and maintenance procedures.) Refer to the Afloat Shopping Guide and to appendix B and appendix C for information to help identify and procure replacement parts. If the answer to the problem is not covered in the appendices, consult the appropriate technical point of contact at Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), or a commercial point of contact. To accomplish repairs on the handwheel assembly, the dog arms, or the hinges, remove the scuttle from its frame as follows:

a. Use a chisel to knock off the upper brace link collar and hinge pin collars. Remove the hinge pins and brace link pin.

b. For flush scuttles, remove the flathead screws from the hinge blocks.

c. Lift the scuttle from its frame. Rope off the opening or cover with plywood as a safety precaution. Carry the scuttle to the shop for disassembly.

5-2. DISASSEMBLY AND REPAIR.

5-2.1 STEEL SCUTTLES.

a. To remove the handwheel(s), remove the handwheel locknut(s) from the ends of the spindle. (Jamnuts or a jamnut and acorn nut must be installed in place of a locknut.)

b. Remove the cotter pin and clevis pin attaching each dog arm to the spider. Remove the dog arms from the assembly. See figure 5-1 and figure 5-2.

c. For flush scuttles, remove the spindle collar setscrew and unscrew the collar. See figure 5-3.

d. Unthread the spider from the spindle. Remove the spindle from the spindle sleeve.

e. Using a 5/8-inch diameter (approximate) brass pipe or round stock, drive out the two flanged spindle bushings from the sleeve.

f. Scrape rust, paint, and old grease from the spindle sleeve using a flat tipped punch and a 1-inch diameter rotary wire brush chucked in an electric drill. A no. 320 grit aluminum oxide cloth can also be used. Remove all traces of packing with a rag and dry cleaning solvent. Use caution when working with the flammable solvent.

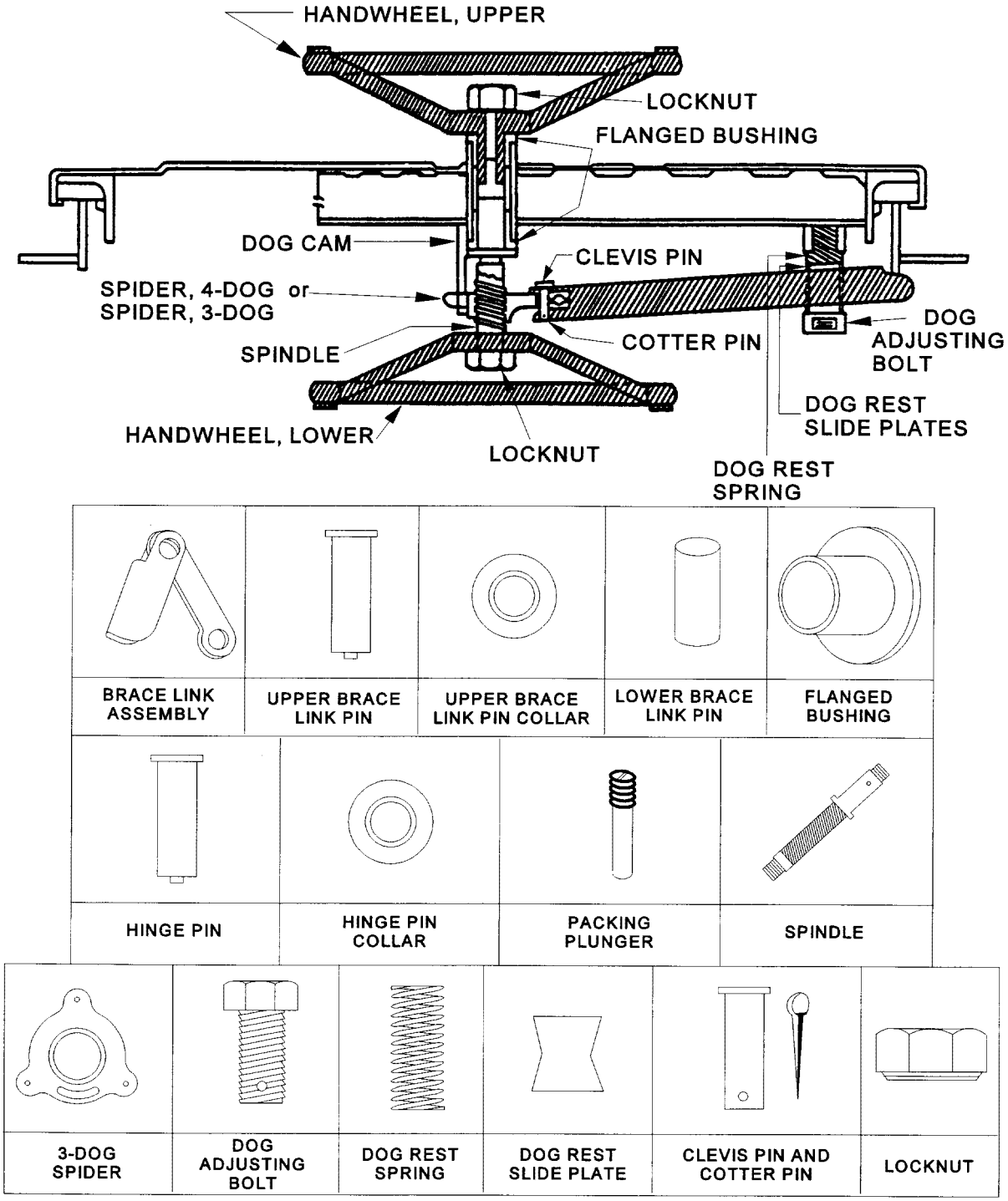


Figure 5-1. Raised Scuttle Components

g. Dog adjustment bolts have a locking device that consists of a small nylon plug pressed into a hole in the body of the bolt. The locking device prevents the adjustment bolt from backing out after adjustment of the dogging arm. Inspect each adjustment bolt for wear by trying to tighten by hand. If the bolt screws in all the way by hand, it is worn and must be replaced.

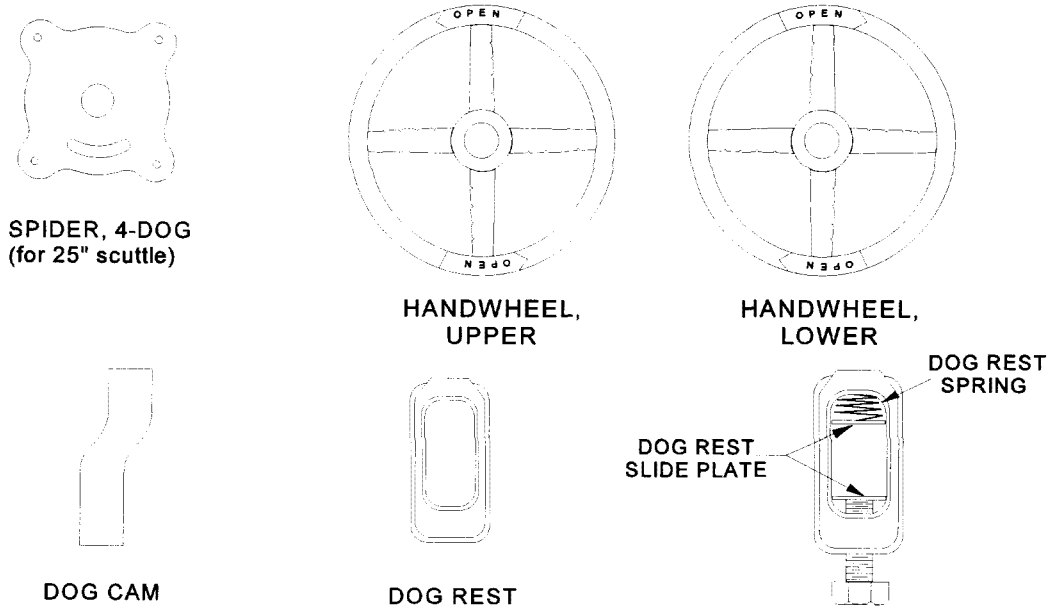


Figure 5-2. Scuttle Components

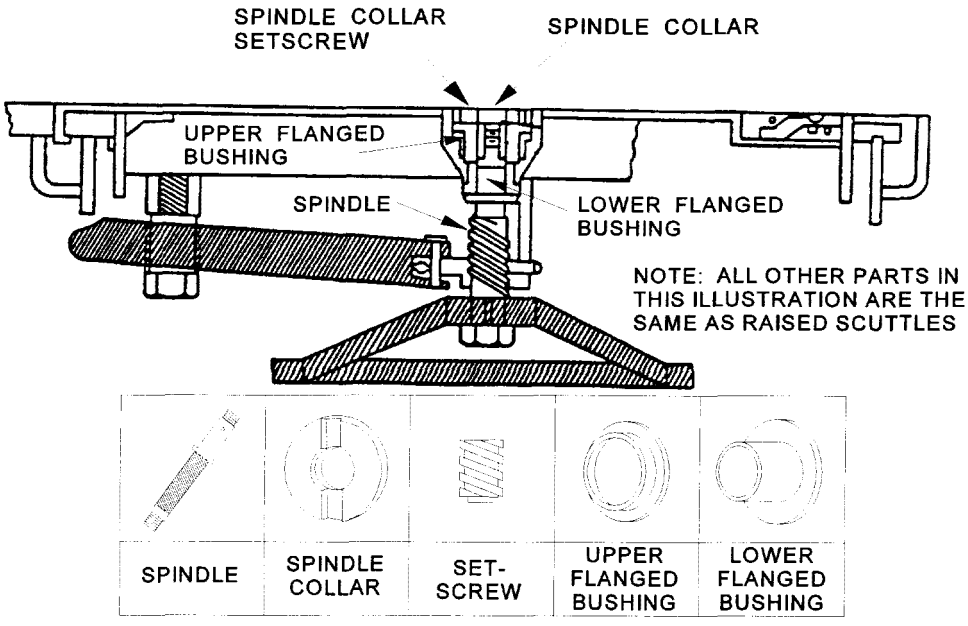


Figure 5-3. Flush Scuttle Components

CAUTION

The gasket must be removed from the scuttle before working with an oxy-acetylene torch; otherwise, the heat will destroy the gasket.

h. Remove the dog adjusting bolt from each dog rest. If a bolt is frozen to the dog rest, heat the dog rest with an oxyacetylene torch. Secure the torch, and remove the bolt with a wrench.

i. If the threads in a dog rest are damaged beyond repair, replace the dog rest as follows:

1. Burn the dog rest off with an oxyacetylene torch.
1. Weld on a new dog rest in exactly the same position and alignment as the dog rest removed.

j. Chase the threads in each dog rest with a 5/8-18UNF tap.

k. Coat the dog adjustment bolt threads with antiseize compound.

l. Examine all other parts for wear or damage, and procure replacement parts as required. (Refer to the Afloat Shopping Guide and appendix C.) Chase spindle threads with a 3/4-16UNF tap and die. Replace the spindle if any of the following conditions are found:

1. Spindle is bent or has deep scratches.
2. The threads are so badly worn that a new spider, when screwed on to the spindle, wobbles excessively.
3. The machined flange is cracked or completely broken away. Often, the flange will crack around the entire periphery of the inner diameter, breaking free and forming what looks like a washer. See figure 5-4.

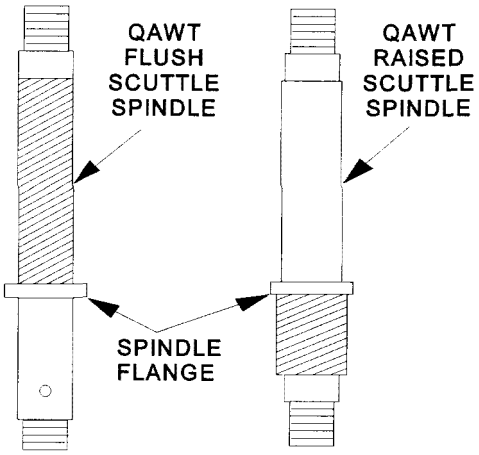
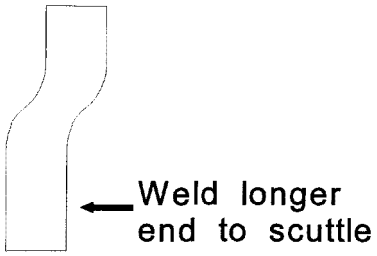


Figure 5-4. Scuttle Spindles

If either the spindle or the spider is damaged, replace both parts; otherwise, the spindle and spider will not fit properly. If the spider must be replaced, be aware that spiders for 18- and 21-inch scuttles have three dog arm holes and are interchangeable. Spiders for 25-inch scuttles have four dog arm holes and can only be used on 25-inch scuttles

m. Examine the dog cam welded to the scuttle underside. See figure 5-1 and figure 5-2. Dog cams can become bent or break away completely over time from operation of the handwheels. If a cam requires replacing, it is important to position the new cam exactly in the same position as the old cam. Carefully mark the position of the old cam to indicate the proper fit-up of the new dog cam to the slot in the spider. If the old cam is missing, the old weld left on the scuttle will give a good idea of the proper position for the cam. Ensure the correct end of the cam is welded to the spider. The longer of the two sections of the cam is the end that should be welded. See figure 5-5 and .

n. Clean parts with a rag and dry cleaning solvent. Prime and paint the dog arms. Use Formula 150 primer and Formula 151 top coat.



DOG CAM

Figure 5-5. Dog Cam

5-2.2 ALUMINUM SCUTTLES.

a. To remove the handwheel(s), remove the handwheel locknut(s) from the ends of the spindle. (Jamnuts or a jamnut and acorn nut must be installed in place of a locknut.)

b. Remove the cotter pin and clevis pin that attach each dog arm to the spider. Remove the dog arms from the assembly. See figure 5-1 and figure 5-2.

c. For flush scuttles, remove the spindle collar setscrew and unscrew the collar. See figure 5-3.

d. Unthread the spider from the spindle. Remove the spindle from the spindle sleeve.

e. Using a 5/8-inch diameter (approximate) brass pipe or round stock, drive out the two flanged spindle bushings from the sleeve.

f. Use a Scotch Brite pad to scrape corrosion, paint, and old grease from the spindle sleeve. Remove all traces of packing with a rag and dry cleaning solvent. Use caution when working with the flammable solvent.

g. Dog adjustment bolts have a locking device that consists of a small nylon plug pressed into a hole in the body of the bolt. The locking device prevents the adjustment bolt from backing out after adjustment of the dogging arm. Inspect each adjustment bolt for wear by trying to tighten by hand. If the bolt screws in all the way by hand, it is worn and must be replaced.

CAUTION

Do not apply heat to remove dog adjusting bolt.

h. Remove the dog adjusting bolt from each dog rest. If a bolt is frozen to the dog rest, use solvent to loosen the dog bolt.

i. If the threads in a dog rest are damaged beyond repair, replace the dog rest as follows:

   1. Grind down the dog rest.
   2. Weld on a new dog rest in exactly the same position and alignment as the old one.

j. Chase the threads in each dog rest with a 5/8-18UNF tap.

k. Coat the dog adjustment bolt threads with antiseize compound.

l. Examine all other parts for wear or damage, and procure replacement parts as required. (Refer to the Afloat Shopping Guide and appendix C.) Chase spindle threads with a 3/4-16UNF tap and die. Replace the spindle if any of the following conditions are found:

1. Spindle is bent or has deep scratches.
2. The threads are so badly worn that a new spider, when screwed onto the spindle, wobbles excessively.
3. The machined flange is cracked or completely broken away. Often, the flange will crack around the entire periphery of the inner diameter, breaking free and forming what looks like a washer. See figure 5-4.

If either the spindle or the spider is damaged, replace both parts; otherwise, the spindle and spider will not fit properly. If the spider must be replaced, be aware that spiders for 18- and 21-inch scuttles have three dog arm holes and are interchangeable. Spiders for 25-inch scuttles have four dog arm holes and can only be used on 25-inch scuttles.

m. Examine the dog cam welded to the scuttle underside. See figure 5-1 and figure 5-2. Dog cams can become bent or break away completely over time from operation of the handwheels. If a cam requires replacing, it is important to position the new cam in exactly the same position as the old cam. Carefully mark the position of the old cam to indicate the proper fit-up of the new dog cam to the slot in the spider. If the old cam is missing, the old weld left on the scuttle will give a good idea of the proper position for the cam. Ensure the correct end of the cam is welded to the spider. The longer of the two sections of the cam is the end that should be welded. See figure 5-5.

n. Clean parts with a rag and dry cleaning solvent. Prime and paint the dog arms. Use Formula 150 primer and Formula 151 top coat.

5-3. SCUTTLE ASSEMBLY.

5-3.1 HANDLE INSTALLATION FOR RAISED SCUTTLES.

a. Thinly coat the inside of the spindle sleeve with a silicone compound.

b. Coat the lower flanged bushing with a silicone compound, and tap into place in the sleeve with a rawhide hammer.

NOTE

For flush scuttles, the lower flanged bushing is shaped differently than the upper bushing. See figure 5-3.

c. Coat the spindle bearing surface and thread with silicone compound, and thread the spider onto the spindle approximately halfway. The spider boss should face down, away from the spindle flange.

d. Insert the spindle into the scuttle spindle sleeve. Pass the crescent shaped slot in the spider over the dog cam. There should be a loose fit between the cam and slot. If the fit is too tight, grind or file the slot to fit. The dog cam may need to be tapped to one side or the other with a hammer to help fit the slot in the spider over the dog cam. This is invariably true if the cam has been replaced.

e. From the scuttle top, cut and wrap the spindle with approximately 12 inches of string packing. Push the packing into the spindle sleeve with a screwdriver. Coat the upper flanged bushing with silicone compound, and install the bushing.

NOTE

Do not apply string packing or stick packing if self-lubricated bushings are being installed in the assembly.

f. Coat the spindle handwheel nut threads with antiseize compound, and install the upper handwheel.

NOTE

Be sure to install the upper handwheel. Ensure the arrow cast into the handwheel points in the direction the handwheel is turned to open the scuttle. On the lower handwheel, the arrow points in the opposite direction. Do not mix the directions up. See figure 5-2. Handwheels for 18- and 21-inch scuttles are 10 inches in diameter; handwheels for 25-inch scuttles are 13 inches in diameter.

g. Install a 5/8-11UNC stainless steel locknut and tighten. If the nuts on the scuttle are plated steel, replace with CRES nuts. If in doubt, test with a magnet. The CRES nuts attract the magnet very little, if at all.

h. If desired, add a stainless steel 5/8-11UNC acorn style cap nut atop the locknut to protect the packing plunger. Besides protecting the packing plunger, this method also eliminates any possibility of the handwheel nut loosening over time. The CRES acorn nuts are available through the Navy Stock System. If there are not enough threads left on the spindle to use the acorn nut, replace the previously installed CRES locknut with a CRES jamnut, which is thinner than the regular nut.

5-3.2 HANDLE INSTALLATION FOR FLUSH SCUTTLES.

a. Thinly coat the inside of the spindle sleeve with a silicone compound.

b. Coat the lower flanged bushing with a silicone compound, and tap into place in the sleeve with a rawhide hammer.

NOTE

For flush scuttles, the lower flanged bushing is shaped differently than the upper bushing. See figure 5-3.

c. Coat the spindle bearing surface and thread with silicone compound, and thread the spider onto the spindle approximately halfway. The spider boss should face down, away from the spindle flange.

d. Insert the spindle into the scuttle spindle sleeve.

e. Coat the spindle collar threads with antiseize compound, and thread the collar onto the spindle until its top surface is flush with the top of the spindle.

f. If either the spindle or spindle collar must be replaced, a new setscrew hole will have to be drilled and tapped. This is because new spindles and collars do not come drilled and tapped for a setscrew. Do not attempt to reuse the old hole in a reused part. Drill and tap a completely new hole. Use a no. 3 drill and 1/4-28UNF tap.

g. Align the two halves of the setscrew hole in the collar and the spindle. Coat the setscrew with antiseize compound and install.

5-3.3 FINAL ASSEMBLY OF RAISED AND FLUSH SCUTTLES.

a. For each dog arm, insert the dog rest spring and two dog rest slide plates into the dog rest. One slide plate sits on top of the spring and rides against the upper surface of the dog arm. The other slide plate rides against the lower side of the dog arm and rests on top of the end of the dog adjusting bolt.

b. Insert the dog arm between the two slide plates, sliding the arm up and into the spider. Ensure the beveled side of the dog arm faces toward the scuttle underside or coaming.

c. Pass the headed clevis pin from the scuttle underside through the hole in the dog arm and spider. Align the hole in the clevis pin with the small hole in the dog collar, and insert a 3/32-inch by 1-inch CRES or brass cotter pin. Bend over the long leg of the cotter pin.

d. Repeat step a through step c for the other two or three dog arm assemblies.

e. Coat the dog arm adjusting bolt threads with antiseize compound and install the bolts. Do not tighten the bolts at this time. Tighten the bolts only after assembly/adjustments and a chalk test are completed.

f. For raised scuttles, install the lower handwheel, washer, and locknut. Use antiseize compound on the spindle threads.

5-4. INSTALLATION OF SCUTTLE ONTO FRAME.

a. For raised scuttles:
   1. Place the scuttle in the frame.
   2. Insert the hinge pins and lock collars. The beveled side of lock collars must face out.
   3. Install the brace link pin and collar. Bend the end of the pin with a ball peen hammer to lock the pin to the collar.

b. For flush scuttles:
   1. Clean the recessed areas around the scuttle opening of any debris and corrosion. Prime and paint as required. Use Formula 150 primer and Formula 151 top coat.
   2. Replace the hinge pins, and peen over the boss with a backup hammer and ball peen hammer.
   3. Attach the brace link to the brace pad hinge block with a new pin. Peen over the boss to lock in place.
   4. Lay the hinge blocks over the screw holes in the scuttle recess. Place the scuttle in the frame over the hinge blocks, and replace the upper hinge plates and flathead screws. Coat the hinge blocks and brace link with wire rope grease.

NOTE

The CRES brace links are available commercially for flush scuttles located on the weather decks.

c. Stand on the underside of the scuttle. Close and dog down the scuttle approximately halfway. Set up on the dog adjusting bolts until the dog arms just begin to pull down on the scuttle.

d. Open the scuttle and accomplish the chalk test. (Refer to chapter 2, paragraph 2-1.5.) Readjust dog bolts and accomplish another chalk test as required.

e. Insert the packing plunger and stick packing. (Refer to chapter 2, paragraph 2-1.12.)

NOTE

Scuttles equipped with self-lubricated bushings do not require stick packing or string packing. The packing plunger is left in place to fill the void that would remain in the spindle.

f. Operate the scuttle to inspect for smoothness with a minimum of effort and no binding. The dog arms should fully engage the coaming. If the handwheel is difficult to turn, open the scuttle and tap the sides of the handwheels with a rawhide hammer from all four compass points. This procedure helps seat the bushings in proper alignment with the spindle. The handwheel should then be much easier to turn.