MAINTENANCE INSTRUCTION

NATIONAL JOURNAL BOX FRICTION TYPE

GENERAL DESCRIPTION

The National journal box, Fig. 1, consists of a cast steel housing with a dust proof spring closed lid, wedge, journal bearing, thrust bearing and lateral springs, dust guard, dust guard wedge, and a good grade of long skein twisted wool waste, in addition to gaskets, lockwire and bolts.

Channels, Fig. 2, on each side of the journal box fit over the truck pedestals holding the journal box in place in the truck frame. A tie bar is bolted across the two lower ends of the pedestals which serves as a reinforcement for the pedestals, and also prevents the journal box from dropping out of the pedestal in case of derailment.

The 6" × 12" wedge affords a solid contact between the box and the bearing. It has a smooth finish and is easily installed or removed.

The journal bearing is a bronze back babbit type bearing. It rides on the top side of the axle journal, with the 3/4" radius toward the wheel.

The thrust bearing, or thrust block as it is sometimes called, is a steel casting with a bronze face. It is located in the front part of the journal box and contacts the end of the axle if lateral thrust is exerted. It also houses the 9 lateral springs and the 2 snubber lateral springs. An oil passage is bored in the recess of the thrust bearing housing to the bearing surface for lubrication, which is supplied by oil soaked waste.

The dust guard fits in a slot in the back end of the journal box. When the journal box is assembled on the axle journal, the felt dust guard fits on the shoulder of the axle next to the wheel to prevent oil from leaking out of the box and also to prevent dust and water from entering the box.

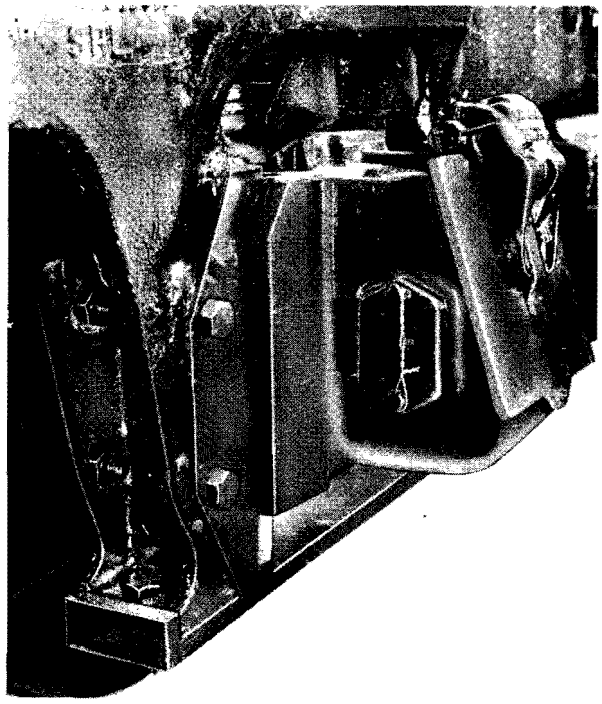

Fig. 1 - National Journal Box

Oil soaked wool waste is packed between the bottom of the housing and the axle journal. Oil soaked cotton waste is also placed in the recess of the thrust bearing to provide lubrication between the thrust bearing and the end face of the axle.

MAINTENANCE

Lubrication

Check and lubricate at intervals as specified in the Scheduled Maintenance Program.

THIS ISSUE COMPLETELY REVISED AND SUPERSEDES ALL * PREVIOUS ISSUES.

Inspection

Periodical inspections are made, and quite rarely a journal brass may be changed out, when no other truck or wheel work is necessary.

Mechanical damage from a derailment or wreck may necessitate journal bearing work, but generally speaking, journal bearing maintenance work is done when the wheels and axles are removed for wheel work.

Cleanliness, using a good quality of long skein wool waste and careful repacking will more than pay for the extra effort by many months of trouble free bearing service.

Removing Journal Boxes

Wear between the journal box liners and the pedestal wear plates should be checked BEFORE the journal boxes are removed from the truck. This will determine in advance if box liners or pedestal wear plates need to be removed and renewed.

By means of a feeler gauge, measure the clearance between the inner stop on the journal box and the truck frame pedestal jaw. Then without moving the journal box measure the clearance between the outer stop and the same pedestal jaw. The sum of these two measurements will be the total lateral free play on that box. Take the same measurements on the opposite journal box on the same axle. The maximum free play for each box is 3/8". If the free play on either box exceeds 5/16", or if the total free play of both boxes is 5/8", it would be desirable to renew either the pedestal liners or the journal box liners or both depending on their individual condition.

The clearance between the driving face of the journal box and the pedestal is 1/16" to 1/8". The condemning limit is 1/4". If this clearance exceeds 3/16" it is getting close enough to the condemning limit so that renewal of the liners on the driving faces on the journal box and the pedestal wear plates would be justified.

The pedestal tie bars should be removed and the journal box jacked up just high enough to remove the wedge and the brass bearing. If the box is jacked up TOO HIGH, the felt seal in the dust guard

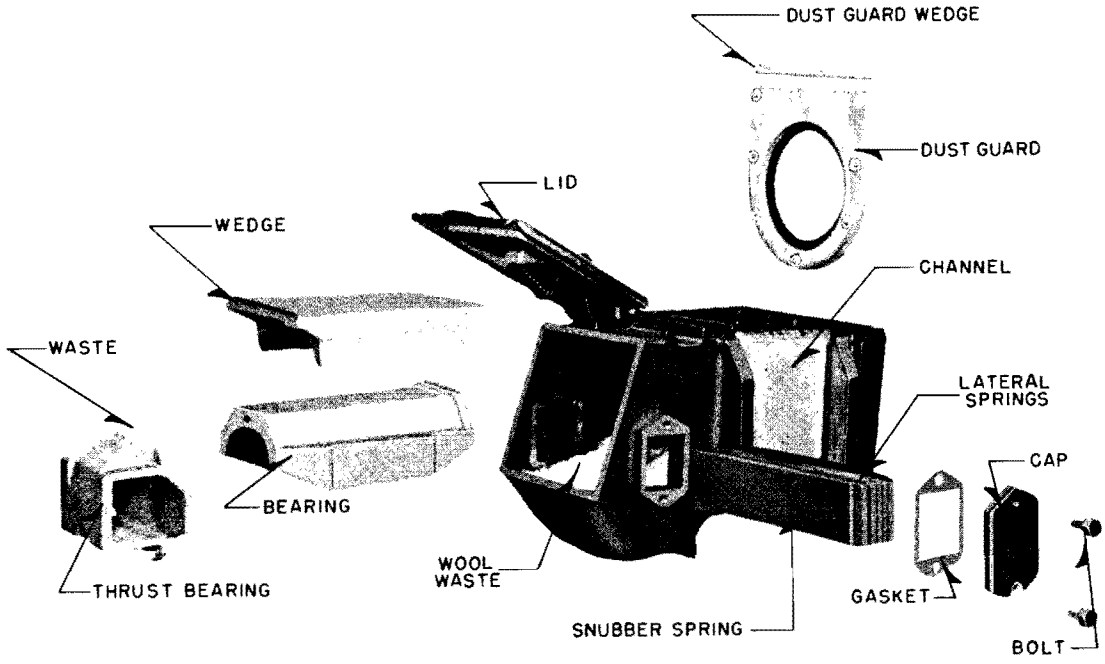

Fig. 2 - Exploded View Of National Journal Box

may be DAMAGED BEYOND USE. If the axle has a collar on its end, be sure the brass is not damaged during removal.

Take the spring covers off each side of the box and remove the springs. One spring leaf may be punched out, and the rest of the spring pack will be loose and can be removed easily. Hold the thrust block while removing the springs so it will not fall and be damaged.

Remove and inspect the packing to determine if it can be reused.

After the wheels and axle have been removed from the truck, the journal boxes can be lifted off the axle ends.

The journal box should be cleaned thoroughly, inside and out. Remove and inspect the dust guard wedge and the dust guard from the rear of the box. Renew if worn or damaged.

Check bearing face of thrust block and renew if worn 3/32" or if there are ridges on the face. The maximum wear on the thrust block face is 1/8". With the proper equipment, the face of the thrust block can be built up with bearing metal and machined off to its original dimension.

The wedge should be checked for cracks and distortion.

Check the journal brass as follows:

1. The back or lug must not be cracked or broken.

2. The bearing metal must not be loose, or sections of the metal broken out.

3. The bearing metal must not be worn through to the brass at either the crown or sides. The minimum thickness of the brass bearing at the crown is 1-1/4". Be sure the radius at the back of the brass has not been damaged and has the same contour as the 3/4" radius at the axle fillet.

4. If the bearing metal has started to pull at any part of the bearing surface, the bearing should be renewed. Scraping bearings is not recommended; the resulting high and low spots in the bearing surface may cause trouble. Scraping also increases the bearing bore, which if carried too far will also cause trouble.

   If the bearing metal extends below the side edges of the brass, with no signs of metal pulling at any other part of the bearing surface, this bearing metal may be trimmed away, if the bore of the brass is not too large. Be sure there are no sharp corners at the side edges.

5. The radius of the bore of a new bearing is from .005" to .015" greater than the radius of the O.D. of a new axle journal. If the bore of the bearing is 1/16" or more greater than the radius of the axle journal, the bearing should be renewed.

   Clean and inspect the thrust block springs for cracked or broken springs.

Removing And Reapplying Journal Box Liners

The journal box should be completely disassembled. To remove liner plate, grind at least two sides of the liner welds free, then the liner can be wedged off with the aid of a chisel or wedge. Any remaining weld deposit on the box must be ground off to allow proper fitting of the new liner.

When the new liners are applied, they must fit flat and tight to the backing surfaces. The use of a clamping fixture to hold the plate tight against the box while welding is recommended.

Low hydrogen welding electrode, A.W.S. Class E-7016, 5/32" diameter, is recommended for application. The weld should be made with a low current consistent with proper welding practice.

A full fillet weld with a convex weld contour is desirable and weld craters must be filled in by backing into the weld puddle. Welding should be done in the flat welding position with the journal box submerged in water, except for the part being welded.

Interchangeability

All parts of the journal box are interchangeable when new. Experience has shown that after the bearing parts have been operating together for a considerable length of time, they will "wear in" in a complimentary and individual manner. For this reason it is recommended that each journal bearing be kept with the same axle journal, regarding them as a unit.

Reassembly

With the inside of the box thoroughly cleaned and dry, the dust guard and dust guard wedge are applied to the rear of the box, before the box is put onto the axle. After the box has been applied to the axle, the axle journal and the bearing surface of the brass should be coated with a good quality of clean car oil.

With the weight of the box supported, the brass bearing and the wedge are applied. Be sure the brass and the wedge are properly positioned in the box. The transverse center of the brass and the wedge should line up with the transverse center of the box.

To accomplish this, slide the brass onto the axle journal. Slide the wedge over the top of the brass. With the wedge in its proper position, there should be 1/8" clearance between the outer end of the wedge and the inner edge of the lip inside the box, Fig. 3. The outer end of the brass should extend 9/16" from the edge of the wedge on top of the brass.

It is possible that the 9/16" dimension cannot be obtained if the wheel and axle assembly (or the truck frame) is crowded over to one side. Barring the wheels or truck frame in the opposite direction will give sufficient clearance to get this dimension. Remove the support so the brass bearing will have the weight of the box.

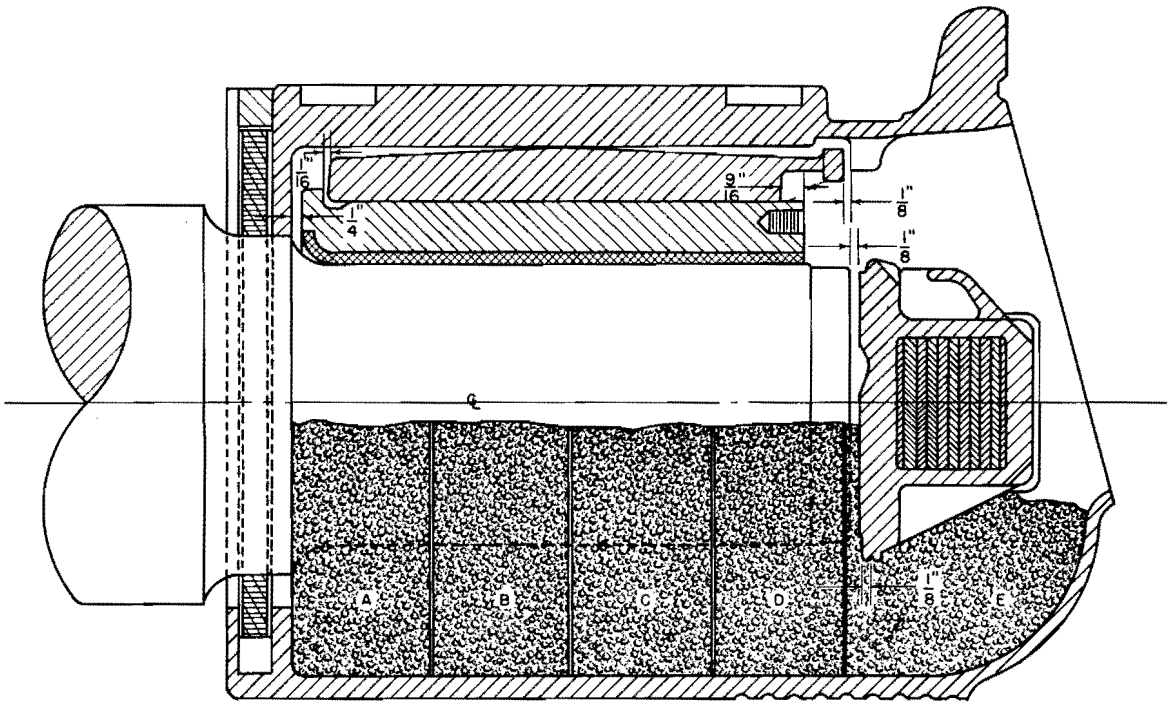

Fig. 3 - Side View Cross-Section of Journal Box

The box should then be packed with a good quality of clean, long skein wool waste that has been saturated with car oil.

Preparation Of The Packing

The waste must be loosened when taken from the bale, to avoid any tightly packed masses, and should be shaken lightly by hand to allow lint and short threads to fall out.

The waste is next placed in a saturating vat and kept COMPLETELY SUBMERGED in oil at a temperature of not less than 70° F. for a period of at least 48 hours to insure proper saturation. Then it must be drained (to remove the excess oil) until the packing is in a resiliant condition. Oil should not drip from drained packing when lifted from the drain rack, but oil should FLOW from it when squeezed in the hand. Properly saturated waste should contain approximately 3-1/2 pints of oil per pound of dry waste.

Stored saturated packing, awaiting use, must be kept in containers with tight fitting lids to prevent contamination.

To forestall "waste grab" or other causes of a hot journal, it is very important that journal bearings be properly packed.

The "Roll" method of packing, Fig. 3, makes the most satisfactory and the neatest job, as there are no loose ends to cling to the axle and be carried up and under the brass as is so often the case when wads of waste are used as packing. This is especially true in cold weather.

Generally four rolls of packing are used under the axle journal, Fig. 3, a, b, c, d. When the first roll is put into the box, it is imperative that this roll be in complete contact with the under side of the axle journal and packed against the rear of the box to insure proper lubrication for the axle fillet.

As each successive roll is packed into the box, be sure they are against the under side of the axle. The ends of the rolls are then tucked down against the sides of the box. The finished packing should extend to no less than 1", but not more than 1-1/2" below the center of the axle, Fig. 4.

The thrust block and springs are next applied. The two cambered springs are put in first, one to the inside and one to the outside of the thrust block pocket, with the bow AWAY FROM THE AXLE ENDS, Fig. 5. Take all but one of the flat springs and put them BETWEEN the cambered springs. The last flat leaf may be driven in. Be sure the springs are tight in the box. Shims may be used if necessary to tighten these springs.

Check the bearing face of the thrust block and make sure it is square with the face on the end of the axle.

The fifth or last roll of packing may be packed under and around the thrust block. Put a small wad of waste in the pocket on upper side of the thrust block.

A good grade of clean car oil is poured over the waste at the sides of the journal and also onto the wad of waste in the thrust block.

Do not put in so much oil that it lies on top of the waste as this may cause the waste to settle down away from the under side of the axle. It may also cause any loose material to be carried up and under the brass, resulting in a hot journal from waste grab, and it

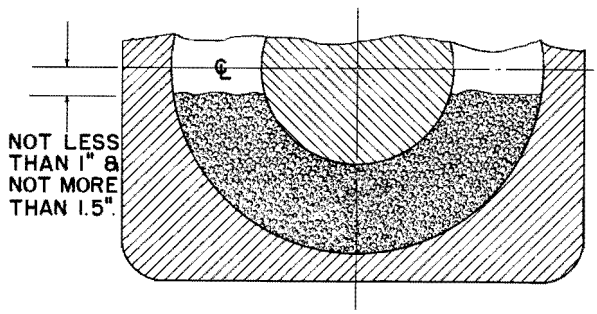

Fig. 4 - Height of Packing in Journal Box

is wasteful, as the excess oil will leak out at the rear of the box.

When inspecting journal box lubrication after they have been in service, press your fingers into the waste. If the finger tips are oily, there will be sufficient oil for journal lubrication, however, it is advisable to add a small amount of oil to the waste in the top of the thrust block, assisting in thrust block lubrication.

Total Lateral Between Axle End And Thrust Blocks

The total lateral between the axle ends and the thrust blocks should be taken after the wheel and axle assembly and the journal boxes have been installed in the truck.

With long feelers, measure the clearance between the journal box guide and the inner side of the pedestal, on each end of the axle. Then measure the clearance between the axle ends and the thrust blocks. The sum of the four measurements will be the total lateral free play between the axle ends and the thrust blocks. The nominal total lateral free play is approximately 1/4". The condemning limit is 3/4".

With pedestal liners, journal box liners and both thrust blocks worn to their condemning limit, the combined total lateral free play at the axle ends can be as much as 1-1/4". However, the total allowable combined lateral free play is 3/4" maximum.

To prevent the combined lateral free play from exceeding the 3/4" maximum, it would be more economical to renew the pedestal and journal box liners while the total lateral can still be controlled by the thrust blocks.

Pedestal and journal box liners can be renewed only at time of journal box removal from the pedestal ways.

Thrust blocks can be renewed without removing journal box from pedestals.

If with new, or slightly worn journal box liners and pedestal wear plates, and new thrust blocks the total lateral free play is still 3/8" or more, this may be caused by an axle whose ends may have been cut or scored at some time and have

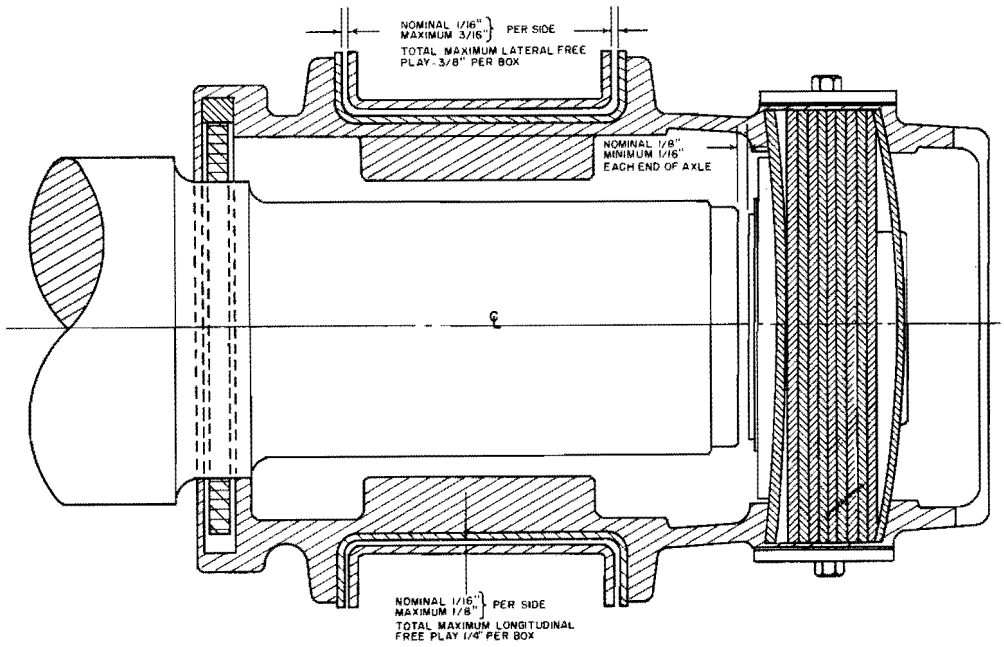

Fig. 5 - Top View Cross-Section of Journal Box

been machined off, making it shorter than a standard axle.

As there are no provisions made for adjustment on the thrust blocks, it will be necessary to build up the face of the thrust block with bearing metal and machine it off to about 1/8" maximum over thickness, if the proper equipment to do this work correctly is available.

DO NOT under ANY circumstances attempt to stamp identification marks or axle data on the end faces of the axle, as this will ruin the thrust blocks very quickly.