VAN HORN AVIATION, L.L.C.
Tempe, Arizona

Customer Support Specification CSS-500
WC-6TG-8 Bearing Installation

August 28, 2012

Revision B
Revision B Date: September 15, 2014

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REVISIONS

REV	DATE	DESCRIPTION	APPROVED
A	08/14/13	Revised speeds in Section 2.2.5 Revised processes in Sections 2.2.7 through 2.2.12 Removed Figure 5 showing 90° swaging	JVH
B	09/15/14	Complete rewrite.	JVH

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1 EQUIPMENT AND MATERIALS

1.1 WC-6TG-8 Bearing. May be purchased from Aeronautical Accessories, www.aero-access.com.

1.2 Dixie Aerospace RST 2153 Bearing Tri-Roller Swaging Tool and Locating Fixture. May be purchased from Van Horn Aviation.

1.3 Table-mounted arbor press.

1.4 Hydraulic press to remove bearings.

1.5 Manual milling machine or drill press if no milling machine is available.

1.6 Feeler gage, 0.005 inch.

1.7 Loctite 609 Retaining Compound.

1.8 Acetone, lacquer thinner or equivalent solvent.

1.9 Machine oil.

1.10 Super fine abrasive pad, or 400 grit abrasive cloth/paper.

2 PROCEDURE

Bearings are installed per NAS 0331, Method 200 except that proof load is not required. The procedures below are used by Van Horn Aviation. They provide repeatable results that meet NAS 0331 installation requirements.

2.1 Pre-Installation.

2.1.1 Remove existing bearings using a hydraulic press. Press the bearing out from the lower surface. The upper surface will be against the press bed. Data plate is on the upper surface.

2.1.2 Inspect the bore(s) in the root fitting for scratches, nicks, or other marks. Remove any damage by blending using abrasive pad, cloth, or paper. Maximum depth of scratches, nicks, or other marks is .005 inches. After blending, solvent wipe the bore.

2.1.3 Wipe down the outside bonding surface area of the replacement bearing with acetone, lacquer thinner or equivalent solvent to remove any contamination.

2.2 Bearing Installation.

It is very important that the swaging tool is square to the drill press or milling machine bed. An out of square condition (spindle is not perpendicular to bed) coupled with small amounts of drill press flexing causes uneven swaging. Uneven swaging results in one side of the bearing being swaged more than the other side. VHA has found that progressively swaging the bearing results in the best lip formation when there is flexing and an out of square spindle.

2.2.1 Apply a coat of Loctite 609 retaining compound onto the outer surface of the bearing and to the inner surface of the root fitting bore.

2.2.2 Place the bearing onto the lower surface of the blade (data plate in on upper surface of blade), insuring that the bearing is straight and not skewed relative to the housing bore.

2.2.3 Using the arbor bearing press, press the bearing into the housing. See Figure 1.

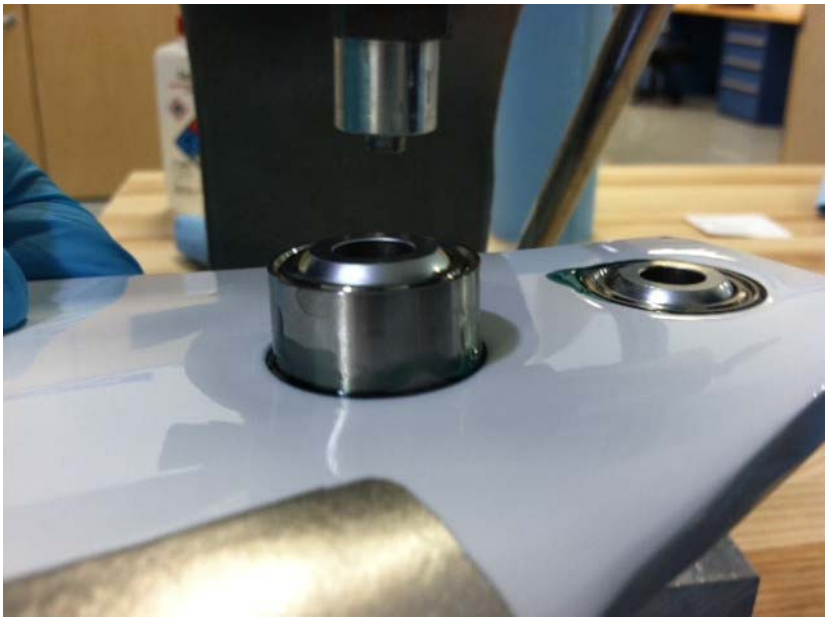


Figure 1.
Placement of the bearing onto the blade surface, ready to be pressed. Note that the bearing sits aligned straight with the housing and Loctite 609 has been applied to the bearing's bonding surface.

2.2.4 Visually inspect the pressed bearing to insure that it is centered within the housing.

2.2.5 Lubricate the swaging tool rollers using machine oil and install the tool in the spindle chuck. Preferably a manual milling machine should be used because of spindle squareness and rigidity. If a milling machine is not available then a drill press may be used. The spindle speed should be set to 100 to 225 RPM. 190 RPM is the preferred speed.

2.2.6 Position the anvil (locating fixture) on the bed (see Figure 2.).

2.2.7 Position the blade parallel to the bed and to the left of the spindle. Set the bearing atop the anvil. See Figures 3., 4., and 5. for reference. Swage the upper surface first. Gradually apply swaging loads To begin initial s gradually apply a load until a swaged lip begins to form and then stop.

NOTE

Continuing to apply load at this point in the operation may result in over swaging. Swaging forces could cause the bearing to move within the rooting fitting bore as the lip contacts the bore chamfer. If this happens, the lip will continue expanding resulting in cracks.

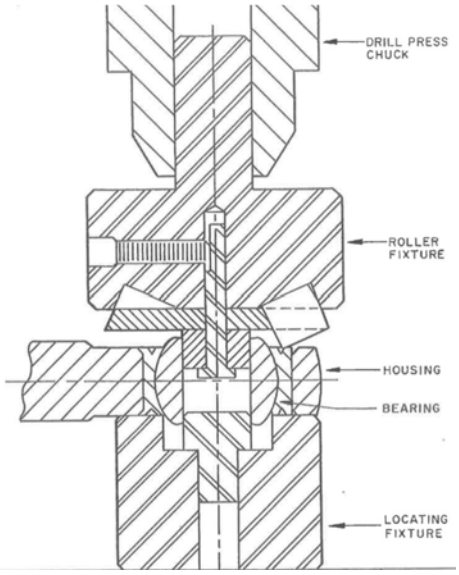


Figure 2.
Schematic depicting the drill press setup for bearing swaging.

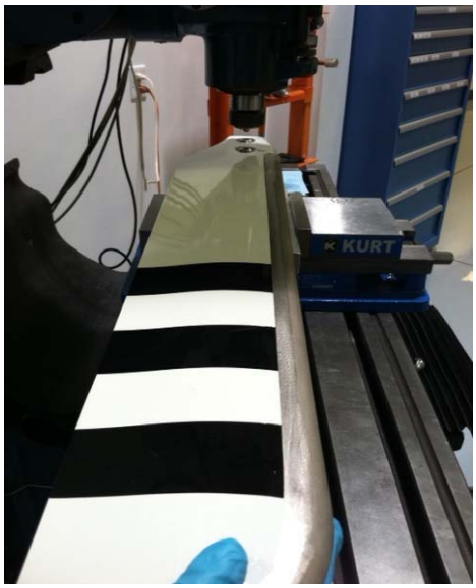


Figure 3.
Positioning of the blade parallel to the bed.

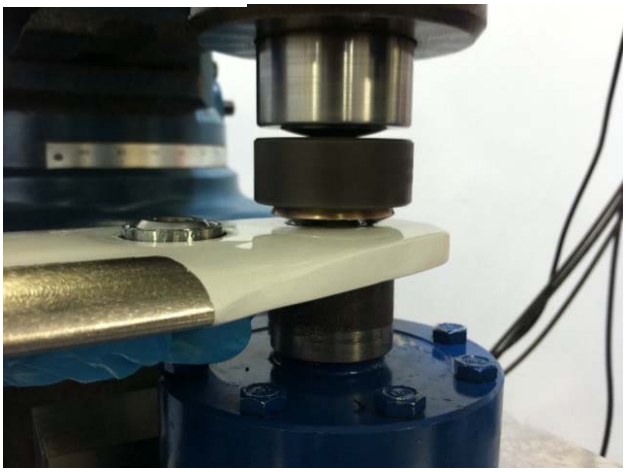
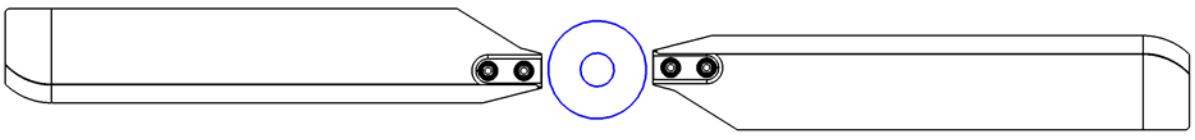


Figure 4.
Upper bearing being swaged. The anvil is seated atop the bed and the blade then positioned between the roller swaging fixture and anvil.



Blade Left of Spindle

Blade Right of Spindle

Figure 5.
Blade Positioning

2.2.8 Flip the blade over to swage the lower surface. The blade should still be positioned parallel to the bed and to the left of the spindle. Gradually apply swaging loads until lip begins to form. Measure the gap between the lip and bore chamfer (see Figure 6.). Take several measurements around the circumference of the bearing. You may notice that the gap varies. This is because of milling machine or drill press flexing and/or an out of square spindle. Continue applying load until the gap at any location around the bearing meets the .005 inch requirement. Stop swaging at this point. Flip the blade and perform this same procedure to finish the initial swaging.

NOTE

All subsequent operations are meant to "even out" the swage gap. Depending on spindle squareness and machine rigidity, multiple blade positions may be required.

2.2.9 Rotate the blade 180° so that it is parallel to the bed and to the right of the spindle. Perform the operations in 2.2.8

2.2.10 Wipe away any excess Loctite that might be exposed before damage to the paint occurs.

3 FINAL INSPECTION

3.1 Use the 0.005 inch feeler gage around the entire circumference of the bearing gap to insure that the lips have been properly swaged over the bearing housing. An acceptance of the feeler gage up to 40% of the bearing circumference (144°) may be allowed. See Figures 6. & 7.

3.2 Visually inspect the area outside the swaged bearing to insure that there is no damage from the swaging operation.

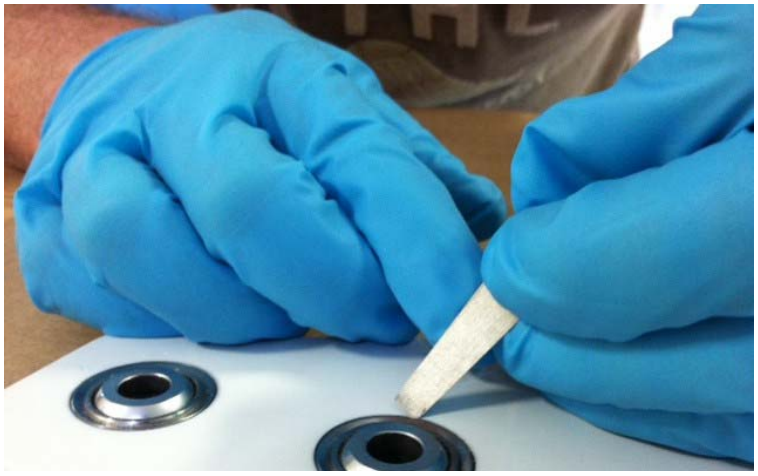
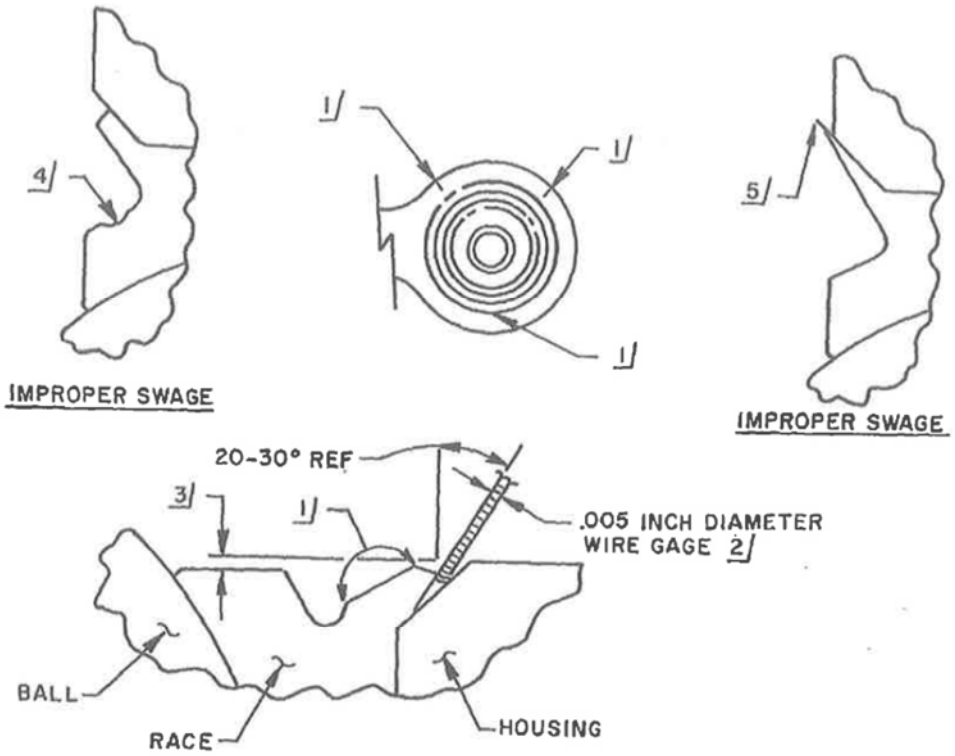


Figure 6.
A 0.005 inch feeler gage is used to inspect the gap in the swaged lip of the bearing such that no more than 40% of the circumference may accept the gage.



Inspection of swaged V-groove
Bearings shall be as follows:

1/ Visually inspect this circumferential area for cracks and separations.
2/ Inspect circumference of the gap in the swaged lip as shown with .005 inch feeler gage. A properly swaged bearing in an optimally prepared housing will not accept the feeler gage, however, no more than 40% of the circumference may accept the gage. (Inspect while installation treatment is uncured.)
3/ Bearing race face to be flush with housing within ±0.010 inch.
4/ Visually inspect inner face of bearing groove to assure there is no evidence of roller contact during the swaging operation.
5/ Visually inspect the swaged portion of the swaged lip to assure that over-swaging has not occurred.

Figure 7.
Schematic of an improper swage with cracks and separations.