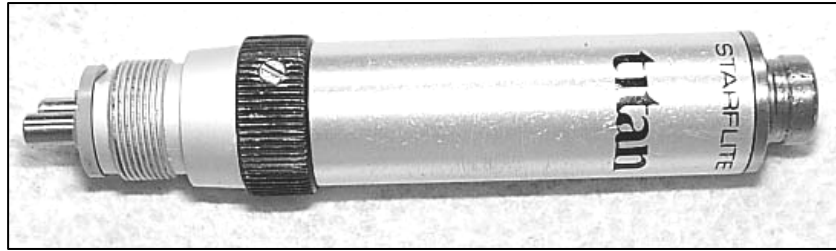


# STAR 5K MOTOR REPAIR PROCEDURE



The Star 5K Motor is used with a wide variety of Star attachments. Two of the attachments, the Star Motor to Angle Adapter and the Star Nosecone are also covered in this manual. It has gone through very little change since its inception so the following procedure will be relevant for any Star non-swivel 5K motor you encounter. Most replacement parts are available for this motor. Do not confuse this handpiece with the Star 20K Motor. The Star 20K Motor is much shorter. As always, try to determine the problem before disassembling the motor.

Some of the most common problems with this handpiece are:

- The motor is locked up.
- The motor has low torque.
- The threads are worn.
- There is a loud grinding noise inside the motor.
- The main drive gear is worn.

The repair procedures for each of these problems is addressed below



## STEP 1

The first step is to make sure you have a tool that will allow you to put downward pressure on the drive gear of the motor while you unscrew the housing. This will prevent you from bending the alignment pin and ruining the head while you disassemble the unit. Your tool will consist of a long shaft that has a star gear attached to one end. The opposite end of the shaft should be held by your wooden handled hand collet or other similar device (see picture).



## STEP 2

Now place the threaded portion of the motor into a 9/16" collet. Once the collet is secure, wrap the main housing of the motor with a rubber strip and apply downward pressure to the drive gear using the above mentioned tool from **STEP 1**. While applying this pressure, you may unscrew the motor housing from the head. All thread patterns on this handpiece are regular so turn the housing counterclockwise to unscrew.



## STEP 3

Once the housing has been unthreaded from the head, push the internal motor parts out onto your

work surface and remove the head from the collet. If the problem with the handpiece was only worn threads, replace the head (60203) and reassemble by following **STEP 4** and **STEP 16**. Otherwise, proceed to the next step.

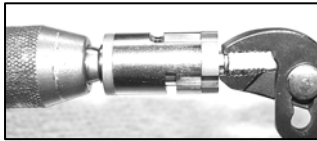


#### **STEP 4**

In a complete overhaul you will want to replace the three o-rings on the head and also the forward/reverse valve o-ring. First, remove the top green

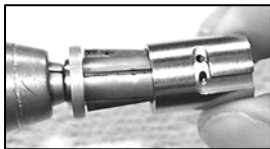


o-ring. Then remove the screw from the forward/reverse ring. Once the screw is removed you can pull the f/r ring off of the head and remove the o-rings with a needle. Then you will need to tap the forward/reverse valve out of the head and remove the o-ring found under the valve.



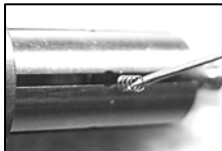
#### **STEP 5**

Now that the head is disassembled, we will disassemble the internal motor. You will need to pull the alignment pin and distributor plate off of the motor. Then put the drive gear in your wooden handled collet holder. Once the gear is held securely, unscrew the locknut from the rear of the motor.



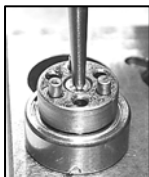
#### **STEP 6**

At this point, you can pull the end plate and rotor housing off of the rotor. Carefully remove the blades and springs. Be aware that some models do not have springs. Generally, a locked up or low torque motor can be repaired by ultrasonically cleaning the internal motor parts and replacing the blades and springs. Sometimes a new rotor housing is needed as well.



#### **STEP 7**

It is sometimes necessary to replace the drive gear, bearing or planetary gears on the gear reduction assembly. To change the drive gear, follow the instructions in **STEP 9**. To change the bearing, follow **STEP 8**.

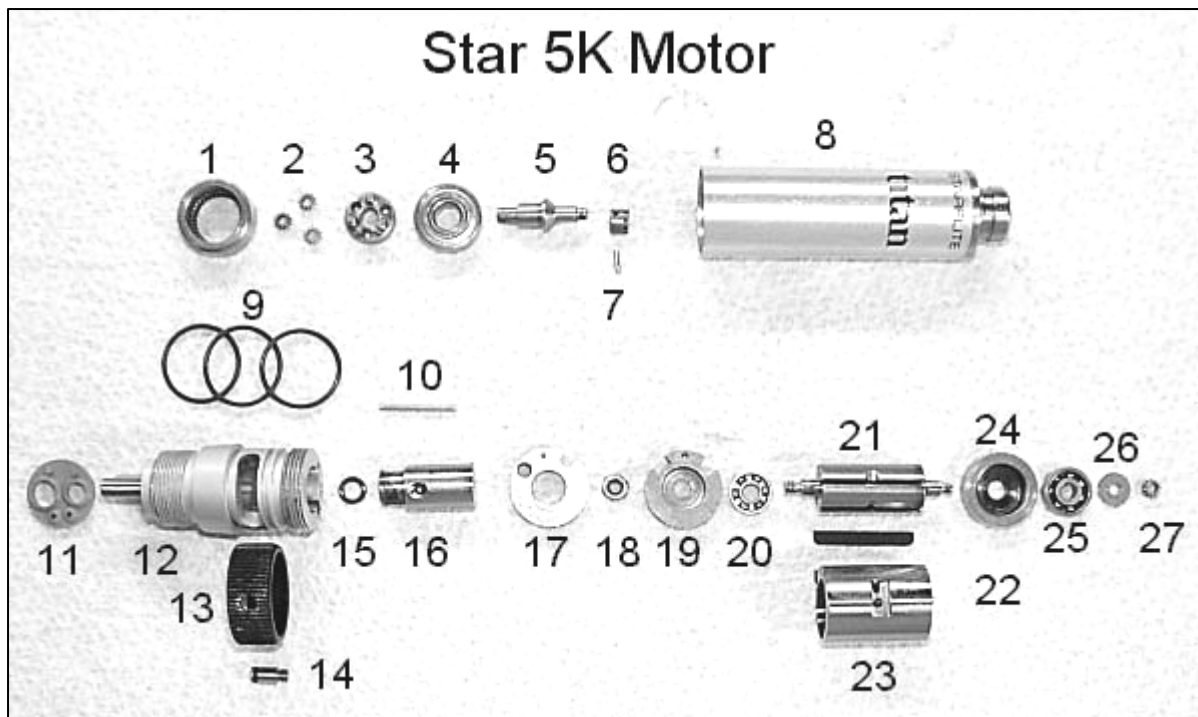


#### **STEP 8**

To remove the bearing, you must drive the output shaft through it and the gear plate. Place the gear down into Hole #6 in your work block. You then need to tap the shaft out of the gear plate as shown. This will leave you with a bearing, the gear plate and the output shaft assembly shown in step 9.



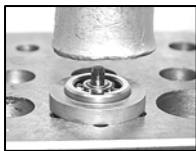
**STEP 9** To replace the drive gear, you will need to drive the retaining pin out of the gear and output shaft. Place the shaft over two v-blocks. Then, using a small thin punch, tap the pin out of the assembly.



Picture Number	Part Number	Description
1	60216	Ring Gear
2	60218	Planetary Gears
3	60215A	Gear Plate
4	60223	Output Shaft Bearing
5	60225	Output Shaft
6	60219	Drive Gear
7	60219A	Drive Gear Pin
8	60201	Main Housing
9	60226	Head O-Rings
10	60222	Alignment Pin
11	40422A	4-Hole Gasket
12	60203A	Head
13	60213	Forward/Reverse Ring
14	60214	Forward/Reverse Ring Screw
15	60227	Forward/Reverse Valve O-Ring
16	60211	Forward/Reverse Valve
17	60210	Distributor Plate
18	60221	Lock Nut
19	60208	Lower End Plate
20	60225	End Plate Bearing
21	60207	Rotor
22	60220	Rotor Blades
23	60206	Rotor Housing
24	60209	Upper End Plate
25	60224	End Plate Bearing
26	60229	Bearing Retainer
27	60217	Sun Gear

We will address some of the troubleshooting tips now that we are about to reassemble our adapter.

- *The Motor is Locked Up.* This is usually caused by the existence of rust and debris in the internal motor. Disassemble and clean all the motor parts to cure the problem. Occasionally, a broken rotor blade will seize the motor up. Replacing the blades will remedy that problem. If the lock nut is loose or too tight, you may also have a locked up motor. Be sure to adjust the nut as described in **STEP 17**.
- *The Motor Has Low Torque.* In addition to the repair steps mentioned above, you need to do the following. Lap all the motor plates on fine grit sandpaper, (2000 grit). Replace the Forward/Reverse Valve O-Ring like in **STEP 19**. And make sure the spacing between the rotor and lower end plate is correct, see **STEP 11**. You may also need to replace the rotor housing (60206), if it is damaged.
- *The Threads are Worn Out.* Simply replace the head as described in **STEP 19**.
- *There is a Loud Grinding Noise in the Motor.* Generally, replacing the bearings will quiet down the motor. The bearings numbers are 60224 and 60225. Look at **STEP 8**, **STEP 10** and **STEP 15** for the proper repair procedure.
- *The Main Drive Gear is Worn Out or Cracked.* To replace this gear, follow **STEP 8**, **STEP 9**, **STEP 13** and **STEP 14**.



#### **STEP 10**

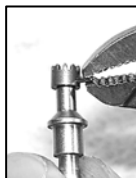
To remove the bearing and sun gear, place the body of the rotor into your elevated work block as shown. Using a thin punch, tap the rotor post out of the gear, bearing and lower end plate.

#### **STEP 11**

Reassemble the rotor assembly by placing a new bearing into the lower end plate. Stand the rotor up into hole #4 and place the cover plate on top (Bearing Exposed). Now set an old bearing (Same Size) on top of the new bearing. Next, place a piece of paper between the rotor and cover plate. Carefully press the rotor and cover plate together and then remove the piece of paper from the assembly. The cover plate should spin nicely.

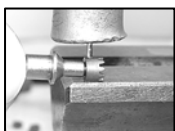
#### **STEP 12**

Replace the sun gear by putting the opposite end of the rotor assembly into hole # 4. Then press the gear onto the rotor assembly with the press until it is fully seated.



#### **STEP 13**

To replace the drive gear, slide it onto the output shaft. Make sure the pin hole in the gear lines up with the pin hole in the shaft. Place the pin into the hole in the gear and try to slightly insert it with your pliers.



#### **STEP 14**

Now place the assembly over a flat surface. Preferably, the edge of your v-block or work block. Make sure the pin is alligned properly and use a brass hammer to tap the pin into place.



### STEP 15

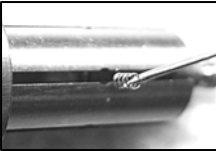
To complete the reassembly of the reduction gear assembly, first push the bearing onto the back of the output shaft. Then, place the gear down into



Hole # 1 of your work block. Next, line the gear plate over the base of the shaft as shown in the picture (near left).

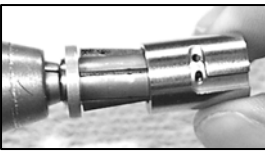
Using a flat rounded punch, that will not touch the three posts that hold the planetary gears, tap the plate onto the post. Apply grease to the three posts and replace the

planetary gears.

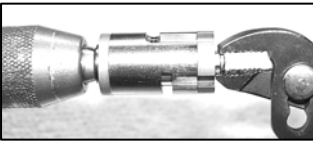


### STEP 16

Place the rotor blade springs back into their appropriate holes in the rotor. With those in place, push the blades into the rotor slots. The blades must be put into the slots with the curved edge side down. The



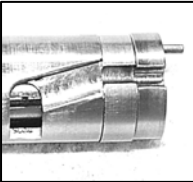
flat edges on the blades need to be towards the outside of the grooves to maximize the amount of air they catch.



### STEP 17

Once again secure the sun gear in your wooden handled collet. Next, slide the upper end plate into its position, bearing away from the rotor, and tighten the assembly by screwing the

locknut onto the appropriate threads. If the nut does not have good resistance while being screwed into position, it is faulty and must be replaced. To properly adjust this internal motor, screw the lock nut all the way down, and then back it off approximately 1/4 turn. When adjusted properly, you should be able to turn the upper end plate with your fingers.



### STEP 18

Line up the alignment pin holes in the rotor housing and upper end plate. Insert the alignment pin and then push the distributor plate onto the pin.



### STEP 19

To reassemble the head, place the forward/reverse valve upside down on your work surface. Install the bottom two green o-rings and collar onto the head and place the forward/reverse valve o-ring into the groove on the valve. Lower the head over the valve so that the hole in the forward/reverse collar will line up with the hole in the valve. Install the collar screw and third green o-ring.



### STEP 20

Place the threads from the head into the 9/16" collet. Stack the gear reduction assembly on to the motor assembly. Then place that assembly on top of the head (as shown). Be sure to insert the motor alignment pin in the proper hole. With the forward/reverse ring in the forward position, lower the main housing over the unit.



### **STEP 21**

You should now begin to thread the housing onto the head. Again apply downward pressure on the drive gear with your gear shaft tool described in **STEP 1**. While applying the downward pressure screw the outer housing completely onto the head.