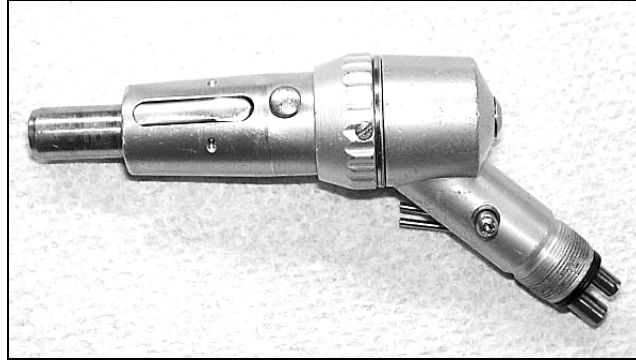


## MIDWEST SHORTY 2-SPEED MOTOR



The Midwest Shorty 2-speed motor has been in existence for many years. It is a durable handpiece and has a speed range of 0 – 30000 rpm. It has replaced the Midwest Tru-Torc and you will come across them quite often in the field. Many aftermarket replacement parts exist for this handpiece. As always, try to determine the problem before disassembling the handpiece.

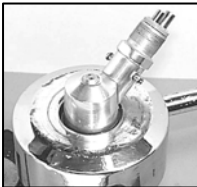
Some of the most common problems and solutions are addressed in the Midwest Tru-Torc and Shorty troubleshooting guide immediately preceding this section.

### **SUB ASSEMBLY A & B DISASSEMBLY**



#### **STEP 1**

Remove the front sheath housing. Do this by placing it in a 3/4" collet just below the spindle lock button as shown. Then wrap a strip of rubber around the speed change collar and motor housing and unscrew. All the threads on this handpiece are regular thread, so turn counterclockwise to remove. Next, simply unscrew the speed change collar screws and remove the collar.



#### **STEP 2**

Lock the clutch housing of the handpiece into a 49/64" collet. Loosen the upper turbine housing by hand and remove. Remove any spacer washer(s) and place them on your work surface.

### **SUB ASSEMBLY A DISASSEMBLY (NOSE SECTION)**



#### **STEP 3**

Line the wide drive rings up with the half moon grooves in the clutch as shown at left. Reach under the drive plate with a flat thin screwdriver. Pry the plate up. This will expose the three wide drive rings. Place them along side the drive plate on your work surface. You may need to work your way around slowly while always prying UP on the drive plate.



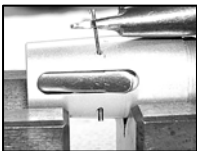
#### **STEP 4**

Now that the drive plate and wide drive rings have been removed, place a 3/16" collet into the collet holder. Insert the spindle halfway above the fork, into the collet. Once the collet is tightened, use a flat head screwdriver to unscrew the spindle bolt. Then pull the various pieces apart and place on your work surface.



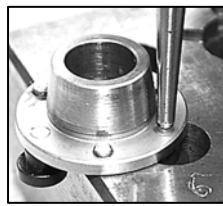
#### **STEP 5**

You can now place the nosepiece in a 13/32" collet. Unscrew the sheath housing from it while simultaneously depressing the latch. This will keep the flange on the nosepiece from being caught up.



#### **STEP 6 (Only perform this step if the latch is damaged)**

If you need to replace the latch on the sheath housing, place it over two v-blocks. Hold a small punch or pin with a set of tweezers over one end of the pin in the housing. Gently tap the pin out of the housing and remove the latch and spring. The replacement latch kit is part# 40503.

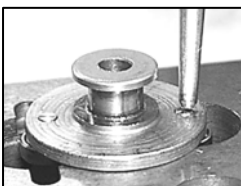


#### **STEP 7 (Only perform this step if necessary)**

To remove the dog pins (40459) from the drive plate, place the plate into the crows foot shaped hole on your block (far left pic). Then use a thin punch to drive the pins out of the holes. To remove any of the bushing posts, place the plate upside



down over Hole #6 in your block (above right picture). Again use a thin punch to drive the post(s) out of the drive plate. To the left is a picture of the bushing and bushing post disassembled from the drive plate.

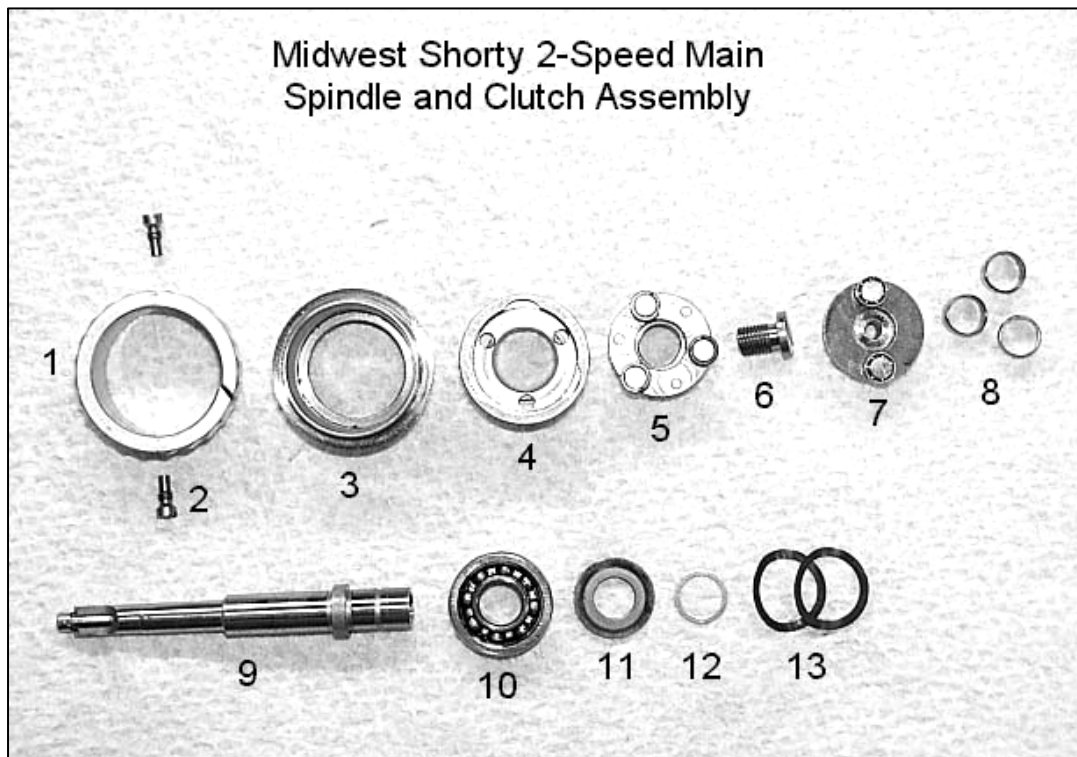


#### **STEP 8 (Perform this step only if bearing is broken)**

If the small 40435 bearings on the drive ring spindle are damaged, they must be replaced. Accomplish this repair by placing the damaged bearing upside down in one of the holes on your block as shown in the picture at left. Place a thin punch over the back of the bearing post and tap it out. The disassembled bearing post should contain the 40435 bearing, and a brass 40453 spacer washer as shown.



The nose portion disassembly should now be complete. Line up your parts like that shown in the picture on the following page. All of these parts are replaceable and all can be ultrasonically cleaned.



Picture Number	Part Number	Description
1	40443A	Speed Change Collar (2-Speed)
2	40443	Speed Change Collar Screws
3	40493	Clutch Housing
4	40493A	2-Speed Clutch
5	40437B	Drive Plate (shown with Bushing Posts (40460 & Bushings 40461) Also note: the Clutch Pins (40459) are inserted as well.
6	40494A	Spindle Bolt
7	40437A	Wide Drive Ring Spindle
8	40437	Wide Drive Rings
9	40449	Main Spindle
10	40432	Main Spindle Bearing
11	40464	Thrust Washer
12	40464B	Metal Shim
13	40448	Loading Springs

### **SUB ASSEMBLY B DISASSEMBLY (MOTOR HOUSING)**

(Note: most pictures are of a 40446 1-speed raceway, not the correct 40446A raceway)

#### **STEP 9**

After removing the two narrow drive rings, insert your turbine raceway tool (00003) into the three holes in the raceway. Unscrew the raceway from the housing. If you cannot get the raceway to unscrew, put the threads of the

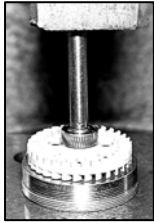


housing into a 9/16" collet. With the housing securely held, insert the raceway tool into the raceway and unscrew.



**STEP 10**

Remove the vent plug from the housing. Like all threads on this handpiece, turn counterclockwise to unscrew. Once the plug is out, replace the o-ring (404072) in the rear of the housing.



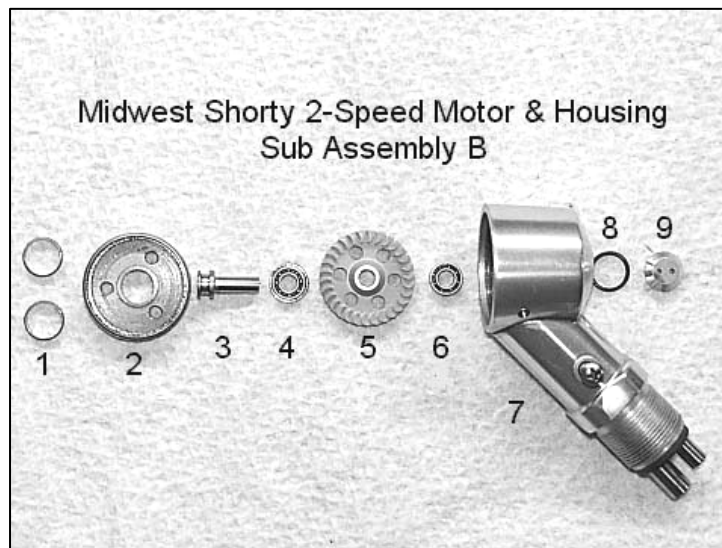
**STEP 11**

To disassemble the turbine, place the drive ring raceway over the largest hole on your work block (as shown). Then put your Lares disassembly tool (00024L1) into the end of the motor spindle. Press the spindle and tool through the raceway.



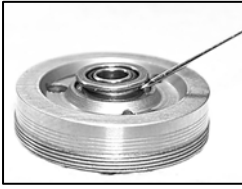
**STEP 12**

Now turn the partially disassembled raceway over (see picture). The front motor bearing must be removed from the raceway. Use your Lares assembly tool (00024L2) to punch the bearing out of the raceway. Always replace these motor bearings when performing an overhaul. Place all of your dirty or fouled parts in the ultrasonic cleaner.



Picture Number	Part Number	Description
1	40438	Narrow Drive Rings
2	40446A	Drive Ring Raceway (40446 is pictured)
3	40442	Turbine Spindle
4	40433	Front Turbine Bearing
5	40454	Impeller
6	40405C	Rear Turbine Bearing
7	40424A	2-Speed Turbine Housing (40424 is pictured)
8	404072	O-Ring
9	40501	Shorty Vent Plug (pictured)

## SUB ASSEMBLY B REASSEMBLY (MOTOR SECTION)



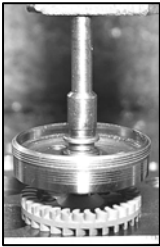
### STEP 13

Place the turbine raceway upside down on your work surface. Insert the front turbine bearing into the appropriate hole (as shown). With the bearing partially inserted, place a small dab of Loctite on the tip of a needle and apply sparingly under the flange of the bearing. Press the bearing firmly into the drive ring raceway and let sit.



### STEP 14

After the Loctite has cured, center the raceway, bearing side down, over Hole# 7 in your work block (picture at left). Place the turbine spindle over the hole in the bearing with the fat side up. Put your Lares assembly punch in the top of the spindle and press the spindle into the bearing.

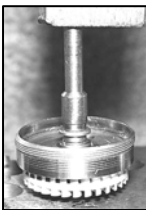


### STEP 15

Now center the impeller over Hole# 6 in your work block. Place the small end of the turbine spindle into the impeller (as shown). Using the same Lares punch, press the spindle into the impeller.

### STEP 16

If you did not replace the rear o-ring in **STEP 10**, do so now. Then reinstall the vent plug.



### STEP 17

Place the rear turbine bearing (40405C) into Hole # 2 of your work block. Be sure the balls in the bearing are face down. Put the small end of the turbine spindle into the bearing. Use the Lares punch to press the partial turbine assembly into the bearing.

### STEP 18

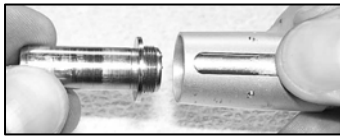
Insert the raceway tool into the three holes in the raceway. Carefully begin to thread the raceway into the motor housing. A good tip is to turn the raceway counterclockwise until a click is heard. Then begin to thread the pieces together. Once started, thread the raceway securely into the housing until it bottoms out.



### STEP 19

Now insert the two narrow drive rings into the drive ring raceway 180 degrees apart. Notice there is a small cut out portion on the inside edge of the drive ring raceway. This allows you to insert the narrow drive rings into the proper position.

## SUB ASSEMBLY A REASSEMBLY (NOSE SECTION)



### STEP 20

Reinstall the latch kit back onto the sheath housing. Once this is done, place the front spindle bearing into the nosepiece. Depress the latch and screw the nosepiece back into the housing. Firmly screw the two pieces together using two rubber strips.



### STEP 21

Now place the main spindle bearing onto the back of the spindle. Follow this by sliding the thrust washer and shim washer over the end of the spindle.



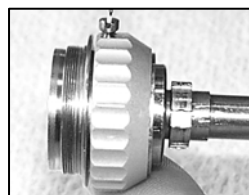
### STEP 22

Now insert the clutch into the clutch housing. Turn the assembly over and place 2 dabs of green grease onto the back of the clutch 180° apart from each other. This is where you will now place the two loading springs.



### STEP 23

At this point, hold the spindle assembly and clutch assembly horizontally and opposite each other (far left). Press them together and hold tightly while screwing the spindle bolt into the spindle as shown (near left).



### STEP 24

Insert the spindle half way into the 3/16" collet. Now tighten the spindle bolt, tightly, into the spindle (far left picture). Remove from the collet. At this point you can slip the speed change ring onto the clutch housing and insert the screws (as shown above).



### STEP 25

It is now time to install the three wide drive rings. Insert the wide drive ring plate into your wide drive ring tool (00017). Follow that by spacing the three drive rings evenly in the tool (as shown). Grooves are pre cut into the tool and will properly space the wide drive rings.



### STEP 26

With the drive rings properly placed in the drive ring tool, lower it over the nose section (far left). **Make sure the three black bushings are out of the way of the grooves where the three drive rings are to be**

**inserted.** Once the two pieces are aligned, slowly lift the tool off of the drive ring plate. Use a small flat screwdriver to press the three drive rings into the clutch (as shown above). This will correctly insert the wide drive rings and plate into the clutch housing. This tool does not insert the drive ring into a 2-Speed the way it does on a 1-Speed. The tool will align them, then, using a finger, keep them in place and use the screw driver to slip each one down separately.



#### **STEP 26**

You now have two properly assembled Shorty halves. Sub Assembly A and Sub Assembly B. Place any spacing washers that may have been present back onto the outer edge of the clutch housing. **Now mesh the two drive plate bearings into the two narrow drive rings in the motor housing.** Once these are correctly aligned, begin to thread the two halves together. Be sure not too cross-thread the pieces. If the pieces seem to stop threading together right before they look properly seated, STOP. You may not have the drive plate bearings aligned exactly inside the narrow drive rings. Back the pieces a part 1/16<sup>th</sup> of a turn and retighten. If they still don't align, unscrew the pieces and start this step over. Forcing assembly A and B will break the LocTite loose on the turbine assembly.



#### **STEP 27**

To firmly tighten the two assemblies together, once again, place the sheath housing into the 3/4" collet. Insert the spindle into the housing. Wrap the motor housing with a strip of rubber and tighten firmly in a clockwise motion.