



SHOP REFERENCE AND MAINTENANCE GUIDE

TMS700E Series

Volume 1

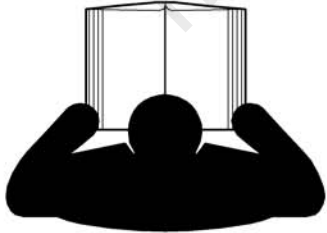
NOTICE

The information contained in this manual is intended as a supplement to the Service and Parts Manuals supplied with your Grove Crane, and to assist with the general servicing and maintenance for Grove TMS700E Series Cranes.

Always Refer to your original serial number specific parts manual for part identification and part ordering.

The crane serial number is the only method your distributor or the factory has of providing you with correct parts and service information.

The crane serial number is stamped on the top of the outrigger box.
Always furnish crane serial number when ordering parts or communicating service problems with your distributor or the factory.

	 WARNING
	To prevent death or serious injury: • Avoid unsafe operation and maintenance. • This crane must be operated and maintained by trained and experienced personnel. Manitowoc is not responsible for qualifying these personnel. • Do not operate or work on this crane without first reading and understanding Operator's Manual and Rating Plate supplied with crane. • Store Operator's Manual in holder provided on crane. • Attach laminated Capacity Charts supplied with crane to chain in operator's cab. • If Operator's Manual or Capacity Charts are missing from cab, contact your distributor for new ones.

What oil should I use on retrofit vehicles?

The simple answer to this question is to use the oil that the compressor manufacturer recommends. As you can see by the chart on the previous page, most manufacturers recommend using a PAG oil. So, if you encounter a vehicle that was modified with a blended refrigerant, special care should be taken to remove all of the old oil and to replace the drying agent during the service procedures. CFC's left in the system will have an adverse affect on the PAG oil you install, leading to premature system damage. As you will see from the following paragraphs mixing oils, refrigerants and cleaning solvents can be very detrimental to the AC system.

Polyalkylene Glycol

PAG refrigerants oil was developed for HFC (R134a) systems and cannot tolerate even minute amounts of chloride, such as from aluminum chloride, a coating inside pipes that may have formed from the original R-12, or if 5% or more of the chlorinated refrigerants were left in the system. Ester oils are not stable with free chlorine molecules either. The chlorine accelerates the hydrolysis of esters causing them to break down. If the drying agent was not replaced or the system was not flushed, it is a good bet that these unwanted chemicals were left in the system. Chlorinated refrigerants include chlorofluorocarbons and hydro chlorofluorocarbons. Some of these products include R11, a flush, and R12. R11 is extremely damaging to PAG oil, more so than R12. HCFCs include R22, R124, R142b which are ingredients used in the following blended refrigerants R-406A Auto frost, Frigc FR12, Freeze 12, Freezone RB267, R414A (GHG-X4), and R-414B Hotshot. Using any of the above refrigerants or blends containing CFC's will cause PAG or Ester oils to break down, reducing the life of the compressor. Generally speaking, when a retrofit car comes in for service, you would have no way of knowing what refrigerant or type of oil was installed. We have found very few vehicles with the proper retrofit sticker under the hood. Your only option is to use a refrigerant identifier.

Chemical Solvents

The use of chemical flushing solvents when servicing A/C systems is another area for concern. Many of these cleaning agents contain R-141b, a chlorinated solvent. Leaving any amount of cleaning solvent in the system can be fatal to the compressor. Even small traces of a chlorinated substance can cause PAG and Ester oils to degrade, resulting in excessive compressor wear. Section #4 of this workbook details correct flushing procedures. Following these procedures will ensure that there are no solvents left in any of the system components.



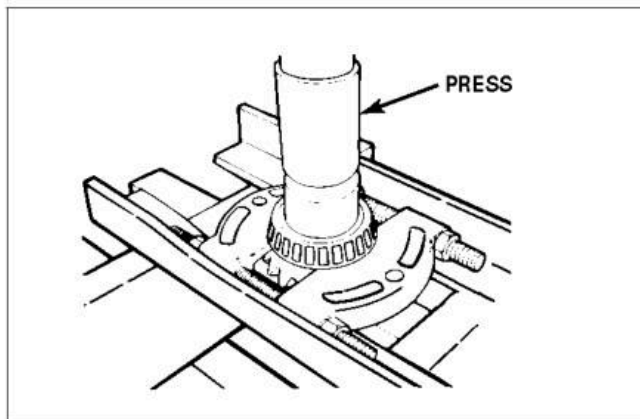


Figure 3.26

12. Use a brass drift and hammer to remove the cup of the rear side gear cone from the differential side of the carrier.

Disassembly

Input Shaft, Bearing Cage, Oil Pump and Inter-Axle Differential

1. Use the correct tool to remove the yoke or flange from the input shaft. Figure 3.27. If the carrier is not equipped with an oil pump, remove the bearing cage from the input shaft. Figure 3.28.

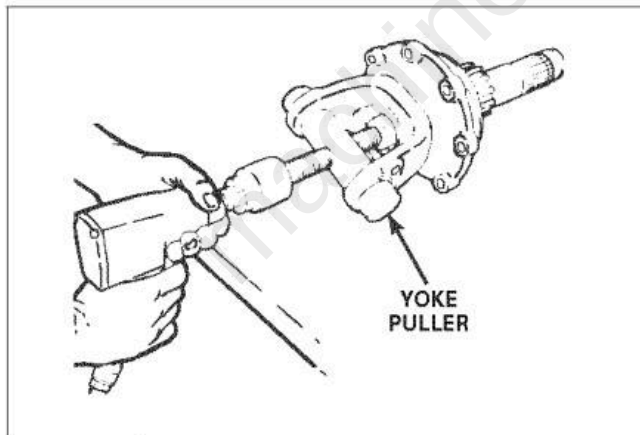


Figure 3.27

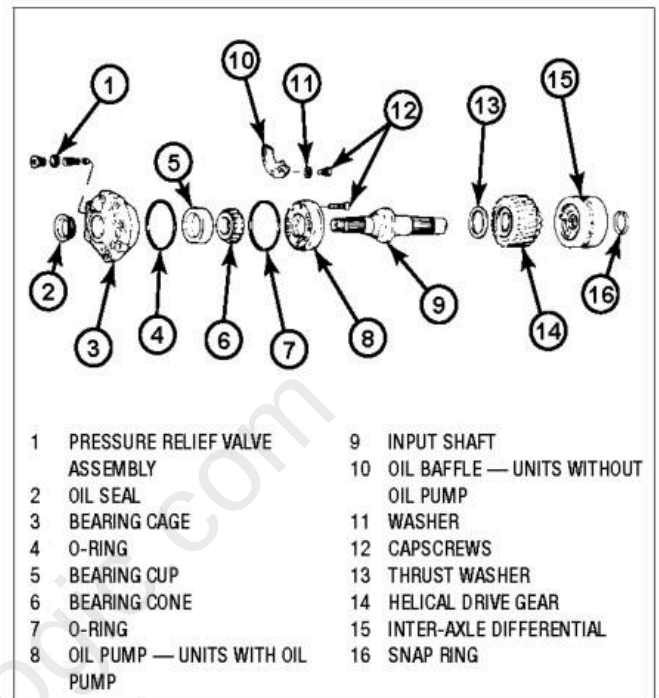


Figure 3.28

CAUTION

Carefully remove the pinion seal from the yoke or carrier. Do not damage the seal bore when you remove the seal. Damage to components can result.

NOTE: Grove recommends replacing all seals with the triple-lip or main oil seal. The addition or replacement of a POSE™ seal is also highly recommended.

2. Pry under the oil seal flange to remove the oil seal from the input bearing cage. Discard the oil seal. Figure 3.29.

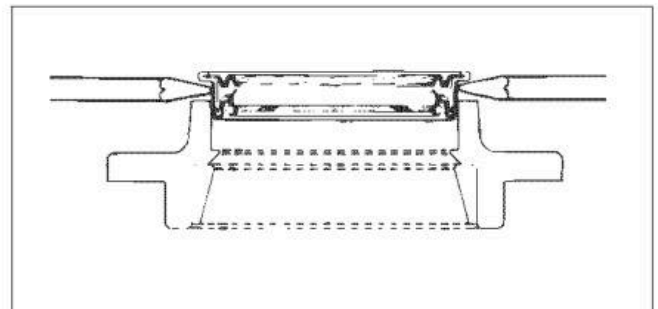


Figure 3.29

Troubleshooting Brake Drum Wear (cont'd.)

Condition	Possible Cause	Corrective Action
Polished or glazed drums, mirror-like shine	Low-pressure braking Linings not aggressive enough or not component equipment manufacturer-approved	Replace the drum.
Scoring, Grooving Deep grooves in the drum's surface that exceed the drum's maximum diameter. Drum can appear to be in good condition.	Dirt or contaminants in the brake system Linings worn to the rivets or not component equipment manufacturer-approved	Check for dirt embedded in the lining. Install dust shields. If dust shields are installed, remove the shields and try operating the vehicle without them.
"Blue" drum Inside of the brake drum has "blue" tint from excessive heat. Components can be deformed or damaged.	Braking generates extremely high temperatures caused by axle wheel-end imbalance Poor driver techniques Linings not component equipment manufacturer-approved Brake system incorrectly spec'd for the application Brake drag	Replace the drum.
Cracked drum Drum has cracked, but may not show signs of wear, heat checking or hot spotting.	The parking brake is set while the brakes are extremely hot. The cooling drum contracts on the brake shoes with enough force to crack the drum. Brake drum pilot interference with the hub or wheel pilot Drum cracked prior to assembly	Replace the drum.
Broken bolt flange, brake surface not cracked	The brake drum pilot interferes with the hub or wheel pilot. Drum cracks at installation. High temperatures cause expanding brake shoes to separate the bolt flange from the drum Incorrect drum assembly on a spoke wheel Brake drum not seated correctly on the hub or pilot wheel Both brake shoes do not contact the drum simultaneously	Replace the drum.
Broken bolt flange, cracked brake surface	Excessive wear, heat checking or hot spotting Any combination of the above	Replace the drum.
Oil or grease has penetrated the drum's surface; the drum is discolored Oil and grease spots have penetrated the drum's surface and are evident on components. Discolored drum	Wheel or hub oil seals leak	Attempt to remove oil and grease spots from the drum. If you cannot completely remove the oil and grease spots, you must replace the drum.

OSHA STANDARD 29 CFR PART 1910.177 (SERVICING MULTI-PIECE AND SINGLE PIECE RIM WHEELS) (continued)

(8) No attempt shall be made to correct the seating of side and lock rings by hammering, striking or forcing the components while the tire is pressurized.

(9) Cracked, broken, bent or otherwise damaged rim components shall not be reworked, welded, brazed, or otherwise heated.

(10) Whenever multi-piece rim wheels are being handled, employees shall stay out of the trajectory unless the employer can demonstrate that performance of the servicing makes the employee's presence in the trajectory necessary.

(11) No heat shall be applied to a multi-piece wheel or wheel component.

(G) **Safe operating procedure—single piece rim wheels.** The employer shall establish a safe operating procedure for servicing single piece rim wheels and shall assure that employees are instructed in and follow that procedure. The procedure shall include at least the following elements:

(1) Tires shall be completely deflated by removal of the valve core before demounting.

(2) Mounting and demounting of the tire shall be done only from the narrow ledge side of the wheel. Care shall be taken to avoid damaging the tire beads while mounting tires on wheels. Tires shall be mounted only on compatible wheels of matching bead diameter and width.

(3) Nonflammable rubber lubricant shall be applied to bead and wheel mating surfaces before assembly of the rim wheel, unless the tire or wheel manufacturer recommends against the use of any rubber lubricant.

(4) If a tire changing machine is used, the tire shall be inflated only to the minimum pressure necessary to force the tire bead onto the rim ledge while on the tire changing machine.

(5) If a bead expander is used, it shall be removed before the valve core is installed and as soon as the rim wheel becomes airtight (the tire bead slips onto the bead seat).

(6) Tires may be inflated only when contained within a restraining device, positioned behind a barrier or bolted on the vehicle with the lug nuts fully tightened.

(7) Tires shall not be inflated when any flat, solid surface is in the trajectory and within one foot of the sidewall.

(8) Employees shall stay out of the trajectory when inflating a tire.

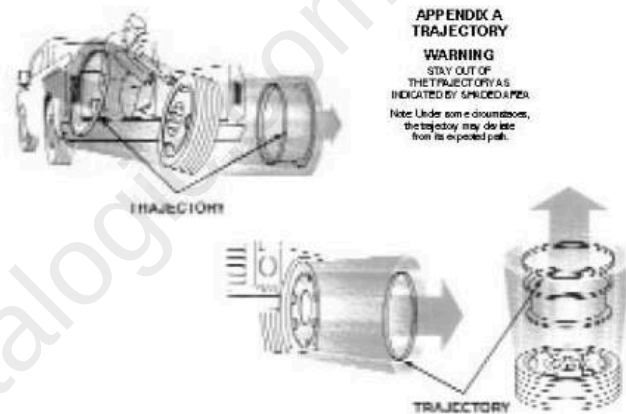
(9) Tires shall not be inflated to more than the inflation

pressure stamped in the sidewall unless a higher pressure is recommended by the manufacturer.

(10) Tires shall not be inflated above the maximum pressure recommended by the manufacturer to seat the tire bead firmly against the rim flange.

(11) No heat shall be applied to a single piece wheel.

(12) Cracked, broken, bent, or otherwise damaged wheels shall not be reworked, welded, brazed, or otherwise heated.



Appendix B—Ordering Information for the OSHA Charts

OSHA has printed two charts entitled "Demounting and Mounting Procedures for Truck/Bus Tires" and "Multi-piece Rim Matching Chart," as part of a continuing campaign to reduce accidents among employees who service large vehicle rim wheels.

Reprints of the charts are available through the Occupational Safety and Health Administration (OSHA) Area and Regional Offices. The address and telephone number of the nearest OSHA office can be obtained by looking in the local telephone directory under U.S. Government, U.S. Department of Labor, Occupational Safety and Health Administration. Single copies are available without charge.

Individuals, establishments and other organizations desiring single or multiple copies of these charts may order them from the OSHA Publications Office, U.S. Department of Labor, Room N-3101, Washington, DC 20210.



S-141

Remove the miter housing from the bearing cap by removing the bolts and lock washers which pass through the miter housing. Two bolts and lock washers are located inside the miter housing and must be removed before the housing can be separated from the bearing cap.



S-142

Carefully turn and with a soft hammer tap the housing off the bearing cap.



S-143

Remove the "O"-ring seal and the self-locking nut and washer from the actuating shaft, and remove the miter gear from the shaft.



S-144

Mark the bearing cap and bearing retainer to indicate the locking pin hole location and remove the retainer locking pin.

Swing Valve

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Full Version Available

Grove TMS700E Truck Crane Maintenance Manual

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