INSTALLATION AND MAINTENANCE INSTRUCTIONS

Section 2

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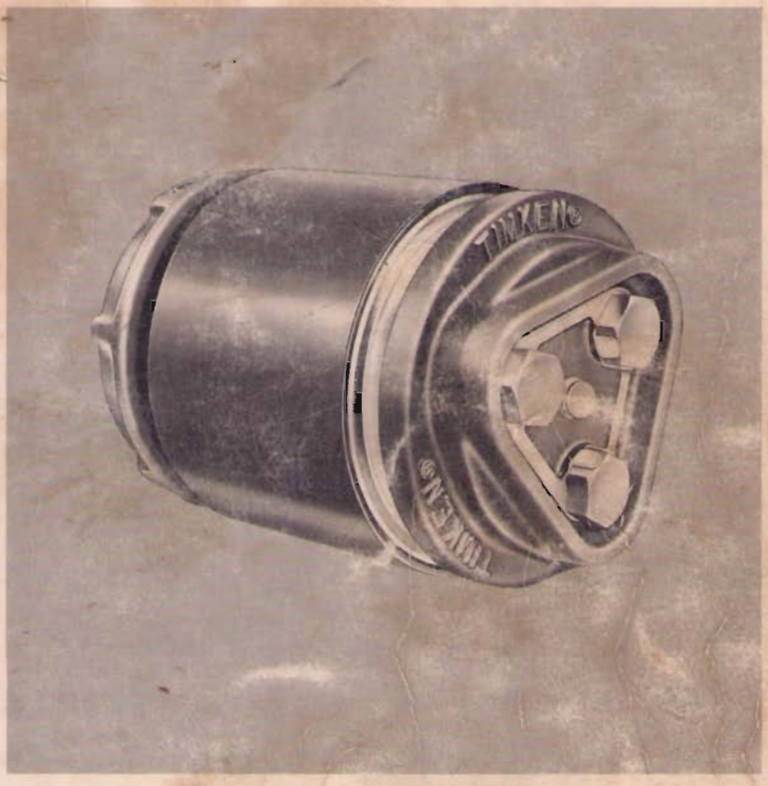

TIMKEN®

"AP" - ALL PURPOSE

RAILROAD TAPERED ROLLER BEARINGS

THE TIMKEN ROLLER BEARING COMPANY
Canton, Ohio 44706 - Cable Address "TIMROSCO"

TIMKEN "AP" (ALL-PURPOSE) BEARING ASSEMBLY

INSTALLATION

AND

MAINTENANCE INSTRUCTIONS

THE TIMKEN ROLLER BEARING COMPANY

CANTON, OHIO, U.S.A., 44706

CABLE ADDRESS "TIMROSCO"

A-24389

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FOREWORD

This instruction book represents the recommendations of The Timken Roller Bearing Company. It is a guide to the proper care and procedure that should be followed for the maintenance of Timken roller bearings as applied to railway equipment.

The periodic attention recommended should be scheduled for convenience, with other phases of equipment maintenance.

SECTION 2

BEARING DISASSEMBLY

CLEANING AND INSPECTION

BEARING REASSEMBLY

STORAGE AND SHIPMENT

SEE SECTION 1 FOR BEARING INSTALLATION AND REMOVAL, TRUCK ASSEMBLY AND DISASSEMBLY, SERVICE INSPECTION, AND SHOP PRACTICE INSTRUCTIONS.

CONTENTS

SECTION 2

BEARING DISASSEMBLY

- GENERAL
- SEAL REMOVAL AND INSTALLATION TOOLS
- DISASSEMBLING THE BEARING

General

Roller bearing maintenance should be confined to a specific area. The work space should be clean, well lighted, and free from congestion. Benches, tools, cleaning tanks, and other facilities should be used exclusively for the maintenance of roller bearings.

A typical bench layout for roller bearing maintenance is shown in Figure 1. This bench layout may be modified to suit available space and number of bearings to be serviced.

Facilities, tools, and fixtures for Timken "AP" roller bearing assembly, disassembly, and maintenance must be approved by The Timken Roller Bearing Company. When approved facilities and tools are not available, Timken "AP" roller bearings should be returned to The Timken Roller Bearing Company for repair.

Tools, fixtures, and gages used for the maintenance of the "AP" roller bearing may be obtained commercially or may be made from drawings available upon request from The Timken Roller Bearing Company.

To prevent unnecessary damage to the seals, the tools designed for seal removal should be used. These tools are designed for use with a small press. Hand operated tools are also available.

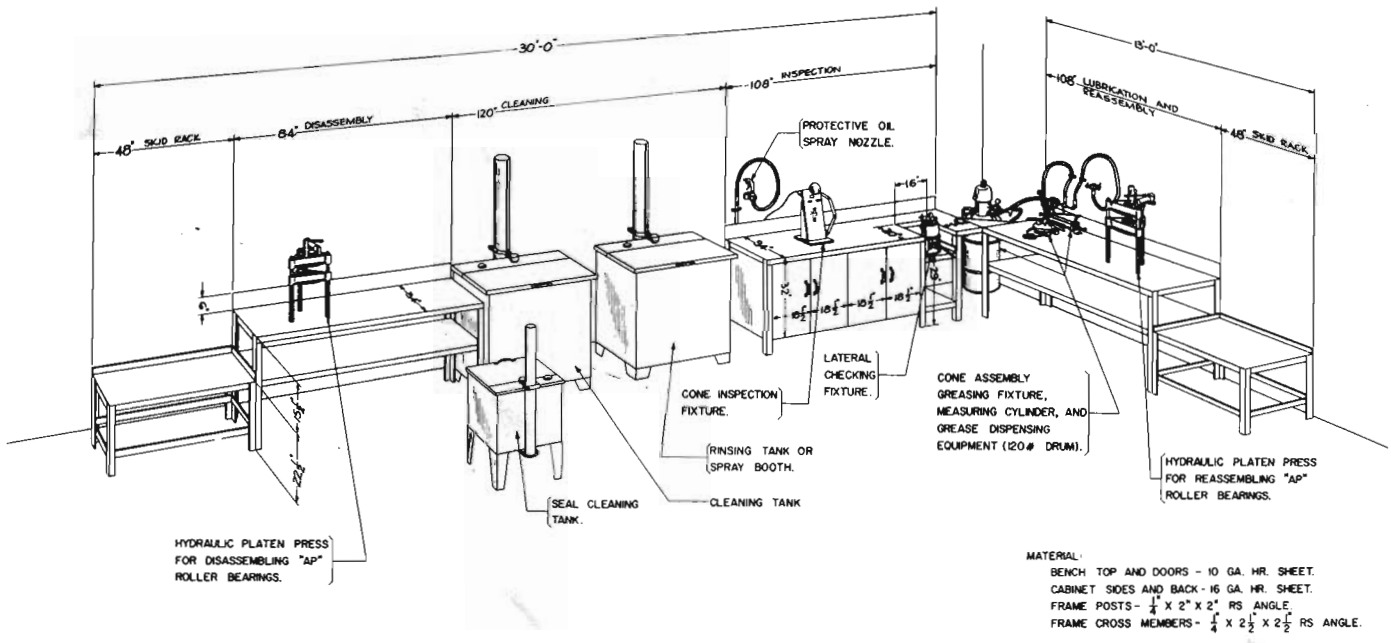


Figure 1. Typical Bench Layout Recommended by the AAR for Roller Bearing Maintenance.

Seal Removal and Installation Tools

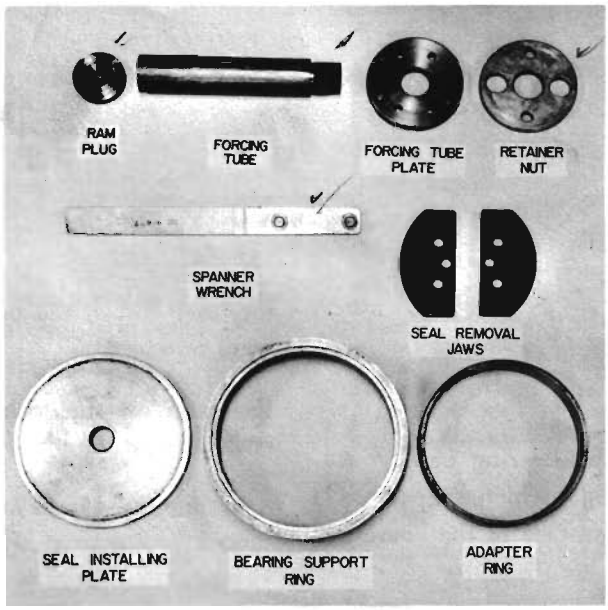


Figure 2.

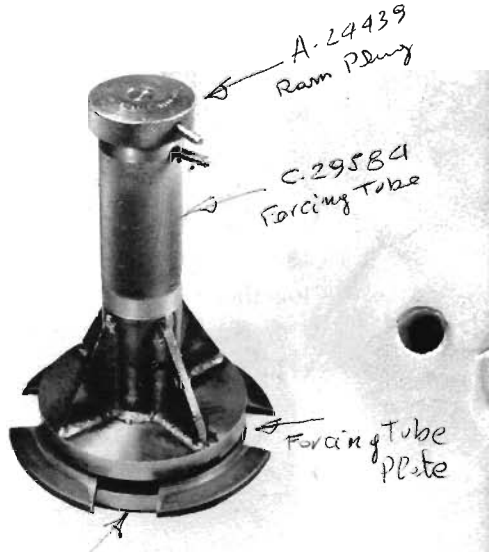


Figure 3.

Two styles of tools are available for removing the seals from the bearing cup. The separate jaw style as shown in Figure 2, or the cam actuated style as shown in Figure 3.

Disassembling the Bearing

To disassemble the Timken "AP" roller bearing, the seals must be removed from both ends of the bearing cup.

The seals are retained in the bearing cup by a press fit and by a small bead which snaps into grooves located in the counterbores of the bearing cup.

The seals, seal wear rings, backing rings, axle end caps, locking plates, and cap screws are completely interchangeable.

Tags with wire ties are not to be used to identify seals as the tie wires will cut the seal lips.

If desired the existing bearing lateral play of a bearing assembly may be maintained by keeping the cone assemblies, cone spacer, and bearing cup together through disassembly, cleaning, inspection, and reassembly. It is not necessary to mark the cone assemblies for position in the bearing cup for reassembly. The cone assemblies may be applied to either end of the bearing cup from which they were removed.

Excess grease should be removed from the bearing parts at disassembly by hand.

A preliminary visual inspection of all bearing parts should be made at disassembly. Parts that are obviously damaged to the extent that they will be rejected should be scrapped.

It is essential that cone assemblies be identified with the end of the bearing cup from which they were removed through the disassembly, cleaning, and inspection operations. Cone assemblies are to be scrapped if the mating roller race in the end of the cup from which they were removed is found to be brinelled to the extent that the cup will be scrapped. (AAR Wheel and Axle Manual, Classification of Bearing Damage)

After the bearing parts have been disassembled, cleaned, inspected, and repaired, bearings should be reassembled from the satisfactory used parts together with new parts as required.

Disassembling the Bearing

The seal wear rings and backing ring must be removed from the bearing assembly to permit inserting the jaws for seal removal.

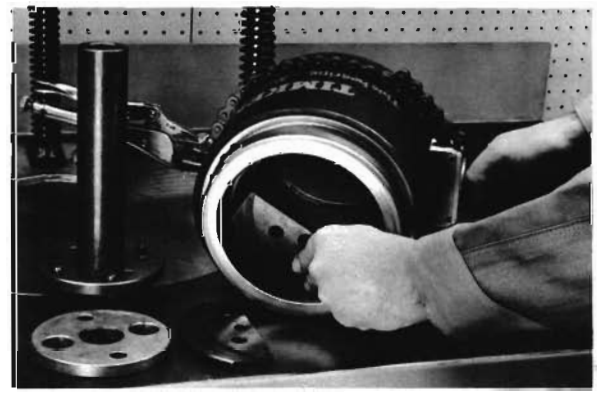


Figure 4.

SEPARATE JAW TOOLS

The seal removal jaws of the separate jaw style tools are separate from the forcing tube and the tool is assembled in the bearing as shown in Figures 4, 5, and 6.

The jaws are inserted between the face of the cone and the seal element, as shown in Figure 4.

Insert the forcing tube through the bearing bore and make sure that the tube plate is flat against the jaws with the guide pins through the holes provided in the jaws.

Apply and tighten the retainer nut using the spanner wrench, as shown in Figures 5 and 6.

Note the device used for handling the roller bearings easily and safely during disassembly and assembly operations.

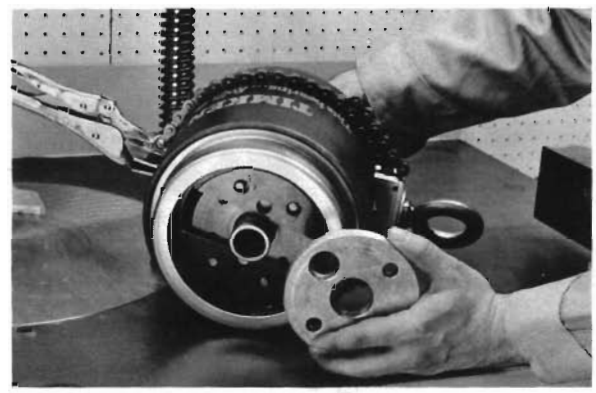


Figure 5.

Figure 6.

Disassembling the Bearing

Position the bearing assembly on the bearing support ring (Figure 7).

Figure 7.

Center the bearing assembly in the press and press the seal out of the bearing assembly (Figure 8).

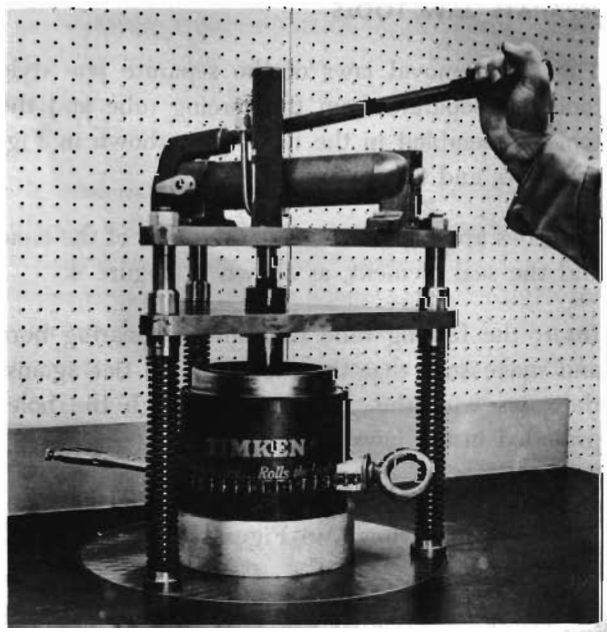


Figure 8.

Remove the bearing cup, cone spacer, cone assembly, and seal from the bearing support ring (Figure 9).

The same procedure should be followed to remove the seal and cone assembly from the opposite end of the bearing cup.

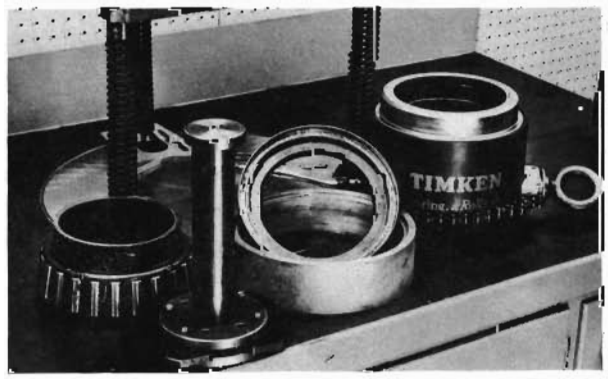


Figure 9.

Disassembling the Bearing

CAM ACTUATED JAW TOOLS

The jaw segments are an integral part of the cam actuated jaw style tools and are expanded by cam action as shown in Figure 10.

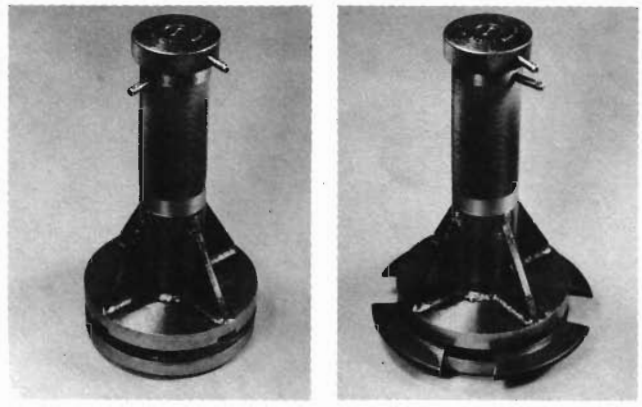


Figure 10.

Place the bearing assembly in a vertical position on the outer face of the seal case, as shown in Figure 11 and insert the seal removal tool through the bore of the cones. When the tool is setting on the bench in the bearing, the jaws are at the proper location to enter the space between the inner seal case and cone back face.

Figure 11.

To fully expand the jaws, turn the ram plug until the guide pins are parallel, as shown in Figure 12. If the jaws are not fully extended the seal element may be damaged by the tool jaws during seal removal.

The bearing assembly is then placed in a bearing support ring and the seals are pressed out of the bearing in the same manner as with the separate jaw style tools.

Figure 12.

CLEANING AND INSPECTION

- PARTS IDENTIFICATION
- CLEANING
- INSPECTION AND REPAIR

Identification of Timken "AP" Roller Bearing Parts

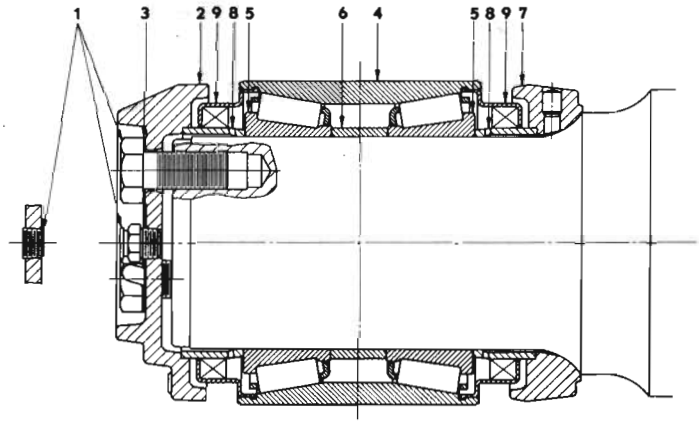
For identification purposes all parts of the Timken "AP" roller bearing assembly, except the cap screws, lubricant fitting, and pipe plug which are AAR standard parts, are marked with the name Timken and a part number. The location of the Timken name and part number on the bearing parts is shown in Figure 13.

A tabulation of the bearing part numbers for each axle size is shown in Table 1.

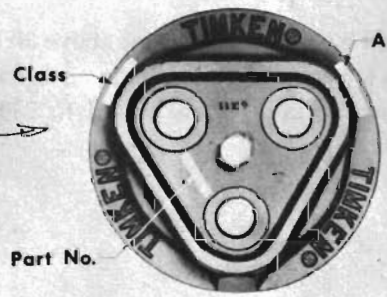
Class and Size	Cone Assembly	Bearing Cup	Cone Spacer
B (4¼" x 8")	HM120848	HM120817XD	HM120848XA
C (5" x 9")	HM124646	HM124618XD	HM124646XA
D (5½" x 10")	HM127446	HM127415XD	HM127446XA
E (6" x 11")	HM129848	HM129814XD	HM129848XA
F (6½" x 12")	HM133444	HM133416XD	HM133444XA
G (7" x 12")	HM136948	HM136916XD	HM136948XA

Table 1.

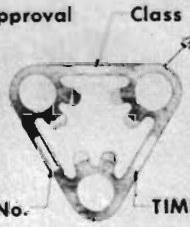
Location of Identification for Timken "AP" Roller Bearing Parts



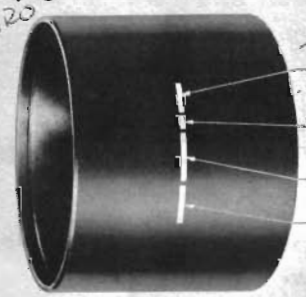
1 Cap screws, lubricant fitting, and pipe plug are AAR standard parts and are not stamped with the Timken name or part number. See AAR Manual pages D-59 and L-28.



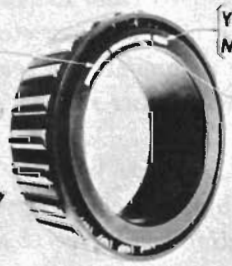
2 AXLE END CAP



3 LOCKING PLATE
AAR Manual page D-60



4 BEARING CUP

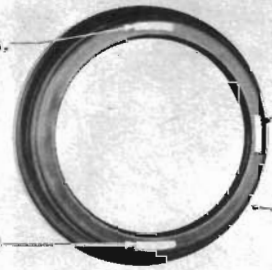


5 CONE, ROLLER, AND CAGE ASSEMBLY

6 CONE SPACER

7 BACKING RING

8 SEAL WEAR RING



9 SEAL

Figure 13.

Cleaning

After the bearings have been disassembled the excess grease should be removed from the bearing parts prior to preceding with the cleaning operations.

Continuous type solvent washers or agitating batch type cleaning tanks, large enough to handle one truck set of bearings and equipped to heat the cleaning solution, are best suited for bearing cleaning.

To minimize the time required for cleaning bearings and to increase the life of the cleaning solutions the grease may be purged from the cone assemblies by using a centrifugal grease slinger similar to that shown in Figure 14. This slinger may be either single or double-ended.

SANDBLAST CLEANING METHODS MUST NOT BE USED

After cleaning, all parts should be coated with light machine oil to prevent corrosion.

Waste should not be used to clean roller bearings. Clean rags free from lint should be used.

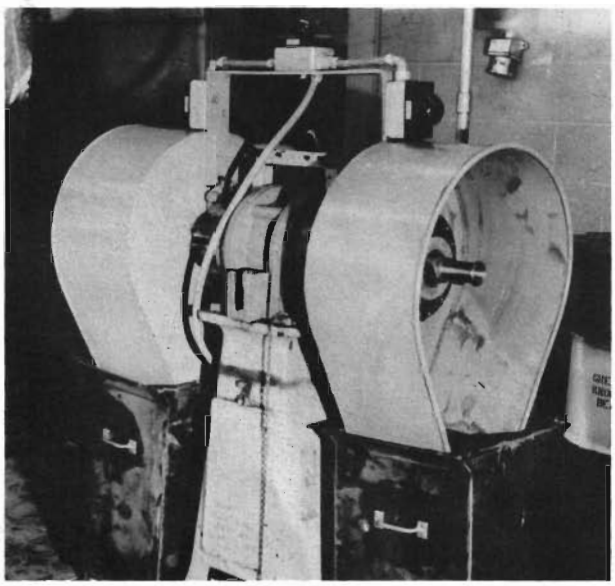


Figure 14.

CONE ASSEMBLIES, BEARING CUPS, AND CONE SPACERS

Cone assemblies, bearing cups, and cone spacers should not be cleaned in the same tank used for cleaning other bearing parts.

Granular caustic soda compounds, mixed with water, 8 ounces per gallon, and heated to 190° to 200° F. are satisfactory for cleaning roller bearings. However, the bearings must be rinsed in neutral oil, or soluble oil, preferably heated, to prevent corrosion and to dissolve the residue of metallic soap that remains on the bearings after cleaning in caustic soda solutions.

Car oil, or an oil having a flash point above 300° F. is also suitable for cleaning bearings in an agitating batch type cleaning tank when heated to 290° to 300° F.

SEALS

When seals are removed from the bearing assembly, they should be cleaned, inspected, and lubricated before being reapplied. The seals should not be cleaned along with other bearing parts.

Petroleum solvents such as kerosene or Stoddard solvent should be used for cleaning seals either by hand or in an agitating batch type cleaning tank.

Cleaning solvents which are strong oxidizing agents, chlorinated, nitrated hydrocarbon, acetones, or acetates, such as the following should not be used:

1. Xylene
2. Alcohol or solvents containing alcohol.
3. Trichlorethylene or perchlorethylene
4. Carbon tetrachloride

Cleaning

ADAPTERS, END CAPS, BACKING RINGS, SEAL WEAR RINGS, AND CAP SCREWS

These parts may be cleaned by the same methods recommended for cone assemblies, bearing cups, and cone spacers. However, these parts should not be cleaned in the same tanks used for cleaning cone assemblies, bearing cups, and cone spacers.

These parts may be steam cleaned except for the seal wear rings. If backing rings are steam cleaned the wear rings should be removed from the backing rings and cleaned in a caustic soda solution.

Lubricate the wear rings with a coating of light oil immediately after cleaning to prevent corrosion.

DO NOT USE ANY ABRASIVE MATERIAL such as emery cloth for cleaning the outside surface of seal wear rings. The use of such materials will scratch the wear ring surface and may prevent the seal from retaining the lubricant.

Inspection and Repair*

GENERAL

Under normal conditions no perceptible wear will occur on the bearing cup or cone assembly. However, due to the abrasive action of contaminants that sometimes do get into the lubricant, wear may occur.

Railroad equipment axle journal roller bearings are damaged as a result of being subjected to loads and conditions, other than those for which they were designed, which occur in service operations, wrecks, derailments, floods, and other abnormal service conditions.

These instructions will serve as a guide to determine the classification of the different types of bearing damage which can be considered as being acceptable for continuing the bearing parts in service.

The magnitude of bearing damage considered in these instructions for acceptance or rejection applies to all Timken "AP" bearing applications in railroad main line interchange or noninterchange service including freight car, passenger car, and diesel locomotive equipment.

There is considerable difference in standards of acceptance or rejection depending on the type of service in which the bearings operate. A greater magnitude of bearing damage may be acceptable for bearings operating in types of service where conditions are less severe and restrictive than in main line railroad service.

*This section on inspection and repair also applies to SC (Self-contained) bearings.

Many bearing parts have been rejected which may have been satisfactory for further service. If it is questionable whether bearing parts will perform satisfactorily to the next wheel work period, it is more economical to replace questionable bearing parts at inspection when bearings are disassembled.

Some bearings are running in service, which, if disassembled, would be rejected. However, these bearings are operating with wheels that are partially worn and are expected to perform satisfactorily until they are inspected at wheel renewal.

Where questions arise in the interpretation of these recommendations, the bearing parts may be held for examination by a Timken Company service engineer.

Depending upon the extent or type of damage to bearing components, it may be possible to repair the damage to improve the life expectancy of bearing parts by grinding or polishing to eliminate the natural progression of the damage in service.

The tools and materials shown in Figure 15, are recommended for repairing minor bearing damage.

Bearings that have been removed from an axle, disassembled, and inspected or repaired should be marked on the outside surface of the cup adjacent to the manufacturing date stamp.

This marking should include the letter "R", the date, and the repairing company's initials and shop code letters. "R-2" should be used for the second inspection, "R-3" for the third inspection, etc. Previous markings should not be removed at subsequent inspections.

Inspection and Repair

An electric pencil or small hand grinder should be used for marking bearings. Characters should be ¼" high of a type and quality that will maintain legibility in service.

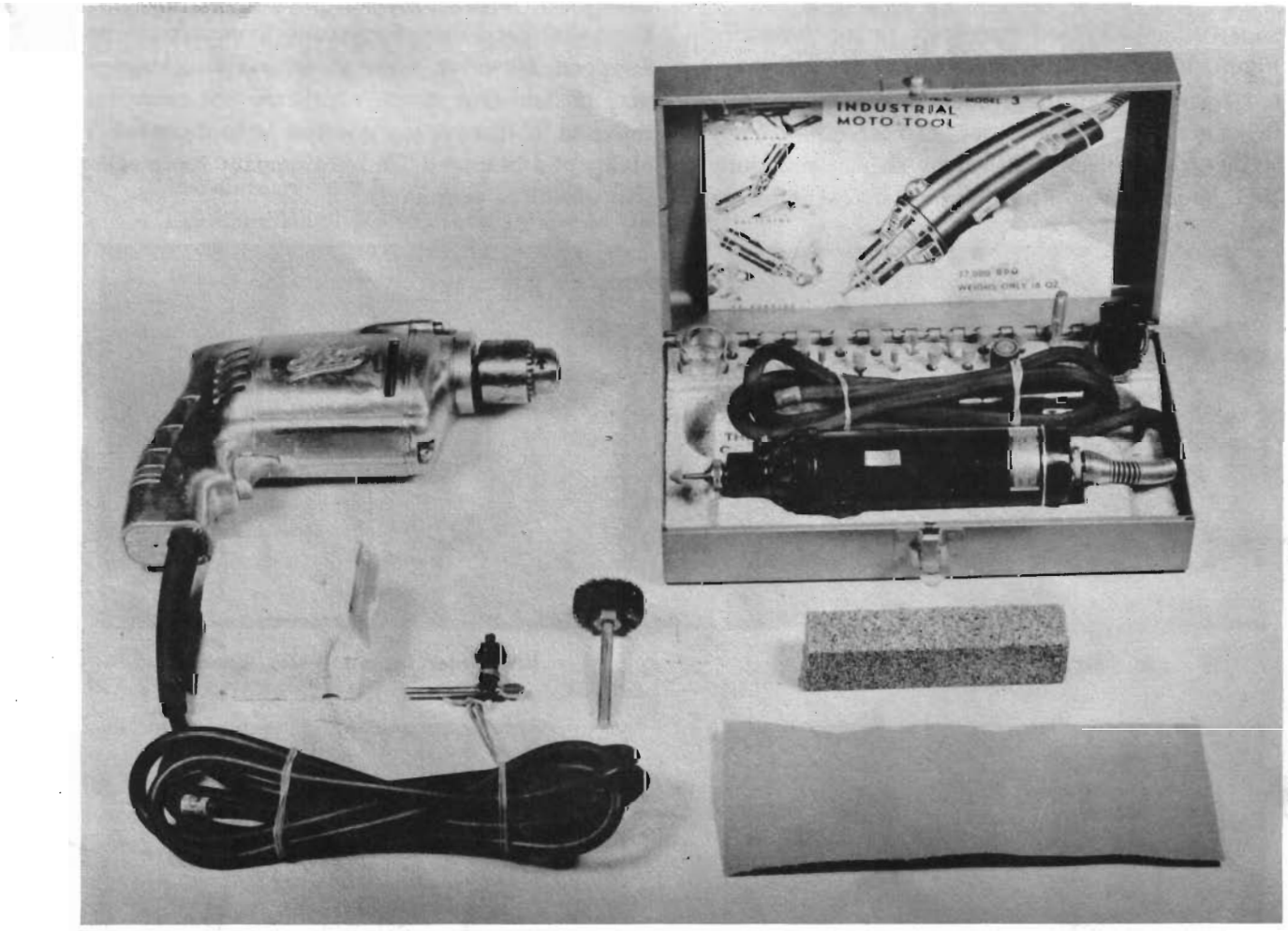


Figure 15. Tools and Material Required for Repairing Roller Bearing Cups.

Inspection and Repair

Three forms of surface damage are shown to represent different intensities of corrosion on the roller track paths and rollers in Figure 16.

A. Stains and Discoloration

B. Water Etching - Not Pitted

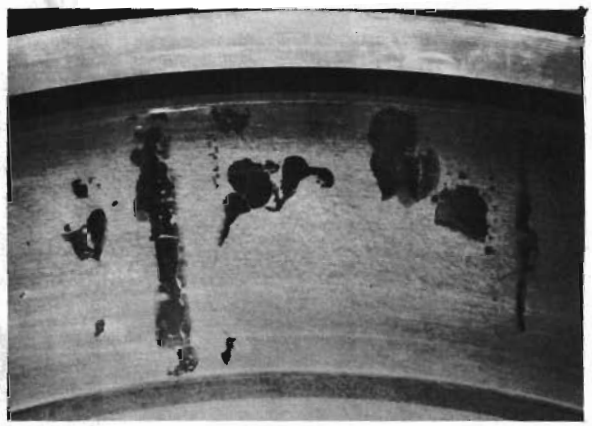
C. Water Etching - Pitted

Superficial stains and discolorations as shown in Figure 16A, or water etching, to a minor degree, as shown in Figure 16B, where the etching is superficial, are acceptable for continued service after the surfaces have been polished as shown in Figure 16D. Slight pitting after polishing is acceptable.

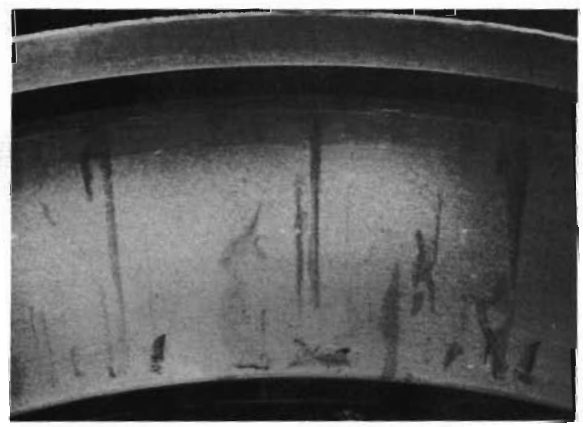
Rusting which has advanced to severe pitting, as shown in Figure 16C, that cannot be polished off rollers or cup roller paths should be considered cause for rejecting the bearing part affected.

Bearing parts discolored by localized heating from an external source must be scrapped.

Bearings having heat discoloration ranging from dark straw to blue indicates that the hardness of the metal has been affected. Such parts must be scrapped. However, these stains and discoloration may be lubricant stains, which are not cause for rejection. If there is any question as to the serviceability of a bearing a Timken Company representative should be consulted.

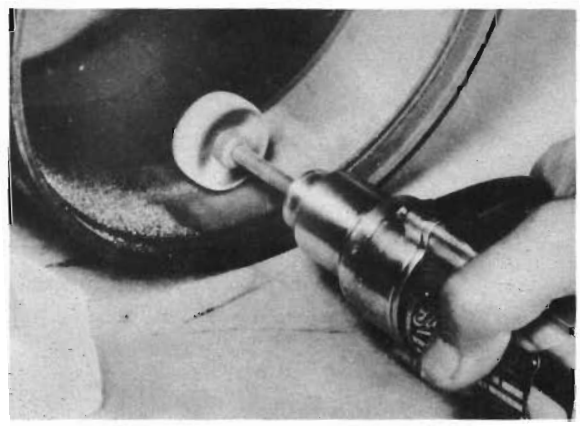


A. Stains and Discoloration



B. Water Etched - Not Pitted

C. Water Etched - Pitted



D. Polishing Cup Roller Race Using a Wire Wheel and Polishing Rouge

Figure 16.

Inspection and Repair

BRINELLING

IMPRESSIONS IN THE ROLLER PATHS OF BEARING CUPS OR CONES CAUSED BY THE IMBEDDING OF ROLLERS RESULTING FROM IMPACT WHEN THE ASSEMBLY IS NOT IN MOTION.

A. Cups

If brinell marks are faint, as shown in Figure 17D, of any length up to the full width of the roller path, the cup may be considered acceptable for further service.

If the length of a brinell mark is less than ½ the width of the roller path as shown in Figure 17A, 17B, and 17C, the cup is acceptable for further service.

If the length of a heavy brinell mark is more than ½ the width of the roller path as shown in Figure 18, the cup should be rejected.

B. Cone Assemblies

Cone assemblies may be considered satisfactory for further service if the mating brinelled cup race is suitable for further service.

Cone assemblies should be rejected if the mating cup race has been rejected because of brinell marks.

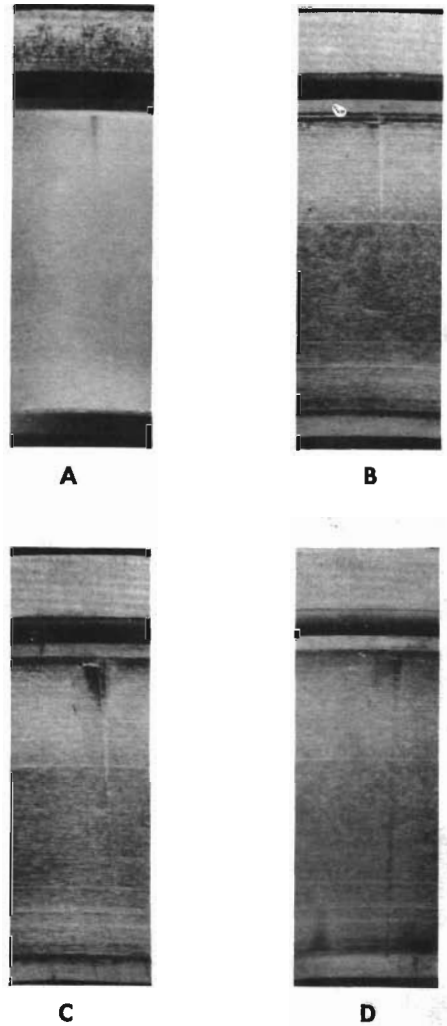


Figure 17.

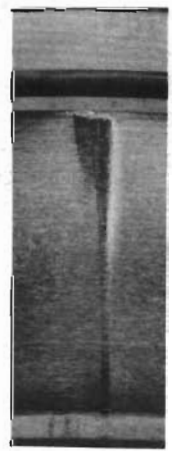


Figure 18.

Inspection and Repair

SPALLING (FLAKING OF SURFACE METAL)

A. Cups

Spalls which are just beginning as shown in Figure 19A and 19B may be repaired as noted below by grinding and the repaired cups may be returned to service.

If spalls are larger than ⅜″ x ⅜″ as shown in Figure 19C, the cup should be rejected and not returned to service.

A small hand grinder may be used to repair spalled areas, as shown in Figure 20, within the following limitations:

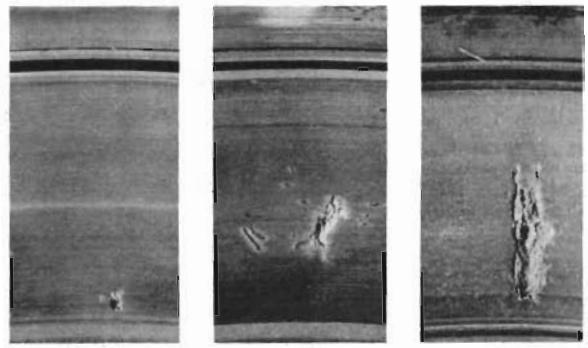
All loose material should be ground away and the edges of the ground area rounded by polishing with fine emery cloth or crocus cloth.

In repairing a spall, loose material at the edges of the spall must be ground out enlarging the affected area. The repaired spall should not be more than ⅜″ x ⅜″ and not more than ⅛″ deep after grinding.

Not more than two spalls of maximum size are to be repaired by grinding in any 2″ circumferential section of a cup roller track.

Not more than four small spalls (1/16″ x 1/16″ or less) are to be repaired by grinding in any 2″ circumferential section of a cup roller track.

If the bridge between two or more repaired spalls is less than 3/16″ the spalls should be combined by removing the bridge. The over-all dimension must not exceed ⅜″ x ⅜″.



A B C

Figure 19. - Spalling

Fine abrasive grinding wheels, approximately 5/16″ in diameter with ⅛″ or ¼″ diameter shanks should be used for repairing bearing spalls. The grinding wheels should be dressed to a point, as shown in Figure 15, for convenience.

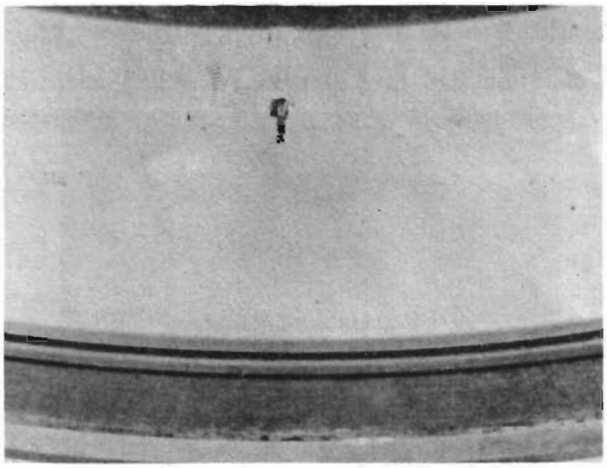
Note: More and larger spalls are acceptable in bearing cups used in housing type applications where the bearing cup can be positioned in the bearing housing so that the damaged area of the cup is not in the load zone.

B. Cone Assemblies

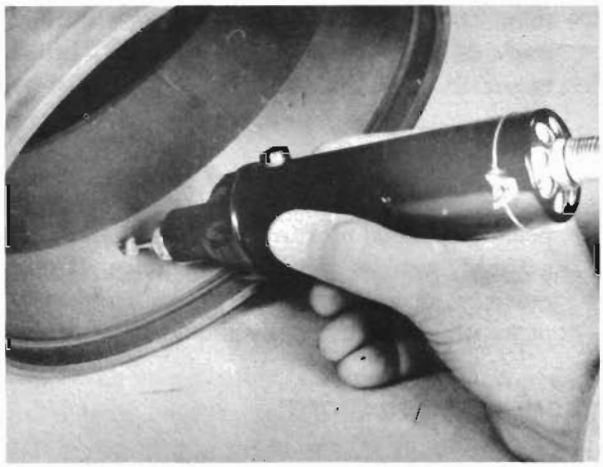
If the roller race of a bearing cone (bearing inner race) is spalled, the cone assembly should be scrapped. Exception—cones with small pinhead-sized pits in the roller race may be acceptable for further service.

If one or more rollers of a cone assembly are spalled the cone assembly should not be returned to service.

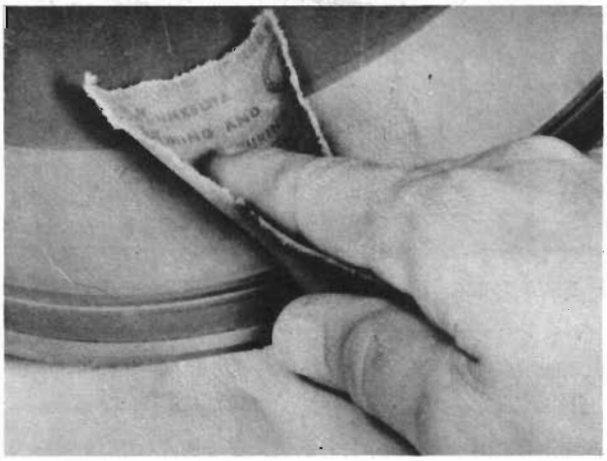
Inspection and Repair



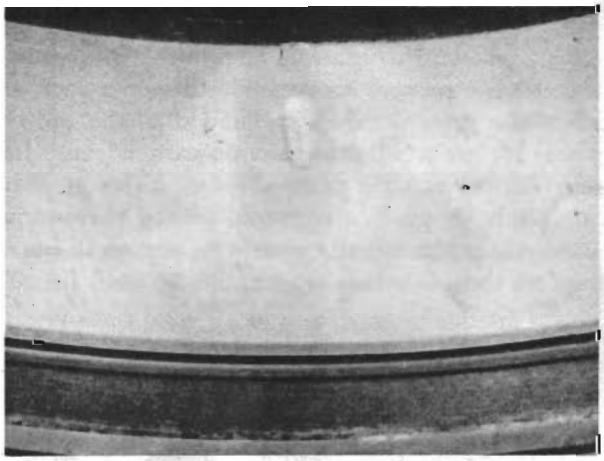
Small Repairable Spall in Bearing Cup



Grinding Spall with Pencil Grinder



Polishing Ground-out Spall with 320 Grit Emery Cloth to Round Edges



Repaired Spall

Figure 20. Method of Repairing Small Spalls in a Bearing Cup Roller Race.

Inspection and Repair

PEELING

A. Cup

Cups having very shallow peeling (usually less than 0.001" deep) or smearing in the roller track, as shown in Figure 21, may be returned to service after polishing.

B. Cone

If the cone raceway or rollers do not show peeling or metal pickup from the cup, the cone assembly can be returned to service. If cone raceway or rollers are peeled or have metal pickup the cone assembly should be scrapped.

FRAGMENT INDENTATIONS

Fragment indentations, as shown in Figure 22, usually caused by contaminants in the lubricant, are not considered a sufficient cause for rejecting bearing parts unless roughness can be detected when the bearing is rotated by hand.

ELECTRIC BURNS

Pitting, shown in Figure 23A, resulting from electric current passing through the bearing, such as when the ground cable is clamped to the rail or wheel for arc-welding repairs on cars, is cause for rejecting the bearing parts affected. Although only one pit is shown in the photo, pitting may occur at several points simultaneously on any or all bearings on the car when arc-welding is used for repair work if the ground cable is not clamped to or near the part being welded as recommended.

Fluting or corrugation, as shown in Figure 23B, resulting from electric current passing through the bearing is cause for rejecting the parts of the bearing affected.

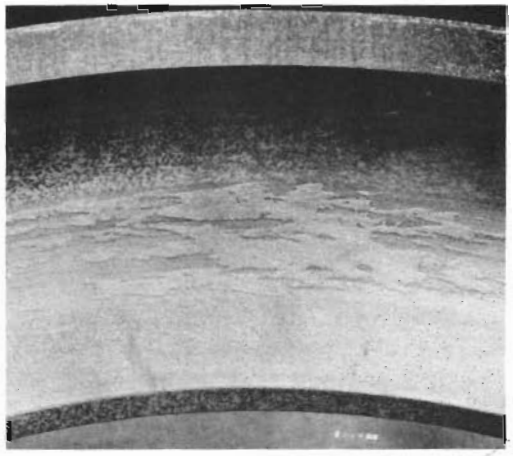


Figure 21.

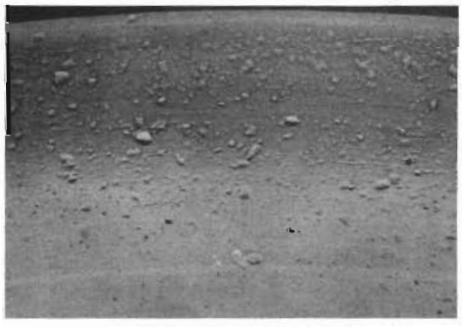
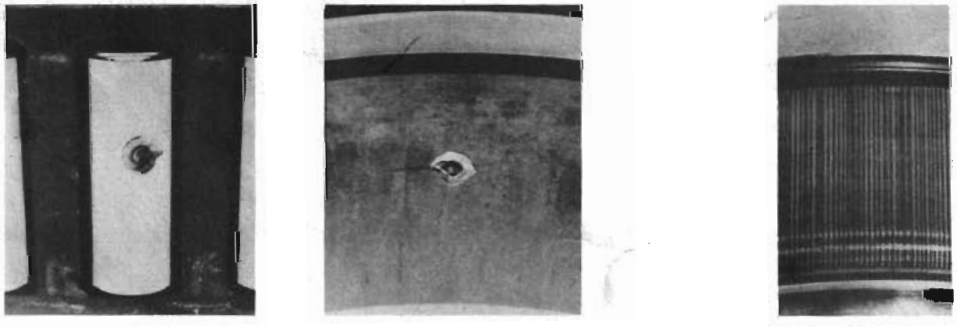


Figure 22.



A - Pitting

B - Fluting or Corrugation

Figure 23.

Inspection and Repair

CONE ASSEMBLY INSPECTION

The cone bores should be checked to the dimensions shown in Table 2 before the cones are returned to service to insure an interference fit on the axle. (AAR Wheel and Axle Manual, Roller Bearing Practice). If the bore of a cone assembly is not within the limits specified in Table 2 the cone assembly should be scrapped.

The cone bores may be checked with inside micrometers of known accuracy or with a dial bore gage as shown in Figure 27. A ring master should be used to set the dial bore gage as shown in Figure 26.

Cracks or pieces broken out of the cone shall constitute cause for scrapping the cone assembly.

The following tools may be used to facilitate cone inspection: A probe as shown in Figure 24 that can be inserted between the rollers and, a stand as shown in Figure 25 to hold the cone assembly for inspection. The stand is provided with a slot to direct light between the small rib of the cone and the cage flange onto the roller race.

Cracks or pieces broken out of the cup shall constitute cause for rejecting a bearing cup.

The outside diameter of the cup and cup counterbore should be checked to the dimensions shown in Table 2. The cup counterbore may be checked with inside micrometers of known accuracy or with a dial bore gage as shown in Figure 28. A ring master should be used to set the dial bore gage as shown in Figure 26. Cups not within the limits specified in Table 2 should be scrapped.

Class and Size	Bearing					Seal		
	Cone		Cup					
	Part Number	Bore	Part Number	O.D.*	Counterbore†	Part Number	Major O.D.	Out-of-Round‡
B (4¼" x 8")	HM120848	4.0015 4.000	HM120817XD	6.505 6.500	6.0655 6.0625	K-86895	6.074 6.068	6.064 6.079
C (5" x 9")	HM124646	4.689 4.6875	HM124618XD	7.6925 7.6875	7.1905 7.1875	K-85600	7.200 7.194	7.190 7.205
D (5½" x 10")	HM127446	cond 5.189 5.1875	HM127415XD	8.1925 8.1875	7.753 7.750	K-86860	7.763 7.757	7.753 7.768
E (6" x 11")	HM129848	5.689 5.6875	HM129814XD	8.6925 8.6875	8.253 8.250	K-86861	8.263 8.257	8.253 8.268
F (6½" x 12")	HM133444	6.189 6.1875	HM133416XD	9.9425 9.9375	9.378 9.375	K-85520	9.388 9.382	9.378 9.393
G (7" x 12")	HM136948	7.0015 7.000	HM136916XD	10.880 10.875	10.278 10.275	K-96501	10.288 10.282	10.278 10.293

*Cup O.D. - New Cup O.D. Tolerance shown in Table. 0.0025" (0.005" Diameter) Wear of Adapter Cup Seat Pads into Bearing Cup O.D. is Acceptable.

Cup Out-of-round - 0.005"

‡Seal Out-of-round - Diameter at all points must be within the limits specified.

†Counterbore Out-of-round - 0.005" but must average within tolerances shown.

Table 2.

Inspection and Repair

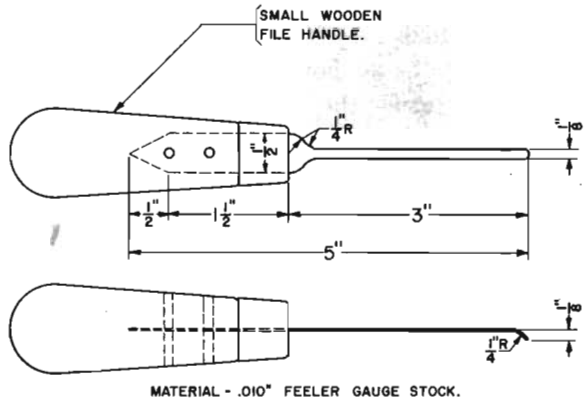


Figure 24.

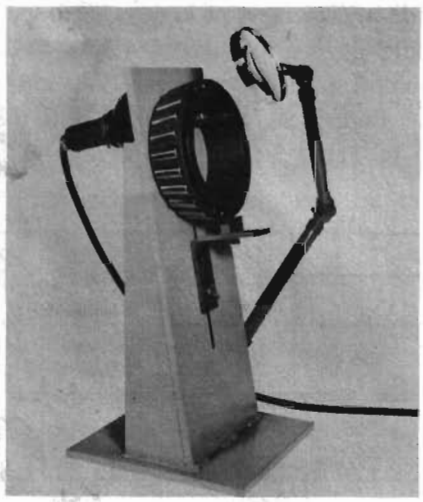


Figure 25.

Figure 26.

Figure 27.

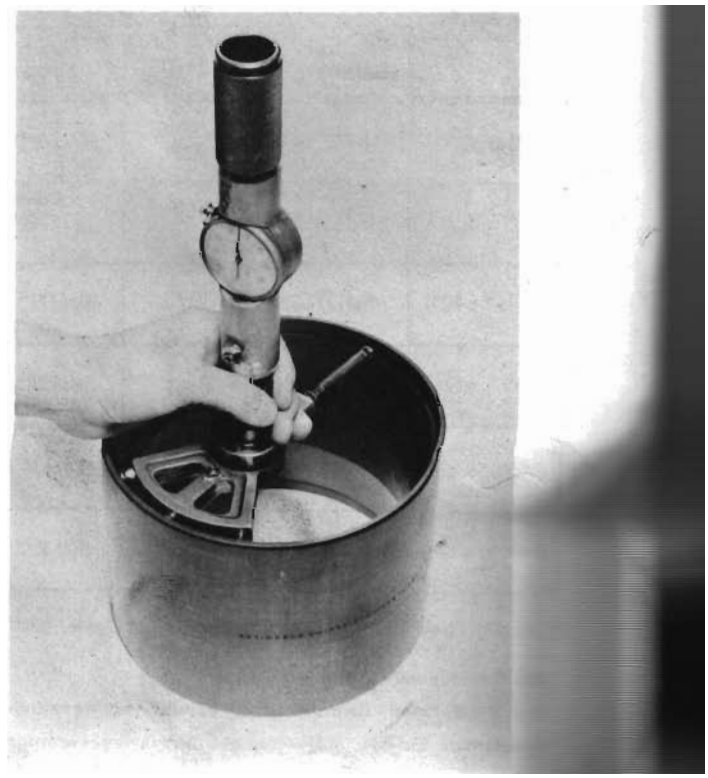


Figure 28.

Inspection and Repair

CAGE - INSPECTION

Examine the cage of the cone assembly. If the cage is bent or deformed the cone assembly should be rejected. Particular attention should be given to the development of cracks at the corners of the roller pockets. Cracks of any size constitute cause for scrapping the cone and roller assembly.

The cages of Timken bearings used for railway equipment axle applications are guided on the small cone rib. Cages are considered to be worn excessively when the total clearance on diameter between the small rib of the cone and the cage flange is 0.090″ or more.

Measure this cage flange clearance using two sets of feeler gages. Insert the feeler gages between the small rib of the cone and cage flange at two locations diametrically opposite. If the total of the two sets of feeler gages is 0.090″ or more, the cone assembly should not be returned to service.

If the roller pocket of the cage is worn to the extent that a 0.060″ feeler gage can be inserted between the roller and the cage bridge the cone and roller assembly should not be returned to service.

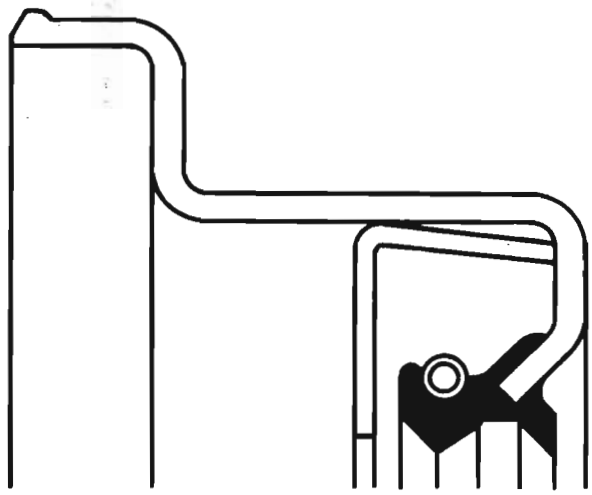


Figure 29.

SEALS

The two types of seals shown in Figures 29 and 30 are used in Timken "AP" roller bearings. The seal shown in Figure 29 has the sealing lips bonded to the outer case. The seal shown in Figure 30 has a removable seal element.

If it is necessary to scrap a seal, it is not necessary to scrap the complete seal assembly if the seal has a removable seal element. The seal element may be removed from the seal case and a new element applied with the tools designed for that purpose (see seal element removal and installation instructions).

If either of the seal lips is slivered, rough, or torn, the seal or seal element should be scrapped.

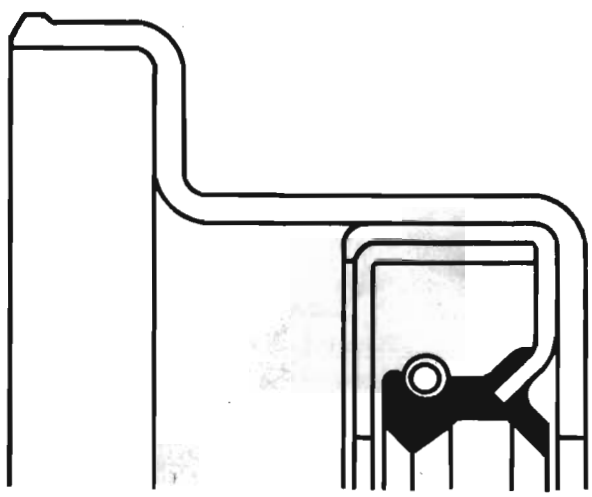


Figure 30.

To check the interference fit of the seal element and seal wear ring, place a 0.010″ undersize seal wear ring on a smooth flat surface with the chamfered end of the wear ring at the top and apply the seal to be checked.

Inspection and Repair

Hold the seal wear ring stationary and turn the seal by hand. If at least a slight drag is not perceptible between the lips of the seal and the wear ring, or if there is any free diametral shake between the wear ring and the seal element, indicating that the I.D. of the element is larger than the O.D. of the wear ring, the seal element should be scrapped.

The seal element and seal wear ring should be wiped clean before testing for fit.

DO NOT ATTEMPT TO INSERT ANY TOOL OR OTHER INSTRUMENT BETWEEN THE SEAL ELEMENT LIPS AND THE SEAL WEAR RING to determine the fit of the seal on the wear ring.

A minimum of 0.020″ clearance must be maintained between the seal element fluid lip and the seal element case. If the seal element case is distorted or bent to the extent that the clearance between the fluid lip of the seal and the seal element case is less than 0.020″ at any point, the seal element must be scrapped.

When a seal element is removed from the outer seal case, the seal element must be scrapped.

When a new seal or seal element is installed, it is not necessary to apply a new seal wear ring if the wear ring is otherwise satisfactory for further service.

In addition to inspecting the seals for service damage and wear, the major outside diameter of the seal case should be checked to the dimensions shown in Table 2, using the seal case O.D. gage shown in Figure 31. This gage is available commercially.

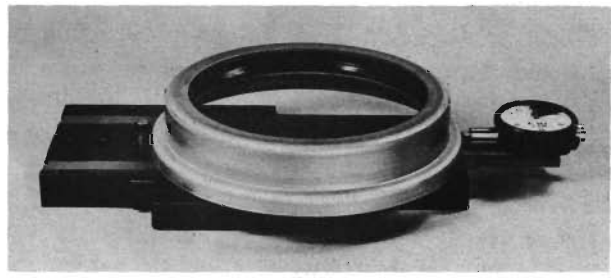


Figure 31.

SEAL WEAR RINGS AND BACKING RINGS

If the outside surface of the seal wear ring is cracked or scratched or if the lip contact path has worn to a depth of 0.005″ (0.010″ on diameter), the seal wear ring should be scrapped.

It is not necessary to remove the inner seal wear ring from the backing ring for cleaning or inspection of the wear ring.

The backing ring should be inspected for cracks. The vent fitting in the backing ring should be inspected to be sure that it is not clogged or damaged. If the vent is damaged a new vent should be applied.

To remove the vent fitting from the backing ring, Figure 32, clamp the backing ring between the back face and forged counterbore face in a vise using brass jaw faces.

Insert a ⅜″ diameter rod in the vent hole in the bore of the backing ring and force out the original vent fitting past the peen marks by tapping the rod with a hammer. Care must be taken to see that the machined faces of the backing ring are not damaged.

The two upset spots of the vent fitting hole can be displaced so that a new vent fitting can be inserted in the hole by driving a ½″ rod that is slightly tapered on the end into the vent fitting hole.

Clean the vent hole thoroughly.

Insert a new vent fitting and upset the metal over the vent fitting at two diametrically opposite points

Inspection and Repair

preferably at the points of the original peening using a hand punch and hammer. A 5/32" diameter flat face punch with the sharp corners on the flat face rounded is well suited for this operation. Care must be taken that the metal is not upset sufficiently to damage the vent fitting. The vent fitting must be forced against the hole backing shoulder so that the fitting will not have end play after assembly.

The inner seal wear ring has an interference fit in the backing ring of 0.001" to 0.008" tight.

If the seal wear ring does not have a tight fit in the counterbore of the backing ring and the seal wear ring is worn in the area of the backing ring fit to the extent that it is not a press fit in the backing ring the seal wear ring should be scrapped.

If the counterbore of the backing ring is worn to the extent that it is not a press fit on the seal wear ring the backing ring should be scrapped.

If it is necessary to scrap the inner seal wear ring or backing ring, see instructions for backing ring and seal wear ring disassembly and assembly.

AXLE END CAPS

Axle end caps that are distorted, cracked or damaged should be scrapped.

CAP SCREWS

Cap screw threads should be inspected for excessive wear or damage. Cap screws which cannot be tightened to the recommended torque must be scrapped.

FRAME ADAPTERS

All frame adapters must be inspected in accordance with "Instructions for Inspecting Service-Worn Adapters," A-30574, before they are returned to service. Also see AAR Wheel and Axle Manual "Adapter Practice".

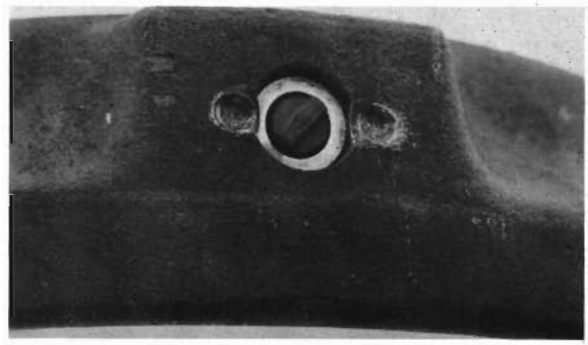


Figure 32. Vent Fitting in "AP" Bearing Backing Ring.

LOCKING PLATES

All used locking plates should be replaced with new ones at reassembly (AAR Wheel and Axle Manual Roller Bearing Practice).

REPLACEMENT OF BEARING PARTS

When one or more component parts of a bearing assembly are replaced with new or service-worn parts the bearing bench lateral play must be established in accordance with instructions.

Bearing component parts of competitive manufacture are not interchangeable with and MUST NOT BE MIXED with Timken bearing components in unit assemblies.

Timken roller bearing component parts are easily identified. The registered trademark "Timken" is on each part of the bearing assembly except the cap screws, lubricant fitting and pipe plug which are AAR standard parts. The location of the Timken name on the bearing parts is shown in Figure 13.

BEARING REASSEMBLY

- CHECKING THE BEARING BENCH LATERAL PLAY
- LUBRICATION
- SEAL INSTALLATION - PRESS OPERATED TOOLS
- SEAL ELEMENT REMOVAL AND INSTALLATION
- BACKING RING AND SEAL WEAR RING DISASSEMBLY AND ASSEMBLY

Reassembling the Bearing

CHECKING BEARING BENCH LATERAL PLAY

Lateral adjustment of the "AP" roller bearing is controlled by the cone spacer between the two cone and roller assemblies.

Cone assemblies and bearing cups of the same series number are interchangeable until a cone spacer has been selected to establish the bearing lateral play, after which these parts must be kept together as a unit assembly.

If the bearing cone assemblies, cups, or cone spacers of two or more bearing sets become mixed, or if new or replacement bearing parts are substituted, the bench lateral play must be checked.

The bench lateral play of the bearing assembly must be checked to make sure that the cone spacer has the required length necessary to provide running lateral play after the bearing is pressed on the axle.

The bearing bench lateral play should not be checked when the bearings are dry. All bearing parts should be dipped in light machine oil after they have been cleaned.

The bearing bench lateral play should be checked with the device shown in Figure 33. Bearing bench lateral play cannot readily be obtained by using micrometer measurements.

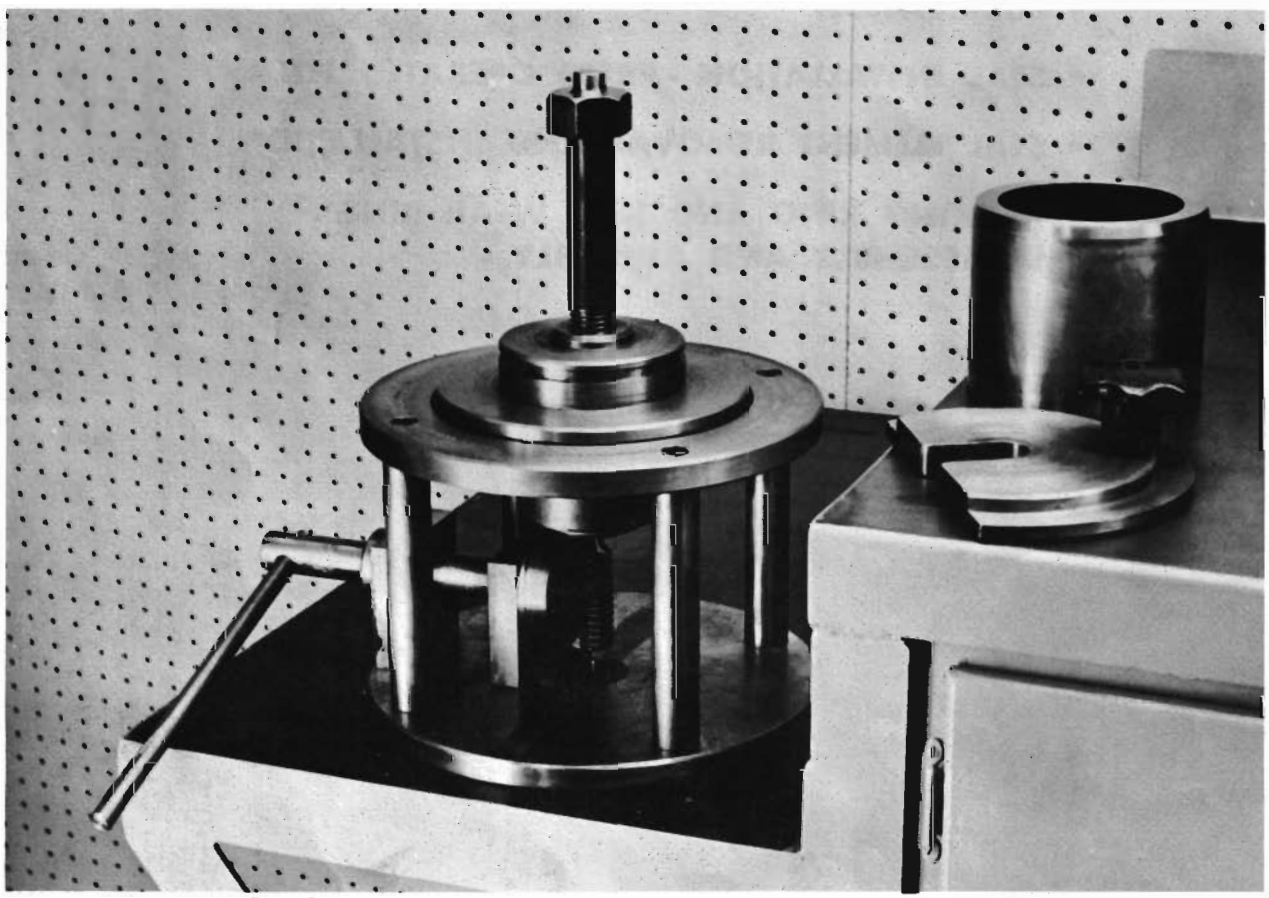


Figure 33.

Reassembling the Bearing

CHECKING BEARING BENCH LATERAL PLAY

Select the bearing adapter sleeve for the bearing size to be checked. Place the adapter sleeve on the adapter sleeve holder of the lateral checking device and tighten the set screw (Figure 34).

Figure 34.

Place a cone assembly and a cone spacer on the adapter sleeve, as shown in Figure 35.

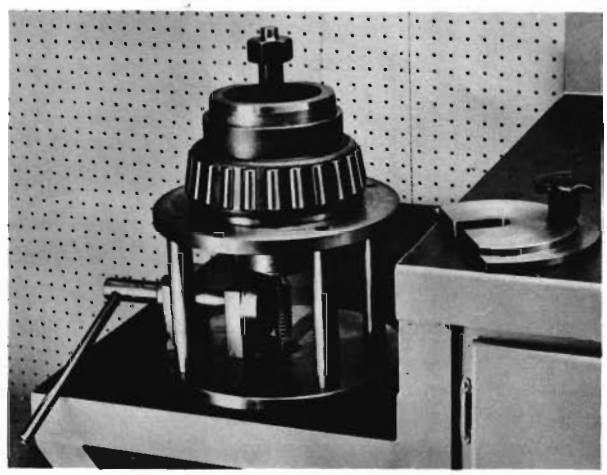


Figure 35.

Position the bearing cup on the cone assembly and carefully place a second cone assembly in the cup. Position the collar on the upper cone assembly. This collar is designed to fit all bearing sizes. Make sure that the collar is clear of the upper cup face after the locking bolt has been tightened.

With the lateral checking fixture in the raised position, tighten the locking bolt securely to clamp the cone assemblies and cone spacer tightly together (Figure 36).

Figure 36.

Reassembling the Bearing

CHECKING BEARING BENCH LATERAL PLAY

Lower the bearing assembly and revolve the upper cone assembly 12 revolutions to seat the rollers of the upper cone assembly against the large cone rib, as shown in Figure 37.

Apply a dial indicator mounted on a magnetic base to the bearing cup and set the indicator dial to zero (Figure 38).

Actuate the cam arrangement of the fixture to lift the bearing cup off the top plate of the fixture. The bearing cup is then oscillated to seat the rollers of the lower cone assembly against the large cone rib (Figure 39).

The dial indicator reading is the bearing bench lateral play.

This procedure should be reversed by actuating the cam to lower the bearing assembly and oscillating the upper cone to seat the rollers. The dial indicator should return to the zero reading. Raise the bearing by actuating the cam to repeat the check on the lateral measurement.

If the bearing bench lateral play is not within the limits of 0.021″ to 0.027″, the cone spacer should be ground or a new cone spacer selected to provide the specified bearing bench lateral play.

To reduce the lateral play, a shorter spacer is required. To increase the lateral play, a longer spacer is required. These cone spacers are available in increments of 0.003″ from 0.006″ longer than normal to 0.027″ shorter than normal. Each spacer is marked to indicate its length from +0.006″ to −0.027″.

When a cone spacer has been ground or selected to provide the specified bench lateral play this set of bearing parts then becomes a unit assembly and must be kept together until the final assembly has been completed.

Figure 37.

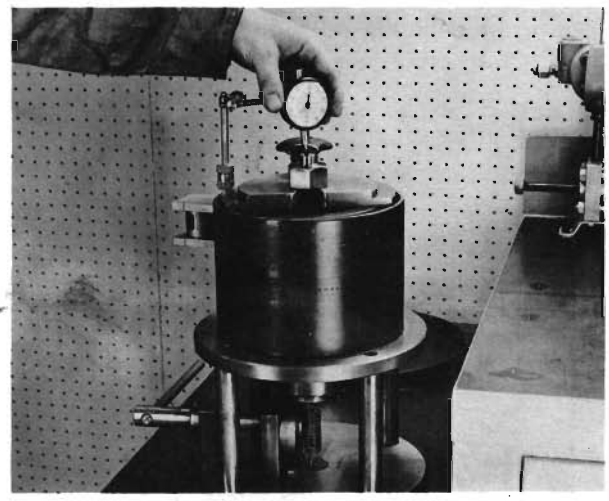


Figure 38.

Figure 39.

Reassembling the Bearing

LUBRICATION

When applying grease to roller bearings every possible precaution must be taken to prevent contaminants from getting into the lubricant.

The grease should be kept covered and in the containers in which it is shipped. Pumping devices equipped with adapter covers to fit the containers in which the grease is shipped should be used for roller bearing lubrication to prevent contamination with dirt or moisture.

The grease containers must be stored away from heat and the grease must not be heated to facilitate application. If the grease is heated, separation of the oil from the soap in the grease will result.

Roller bearing assemblies that have been disassembled and cleaned must be lubricated before being reassembled in accordance with instructions in lubrication instruction booklet A-26863.

A greasing fixture, similar to that shown in Figure 40, should be used to pack the cone and roller assembly with grease.

A cone assembly properly packed with grease is shown in Figure 41.

The roller bearing assemblies CANNOT BE LUBRICATED PROPERLY by applying the initial charge of grease through the lubrication hole in the axle end cap after the bearing has been applied to the axle. This lubrication hole is to be used only when grease is to be added to the roller bearing assembly as follows:

1. At lubrication intervals specified in AAR rule 66-A and in lubrication instruction booklet A-26863.

2. On special applications where an additional quantity of grease is specified for completely filling the bearing assembly at initial lubrication.

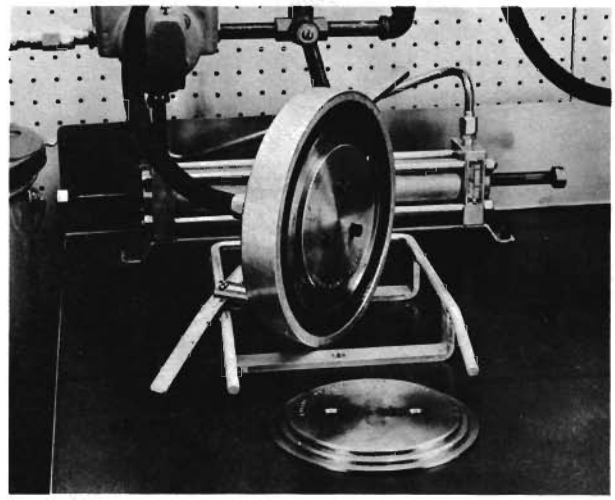


Figure 40.

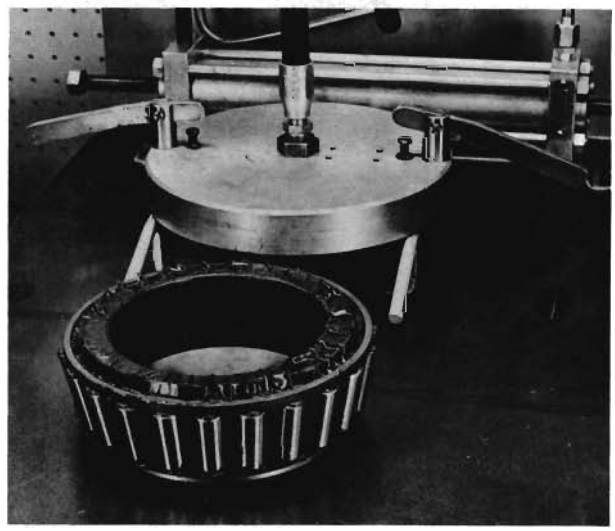


Figure 41.

Reassembling the Bearing

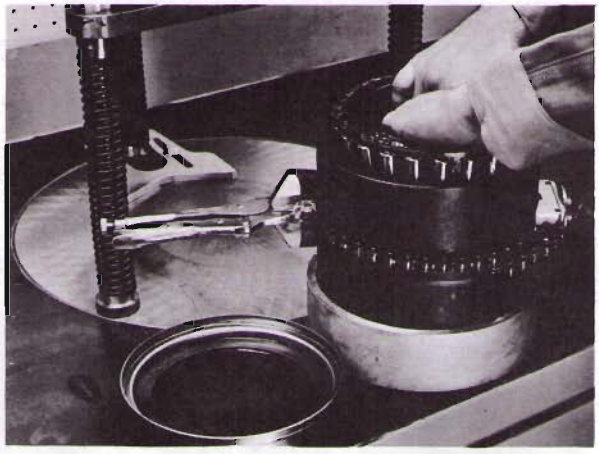


Figure 42.

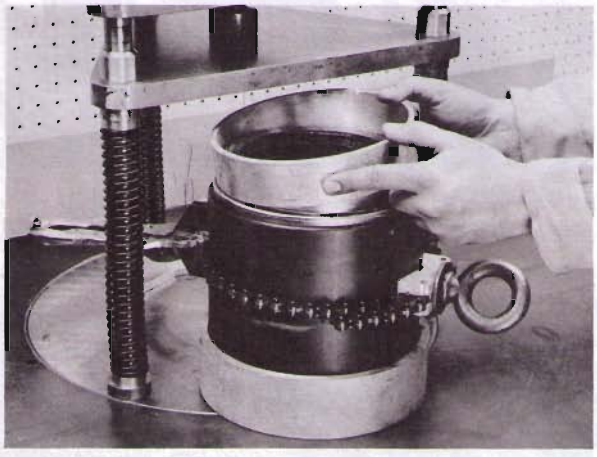


Figure 43.

SEAL INSTALLATION

The seal may be installed in the bearing cup in a small press by using the tools shown in Figure 2.

Position the bearing cup in the bearing support ring and place a cone and roller assembly, that has been packed with grease, in the bearing cup (Figure 42).

Place the seal in position to be pressed into the bearing cup and position the adapter ring on the seal (Figure 43).

The seal installing plate, shown in Figure 2, is required for installing seals in bearing cups if a press other than a platen press is used.

Center the bearing in the press and press the seal into the bearing cup (Figure 44).

Check the seal installation and make sure that it is properly seated. The shoulder of the seal case must be flush with or below the bearing cup face (Figure 45).

Figure 44.

Figure 45.

Reassembling the Bearing

Be sure that the lips of the seal are well lubricated with grease.

Apply the outer seal wear ring. The seal wear rings must be applied with care. The end of the seal wear ring which is to be started into the seal is chamfered so that the seal lips will gradually expand over the seal wear ring without turning under.

DO NOT INSERT ANY TOOL OR OTHER INSTRUMENT BETWEEN THE SEAL ELEMENT LIPS AND SEAL WEAR RING. This may damage the seal element lips or scratch the seal wear ring resulting in bearing lubricant leakage.

Turn the bearing assembly over and place the cone spacer in position in the bearing cup on the face of the cone.

LUBRICATION

The amount of grease specified in lubrication instruction booklet A-26863, should be spread evenly around the cone spacer before the second cone assembly is placed in the bearing cup (Figure 46).

COMPLETING THE ASSEMBLY

Place the second cone assembly, which has been previously packed with grease, in position in the bearing cup. Apply the second seal and check to make sure that it is properly seated (Figure 45).

Apply the inner seal wear ring and backing ring. If the seal wear ring has been removed from the backing ring see instructions on page 45 for applying the backing ring to the seal wear ring.

A cardboard tube as used in the original packaging, or a similar device, should be used to keep the bearing cones and cone spacer in alignment to facilitate installing the bearings on the axle and to prevent dirt or dust from entering the bearings before they are applied to the axle.

The bearing assembly is now ready to be applied to the axle or placed in stock.

When bearing assemblies are to be placed in stock, they should be covered and stored in a dry area well protected from moisture.

Figure 46.

página 34 en blanco

SEAL ELEMENT REMOVAL AND INSTALLATION

- APPLYING THE SEAL ELEMENT REMOVAL JAWS
- SEAL ELEMENT REMOVAL
- SEAL ELEMENT INSTALLATION

Seal Element Removal and Installation Tools

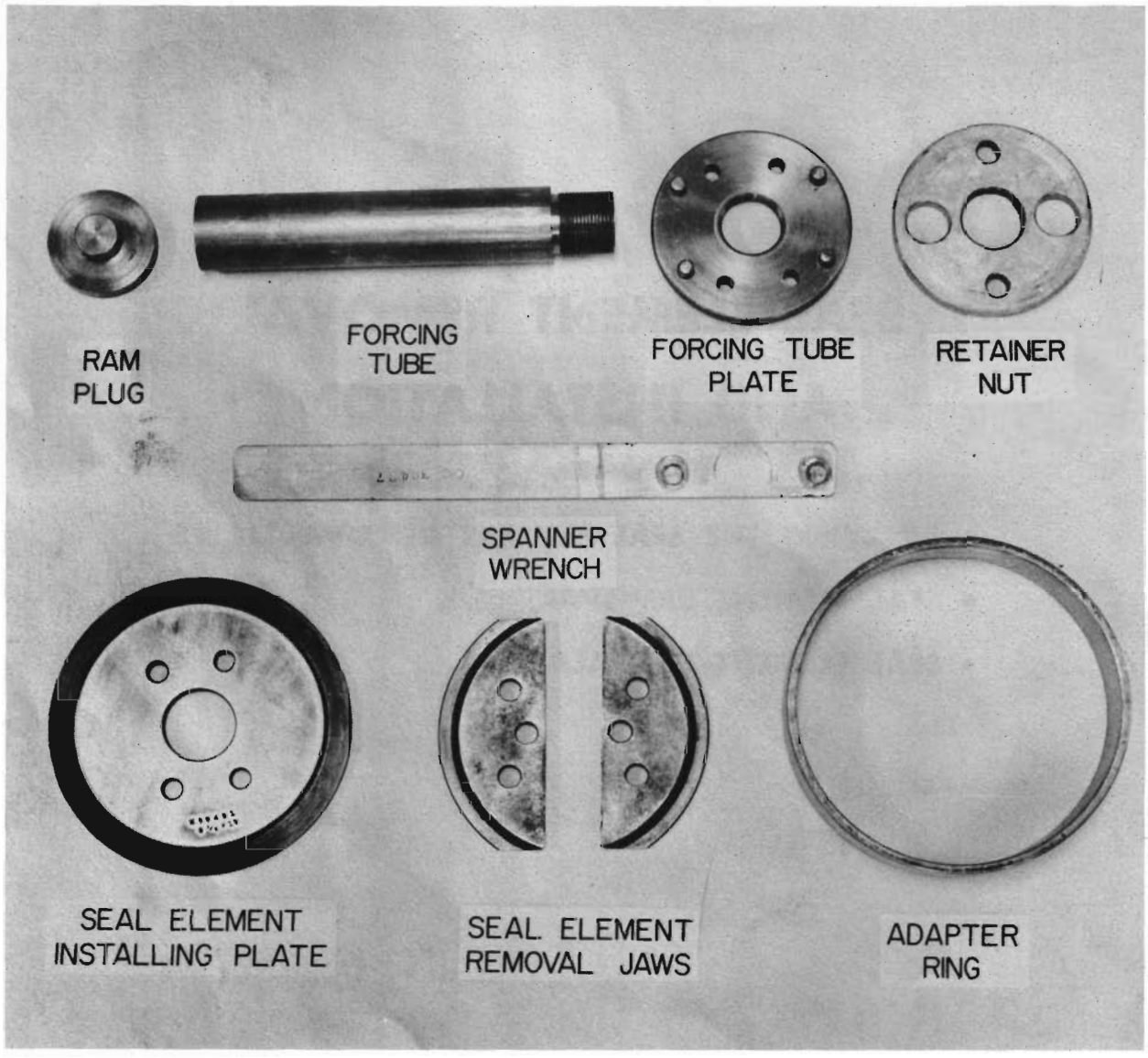


Figure 47. Tools Required for Removing or Installing the Seal Element with a Small Press.

Applying the Seal Element Removal Jaws

Figure 48. Removable Seal Element Removed from the Seal Case.

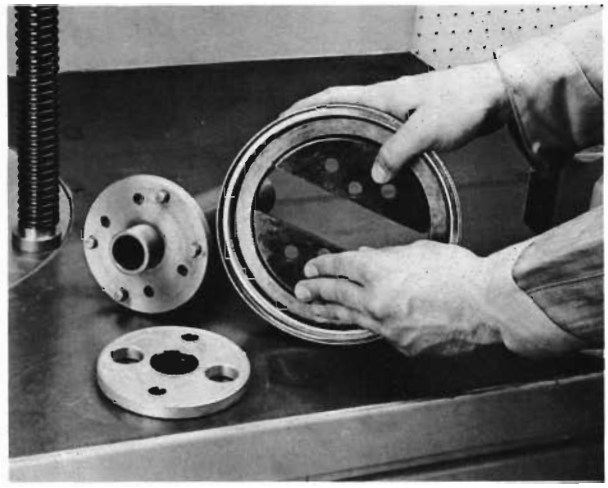


Figure 49.

The seal element may be removed from seals which do not have the element bonded to the outer case, Figures 30 and 48.

Seal element removal and installation tools for use with a small press are shown in Figure 47.

Apply the seal element removal jaws between the inner seal lip and seal element case, as shown in Figure 49.

Position the forcing tube on the seal element removal jaws. Make sure the tube plate is flat against the jaws with the guide pins through the holes provided in the jaws.

Apply and tighten the retainer nut using the Spanner wrench, as shown in Figures 50 and 51.

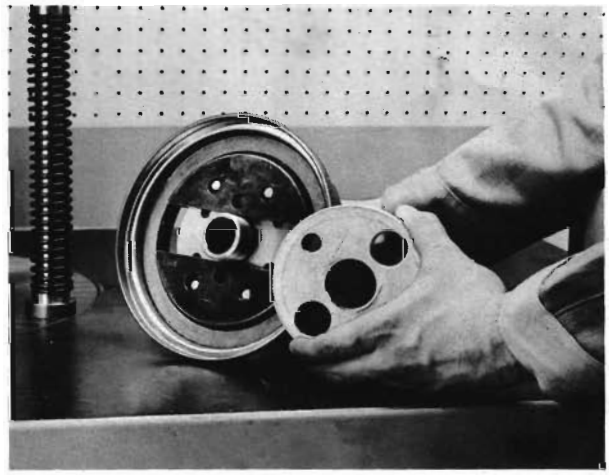


Figure 50.

Figure 51.

Seal Element Removal

Position the seal, with the forcing tube applied, on the adapter ring (Figure 52).

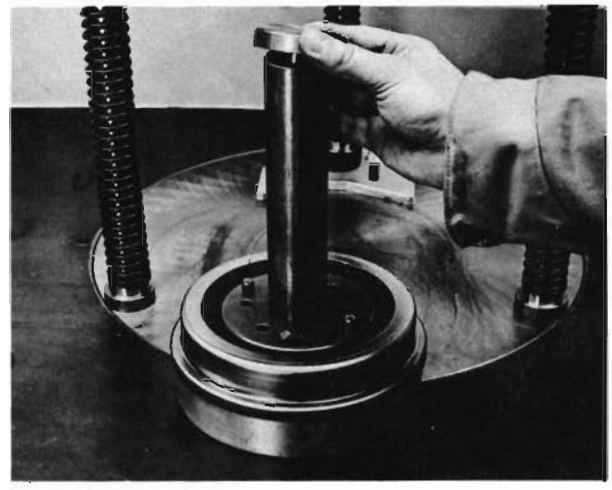


Figure 52.

Center the adapter ring and seal in the press and press the seal element out of the seal case (Figure 53).

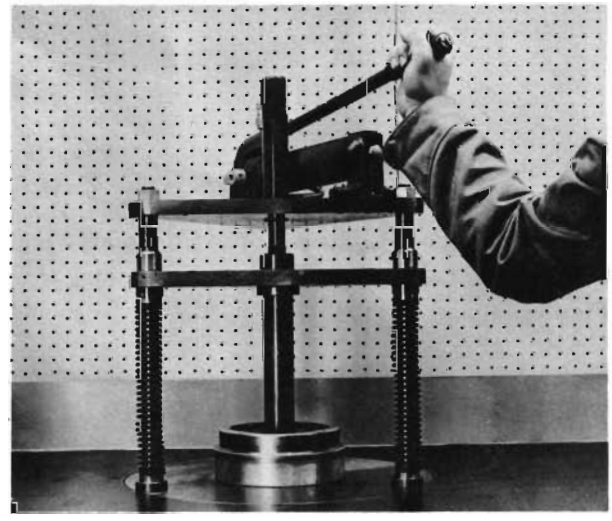


Figure 53.

Figure 54 shows the seal element removed from the seal case.

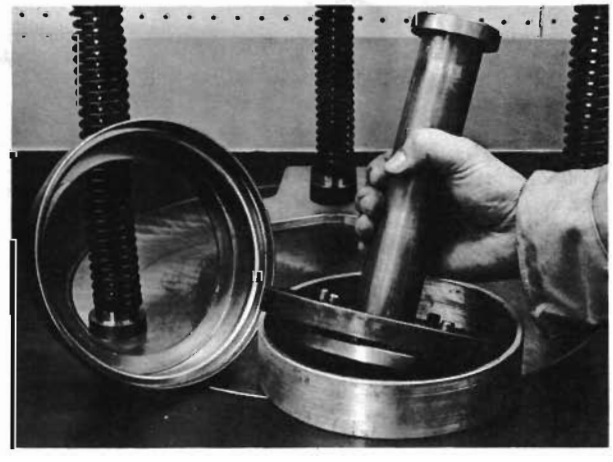


Figure 54.

Seal Element Installation

The seal element may be installed with a small press by using the tools shown in Figure 47.

Place the seal case in the adapter ring and place the seal element in position to be pressed into the seal case with the fluid side up. "Fluid Side" is stamped on the seal element case (Figure 55).

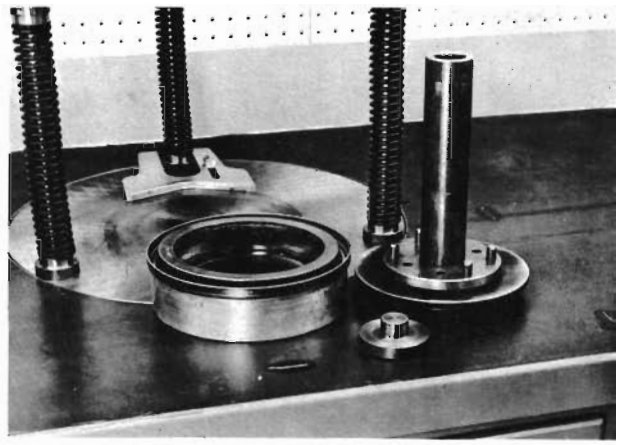


Figure 55.

Position the forcing tube, with the seal element installing plate applied, on the seal element case (Figure 56).

Figure 56.

Center the adapter ring and seal in the press and press the seal element into the seal case (Figure 57).

Make sure that the seal element is seated in the seal case. However, excessive pressure, which may damage the seal element case, should be avoided. The clearance between the fluid lip of the seal and the seal element case must not be less than 0.020" at any point, to insure proper functioning of the seal.

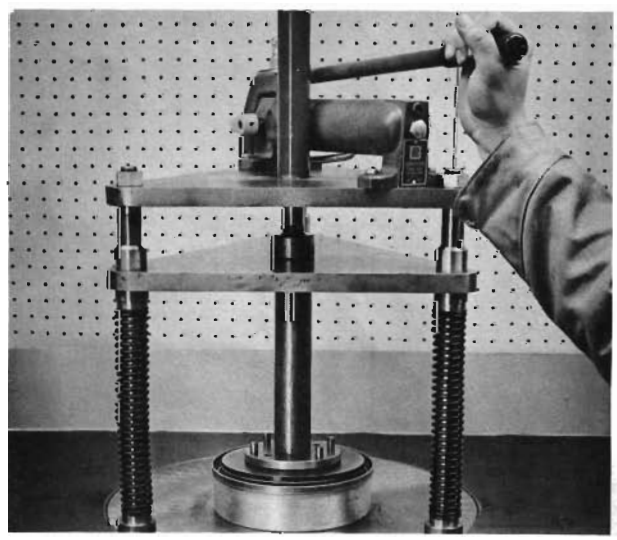


Figure 57.

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BACKING RING AND SEAL WEAR RING DISASSEMBLY AND ASSEMBLY

- BACKING RING AND SEAL WEAR RING DISASSEMBLY AND ASSEMBLY TOOLS
- SEAL WEAR RING REMOVAL
- APPLYING THE BACKING RING

Backing Ring and Seal Wear Ring Disassembly and Assembly Tools

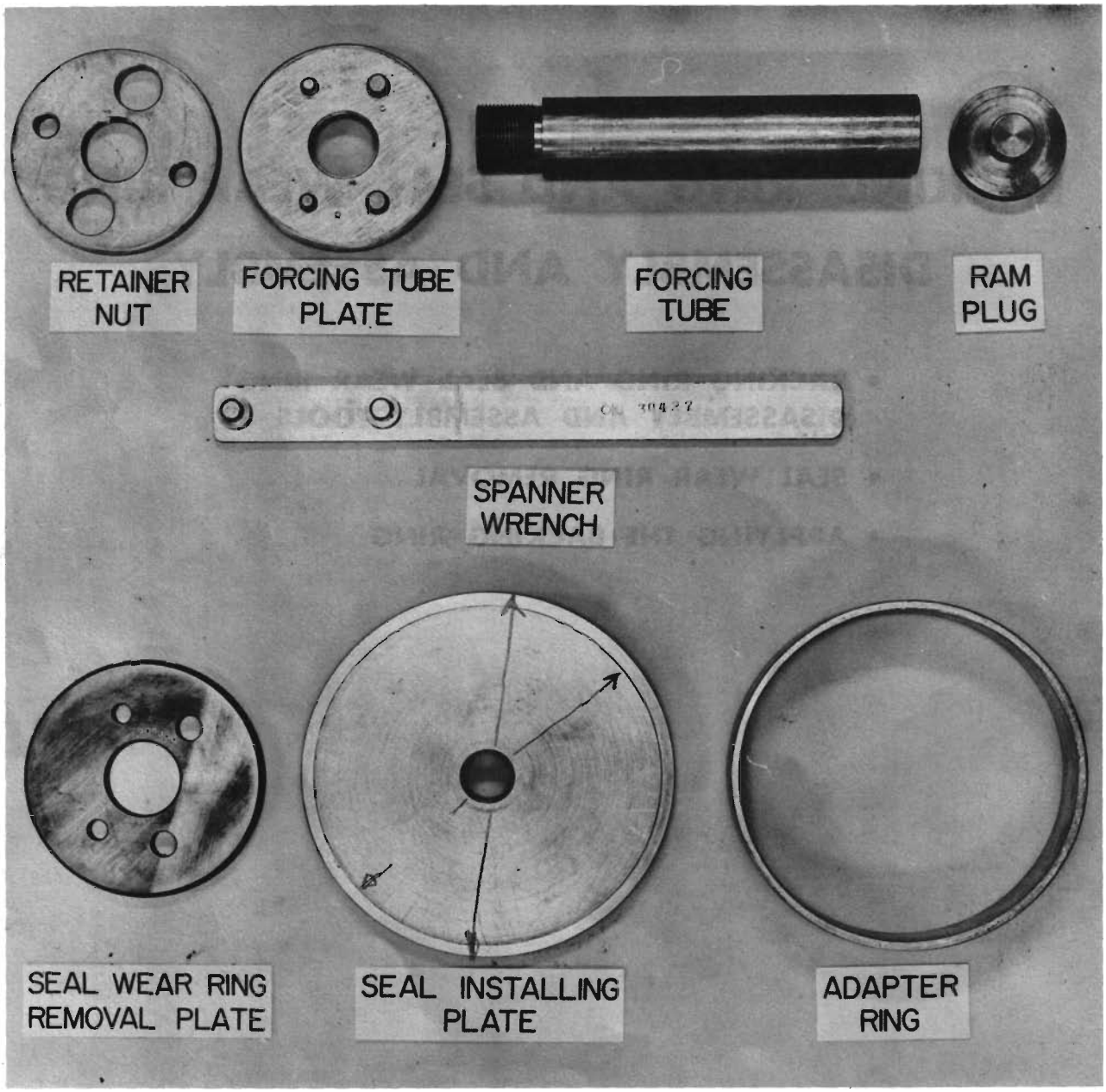

Figure 58. Tools Required for Removing the Seal Wear Ring and Applying the Backing Ring with a Small Press.

Seal Wear Ring Removal

Figure 59.

Figure 60.

When either the seal wear ring or backing ring is to be replaced, the seal wear ring may be removed from the backing ring, as shown in Figure 59, using the tools shown in Figure 58.

Seal wear ring removal tools for use with a small press are shown in Figure 58. All the tools shown, except the seal wear ring removal plate, are tools used for seal and seal element removal and installation.

Figure 61.

ASSEMBLING THE SEAL WEAR RING REMOVAL TOOLS

Position the seal wear ring removal plate on the forcing tube (Figure 60). Make sure the removal plate is flat against the tube plate with the guide pins through the holes provided in the plate.

Apply and tighten the retainer nut using the Spanner wrench, as shown in Figures 61 and 62.

Figure 62.

Seal Wear Ring Removal

Position the backing ring assembly on the adapter ring and place the forcing tube, with the removal plate applied, in the seal wear ring, as shown in Figure 63.

Figure 63.

Center the adapter ring in the press and press the seal wear ring out of the backing ring (Figure 64).

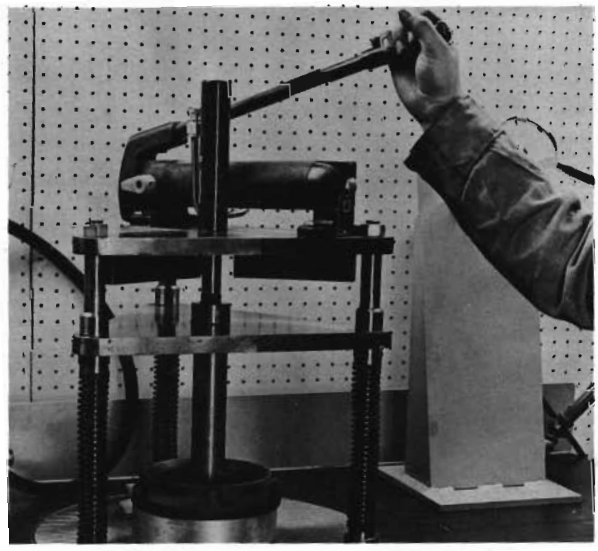

Figure 64.

Applying the Backing Ring

After the bearing has been reassembled, and the seal wear rings have been inserted, apply the backing ring.

The bearing support ring MUST NOT BE USED when the backing ring is pressed on the seal wear ring. The bearing assembly must be resting on the seal wear ring in the opposite end of the bearing, as shown in Figure 65.

Place the backing ring in position to be pressed on the seal wear ring, as shown in Figure 65.

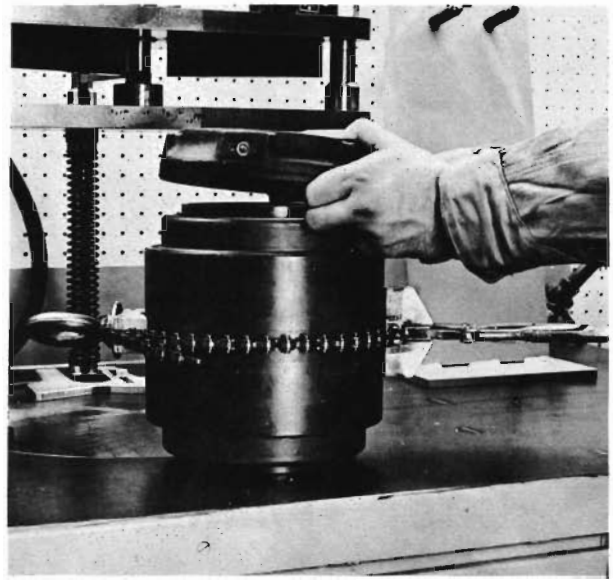

Figure 65.

Center the bearing assembly in the press and press the backing ring on the seal wear ring (Figure 66).

The seal installing plate, included with the tools in Figure 58, is required for applying the backing ring if a press other than a platen press is used.

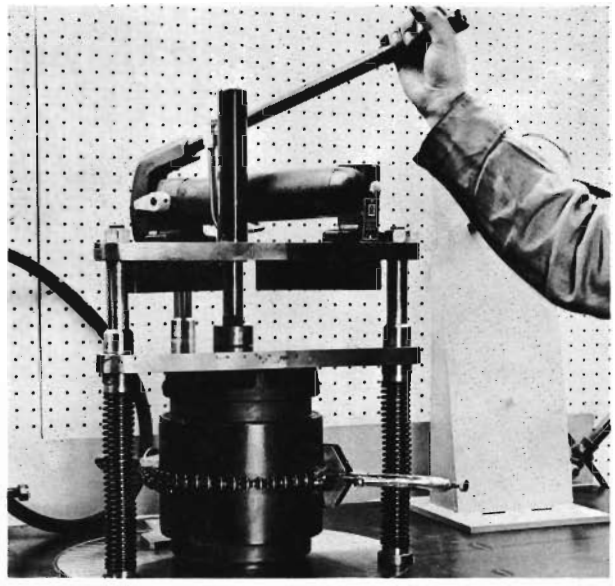

Figure 66.

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STORAGE AND SHIPMENT

- STORAGE
- SHIPPING
- OVERSEAS SHIPPING INSTRUCTIONS

Storage

EQUIPMENT WITH ROLLER BEARINGS APPLIED

When cars and locomotives with roller bearings applied are placed in storage, the brakes should be set or the wheels chocked to prevent the equipment from moving.

It is not necessary to move the equipment periodically to distribute lubricant over the bearing surfaces of Timken "AP" roller bearings.

If the equipment has been submerged in flood water of such a depth that the water could have entered the bearings, the bearings should be removed from the axle, disassembled, cleaned, inspected, and replacements or repairs made as necessary.

WHEEL AND AXLE ASSEMBLIES WITH ROLLER BEARINGS APPLIED

Wheel and axle assemblies with roller bearings applied must be handled with care. Damage may result if the bearings are permitted to strike other objects.

Wheel and axle assemblies with roller bearings applied may be stored on single storage track overlapped as shown in Figure 67 to conserve storage space. With this storage track arrangement the flanges of the wheels will not contact either the roller bearing assemblies or axle bodies of adjacent wheel and axles assemblies. (AAR Wheel and Axle Manual)

Wheel and axle assemblies with roller bearings applied should not be stored on double track used for the storage of plain bearing axles with wheels mounted as shown in the AAR Wheel and Axle Manual. The wheel flanges of the wheel and axle assemblies may contact and damage the bearings on adjacent wheel and axle assemblies.

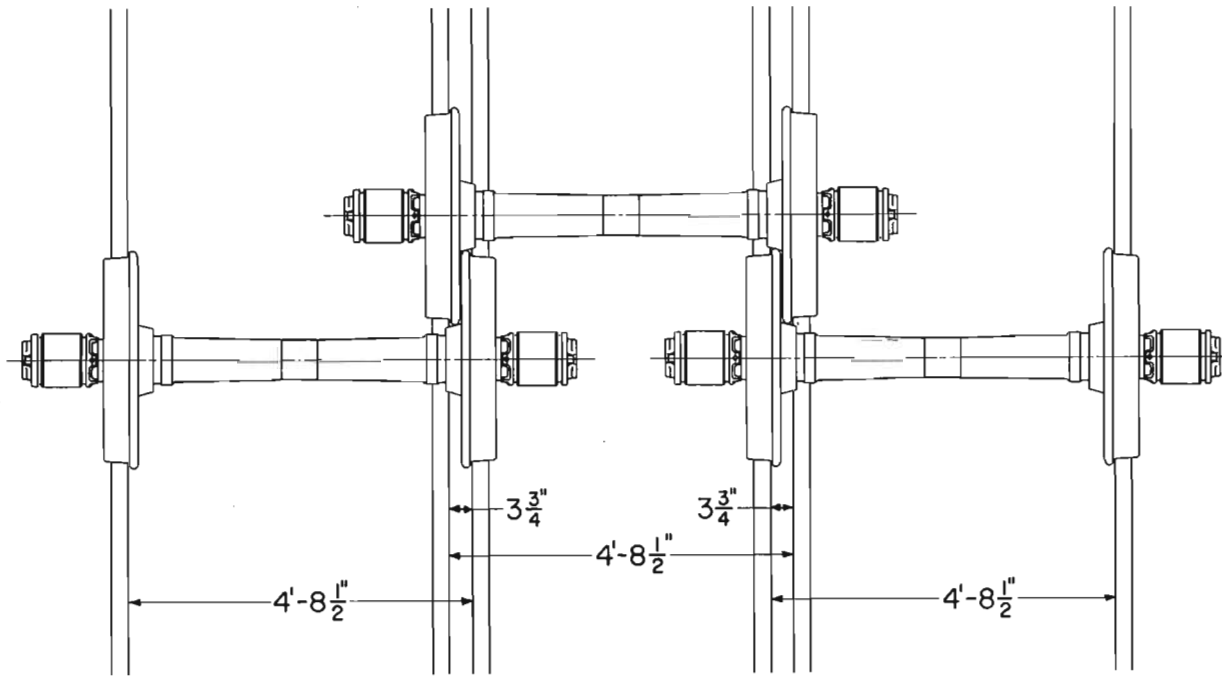


Figure 67.

Storage

When wheel and axle assemblies with roller bearings applied are not stored on track, the wheels should be flange to flange and not overlapped.

It is not necessary to periodically revolve Timken "AP" roller bearings applied to wheel and axle assemblies in storage to distribute lubricant over the bearing surfaces.

If wheel and axle assemblies with roller bearings applied have been submerged in flood water of such a depth that the water could have entered the bearings, the bearings should be removed from the axle, disassembled, cleaned, inspected, and replacements or repairs made as necessary.

The vent fitting recess in the backing rings of bearing assemblies removed from storage should be cleared of all foreign material.

Wheel and axle assemblies with roller bearings applied should be used in the order in which they were stored, oldest stock first.

ROLLER BEARING ASSEMBLIES AND COMPONENT PARTS

Unmounted roller bearings and component parts must be stored in an area that is clean and well protected from moisture.

A periodic inspection of stored roller bearings should be made. Any undesirable condition found should be corrected immediately.

Stored roller bearing assemblies or component parts that have been subjected to moisture must be cleaned and inspected. Roller bearing assemblies, showing evidence of moisture having entered the bearing, must be disassembled, cleaned, and inspected. Damaged roller bearing parts must be repaired or replaced in accordance with instructions under "Cleaning and Inspection".

Roller bearings, either new or used, that are placed in storage as individual parts, or as unit assemblies, should be used in the order in which they were stored, oldest stock first.

New roller bearings and component parts should not be removed from the shipping package until they are to be installed on an axle or assembled as a unit assembly.

New or used seals held in storage must be kept covered to protect them from dust or other possible damage until they are installed in a bearing.

When new roller bearing parts are removed from storage, it is not necessary to clean the protective coating of lubricant from the parts that have been retained in their original shipping package.

Storage

When bearings that have had previous service are disassembled, cleaned, and inspected in accordance with instructions, and are to be placed in stock, they may be stored as unit assemblies or as individual parts.

Bearing assemblies, made up of bearing parts that have had previous service, that are to be placed in storage should be lubricated with the specified quantity of grease and should be adequately protected from dirt and moisture.

Individual bearing parts that have had previous service that are to be placed in storage should be dipped in a suitable rust preventative such as light oil and adequately protected from dirt and moisture.

When roller bearing parts that have had previous service are removed from stock, they must be clean before they are assembled.

Shipping

WHEEL AND AXLE ASSEMBLIES WITH ROLLER BEARINGS APPLIED

When wheel and axle assemblies with roller bearings applied are shipped by rail, the wheel car should be equipped with a wheel rack similar to that shown on page L-69 of the AAR Manual of Standard and Recommended Practice. However, the wheel spacing dimensions of the wheel rack shown in the AAR Manual for plain bearing axles cannot be used. The wheel flanges of adjacent wheel and axle assemblies will contact and damage the roller bearing assemblies.

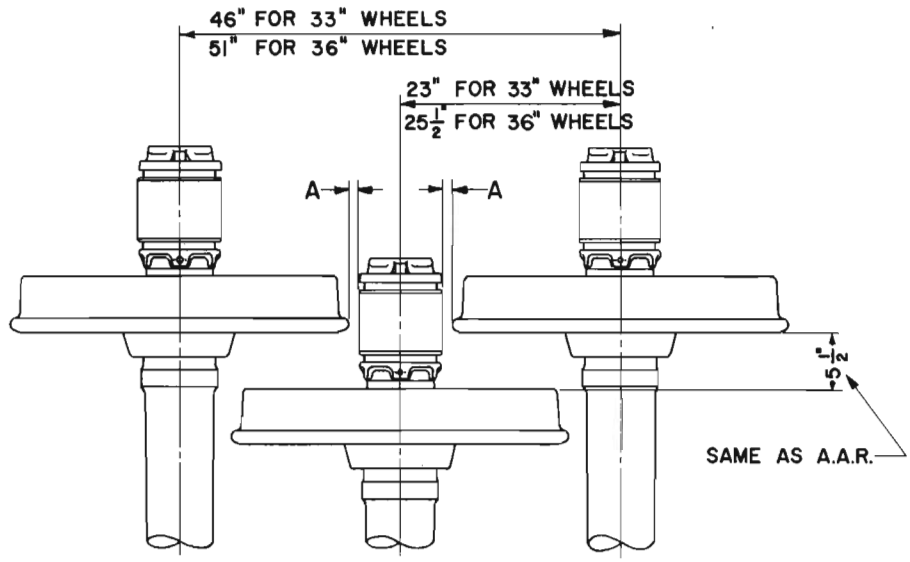
To provide clearance between the wheel flanges and the bearing assemblies on adjacent wheel and axle assemblies, the wheel spacing dimensions shown in Figure 68 should be used. All other dimensions are to be the same as shown in the AAR Manual.

Wheel racks for wheel sizes other than those shown in Figure 68 should provide a minimum clearance of ½" (dimension A: Figure 68) between the wheel flanges and bearing assemblies on adjacent axle assemblies.

If the wheel rack used for shipping wheel and axle assemblies is made to the wheel spacing dimensions shown in the AAR Manual, the wheel and axle assemblies must be placed in single-track position to prevent possible damage to the roller bearings.

When loading or unloading wheel and axle assemblies with roller bearings applied, wooden boards should be placed between the bearing cups and the wheel flanges of adjacent wheel and axle assemblies to protect the bearings from damage.

Shipping



CLASS	WHEEL DIA.	A	CLASS	WHEEL DIA.	A
B (4¼" X 8")	33"	2 7/32"	F (6½" X 12")	33"	1"
C (5" X 9")	33"	1 5/8"	F (6½" X 12")	36"	1 1/2"
D (5½" X 10")	33"	1 3/8"	G	36"	1 1/32"
E (6" X 11")	33"	1 1/8"	GG	36"	17/32"

Figure 68. Wheel Rack Wheel Spacing Dimensions for Shipping Wheel and Axle Assemblies with Timken "AP" Roller Bearings Applied.

ROLLER BEARING ASSEMBLIES AND COMPONENT PARTS

When roller bearing assemblies and component parts are shipped they must be protected from dirt, dust, and moisture. Care must also be taken to prevent the possibility of damage to the bearings during shipment.

New roller bearing assemblies and component parts should be shipped in their original shipping packages.

Roller bearing assemblies and component parts that have had previous service should be wrapped in oil paper, or other suitable protective wrapping, and packed in sturdy cartons for shipment.

Overseas Shipping Instructions

Timken "AP" roller bearing equipped cars or locomotives that are to be shipped overseas should be prepared for shipment as follows:

Heavy grease or car journal compound that is not water soluble or affected by heat (150° F.), should be applied completely around the seal case between the cup faces and the axle end cap and backing ring.

The grease used should be a calcium or lithium soap grease of not less than a number 2 consistency with a maximum penetration of 265-295.

Cars and diesel locomotives must be blocked up under the truck frames to remove the weight of the truck as well as the load on the center plate from the bearing assemblies.

Where locomotives or cars are loaded as deck cargo, it is preferable that the roller bearing equipped trucks be loaded separately below deck, whenever possible.

After the equipment has been unloaded, at the point of destination, each bearing assembly should be examined to make sure that the adapter is properly seated on the bearing cup before the equipment is placed in service.

Bearing assemblies showing evidence of direct contact with sea water should be removed from the axle, disassembled, cleaned, inspected, relubricated and reassembled in accordance with instructions before being released for service.

TIMKEN®

TAPERED ROLLER BEARINGS