WHEEL BEARING INSTALLATION AND SERVICE

Wheel bearing life depends on three things: (1) Proper lubrication, (2) Cleanliness, and (3) Proper Adjustment. Trailer Axle bearings are normally packed with wheel oil seals which require only keeping the oil at the proper level. Whether installing new bearings or servicing a trailer in the shop here are the procedures to follow:

Remove the wheel hub and bearing cones. Clean all the old grease from wheel hub, bearing cones and hub cap with kerosene or diesel fuel oil (NOT gasoline and NOT in a hot solution tank or with water-alkaline solutions). Use a stiff fiber brush, but not steel or brass brush. Dry the parts with a clean absorbent cloth or paper. Compressed air can be used to dry the bearing only if the air is filtered, since water in the air line can cause corrosion. Clean and dry hands and tools, since grease will not adhere to a surface 'wet' with solvent. If bearings are not to be used soon, pack with wheel bearing grease and wrap in clean waxed paper. Do not lay clean bearings on floor or a dirty workbench.

INSPECT FOR DAMAGE:

While the bearing is clean and free of grease, inspect it for signs of wear of damage. Excessive wear caused by abrasive dirt is the most common cause of premature bearing failure. This can be recognized by a dull appearance to the rollers and raceways; they may feel rough or show pit marks or indentations. Flaking or spalling on the small end of the rollers or their corresponding cup and cone rolling surfaces is caused by improper loose adjustments. Spalling or excessive wear at the large end of the rollers indicates an overly tight adjustment.

Fractures or fine hairline cracks across the cup or cone may be caused by forcing a cone assembly on an oversize spindle, forcing a cup into warped hub bore, or by a cocked cup or a cocked cone. Brinelling (a series of lines or indentations on the raceways spaced to a definite pattern) indicates a driving force has squeezed the bearing and damaged the rollers and raceways. This can be caused by improper mounting practices or by sudden excessive shock loads.

Corrosion or pits or pock-marks on the raceways and rollers, resulting from water getting into the lubricant, can be caused by a worn or damaged grease seal, or by handling the bearing with moist hands, or by an improper type of lubricant. Overheated bearings have a blue or brown-blue discoloration and indicates that the bearing metal has been damaged. This can be caused by dirt, lack of lubricant, excessive friction, or too tight an adjustment.

Be sure to check the bearing cone for wear and pits. After the bearing is clean, hold it up so that the bearing is between the eye and the light. Look between the rollers so that the raceway or outer surface if the cone can be seen. Holding the cage, rotate the cone to check for pits over its entire outer surface.

Replace bearings if any these conditions exist and replace worn or damaged grease or oil seals. Always replace a seal if it has been removed from the axle. Be sure to grease the lip of the grease seal before sliding it on the axle. Check the condition of the hub and axle spindle and remove any nicks or burrs which might prevent proper seating.

The bearing cup must fit tightly in the hub. This must be a press fit. Use an arbor press to install the cup in the hub, checking to make sure that it is square and completely bottomed. If an arbor press is not available, use an old bearing cup as a driving tool and tap it lightly with a hammer, this can chip or crack the case-hardened surface.

PACK WITH GREASE

The best way to pack a bearing is with a pressure grease packer. If one is not available they can be packed by hand, but be sure to knead the grease through all the rollers. This is the grease that really does the job. Be sure to use the correct type of grease recommended by that bearing manufacturer. Also, make sure the grease container and the grease packer are always covered to prevent dirt, abrasives and dust from getting into the lubricant. Pack the hub in between the two bearing cups, to a level even with the smallest diameter of the cups. It is dangerous to completely fill the hub, because this grease will expand with heat and escape past the grease seal into the brakes.

The bearing cone should fit on the trailer axle spindle with a slip-fit. In other words, the bearing cone should be tight on the spindle, but should be able to “creep” around when running to distribute the load over all the bearing rollers. However, it should not be loose enough to spin.

ADJUSTMENT OF BEARINGS

Wheel bearings must be correctly adjusted and properly lubricated at regular intervals to achieve maximum bearing life, prevent damage to wheels, axles, and possibly the trailer. Changing the wheel bearing lubricant is recommended every 20,000 to 25,000 miles or twice a year depending on vehicle speed, loads, and general operating conditions.

It should be noted that whenever hubs are removed for any purpose, the bearings will require readjustment. The following procedure will provide for satisfactory bearing adjustment with the wheel raised off the ground and the component parts on the spindle.

1. Install wheel bearing adjustment nut. Screw adjusting nut against the wheel bearing or thrust washer as the wheel is being resolved in both directions, to expel excess lubricant and insure proper seating of bearing rollers. Be sure there is no brake show which will interfere with the bearing adjustment.
2. It is recommended that a torque wrench be used for assembly of the adjusting nut. The adjusting nut should be tightened to 45 foot-pounds torque while rotating the wheel in both directions. If a torque wrench is not available, tighten the adjusting nut with a bar 12 to 15 inches long pushing down with full arm strength (not body weight) while rotating the wheel in both directions.
3. On a double nut axle, back off adjusting nut 2 to 2-1/2 holes on the lock ring or ¼ of a turn. For single nut axles, the back off procedure after first tightening to 45 foot pounds' torque is to back off 1/6 to ¼ turn and install the cotter pin in the nearest hole. With either single or double nut procedure, the resulting end play should be between .001 and .010 inches. However, some oil seal manufacturers recommend a tighter setting because of the superior lubricating qualities of fluid oil.
4. On a double nut axle, install the wheel bearing lock washer and jam nut and tighten to 250 to 300 foot pounds torque. When using a torque wrench, the actual recommendations between 100 and 150 foot pounds torque if the thread size is over 2-5/8 inches. If a torque wrench is not available, tighten jam nut with a 12 to 15-inch bar using full body weight. Then bend the lock ring over both the adjusting and jam nuts to lock the two in place. The wheel should rotate easily but not have excessive play.
5. Check final bearing adjustment with a dial indicator. Adjustment should be within .001 to .008-inch end play. If a dial indicator is not available, check bearing adjustment for play using a pry bar under wheel or tires.
6. Should bearing be improperly adjusted, repeat steps 1 through 4.
7. Install hub cap with proper gasket. Torque of 16 to 20 foot pounds is recommended for the cap screws on the hub cap.
8. If oil is used, fill to line on hub cap, and replace plug.

GREASE RETAINER / OIL SEALS

Maintenance

Felt Type Retainer (Grease)

a. Felt should be replaced every 30,000 to 40,000 miles

Ring and Seal Type (Oil)

a. Every 30,000 to 40,000 miles or whenever the wheels must be removed for any reason, the seals should be inspected for nicks, etc., which could result in a leak.

Replacement

Felt Type Retainer

a. With a wheel puller, remove the entire retainer assembly.

b. Separate the inner and outer ring of the assembly (usually hand pressure is sufficient)

c. Remove the old felt.

d. Inspect the inner and outer rings for excessive damage (bent, nicked, etc.) and replace as required.

e. Install new felt.

f. Assemble inner ring, felt, washer, and outer ring.

g. Install assembly on spindle by tapping the assembly until it is seated against the rear shoulder of the spindle grease retainer collar.

Ring and Seal Type

a. Remove the seal from the hub by tapping on the race of the bearing cone. Care should be taken to avoid bending the cone cage or nicking the rollers.

b. If the axle ring is found to be defective, it can be removed by carefully and lightly tapping the ring all around with a blunt cold chisel. Extreme caution must be exercised to avoid cutting through the ring and damaging the spindle collar.

c. To Install the new ring and seal it is mandatory that the seal manufacturer recommended tool be used.

d. Prior to installing the new ring, inspect the spindle. It should be clean and free of chips, burrs, etc.

e. Apply a thin coating of Permatex No. 2 to the spindle axle collar ring.

f. Using the proper tool, install the ring on the spindle. (See specific manufacturers recommendations for the proper position of the ring)

g. Apply Permatex No. 2 Sealer to the outer seat diameter.

h. Using the proper tool, press the seal into the hub until it is properly seated. (Proper seating specifications are available from the specific seal manufacturer.

i. Inspect the installation to assure that the seal components have bottomed evenly and are in the recommended position.

TIRE SERVICING

SELECTION OF PROPER COMPONENTS

When a tire has been selected for a specific load and application, it must be mounted with its proper tube and flap (if required) on the correct size rim or wheel. The rim should be examined to insure:

A. Size and flange configuration is correct.
B. Valve slot/hole location and configuration is correct.
C. Bead seat configuration is correct (flat; 5 degree; 15 degree).
D. Rim components are properly matched.

Do not Re-Use Tubes, Flaps or Valve Cores, Caps and O-Rings

ALWAYS fit a NEW tube in a new mounting.

TUBES: A tube through normal use will experience growth, therefore, if an old tube is re-used, there is a probability of creasing it with subsequent chafing and eventual failure. When a tube failure occurs, it can cause the costly destruction of the tire.

FLAPS: ALWAYS install a NEW flap in a new mounting.

A flap through use becomes hard and brittle. After a limited time, it will develop a set to match the tire and rim in which it is fitted. Therefore, it will not exactly match a new tire/rim combination.

VALVE CORES, CAPS and O-RINGS: Always install new valve cores, valve caps and O-Rings with new mountings.

PREPARATION OF WHEELS AND RIMS

Prior to mounting, wheel assemblies should be thoroughly inspected for cracks, warpage, deformation of flanges, side rings, lock rings, etc. Condition of stud holes (on wheels) also should be checked. Any corrective work should be done at this time, welding, straightening, etc. All burrs, welds, hammer dents, etc. that are present on the tire side of the rim must be made smooth with a file and/or emery cloth. Remove rust with a wire brush and apply a rust inhibiting paint.

USE OF PROPER MOUNTING EQUIPMENT

Mounting equipment such as irons, rubber covered steel hammers and steel head hammers should be in good condition and free from oil or grease. Lubricant is essential for proper bead seating. Machinery is available for mounting and demounting tubeless tires which, when properly used, cam facilitate mounting. Safely devices such as a cage or portable guard should be used for all inflating procedures.

DEMOUNTING AND MOUNTING OF TUBE-TYPE TIRES

A. Before unlocking a rim or ring, remove the valve core and allow tire to deflate completely.

B. After demounting and disassembly, thoroughly inspect the rim or wheel.

C. Insert a new tube in the tire and inflate only until rounded out.

D. Lubricate tube and tire surface that will contact flap. (Do not over lubricate and avoid allowing lubricant solution to run down into the tire.)

E. Lubricate the rim.

F. Fit and center flap and lubricate all surfaces of the tire and flap that will contact the rim and flanges.

G. Place tire, tube and flap on the wheel or rim, taking care to center valve in slot.

H. Fit side ring and lock rings and insure that they are properly positioned and locked.

PRIMARY INFLATION:

A. An air line with an extension (30” minimum) with an inline gauge and a clamp-on nozzle should be used for inflation. Remove valve core and lay the assembly flat in the ground, using a portable guard. Inflate partially to seat beads, making sure all rim components are centered and locked properly. Check that the guide rib is concentric to the rim flange. If not, tire must be broken down, re-lubricated and re-inflated.

B. Deflate tire by removing the air line. This is to allow the tube to relax, thus eliminating any wrinkles that may have occurred during primary inflation.

FINAL INFLATION:

A. Install valve core and using a portable guard or safety cage, re-inflate tire to recommended pressure and install valve cap.

B. Re-inspect assembly for proper positioning of all components.

ADDITIONAL INFORMATION

Always use a safety device when inflating. Never stand over tire or in front of valve when inflating.

Before final inflation, check the assembly carefully for apparent sign of weakness or irregularities.

Be careful when using irons, particularly when gripping firmly, making sure hands and irons are free from oil or grease. Irons can slip free and fly.

Do not use steel hammers.

Always wear safety goggles or face shields when hammering, buffing or grinding rims or tires.

AIR BRAKE SYSTEM TROUBLESHOOTING

GENERAL

All brake system problems, air or mechanical, affect brake operation.

Mechanical problems result from brake parts being worn, broken, jammed, or out of adjustment.

Air problems result from low air supply, leakage, blockage, or valve malfunction.

Either mechanical or air system problems may be indicated by the same symptom. For example, slow release of brakes may be caused by low air pressure or a faulty brake shoe return spring.

When troubleshooting a system, check the easy things first. Check to see if the air system, is actually coupled to the prime mover, and that air pressure does exist. Also, check control valves for proper position. If there is air pressure, and the control valves are properly positioned, and the system is properly coupled, then the problem is in the trailer air or mechanical system.

The following paragraphs cover the more common symptoms and the probably causes.

1. Brakes will not release.

    a. Inspect the inter-vehicular hose, couplings and seals for proper connection and leakage. Replace worn or damage parts.

    b. Inspect air lines, hoses, and air filters for possible restriction.
    Drain any moisture from filters.

    c. If air system is normal, inspect brake mechanism for weak or broken shoe return spring.

2. Brake Inoperative.

    a. Check air pressure gauge. Inspect system for leaks. Clean or replace air filter element.

NOTE: Larger air leaks may be heard or felt. To detect smaller leaks, use soap and water solution around connections and joints. Bubbles will indicate leaks.

    b. Inspect brake linings. Replace the brake shoes if linings are greasy or worn out. Grease on the linings may also indicate the need to replace the oil seal. If linings are worn, readjust the shoe and drum clearance.

3. Slow brake operation

    a. Check for low air pressure. Inspect system for leaks and restrictions. Clean or replace air filter element. Check air chamber operation.

4. Slow brake release.

    a. Check for proper air venting. Check emergency relay valve for proper operation.

    b. Inspect brake mechanism for weak or broken shoe return spring, and proper lubrication of cam shaft bushings.

5. Brakes grab.

    a. Inspect for proper shoe to drum clearance. Check brake linings for grease and loose linings.

    b. Inspect for loose or worn wheel bearings.

    c. Inspect brake drum for cracks, scoring or deforming.

    d. Drain moisture from air filter.

6. Brakes dragging.

    a. Check for correct shoe to drum clearance. Brake maybe adjusted too tight.

    b. Inspect for weak or broken shoe return spring.

    c. Inspect for out – of – round brake drum.