

GENERAL ASSEMBLY PROCEDURES

A. INSTALLATION OF BUSHINGS (VARIOUS KINDS)

1. Preparing Bushing Seats:

- a. Remove plugs from bushing seats that have been plugged for painting, sort by size into separate containers and return to paint area for reuse.
- b. All bushing seats must be clean, free of paint, grease, shot etc. before installing bushings.
- c. To remove dry paint, rust, etc., from a bushing seat use an air reamer with a flap wheel to ream out the paint. You must use a face shield when reaming.

2. Installing Garmex Bushings:

a. Hydraulic Press Method:

- i. This is the preferred method for installing Garmex bushing into parts that are small enough to lift up onto the press.
- ii. Line up the bushing seat with the ram of the hydraulic press, place a Garmex bushing that has same size O.D. as the bushing seat I.D., on the bushing seat and lined up with it. Press in bushing until it is flush with bushing seat.

Note: Some applications require the Garmex bushing to be set below the surface of the bushing seat. Use a "stepped" bushing punch for this operation.

- iii. For pivot tubes that take two Garmex bushings, press in another bushing from other end of tube.
- iv. For pivot tubes that take a spacer between the two Garmex bushings, press in spacer after installing the first bushing, but before installing the second bushing. Spacer must fill gap between the two bushings.

b. Hammer and Punch Method:

- i. Use this method to install Garmex bushings into large parts, or where the press method is not practical.
- ii. Make sure parts are secure enough so that they will not slip, fall or move excessively.
- iii. Select the correct size Garmex punch for the bushing being used. Make sure end of punch is not mushroomed or cracked before using.
- iv. Select correct size hammer for the application. Make sure hammer is in safe condition not cracked, chipped or broken. You must use a face shield when striking metal on metal.
- v. Use the hammer and punch to drive the bushing straight into the bushing seat, till the edge of the bushing is flush with the edge of the bushing seat.

Note: Some applications require the Garmex bushing to be set below the surface of the bushing seat. Use a "stepped" bushing punch for this operation.

- vi. For pivot tubes that take two Garmex bushings, drive in another bushing from other end of tube.
- vii. For pivot tubes that take a plastic spacer between the two Garmex bushings, drive the correct spacer into the tube after the first bushing has been installed, but before the second one is installed. Spacer must fill gap between the two bushings.

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3. Installing Tension Bushings

- a. To install smaller tension bushings, hold and compress the bushing using a vise grip, line up with bushing seat and use an appropriate size hammer to drive in bushing. Once it is well started, release vise grip and continue to drive tension bushing into seat until bushing is flush with seat. You must use a face shield when striking metal on metal.
- b. To install large tension bushings where it is not practical to compress with a vise grip, slide bushing onto the handle of a "ball driver" tool, insert handle through bushing seat of part, line up bushing with bushing seat and use a large size hammer, strike the end of the "ball driver" until tension bushing is flush with bushing seat. Remove "ball driver".
- c. After installation, lightly grease the inside of the installed tension bushings using "Shell Darina XL EP2" grease or equivalent and a small brush.

4. Quality Checks for Bushings and Reaming of Bushing Seats:

- a. After Garmex bushings have been installed you must check them for damage. This would include no chips, cracks, mushroomed edges, or deep scratches. If damaged, replace bushing.
- b. Check Garmex bushings to make sure that they are tight inside the bushing seats. If you can push or rotate the bushing by hand it is too loose, remove it and put a few drops of "Black Max loctite #380" on it and reinstall. If bushing is so loose that there is "side play" in the bushing, check with your supervisor on what to do.
- c. Check installed Garmex and tension bushings to see if a chrome test pin will fit through bushings. Pin must fit through without having to use excessive force when pushing by hand. If pin is too tight, remove bushings and ream out bushing seats using an air reamer with flap wheel. Ream until test pin will fit through reinstalled bushing.

Note: You must use a face shield when reaming.

- d. To remove installed tension bushings, use a bushing punch and a hammer to drive out bushing. You must use a face shield when striking metal on metal.
- e. To remove Garmex bushings, use a bushing punch and hammer to drive it out if damaged bushing is in a single bushing seat. If bushing to be removed is in a pivot tube where there is more than one bushing or a plastic spacer, use a die grinder with steel bit on it to cut out the bushing.

Note: you must use a charcoal filter respirator and face shield when cutting garmax bushings and work in a well ventilated area. See MSDS sheet on garmax bushing.

B. GREASE ZERK INSTALLATION

1. On painted parts, remove plugs from the grease zerk holes.
2. Check to make sure that there is no welding splatter or any other foreign material in tapped hole.
3. Start the grease zerk in the tapped hole by hand, or if it is a "straight" zerk you can also use a nut driver or a rechargeable drill with socket to start zerk. Make sure zerk is started straight.
4. Use the correct size wrench, nut driver or socket, (depending on zerk), tighten zerk firmly.
5. If zerk is difficult to start or tighten, retap the hole using an appropriate size tap in a "T" handle. Make sure tap is started straight in zerk hole.
6. Any assembly where there is a grease zerk installed and where there is movement at the point of the assembly must be greased using "Shell Darina XL EP2" grease or equivalent. The amount of grease needed depends on the size of the assembly point that is greased, it could be anywhere from 2 - 5 pumps of grease.

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7. If a grease zerk has been painted, you must remove the paint from the top of the zerk before greasing. Use a retractable blade safety knife for this.
8. For zerks that are installed in parts where no further assembly or movement of part exists, check to make sure grease zerk will take grease by pumping a very small amount of grease through zerk.
9. If grease zerk will not take grease, (no grease passes through zerk and pump will not pump), replace zerk with another one.
10. If grease oozes out around thread part of zerk, retighten zerk firmly.
11. Use paper towel or rag to wipe grease from zerk and area after greasing.
12. When greasing, ensure that end of grease gun is fitted securely on grease zerk.
13. To remove a broken zerk use an "easy out" tool. Pound easy out into zerk and turn counter clockwise.

C. DRILLING, TAPPING AND REAMING PROCEDURES

1. When drilling or tapping into steel with a hand tool or power tool you must use cutting fluid to cool and lubricate bits.
2. When reaming, drilling or tapping into steel or nylon with a drill press you must use cutting fluid to cool and lubricate bits.
3. When drilling, the bit should be perpendicular to the work piece.
4. **Never use** side force on a drill bit to enlarge a hole, the bit could break causing injury.
5. Do not use excessive force when drilling. The force used is related to size of bit, less force for smaller bits.
6. Use sharp bits for drilling, you need less force. Return dull bits for sharpening to "Tool Services".
7. Make sure taps are started straight into the hole to be tapped and do not use excessive force, rather use a back and forth motion when tapping by hand.
8. All reamers are designed to be turned clockwise, even when removing the reaming bit from the hole that is being reamed.
9. Make sure adjustable reamers are adjusted according to specification for part being reamed, which are found on work order or in process notes.
10. Always place and store all drill, taps or reaming bits so that the cutting edges will not be damaged.
11. When reaming two nylatron bushings which are in the same tube separated by a spacer, always run the reamer through completely from one end only to keep the reamer in line in each bushing for better pin fit.

D. Resource Information Usage

1. Use blue print part drawings, and assembly drawings, which can be obtained either from the back of work orders, from computers on R-999 or from the engineering office to help you correctly identify manufactured parts. You must know:
 - a. What makes parts "left" or "right"?
 - b. Which is top or bottom, front or back, especially when installing decals?
 - c. Size, because many parts are very similar in appearance (i.e.: ID, OD, length, thickness).
2. Use assembly drawings and process notes on work order or L-502 screen in computer to:
 - a. Get a mental picture of the assembly.
 - b. To identify how and in what sequence parts get assembled.
 - c. Any special instructions regarding the assembly such as decal placement, tightness of nuts and bolts, what part needs to be solid, rotating, swivel or pointing a certain

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direction etc?

- d. Check colour on manufactured parts.
 - e. Get description of part and quantity required per assembly.
3. Use assembly procedures for:
- a. Detailed assembly drawing.
 - b. Bill of material, part description and quantity required per assembly.
 - c. Detailed steps to help you walk through the assembly process in a certain sequence.
 - d. Quality checks for completed assembly.
 - e. Troubleshooting.
 - f. Hints for easier, quicker assembly.

All jobs require some amount of thinking to be performed safely. Train yourself to **Think** and **Plan** for your own safety and the safety of those working with you. If you plan ahead and think of the safe way to do a job at all times, you will **act** and **work** safely. You must want to be safe; you must be safety-minded. You must know all safety procedures and follow them every day.

E. ASSEMBLY QUALITY CHECKS

1. **Paint Quality:** must be of high quality and match or exceed standards set at (Company).
Paint must be checked for:
 - a. **Light areas** - paint thickness must be at least 1.5 mils dry. Look for areas that have been missed.
 - b. **Runs and sags** - have runs and sags fixed that will be clearly seen on a finished product. If the run or sag is small and hidden underneath, behind or inside where it will not be noticed exceptions are allowable.
 - c. **Other paint defects** - watch for water or shot damage, orange peel, fish-eyes, etc. Touch up paint and repainting to be done by paint personnel only.
2. **Weld Quality:** Check welds on all parts for:
 - a. Missed welds.
 - b. Pin holes in welds.
 - c. Poor penetration or over penetration.
 - d. Poor welds - lumps.If a part needs to be welded or rewelded take it back to welding area and have someone fix it for you and get it repainted as needed.
3. **Completed Assemblies, Tests and Checks:** Check all completed assemblies and do all the necessary tests required for each, which may include one or more of the following:
 - a. All installed garmax bushings and tension bushings must be tested for proper fit with a chrome test pin.
 - b. All grease zerks must be tested to see if they will take grease.
 - c. Check all nuts and bolts for proper tension.
 - d. Are all required decals in place as required?
 - e. Make sure all parts that need to move - move, rotate - rotate, swivel - swivel, and parts that need to be solid and stationary, solid and stationary.
 - f. Make sure all parts are on assembly as per bill of material.
 - g. Make all required reaming, drilling, grinding, cutting, banding etc have been done.
 - h. Parts or zerks that need to be greased have been greased.
 - i. Make sure all required decals are in the right place and position.