



## SERVICE INSTRUCTIONS FOR 90° AIRCRAFT ANGLE HEADS

Form Z501A  
Date 1-99/A  
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### USING THRUST BALL ON OUTPUT SPINDLE (ANGLE HEAD ASSEMBLY NO. 65214A, 65266A, 65542A)

The following service instruction is for the purpose of providing guidance in disassembly and assembly of aircraft angle heads which utilize a ball on top the output spindle to take the drilling thrust. Following the instructions will insure that proper gear mesh is achieved.

Recommended lubrication to be used in the angle head assembly is Sioux 1232A grease.

#### Disassembly Instruction:

- Angle head assembly is removed from the tool by loosening the jam nut (65143), which has left hand threads. With the jam nut loose the angle head can be unscrewed from the tool.
- Firmly grip the angle head in a vise but do not tighten excessively as to damage the angle head. Using a 1 1/2" wrench, loosen the angle drill housing (65244) which has left hand threads and unscrew to disassemble. Note that thread lock material was used on the threads and should be cleaned off as good as possible before reassembling.
- The pinion can be pulled out of the angle drill housing by grasping on the bearing retainer (65245). When the bearing retainer is moved from its position on the pinion the 22 pins (65246) will be loose to fall out. Therefore provide a suitable container to catch the loose pins.
- Replacement of ball bearing (10257) is made by loosening and removing retaining nut (65243), which has left hand threads. Ball bearing can then be removed from angle drill housing.
- Output spindle gear is removed by loosening the bearing bushing (65248) which has left hand threads.

Note: If the gear set is being replaced, the bushing (67852) will also need replacement because of possible wear and the need to adjust the ball (10303) with set screw (06012) which was made tamper proof with glue.

- Once the output spindle gear is removed, place the angle head output face on a flat plate under a press and push in the center of the cap (67853) with a 3/16" diameter ram. Pushing on the 3/16" ram will push the bushing free.

#### Assembly Instruction:

- Press bushing (67852) into angle head starting from inside the angle head. Press until bushing flange is flush to cast surface inside the angle head.
- While holding bushing (67852) in position; press cap (67853) onto the bushing until the cap is tight against the top of the angle head.
- Lightly grease both bearing journals on the output gear spindle and place ball (10303) in the center on the small diameter end.
- Insert output spindle with ball on end into angle head and bushing. Slip bearing bushing (65248) onto the output gear spindle and tighten (left hand thread). Check to be sure the output gear spindle turns freely.
- With a small amount of thread lock on the set screw (06012) tighten the set screw until the spindle is tight and will not turn; then loosen the set screw slightly (1/8 turn max) just so the output gear spindle turns free.

- Wipe a thin film of grease on the bearing relieved diameter of the pinion. Place all 22 pins (65246) into position in the grease film on the relieved diameter. Carefully slide bearing retainer (65245), with shallow recess slot end first, onto the pinion and down over the 22 pins.

- Insert pinion into angle drill housing (65244) until the two tangs on the bearing retainer completely engage into the slots of the angle drill housing. With these two parts indexed together insert the pinion into the angle head. Screw the angle drill housing into the angle head (left-hand thread) until the gears are into mesh. Note: A drill bit may be needed to be screwed into the output spindle gear to turn the gear in order to aid in meshing the gear set. Continue to screw the two components together until the gear mesh is tight but be careful not to screw the two components together so tight that the gears can be damaged.

- Now with the gear mesh in a tight position, start to unscrew the angle drill housing from the angle head until the pinion can be just made free to turn. At this point measure the gap between the angle drill housing and the angle head to determine the first estimated amount of shims (65242).

Unscrew the angle drill housing from the angle head and be careful that the bearing retainer stays in position over the 22 pins and locked into the angle drill housing. Slip the number of shims needed to build the dimension estimated in previous step onto the angle drill housing and again screw the angle drill housing into the angle head. Once the gears are meshed, slowly tighten until either 60 in-lb torque is achieved or the gear set becomes tight.

- a) If the angle head was tightened to the 60 in-lb and the gear mesh is completely free, unscrew angle drill housing from the angle head and remove one shim and again assemble to see if the gear mesh becomes tight. **Proper mesh will be achieved when the gear mesh is free and within one shim of becoming tight.**

- b) If the gear mesh was tight, unscrew angle drill housing from the angle head and add one shim. Again assemble and attempt to tighten to 60 in-lb. Repeat this step until the gear set is free to turn.

- Now with the proper amount of shims determined and the angle drill housing tightened to the angle head with 60 in-lb of torque, run the angle head assembly to check for noise and free meshing of the gear set. Since the angle head is not completely lubricated do not run for a long period of time or load the gears.

- When proper operation is achieved, then unscrew the angle drill housing from the angle head and put a drop of thread lock adhesive (Loctite 242 or Omnifit 1350) on the threads and retighten to 60 in-lb.

- Use epoxy or similar adhesive to fill the set screw (06012) inside the cap (67853) to make the set screw tamper proof.

- Add grease to angle head thru grease fitting.

- Assemble angle head assembly to the tool and lock in desired position with the jam nut.

- Operate angle head to check that heat buildup is not excessive and that the gear mesh is acceptable.

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**TOOLS INC.**

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## PARTS LIST FOR 90° ANGLE HEAD ASSEMBLY

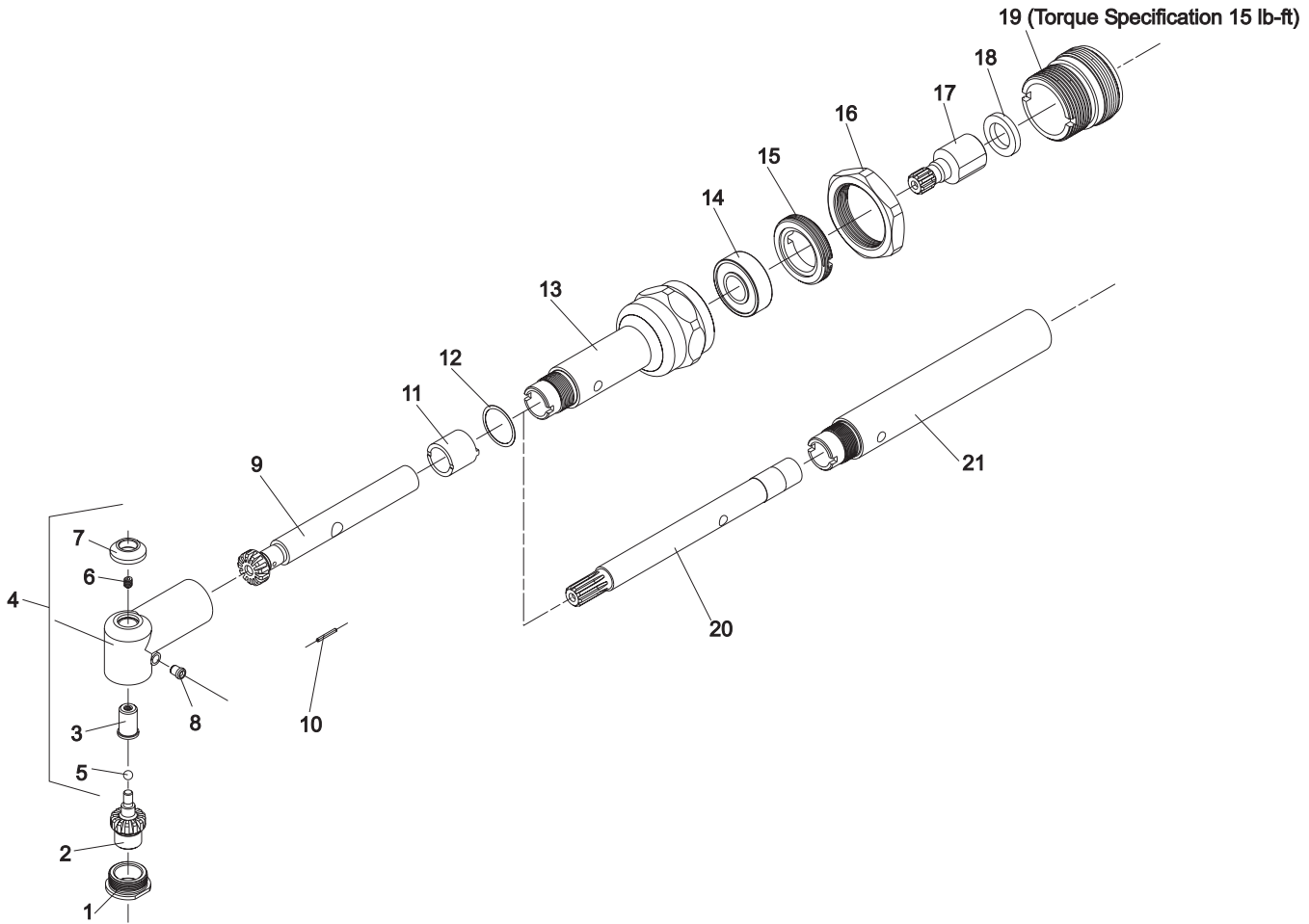


Fig. No.	Part No.	Description
1.	65248	Bushing—Bearing
2.	67495A	Gear—Set (1/4"-28 Th'd) (Includes Figure 3, 5, 6, 7, 9)
	67496A	Gear—Set (#10-32 Th'd) (Includes Figure 3, 5, 6, 7, 9)
	67497A	Gear—Set (9/32"-40 Th'd) (Includes Figure 3, 5, 6, 7, 9)
3.	67852	Bushing (Includes Figures 5, 6)
4.	65247A	Housing—90°
5.	10303	Ball—Steel Ø1/8"
6.	06012	Screw—Set #4-40 x 1/8" Socket Hex
7.	67853	Cap
8.	30375	Fitting—Grease
9.		Pinion—90° (Not Available Individually, Refer to Figure 2)
10.	65246	Pin (Set of 22)
11.	65245	Retainer—Bearing

Fig. No.	Part No.	Description
12.	65242	Shim—.005" (Order Quantity As Needed)
13.	65244	Housing—Angle Drill
14.	10257	Bearing—Ball
15.	65243	Nut—Retaining
16.	65143	Nut—Jam
17.	65146	Adapter—Spindle
18.	44122	Spacer
19.	65231	Adapter
20.	65486	Extension—Drive Shaft
21.	65487	Extension—Housing
	65214A	Assembly—Complete (1/4-28 Th'd) (Includes Figures 1 thru 15)
	65266A	Assembly—Complete (#10-32 Th'd) (Includes Figures 1 thru 15)
	65542A	Assembly—Complete (9/32"-40 Th'd) (Includes Figures 1 thru 15)

\*Order Quantity As Required

FURNISH CATALOG, SERIAL, AND MODEL NUMBER WHEN ORDERING PARTS

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