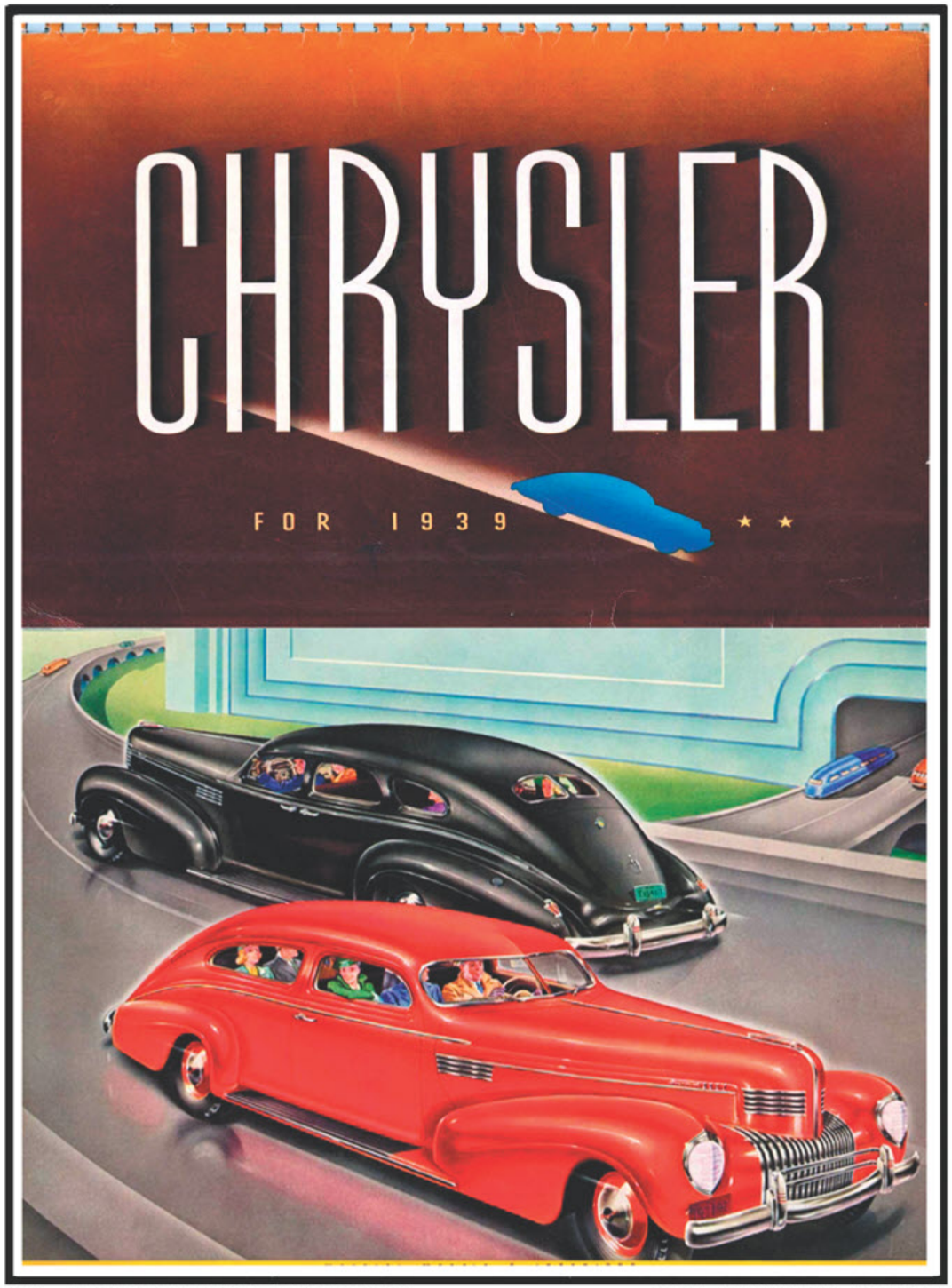
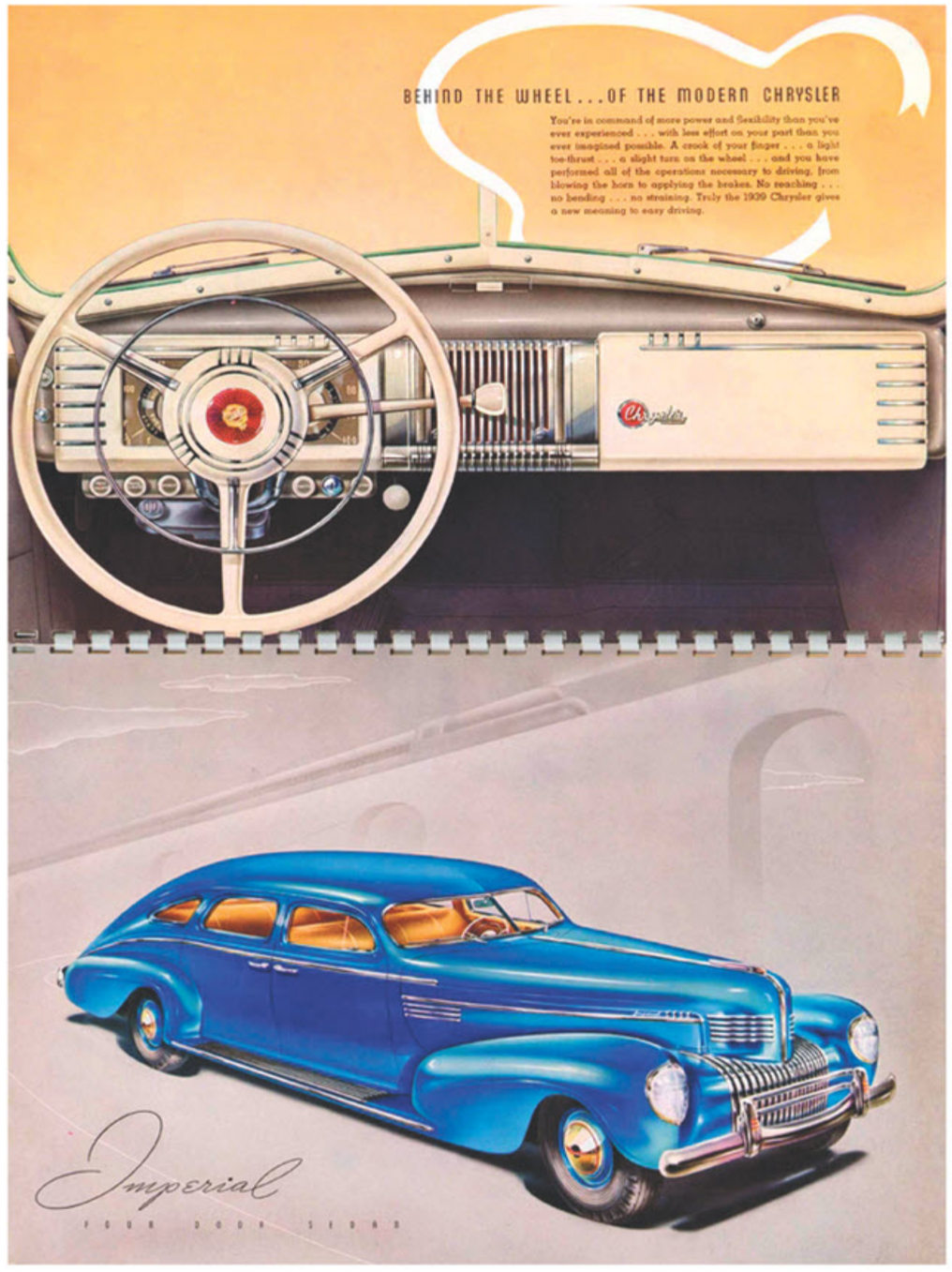
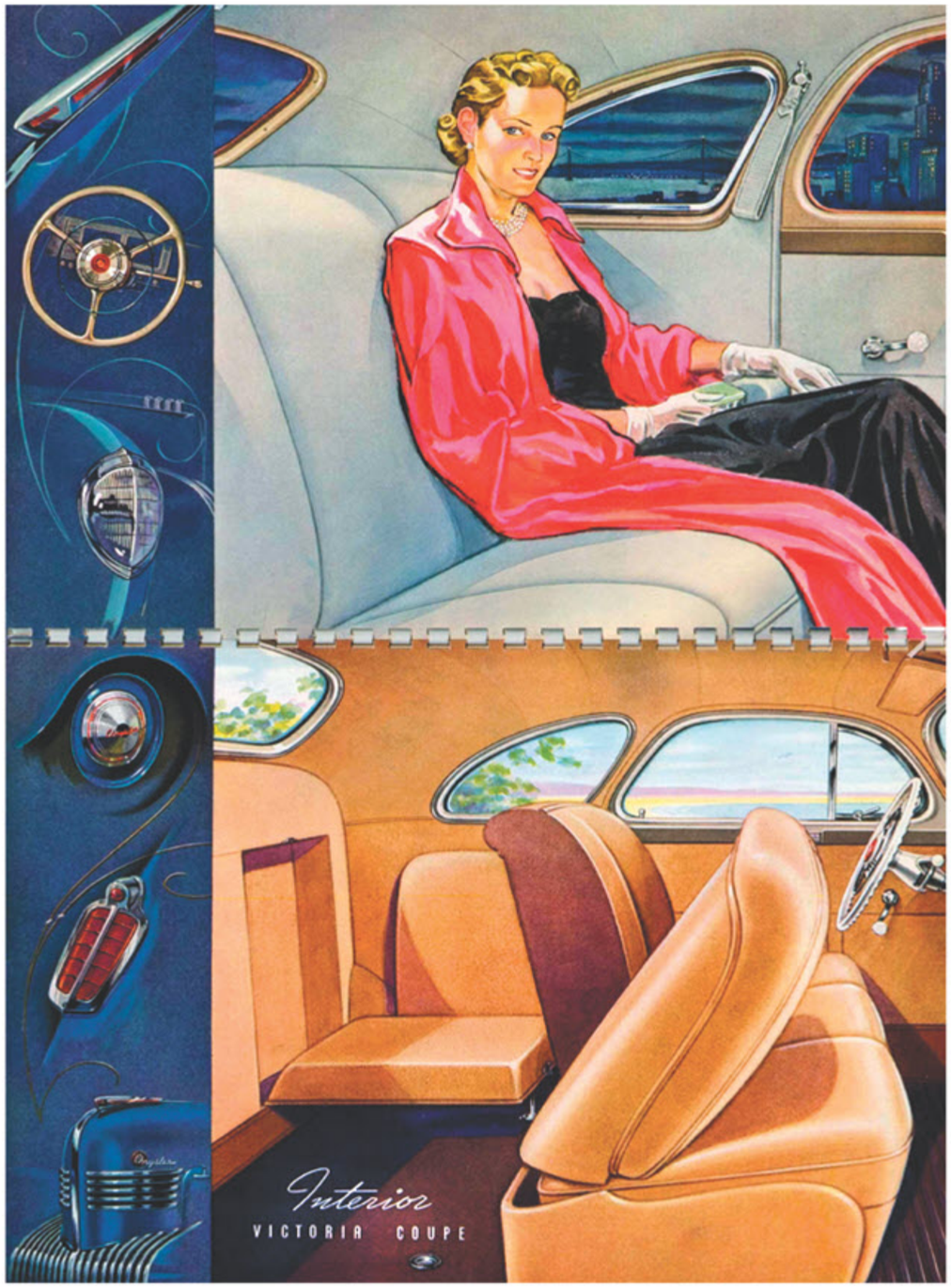

CHRYSLER
FOR 1939


BEHIND THE WHEEL...OF THE MODERN CHRYSLER
You're in command of more power and flexibility than you've ever experienced . . . with less effort on your part than you ever imagined possible. A crook of your finger . . . a light toe-thrust . . . a slight turn on the wheel . . . and you have performed all of the operations necessary to driving, from blowing the horn to applying the brakes. No reaching . . . no bending . . . no straining. Truly the 1939 Chrysler gives a new meaning to easy driving.
Imperial
FOUR DOOR SEDAN



BE MODERN...BUY CHRYSLER

WHEN you see the ultra-modern beauty of the new 1939 Chryslers, you will know that Chrysler Corporation engineering has again pioneered a new and finer type of car. And, because a motor car can prove itself only when *in motion*, you'll want to enjoy the thrilling experience of driving one of these great new Chrysler cars.

Your first thrill, on entering, will be an impression of light and space. You've never seen a car with so much window area . . . nor so much roominess, either. The body is 4 inches wider at the windshield than last year's roomy Chryslers, with bigger V-type windshield, great wide seats, wide uncluttered floors, front and rear.

Both the Chrysler Royal and the Chrysler Imperial have engines with greater horsepower than last year's spirited Chryslers, which gives them phenomenal performance at any speed.

And you'll find a flexibility of power and speed that is utterly amazing. The new Cruise-and-Climb Transmission gives you thrilling performance, magically and automatically shifting on demand between pick-up and cruising ranges, according to the power required. It flashes you out of tight places instantly . . . and saves you money in town or country driving by giving you far greater use of the new Chrysler Cruise-and-Climb Transmission.

The new Steering Wheel Gearshift combines with the Cruise-and-Climb Transmission to reduce driving to a point of ease and simplicity never before attained. The gearshift is directly below your hand and gears are shifted with a minimum of effort. You can't clash gears. You can't shift into reverse accidentally. These two great Chrysler developments do your thinking for you.

* * *

The roadability of the new 1939 Chrysler cars astonishes everybody who experiences it. People say that the car seems to ride in a well-oiled groove . . . on curves and uneven roads, as well as on smooth highways.

These two new cars are Chrysler's finest . . . with Chrysler's topmost standards in engineering . . . in precision building . . . in materials and equipment. And, because of their great new engineering features . . . their many automatic devices . . . their highly developed principles of Airflow streamlining . . . they are the finest of all Chryslers to drive . . . and the most economical.

DRIVING OLD CARS

RESEARCHING OLD CAR PARTS:
BALL BEARING TYPES, REMOVAL, CLEANING, SERVICING & MOUNTING

by Bill Johnson — Publisher

Ball bearings are the forgotten force that help make our cars go. They withstand extreme heat, cold, force, thrust, and sometimes, neglect, yet they just keep right on going, keeping our wheels rolling. Most of us will occasionally pack our front wheel bearings, replace a rear axle bearing or heater motor bearings, but there are other kinds of bearings that we rarely see.

In this article I will cover the types and servicing of many of the ball bearings used in our old cars and trucks.

THE BASIC DESIGN FOR BEARINGS was patented by Phillip Vaughan, a Welsh iron master, to support the axle of a carriage. This evolved into the wheel bearings used in early cars of the late 1800's and what we use today.

THE BASIC MAKEUP OF A BALL BEARING consists of two grooved race rings, a set of balls and a separator. The two rings, one placed concentrically with the other, are held in position by the balls which are equally spaced. When either of the rings revolves, the balls roll in the grooves.

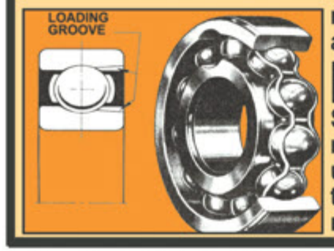
THE BALL BEARING'S FUNCTION is to connect two machine members that move relative to one another, so that the frictional resistance to motion is minimal.

THE PARTS OF A BALL BEARING

The balls and rings of a ball bearing are made of hardened steel with precision tolerances and with a high surface finish. Any abrasion or injury to the contacting surfaces usually leads to premature failure, so when we remove or install them, the following should be avoided:

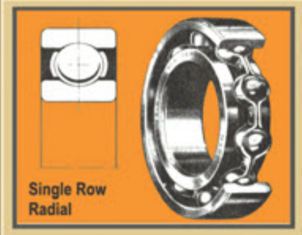
AVOID:

1. Hitting or forcing the bearing in a way that distorts its rings.
2. Letting dirt or metal chips get in the ball or race surfaces.
3. Use of incorrect lubricants, especially now with new multi-viscosity rear end and transmission lubes. Follow your manuals. If our Packards require straight 90-weight, we use 90-weight.

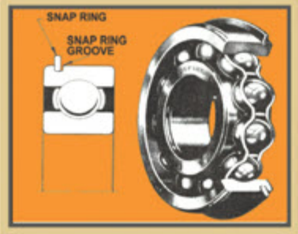


THE TYPES OF BALL BEARINGS

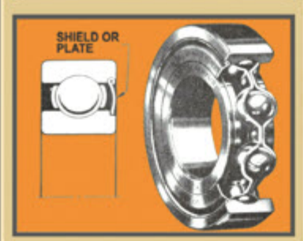
SINGLE ROW RADIAL, LOADING GROOVE Contains a maximum number of balls, inserted through a filling notch or loading groove. Not usually used to interchange with non-loading groove type because of the difference in thrust capacity. Look for loading groove before mounting to avoid mistakes.



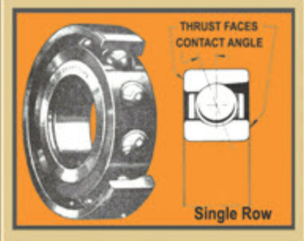
SINGLE ROW RADIAL, NON-LOADING GROOVE Has fewer balls than loading groove type, but has comparatively high thrust capacity. Used in transmission and transfer cases as shaft axial locating bearing. To make sure identification is correct, look on both sides to be certain there is no loading groove.



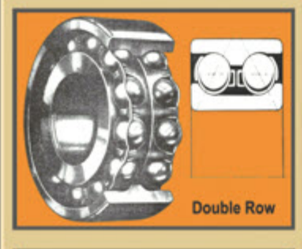
SNAP RING BEARINGS The function of the snap ring is to provide a shoulder for the axial location of the bearing in its housing. Snap ring bearings may be either loading or non-loading groove type, with or without shields. Snap rings are removable and bearings may be used to replace non-snap ring type in case of emergency.



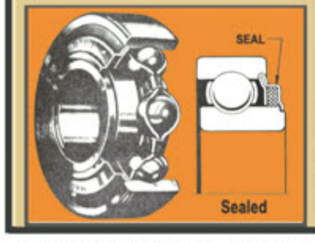
SHIELDED BEARINGS Made single shielded as shown in the illustration, or with shields on both sides. May be either loading or non-loading groove type. Care must be exercised during removal or mounting, not to pound or apply pressure against shields.



SINGLE ROW ANGULAR CONTACT These bearings are intended for combined loads with thrust from one direction only, therefore care must be take to mount this type with the thrust faces in the correct position. Since the ball race shoulder is low on the non-thrust side of the outer ring as shown in the illustration, pressure against non-thrust faces during mounting or removal will result in serious damage to balls and races. In practice, single row angular contact ball bearings are nearly always applied in pairs, mounted opposed, or with one bearing at each end of a shaft, or two butted together to form a double row bearing. Be careful that replacement bearings are mounted in exactly the same relationship to each other as the ones replaced.



DOUBLE ROW ANGULAR CONTACT Double row angular contact bearings are built to resist combined loads or thrust from either direction with minimum deflection. If any looseness or end play develops through abrasive wear, bearings of this type should be replaced. They are also provided for some applications with shields on one or both sides, but it should be noted that double row shielded bearings of different makes are not always interchangeable regarding width.

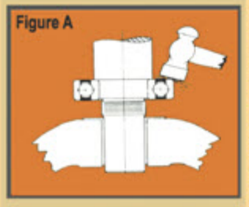


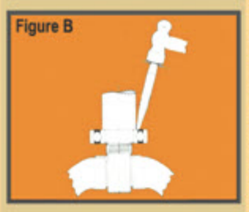
SEALED BEARINGS These are made with permanent seals on either one or both sides. With seals on one side only, great care should be taken to keep clean when handling, since dirt is very difficult to remove from this type. Bearings with seals on both sides, as illustrated, can not be cleaned or re-lubricated, and if excessively rough feeling, must be replaced.

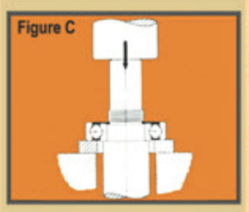
CONTINUED

BEARING REMOVAL

WRONG







Ball bearings are nearly always tight fit on the shaft and a push fit in the housing. Most care in removal is, therefore required in disassembling bearing from shafts.

Never hammer on a bearing, especially on the outer ring as in Figure A. To do so will nearly always cause some damage to the balls and races in addition to the possibility of fracturing the extremely hard race ring.

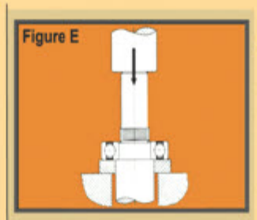
Use of a hammer and drift is bad practice. The drift may slip and damage the separator or shield and there is always the danger of cocking the bearing or cracking the tight fitted ring. If a hammer must be used, follow the method shown in Figure H, not Figure B.

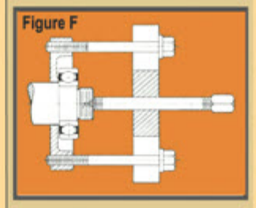
If an arbor press is used, never place the flat blocks under the bearing so they can slip outwards and permit the full force of the press to be exerted on the outer ring, Figure C. Keep blocks snug against shaft as in Figure E.

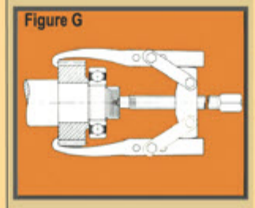
Never spin a bearing before it is cleaned inside, Figure D. When dismounting a bearing is relatively loose and oil carries dirt between balls and races. If it is spun in this condition, the dirt can cause scratch marks, which may later lead to spalling.

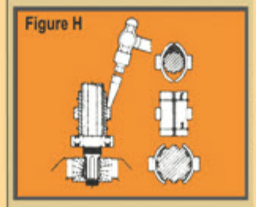
Practically all bearings when removed after use will contain a certain amount of dirt, often introduced during removal. Treat all bearings alike. Avoid introducing more dirt during handling, and do not spin.

RIGHT









An arbor press is one of the best de-mounting tools and should be used wherever possible. Rest the bearing inner ring or both rings (never the outer ring only) against a pair of flat blocks of the same size and using a firm, steady pressure, force the shaft out, Figure E.

Be careful to keep the shaft straight to avoid damage from coking and don't let it strike the floor when it is suddenly released from the bearing. Also be careful not to drop removed bearings, especially on a hard or dirty floor.

If a press is not available, use a puller of a type which can be inserted behind the bearing inner race, Figure F. Be sure that the jaws are set so that they will not slip over the inner race and damage separator or shield when pressure is applied. Exert an even pressure and pull straight. Cocking from unequalized pulling can damage both shaft and bearing.

In cases where gears or other removable parts do not allow the puller to contact the bearing directly, use the puller on the parts as in Figure G.

The use of a hammer is to be avoided unless other methods cannot be used. Split sections of pipe or tubing with welded lugs, as in Figure H can be used for shafts of various sizes. Alternating blows on opposite sides will prevent serious cocking. Be careful that pipe is free of chips that would be shaken into the bearing. In removing a bearing by pounding, care must be taken not to hit or scrape locknut threads on the shaft. Cover bearings with cloth or paper as soon as they are removed.

BEARING CLEANING

WRONG

FIGURE 1

FIGURE 2

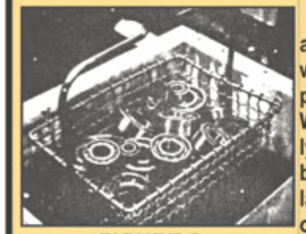


FIGURE 3

FIGURE 4

When bearings are brought in to be cleaned, do not allow anyone to pick them up and spin them, as in Figure 1. A bearing which would otherwise be in entirely serviceable condition after cleaning, might be seriously damaged at this point by such practice. The importance of this lies in the fact that scratches that can be caused by spinning before cleaning may not be felt during inspection and the life of the bearings might be shortened by such injury.

Do not let dirt and oil accumulate in the place where bearings are laid previous to washing. Wipe this place frequently, then fairly clean used bearings cannot become laden with gritty oil from other bearings, as was the case in Figure 2.

Do not pile too many bearings at a time in basket for washing, Figure 3. Residue from very dirty bearings might wash down into other bearings below, thus requiring a longer time to wash than if fewer were cleaned at a time. Double row bearings usually require more time for washing and need more thorough flushing because of the greater width and number of places from which old lubricant or residue must be dislodged.

Bearings with seals or shields on both sides, Figure 4, should not be washed, but should be wiped reasonably clean on the outside and sent by themselves to inspection. The reason for this is that a large proportion of such bearings are clean enough inside when removed to be reused, but if immersed in a tank of cleaning fluid, dirt might be washed in and the fluid could not wholly be removed from the bearings.

RIGHT

FIGURE 5

FIGURE 6

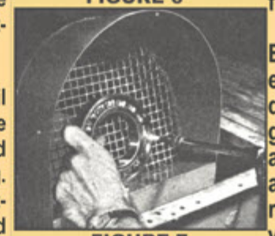


FIGURE 7

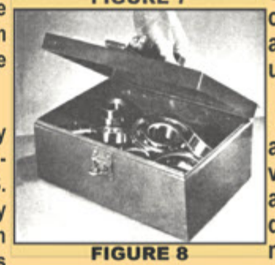


FIGURE 8

Place bearings in a wire basket so there is plenty of space for cleaner to reach all parts and immerse in a cleaning solvent. The tank should have a screened false bottom to prevent settlings from being stirred up into the bearings.

Agitate the basket frequently until grease, oil or sludge is thoroughly loosened and can be flushed out.

Bearings that contain especially heavy carbon deposits or hardened grease should be put in a basket by themselves and soaked in a separate container of solvent. Be sure to use a carbon-softening fluid approved for bearing use.

Using a spray gun with air filter and clean solvent, flush each bearing as in Figure 7, until all dirt or residue is removed. Turn one of the races slowly while flushing to help dislodge dirt from around the balls and separator pockets.

With dry, filtered air, blow the solvent out of the bearings, being careful not to spin them by force of air. Since dry bearings rust quickly, lubricate them by dipping bearings in clean light spindle oil. Rotate them a few times, and after draining off the excess oil, place them in a covered container for inspection.

CONTINUED

BEARING INSPECTION


FIGURE 9

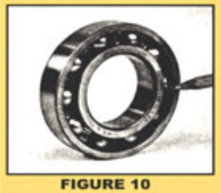


FIGURE 10


FIGURE 11

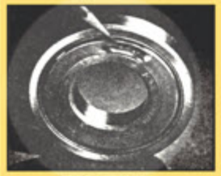


FIGURE 12


FIGURE 13

Most ball bearings fail from preventable causes. The bearing inspector can soon acquire a good knowledge of the causes behind the failures and can use this data to apply corrective measures at parts assembly to avoid repetition of the troubles.

Follow a regular system for inspection. Look for bearings with obvious or visual damage first. Discard bearings that show any of the following:

1. Rusted balls or raceways. Usually caused by water passing worn or defective seals or by condensation inside the housing (Figure 9)

2. Fractured ring. Forcing a cocked bearing on or off a shaft will do this, as will too heavy a press fit (Figure 10)

3. Worn, galled or abraded surfaces. Can be caused by too loose a fit, or bearing locked by dirt and turning on shaft or in housing (Figure 11)

4. Broken or bent shields, seals or separator. Usually caused by improper uses of tools during mounting or removal (Figure 12)

5. Badly discolored balls and races. Usually due to inadequate supply of lubricant (Figure 13). Moderate discoloration of balls and ball track is not a cause for discard.

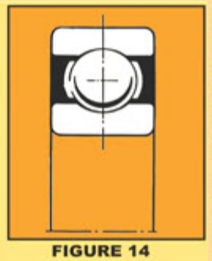


FIGURE 14

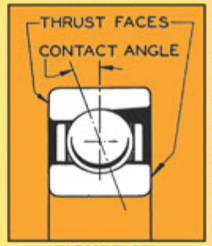


FIGURE 15

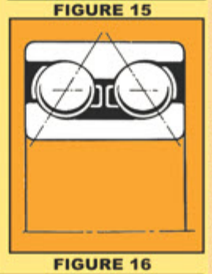


FIGURE 16

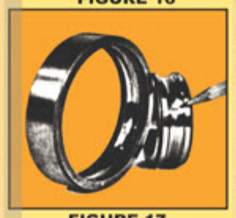


FIGURE 17

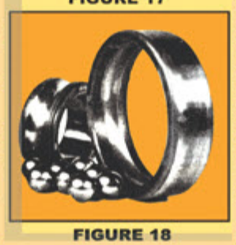


FIGURE 18

Single row radial bearings, Figure 14, normally have a certain amount of looseness or end play, which is easily felt when dismounted.

Single row angular contact bearings, Figure 15, are very loose when unmounted and this greater looseness should not be mistaken for wear.

Double row angular contact bearings, Figure 16, are usually made to zero or minus end play and should have no end play that can be distinguished by hand feel. Bearings rotated by hand for internal inspection should be under enough axial pressure to bring balls and raceways firmly into contact. In case of single row angular contact bearing, pressure must always be applied on the thrust faces.

Bearings should be rejected for the following reasons:

1. General feeling of roughness which remains unchanged by thorough cleaning, indicating damage to raceways or balls, such as indenting by dirt or pitting by corrosion.

2. Catchy or rough feeling at one or more points which repeated flushing will not remove and which may be a spalled or fatigued spot as in Figure 17. Thorough flushing is necessary to be sure it is not caused by dirt.

3. Excessive looseness or end play, indicating lapping by dirt or abrasive in lubricant as in Figure 18. If in doubt check against end play feel of identical new bearing. Races and balls are dull gray when lapped by dirt.

4. Any looseness or end play which can be detected by hand feel is a cause for rejection only in the case of double row angular contact bearings.

BEARING MOUNTING

WRONG

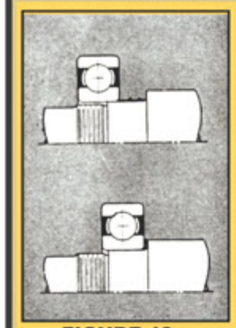


FIGURE 19

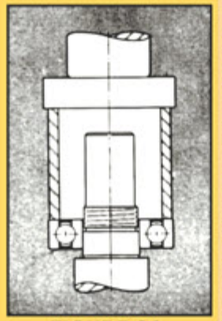


FIGURE 21

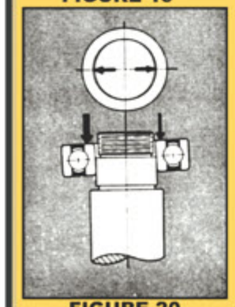


FIGURE 20

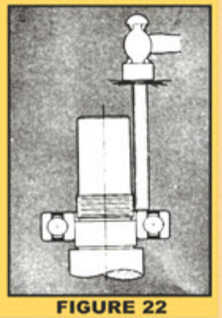


FIGURE 22

Never attempt to mount a bearing on a shaft that has not been wiped clean and given a light coat of oil. Dirt or chips on such a shaft would be trapped between bearing and shaft shoulder, Figure 19, and prevent complete or accurate seating. Never pound on a bearing or apply full force with an arbor press until assured that the bearing is started straight and not misaligned. Forcing a cocked bearing as in Figure 20 distorts the inner race and may cause it to crack. Also, the extremely hard race is likely to burr or score the shaft seal. Never apply mounting force to the bearing outer ring where the bearing is a tight fit on the shaft, as is usually the case, Figure 21. This places a heavy thrust load on the balls and races before they are seated and in the case of bearings not meant for such thrust loads, is most likely to cause serious damage. It is always poor practice to drive a ball bearing to a seat by the method shown in Figure 22. At best the bearing is worked down the shaft by cocking it from side to side and damage may be done that will not show up until after the parts have been put into service.

RIGHT

An arbor press is the most satisfactory tool for mounting ball bearings. Used properly, no blows are struck and there is no danger of loosening shields or seals from this cause. Place the bearing on two flat blocks of equal size so that they contact the inner ring of the bearing as in Figure 23. Then press shaft straight until the bearing is seated solidly against the shaft shoulder. Be sure that the blocks do not scrape or damage the threads if the shaft is threaded for a bearing lock nut. Use of blocks that contact both rings, Figure 24, is also good practice, provided the blocks are flat and the faces parallel. Where the distance from shaft end to bearing seat is short, a piece of pipe or tubing may be used as in Figure 25. The pipe must be clean inside and out, and the ends squared. In cases where a press is not available, a piece of tubing may be used with a hammer as in Figure 26. A plug in the tubing and a shield outside help to prevent jarring dirt into the bearing. The hammer should be applied alternately at opposite points to avoid cocking and particular care should be taken when the bearing is started.

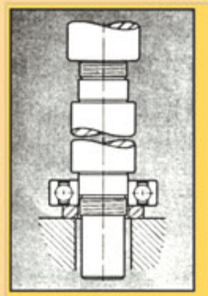


FIGURE 23

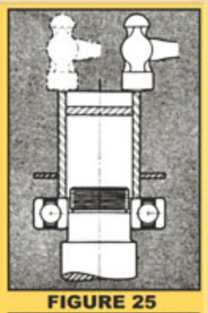


FIGURE 25

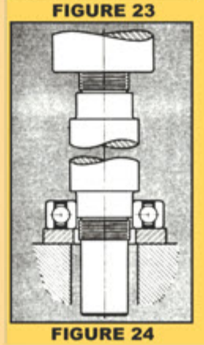


FIGURE 24

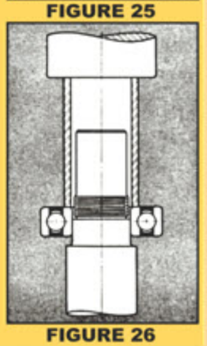


FIGURE 26

With proper care, our cars' bearings can last indefinitely, providing years of trouble-free service.

See you next month, and keep 'em driving!

OLD CAR

MATCH GAME

(Answers on Page One)

Match old car names in Column A with car manufacturers in Column B. Write your answers in the boxes.

A		B
☐	1-FLEETLINE	A-CADILLAC
☐	2-98 HOLIDAY	B-LINCOLN
☐	3-60 SPECIAL	C-BUICK
☐	4-Pilot-Centered Control Panel	D-PACKARD
☐	5-COSMOPOLITAN	E-CHEVROLET
☐	6-PACIFIC HARDTOP	F-STUDEBAKER
☐	7-Country Squire Station Wagon	G-PONTIAC
☐	8-PACER (NOT AMC)	H-MERCURY
☐	9-EL MOROCCO ('56-'57)	I-CHEVY
☐	10-Starchief Custom Catalina	J-OLDSMOBILE
☐	11-Monterey Sun valley	K-EDSEL
☐	12-Land Cruiser	L-FORD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CLASSIC CARS & HOT RODS
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