



## **500 Series Continuous Spanner Manual**

Revision AA

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## Tool Overview

The Continuous Spanner combines the functionality of a traditional pin or hook type spanner with 360° ratcheting capability which allows for rapid rotation without repositioning of the tool. The 500 Series Continuous Spanner is designed to work on bodies having an OD of up to 5 inches.

## Warnings and Intended Use

The following guidelines indicate the intended use of the Continuous Spanner and provide warnings against some potentially dangerous misuses of the tool. **The operator is responsible for the proper use of the tool and insuring their own safety and the safety of all people and property in the area where the tool is used. Failure to use the tool as intended or heed the warnings below may result in tool failure, property damage, severe injury, and/or death.**

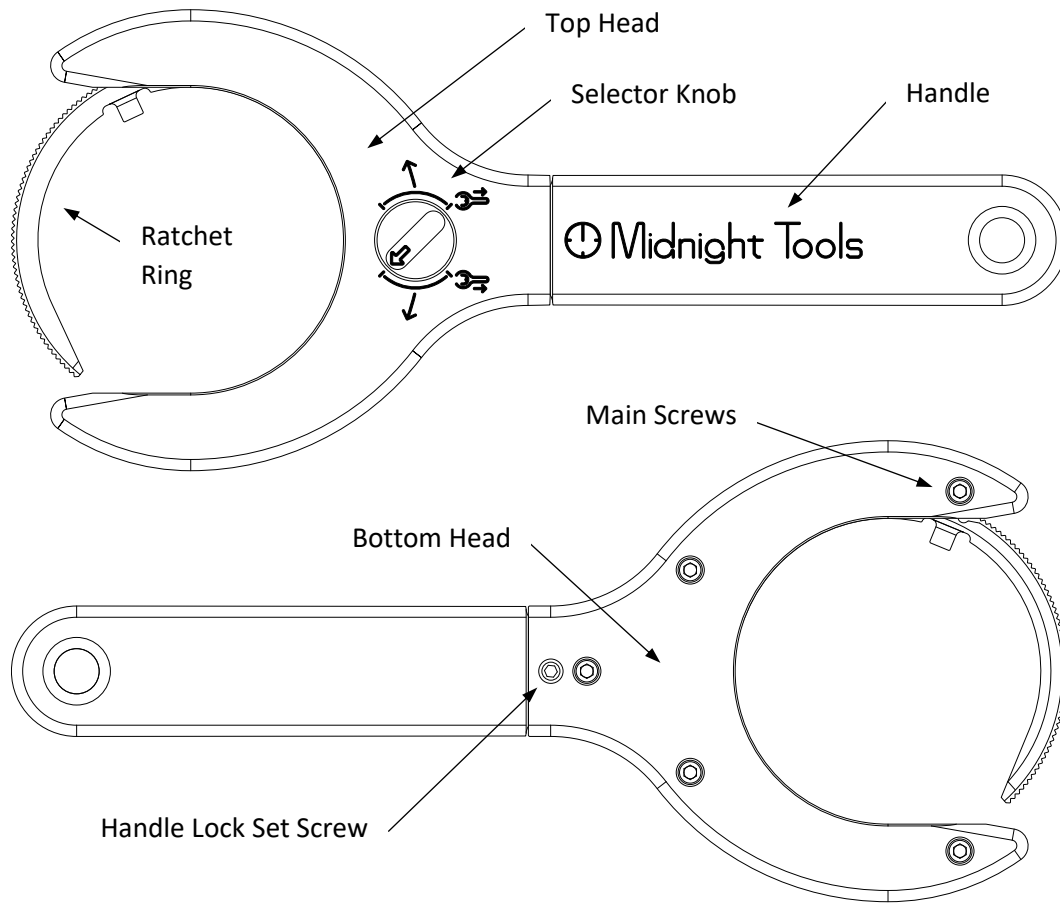
- **The Continuous Spanner is a hand tool. Do not apply force or torque to tool by any means except by hand.**
- **The Continuous Spanner is intended to rotate bodies with spanner engagement features matching the engagement feature on the tool.** A pin spanner should be used with similarly sized holes on the body to be rotated. A hook spanner should be used with grooves which are perpendicular to the features on the tool or which have an angle where torque pulls the hook into tighter engagement with the body. The engagement features on the body to be rotated should be designed to take the required torque without significant deformation. Using the Continuous Spanner with non-matching features, or improperly designed features can cause the tool to slip or otherwise disengage from the body being rotated.
- **The Continuous Spanner not designed for impact loads.** Striking the Continuous Spanner will damage the tool body and may damage other components of the tool. If an impact is required use the Continuous Spanner for the majority of the rotations and an impact rated tool for the required initial or final impact.
- **Do not use 'cheater bars' or other extensions on the Continuous Spanner.** Using these devices can damage the aluminum body of the tool and could cause the tool to slip or otherwise fail.

## Major External Components

The main externally visible components of the Continuous Spanner are illustrated below.

## Tool Overview

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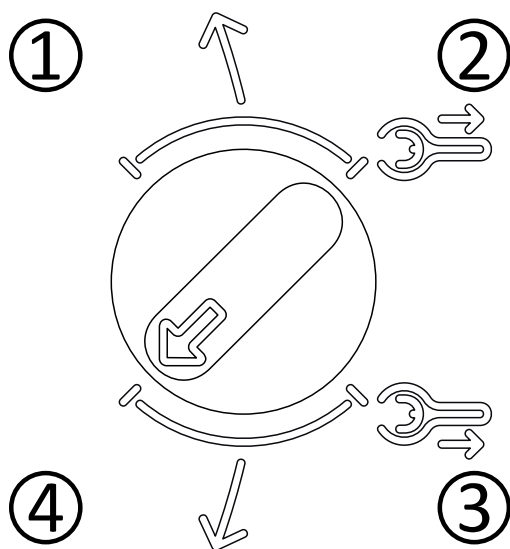
### Installation and Removal

Installation of the Continuous Spanner requires that the opening in the ratchet ring and the openings in the spanner heads be aligned. The position where these openings are aligned is referred to as the home position. Due to the close fit of the Continuous Spanner, this alignment must be precise, or the tool can become wedged. The selector knob has two positions specifically designed to assist with this alignment. When the selector knob is in one of these positions, the spanner will ratchet normally until the home position is reached, at which point there will be a mechanical stop resisting continuing rotation. This stop can be overcome with additional torque or skipped over with quick rotation if installation or removal is not desired. The Continuous Spanner should be stored in the home position to prevent debris from entering the internal areas of the tool.

### Selector Knob Positions

The selector knob has four operational positions. These positions provide rotation clockwise or counter clockwise with or without a stop in the home position.

## Tool Overview



Position	Rotation Direction	Home Stop
1	CCW	Off
2	CCW	On
3	CW	On
4	CW	Off

### Modular Handle and Handle Lock Set Screw

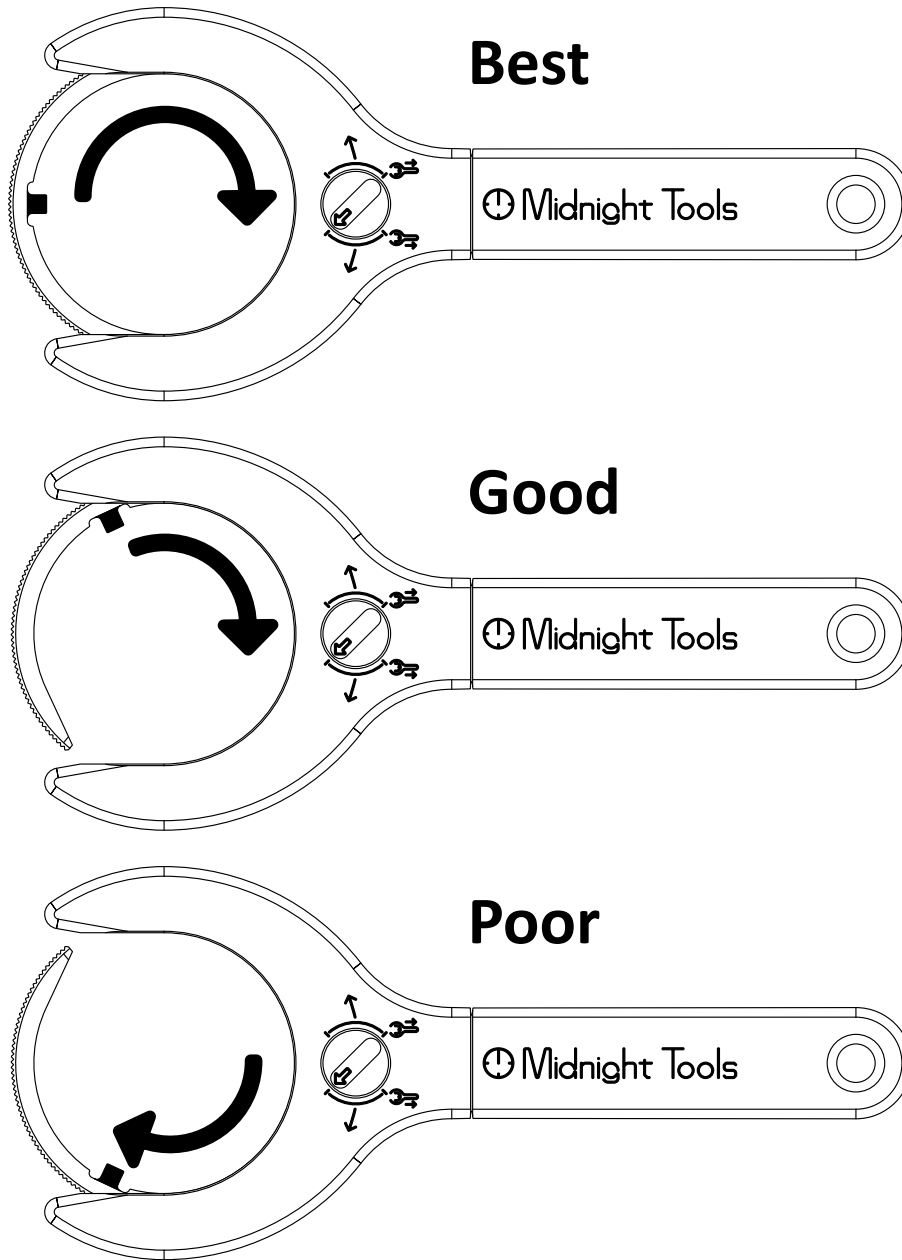
The handle on the Continuous Spanner is designed to be modular allowing the operator to replace or change the handle with minimal difficulty in the field. The details of removing and installing a handle are covered in a later section of this manual. If the handle becomes loose, the handle lock set screw requires tightening. The position of this set screw is illustrated in the previous section. The set screw should be tightened just beyond the point where resistance is encountered using a 1/8<sup>th</sup> inch hex driver. Overtightening the set screw can damage the internal surfaces of the spanner reducing the effectiveness of the locking mechanism.

### Torque and Ratchet Ring Positions

The amount of torque which can be applied by the Continuous Spanner varies depending on the position of the ratchet ring. If high torque is required, the spanner should be positioned with the engagement feature (pin or hook) opposite the handle with both ends of the ratchet ring in the spanner head and engaged with the pawls for best performance. If this is not possible, the pin should be positioned so that torque on the handle is pulling the ring and engagement feature rather than pushing it. These positions for clockwise rotation are illustrated below.

## Tool Overview

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**Note:** Applying high torque in a position where the tool is pushing the pin, such as the illustrated poor position, can allow the tool to bend out of close engagement with the body being rotated and damage the tool. If the spanner head begins to bend away from the body being rotated immediately stop applying torque and reposition the tool to one of the preferred high torque positions.

### Debris, Cleaning, and Routine Care

As an open-ended tool, the Continuous Spanner is subject to debris entry during use. It has been designed to improve debris tolerance and simplify cleaning, but debris should be removed from the area before installing the Continuous Spanner. If the tool is exposed to debris it should be cleaned immediately following use. In general, this can be done without opening the tool by rotating the ratchet ring to expose the inside of the spanner.

## Tool Overview

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If water is used to clean the tool, a water displacer, such as WD-40, should be used immediately after rinsing. The ratchet ring and the internal surfaces of the tool should also be lubricated with a light grease or oil. It is recommended that heavy greases or oils which oxidize be avoided since these can hold debris in the tool.

If the tool becomes jammed with debris, or requires more extensive cleaning, it can be opened following the disassembly procedure which can be found in a later section of this manual.

## Disassembly and Reassembly

Changing handles, replacing components, clearing severe jams, or extensive cleaning require opening the Continuous Spanner. Instructions for opening the tool and reassembly following these events are included in the following sections.

### Required Tools

- 1/8<sup>th</sup> hex key
- 9/64<sup>th</sup> hex key
- A small flat bladed screwdriver
- External snap ring pliers

### Required Supplies

- Light grease or if unavailable a non-oxidizing oil

### Required Safety Equipment

- Safety glasses

### Lubrication

All the highlighted areas on the top and bottom heads of the tool should be lubricated whenever it is disassembled. Also, lubricate the components which contact these areas.





# Disassembly and Reassembly

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## Opening the Spanner

- 1) Place the spanner with the selector knob facing down.
- 2) Loosen the handle lock set screw using a 1/8<sup>th</sup> inch hex key.
- 3) Remove the seven main screws using a 9/64<sup>th</sup> hex key.



- 4) Lift the bottom head to expose the internal components.



- a) If the bottom head is difficult to remove, carefully rock the handle up and down to loosen the double wedge engagement with the top and bottom head.
- 5) The remaining components can be removed as necessary without additional tools, except for the selector knob which requires removal of the snap ring using snap ring pliers.

## Assembling the spanner

- 1) Install the selector knob in the top head.
  - a) Collect the top head, selector knob, 1/8<sup>th</sup> inch bearing ball, spring, wave spring, and snap ring.

## Disassembly and Reassembly

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- b) Lubricate the opening in the top head and the selector knob.
- c) Insert a spring into the hole on the side of the selector knob.
- d) Lubricate the end of the spring and a 1/8<sup>th</sup> inch bearing ball.
- e) Hold the selector knob with the spring facing upward and place a 1/8<sup>th</sup> inch bearing ball onto the spring. If you have difficulty keeping the bearing ball in place use additional or more viscous lubrication between the spring and the bearing ball.



- f) Hold the top head so that the opening for the selector knob is horizontal.
- g) Insert the selector knob partially into the opening in the top head with the spring and bearing ball facing upward. It can be helpful to align the spring and bearing ball with one of the marked selector knob positions.

## Disassembly and Reassembly

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- h) Carefully compress the 1/8<sup>th</sup> inch bearing ball and spring into the selector knob using the end of a small flat bladed screwdriver. Take care to avoid releasing the spring and launching the bearing ball.



- i) Insert the selector knob into the top head until the bearing ball is fully contained.  
j) Remove the flat bladed screwdriver and complete installation of the selector knob.  
k) Place the top head face down.

## Disassembly and Reassembly

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- l) Insert the wave spring over the selector knob cam.



- m) Install the selector knob snap ring into the groove on selector knob. This will require slightly depressing the wave spring.

## Disassembly and Reassembly

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- n) Rotate the selector knob halfway between positions 1 and 4. (The arrow on the selector knob should be parallel with the handle pointing towards the opening in the spanner and the large side of the cam should be closest to the opening.)
- 2) Install the pawls in the top head.
  - a) Lubricate the pawl pockets in the top head.
  - b) Insert the pawls into the pawl pockets.



- c) Place a spring into each of the pawl spring pockets.



## Disassembly and Reassembly

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d) Compress the pawl springs behind each of the pawls.



**3)** Install the selector.

- a) Verify that the selector knob is positioned halfway between positions 1 and 4 with the large side of the cam closest to the opening in the head.
- b) Place the slot in the selector over the cam on the selector knob.

## Disassembly and Reassembly

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- c) Carefully spread one pair of pawls and insert the center pin on that side of the selector into the slot between the pawls. Both outer pins on the selector should be inside each of the pawls.

**Note: Take care not to deform the selector or bend the pins.**



- d) Repeat step C with the other set of pawls.
- 4) Install the home key.
- a) Position the bottom head face down and lubricate the home key pocket and home key.

## Disassembly and Reassembly

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- b) Insert the two springs into the holes on the home key.
- c) Position the key into the cavity in the bottom head with the springs facing away from the main opening and the tabs on the home key facing down.



- d) Use the home key to compress the springs by pushing it away from the opening in the bottom head and down until the home key tabs are fully in the openings in the bottom head.
- e) Gently release the home key. The springs should hold it in position against the tabs on the bottom.
- f) Verify that the springs are extending straight from the back of the home key and adjust if required using the flat bladed screwdriver.



## Disassembly and Reassembly

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- 5) Install the handle.
- a) With the top head face down, lubricate the tab on the handle and the pocket in the top head.
  - b) Insert the handle into the top head. The Midnight Tools logo on the handle should be facing down.
  - c) Lubricate and insert a 1/4<sup>th</sup> inch bearing ball into the hole between the island in the top head and the handle.



- 6) Install the ratchet ring.
- a) With the bottom head face down, lubricate the internal surfaces of the bottom head and the ratchet ring.

## Disassembly and Reassembly

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- b) Depress the home key and insert the ratchet ring with the openings aligned.



- 7) Install the bottom head.
- a) Lubricate remaining surfaces indicated in the lubrication section above.
  - b) While holding the ratchet ring in place, flip the bottom head and carefully position it over the top head. Complete the installation with a straight downward motion. It may be necessary to slightly rock the handle to get the bottom head to seat fully.

## Disassembly and Reassembly

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- c) Verify that the top and bottom heads are in contact. The main screws should not be used to force the top and bottom head together. If the heads do not contact, check for an obstruction prior to proceeding.
- d) Install the seven main screws using a 9/64<sup>th</sup> hex driver and tighten just until contact.
- e) Install the handle lock set screw if it was removed.



- 8) Tighten the handle.
  - a) Carefully tighten the handle lock set screw until just past the point of resistance. **Note: Do not overtighten as this can damage the engagement surfaces.**
- 9) Complete tightening of the seven main screws using a 9/64<sup>th</sup> hex driver. **Note: the threads in the head are aluminum and can be stripped by overtightening the screws. High torque is not required and will not improve functionality.**
- 10) Verify full functionality of the Continuous Spanner.

# Disassembly and Reassembly

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## Replacing the Handle

Replacing the handle follows the related parts of the disassembly and assembly procedures outlined above. A condensed version follows for quick reference. Refer to the above sections for additional details.

- 1) Open the spanner.
- 2) Remove the 1/4<sup>th</sup> inch bearing ball.
- 3) Lift the handle out of the pocket in the top head.
- 4) Lubricate the pockets and tab on the new handle.
- 5) Insert the new handle into the pocket in the top head with the Midnight Tools logo facing downward.
- 6) Replace the 1/4<sup>th</sup> inch bearing ball.
- 7) Close the spanner and tighten the main screws just until contact.
- 8) Tighten the handle lock set screw to just past the point of resistance. **Note: Do not overtighten as this can damage the engagement surfaces.**
- 9) Complete tightening of the main screws. **Note: the threads in the head are aluminum and can be stripped by overtightening the screws. High torque is not required and will not improve functionality.**

## Troubleshooting

### The handle is loose

1. Tighten the handle lock set screw just past the point of resistance. **Note: Do not overtighten as this can damage the engagement surfaces.**
2. If the handle is still loose open the spanner.
3. Clean, lubricate, and inspect the contact surfaces on the handle and the top and bottom head.
  - a. Minor deformation of the channel where the 1/4<sup>th</sup> inch bearing ball contacts the handle is normal. Substantial deformation is an indication of overtightening the handle lock set screw.

### The spanner becomes jammed during installation or removal

1. Verify that the tool is in the home position prior to installation or removal.
  - a. Use positions 2 and 3 on the selector knob to enable the home key to assist with alignment.
2. Verify that the body and handle of the tool are perpendicular to the axis of the body being rotated.

### Spanner will not rotate in the free motion direction

1. Verify that the selector knob is in the intended position.
2. Remove visible debris from the ratchet ring and surrounding areas.
3. Reverse the direction of rotation using the selector knob and attempt to rotate the spanner
  - a. If the spanner rotates, proceed through a full rotation removing any visible debris.
  - b. Return the direction of rotation to the original direction and attempt to rotate the spanner.
4. If the spanner will not rotate in the reverse direction, or the issue remains after completing step 3, it may be necessary to open the tool. **Note: When opening the spanner, it is possible to drop small internal components. Take care to prevent the loss of these parts, especially in environments where these components could interfere with operations or otherwise present a problem.**
  - a. Loosen the handle lock set screw and gently rock the handle up and down.
  - b. Loosen the seven main screws and then, while manually holding the heads together, remove these screws.
  - c. Split the top and bottom heads. **Note: If the spanner is in a horizontal orientation it is recommended to keep the head which is facing down in place and remove the head which is facing upward to reduce the risk of dropping internal components.**
  - d. Carefully remove the pieces of the spanner from the body being rotated.
5. Clean and check the spanner.
  - a. Check all internal areas for debris. Clean and lubricate as required.
  - b. Verify that the six pins on the selector are not bent, damaged, or missing.
6. Reassemble and test the spanner functionality.

### Spanner freely rotates in both directions

1. Rotate the ratchet ring so that one set of pawls is visible.

# Troubleshooting

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2. Verify that there is a spring behind each pawl.
  - a. If a spring is missing open the spanner and replace it.
3. Rotate the selector knob between positions 1 and 4 and verify that the selector pins move and in each position one pawl is extended and the other is retracted into the head.
  - a. If the pawls don't move as expected, examine the selector pins. There should be a pin visible on the side of each pawl opposite the spring.
  - b. Verify that these pins are not bent or otherwise damaged.
  - c. If a selector pin is missing or damaged open the spanner and replace the selector.
  - d. If the selector pins do not move open the spanner and inspect the cam on the selector knob and the slot in the selector around the cam for damage.
4. Inspect the teeth on the ends of the pawls for significant wear or damage
  - a. It is normal for the coating to wear from the contact surfaces of the teeth and for these surfaces to appear polished.
  - b. If the teeth are missing or damaged open the spanner and replace the damaged pawl
5. Rotate the ratchet ring so that the other set of pawls is visible and repeat steps 2-4.
6. Inspect the teeth on the ratchet ring. If there is damage or substantial wear, replace the ratchet ring.

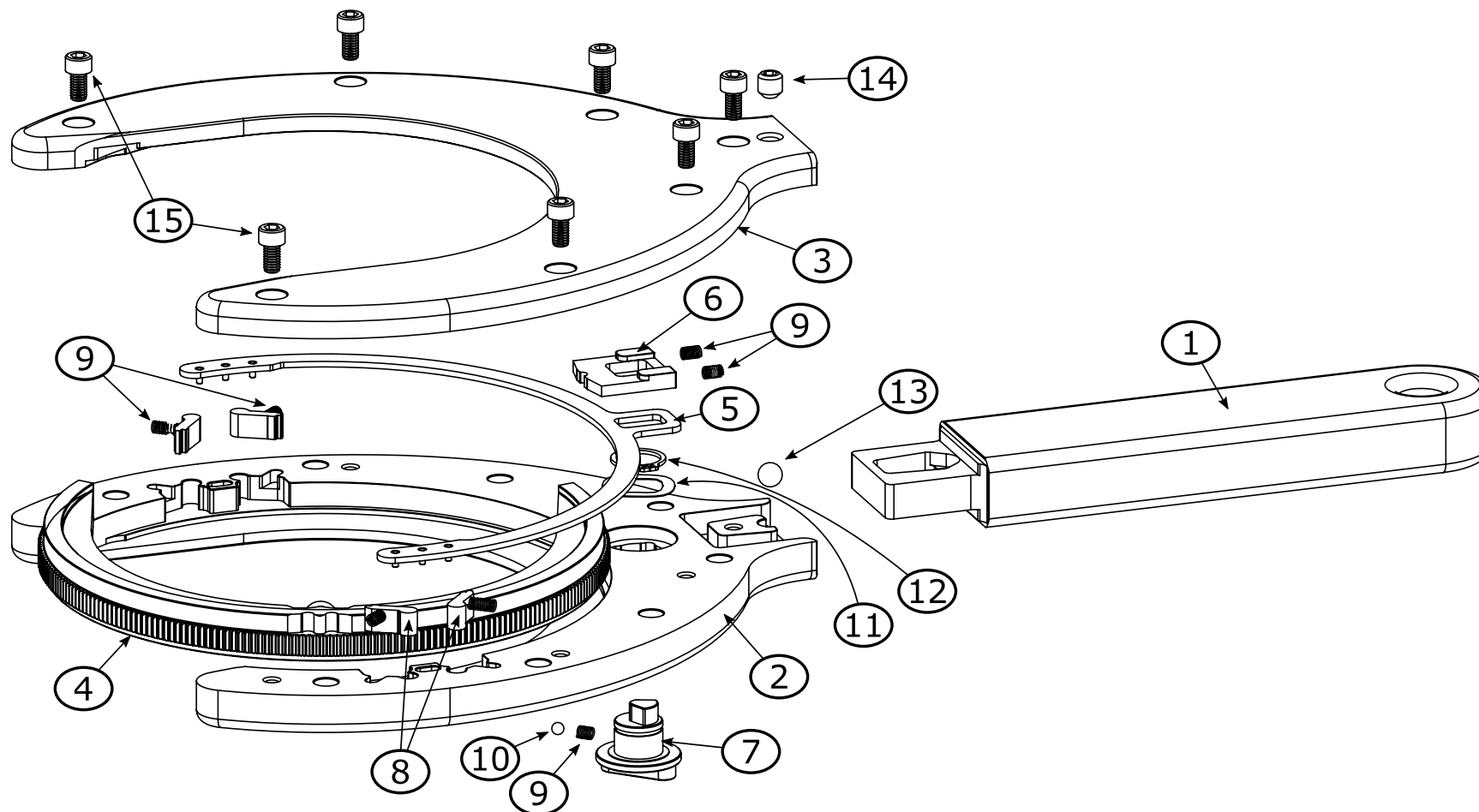
## Selector knob does not rotate freely

1. Open the spanner.
2. Check for debris. Clean and lubricate as required.
  - a. Verify that the groove for the selector in the bottom head is clear.
  - b. Verify that the home key moves freely in the bottom head.
3. With the top head removed check if the selector knob rotates freely.
  - a. If it does not, remove the snap ring and then remove the selector knob from the top head. **Note: there is a small bearing ball and spring loaded into the selector knob. Take care when removing the selector knob to prevent the loss of these parts.**
  - b. Check that the spring in the selector knob can compress freely.
  - c. Examine the body of the selector knob for damage.
  - d. Examine the opening in the top head for debris or damage. Minor wear where the bearing ball contacts the top head is normal.



## Drawings and Part List

### Exploded Spanner Part Illustration



## Drawings and Part List

### Part Number Table

Drawing Item Number	Description	Quantity	Part Number		Version Note
			4.500	4.750	
1	Handle	1	10,000,013		Standard length
2	Top Head	1	10,000,300	10,000,301	
3	Bottom Head	1	10,000,310	10,000,311	
4	Ratchet Ring	1	10,000,320	10,000,330	Standard diameter full length pin
			10,000,321	10,000,331	Standard diameter short length pin
5	Selector	1	10,000,352		
6	Home Key	1	10,000,064		
7	Selector Knob	1	10,000,011		
8	Pawl	4	10,000,010		
9	Spring	7	10,000,200		
10	1/8 Bearing Ball	1	10,000,201		
11	Wave Spring	1	10,000,203		
12	Snap Ring	1	10,000,204		
13	1/4 Bearing Ball	1	10,000,202		
14	Set Screw	1	10,000,205		
15	Socket Head Cap Screw	7	10,000,206		



## Technical Support

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### Technical Support

If you require additional support, or have questions not covered by this manual, contact us using the information available at [www.MidnightTools.com/contact](http://www.MidnightTools.com/contact).