

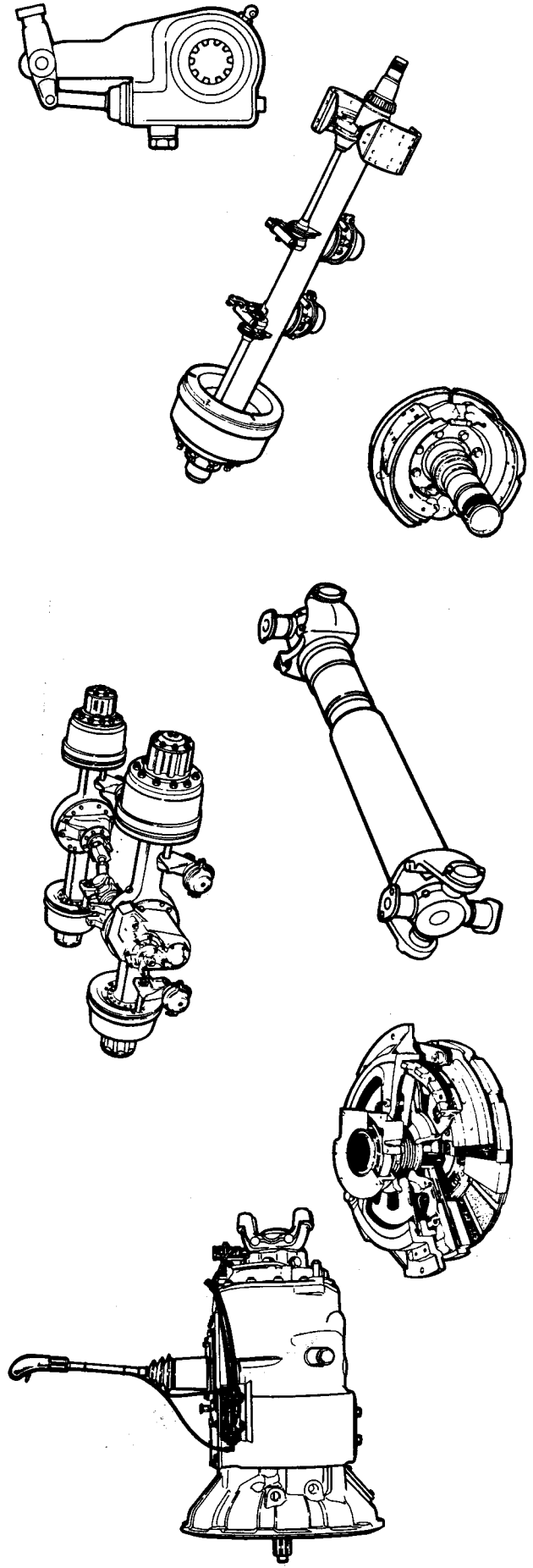
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MAINTENANCE MANUAL NO. 1
REVISED 1-93

Lubrication



Rockwell



Service Notes

This Maintenance Manual describes the lubrication procedures and specifications for Rockwell components.

The information contained in this manual was current at the time of printing and is subject to change without notice or liability.

You must follow your company safety procedures when you service or repair equipment. Be sure you understand all the procedures and instructions before you begin work on the unit.

Rockwell uses the following types of notes to give warning of possible safety problems and to give information that will prevent damage to equipment:



WARNING

A warning indicates procedures that must be followed exactly. Serious personal injury can occur if the procedure is not followed.



CAUTION

A caution indicates procedures that must be followed exactly. If the procedure is not followed, damage to equipment or components can occur. Serious personal injury can also occur in addition to damaged or malfunctioning equipment or components.



TORQUE

This symbol is used to indicate fasteners that must be tightened to a specific torque value.

NOTE:

A note indicates an operation, procedure or instruction that is important for correct service. A note can also give information that will make service quicker and easier.

Some procedures require the use of special tools for safe and correct service. Failure to use these special tools when required, can cause injury to service personnel or damage to vehicle components.



CAUTION:

Always consider the reputation of refiners or vendors when selecting a lubricant. They are responsible for the quality and the correct application of their products.



WARNING

When servicing a vehicle, wear safe eye protection to prevent serious eye injury.

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Section 1 — General Information

Introduction

The efficiency and life of all Rockwell products depend upon proper lubrication to reduce friction, help cool and keep dirt and wear particles away from moving parts.

Improper oil and grease lubricants are a major cause of component failure. It is essential to utilize Rockwell-recommended lubricants, lubrication practices, specifications and product capacities covered in this manual for proper lubrication of Rockwell products. Remember that each component operates differently and requires a different lubricant.

CAUTION

Always consider the reputation of refiners or vendors when selecting a lubricant. They are responsible for the quality and correct application of their products.

Oil Lubricants

There are three categories for oil lubricants:

Petroleum Oil is derived from natural crude oil extracted from the ground. Crude oil also yields combustible fuels and a wide range of petroleum chemicals.

Full Synthetic Oil uses a man-made base oil with predictable physical properties. No refined petroleum-based fluids are used in the base oil. They “slide” better and boost lubricating and cooling performance, particularly in extreme temperatures.

CAUTION

Do not use semi-synthetic oil in Rockwell manual transmissions.

Semi-Synthetic Oil contains a mixture of petroleum-based and synthetic fluids that can extend service intervals, improve cold weather properties and reduce volatility.

Because full-synthetic and semi-synthetic oils keep their lubrication properties longer, they played a pivotal role in the development of Rockwell's factory-filled “Advanced Lube” axles and transmissions.

These advanced lube components bypass the initial oil change and have fewer oil changes.

Section 1 — General Information

Viscosity

The proper viscosity oil for a specific Rockwell component can be selected from the charts in each section. When more than one lubricant is listed, choose an oil viscosity suitable for the expected outside temperature.

- **Multigrade Oils** must be used must when vehicles operate in both cold and warm weather between oil changes.
- **Low Viscosity Single Grade Oils** are used only in cold climates where no warm weather is ever forecast. **Single grade 75W oils are not approved for use in drive axles where temperatures exceed 40° F (4° C).**
- **ON DRIVE AXLES ONLY, Multigrade oil** must be used when vehicles operate in both cold and warm weather between oil changes. The hypoid gearing requires oil with Extreme Pressure (EP) additives to provide adequate lubricant film protection that prevents gear failure.

CAUTION

Do not use thinning agents such as kerosene, gasoline or any other diluents to lower the viscosity of recommended lubricants. Thinning agents damage the lubricant.

NOTE:

Oil viscosity grades are classified by SAE (Society of Automotive Engineers) and their service classification by API (American Petroleum Institute).

Oil Changes

There are many practical reasons for recommended oil changes. Oils not only lubricate, they:

- Provide chemically reactive additives.
- Wash minute wear particles away from contacting surfaces.
- Reduce noise.
- Inhibit corrosion.
- Transfer heat.

Draining and refilling with a fresh supply of oil helps to assure the quality performance of Rockwell components.

The oil change interval can be determined by analyzing oil samples taken at specified intervals or mileage. However, the final recommended scheduled interval may be due to service duty, regardless of vehicle mileage or established change schedule.

Oil suppliers often make laboratory facilities available to determine the useful life of their products under actual service conditions.

Section 1 — General Information

Grease Lubricants

Grease lubricants contain three substances: **oil, a thickener base and additives.**

The oil lubricates, the thickener (base) holds the oil in place and releases it to provide the necessary lubrication; and the additives enhance the characteristics of the oil and thickener. Extreme Pressure (EP) additives help prevent scoring, galling and welding of moving parts.

The thickener may be simple or complex soap (lithium, calcium, aluminum, etc.), organic (polyurea) or inorganic (clay).

When mixing different greases, the possibility of incompatibility exists and should be considered. Mixing incompatible greases may reduce the lubricating ability of the greases.

An important property of a grease is its **dropping point**, the temperature where it changes from a semi-solid state to a

liquid state. However, the operating temperature of a specific grease is not determined solely by the dropping point. Other properties such as resistance to change in consistency and chemical deterioration at high temperatures must be considered.

NOTE:

Grease lubricants are classified by the National Lubricating Grease Institute (NLGI) and given grade numbers based on the consistency of the grease. Recently, the NLGI has developed a new specification and classification for automotive greases based on the application. The NLGI issues licensed symbols (as shown in Figure 1) designating the application for which the grease is approved.

Figure 1



THESE NLGI-LICENSED SYMBOLS IDENTIFY THE TYPES OF GREASE INSIDE PACKAGES ON WHICH THEY ARE DISPLAYED

Section 1 — General Information

EP (Extreme Pressure) Lubricants

CAUTION

Do not use multi-viscosity or EP (Extreme Pressure) GL-5 gear oils in the manual transmission. Use the oil specified in Section 11. The wrong oil will damage the transmission.

“EP” is an abbreviation used by lubricant manufacturers for Extreme Pressure lubricants. EP lubricants contain special additives that provide extra anti-wear protection to heavily-loaded parts. Rockwell requires either EP greases or EP oils in various applications (see the specific sections in this manual for recommendations). Approved hypoid gear oils contain EP additives that protect against tooth scoring.

Section 2 — Clutch

Greasing the Release Bearing

! CAUTION

Make sure the inspection cover on the clutch housing is used. If an inspection cover is not used, dirt and contaminants get into the clutch housing and damage the clutch.

Remove the inspection cover on the clutch housing. Apply grease to the fitting on the release bearing housing until a small amount purges out. **DO NOT OVERGREASE.** Install the cover. Rockwell recommends using a high temperature multi-purpose wheel bearing grease (Rockwell Specification O-661) but use the lubricant recommended by the manufacturer of the vehicle. **Figure 2.**

Greasing the Bell Housing

Apply grease to each fitting on the bell housing to grease the cross shaft for the release fork. Use the specified lubricant at the recommended interval. See the lubricant specifications and maintenance intervals of the manufacturer of the vehicle. **Figure 3.**

Figure 2

RELEASE BEARING LUBRICATION POINTS

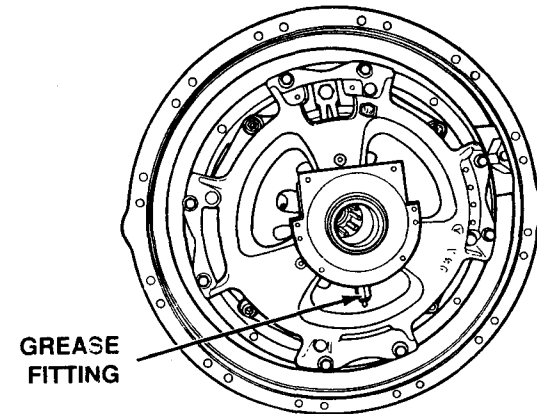
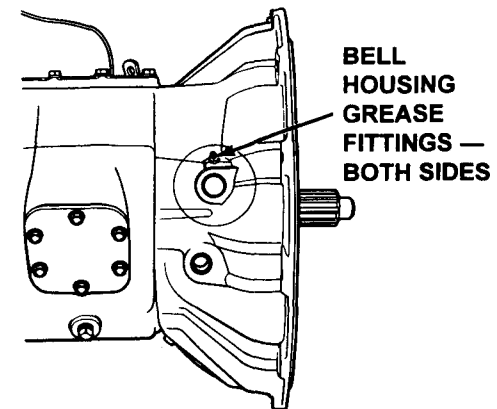


Figure 3



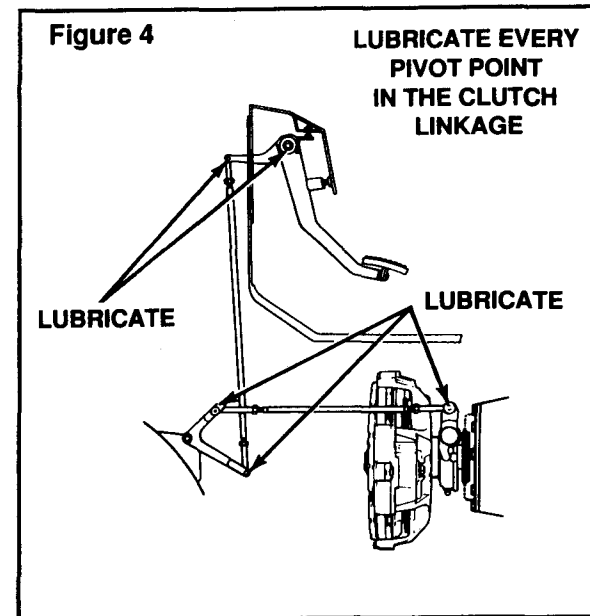
Section 2 — Clutch

Greasing the Clutch Linkage

NOTE:

Some vehicle manufacturers may use “lubed-for-life” ball joints in the clutch linkage. See the lubricant information of the vehicle manufacturer.

Every pivot point on the linkage must be lubricated according to the procedure of the manufacturer of the vehicle. Use the specified lubricant at the recommended interval. See the lubricant specifications and maintenance intervals of the manufacturer of the vehicle. **Figure 4.**



Section 2 — Clutch

Clutch Greasing Interval and Specifications

Component	Greasing Interval	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
Release Bearing	①	High Temperature Multi-Purpose Wheel Bearing Grease	O-661	3	Lithium Complex	-----
Bell Housing	①	②	-----	-----	-----	-----
Clutch Linkage	①	②	-----	-----	-----	-----

NOTES:

① Use the interval specified by the manufacturer of the vehicle or the fleet but make sure the release bearing is greased once per month.

② Use the grease specified by the manufacturer of the vehicle.

Approved Lubricants

Lubricant	Recommendation
Clutch Bearing Grease	Exxon Unirex N Grade 3 (NLGI Grade No. 3, Lithium Complex)

References

For more information on Rockwell clutches see the Maintenance Manual:

MM. No.25A Clutches

Section 2 — Clutch

NOTES:



Section 3 — Driveline

Greasing the Driveline Universal Joint

See Figure 5.

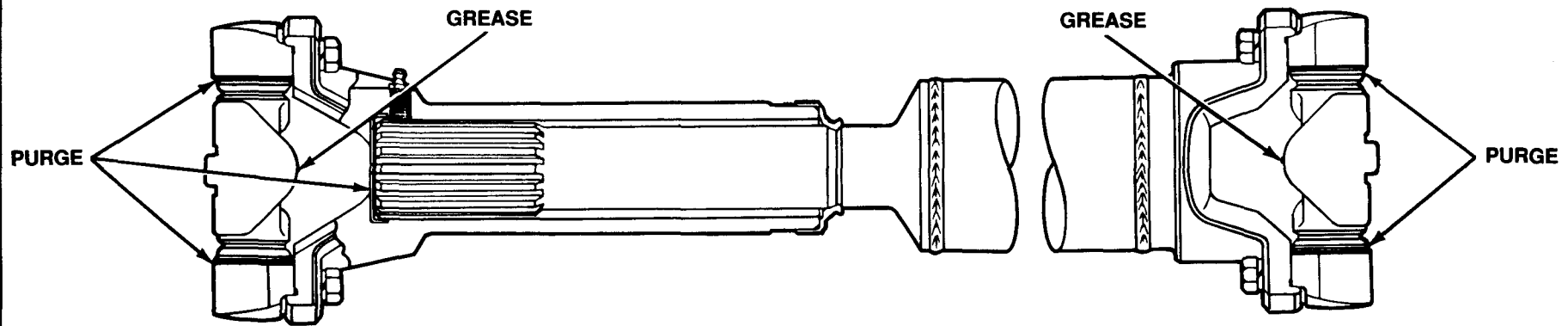
1. Check the driveline for looseness. If loose, service the driveline as necessary.
2. Apply the specified grease at the grease fitting on the universal joint. Apply grease until new grease purges from all the seals.
3. If new grease does not purge at the seals, loosen the bearing cap bolts and regrease until all four cups purge. If new grease still does not purge, replace the universal joint.

Greasing the Driveline Slip Yoke and Splines

See Figure 5.

1. Check the driveline for looseness. If loose, service the driveline as necessary.
2. Cover the air hole so that grease can flow easily to the seal. Apply the specified grease at the grease fitting on the slip yoke. Apply grease until new grease purges from the air hole in the end of the slip yoke.

Figure 5



Section 3 — Driveline

Driveline Greasing Intervals and Specifications

Component	Application	Greasing Interval	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
Universal Joints, Slip Yokes and Splines	Linehaul	50,000 miles (80,000 kilometers)	Universal Joint Grease	O-634-B	2	Lithium 12-Hydroxy Stearate	②
	Highway	16,000 miles (25,000 kilometers)					
	City	6,500 miles (10,000 kilometers)					
	Construction	①					

NOTES:

- ① The greasing interval depends on the individual operating conditions, speeds and loads. To determine the interval, inspect the grease at all positions until an interval can be determined. Grease the assembly as necessary.
- ② Refer to the grease manufacturer's specifications for the temperature service limits.

Approved Lubricants

Lubricant	Recommendation
Universal Joint Grease	Must meet Rockwell Specification O-634-B (NLGI Grade No. 2, Lithium 12-Hydroxy Stearate) Amalie All purpose Grease with Moly-L1-2M Exxon 5160 Shell Super Duty Special FF Marathon Maralube Molycode 529 Phillips Petroleum Philube MW-EP2 Grease

Section 4 — Front Driving Axle

General Information

Drive axles generate small metal wear particles at a fairly steady rate, especially during the break-in period.

If these fine, but hard, particles are allowed to circulate in the lubricant, along with external moisture and dirt, internal components will wear at a much faster rate than normal.

Magnets and Magnetic Drain Plugs

Rockwell front driving axles are equipped with magnetic plugs having a minimum pick-up capacity of 1.5 pounds (0.7 kilograms) of low carbon steel.

The **drain plug** can be reused if, after cleaning, the plug has a minimum pick-up capacity of 1.5 pounds (0.7 kilograms) of low carbon steel.

Breather

CAUTION

Cover the breather when steam cleaning the housing. If the breather is not covered, water goes in the housing and contaminates the oil.

Baffle type breathers help keep Rockwell axles free from external moisture and dirt which can cause premature oil and component failure.

Seals

Seals keep **lubricant in and dirt out** of a component. When they are worn or damaged, seals leak and produce low lubricant levels which may damage components.

Durable triple lip seals, standard in Rockwell axles, protect the quality and levels of the lubricant and provide superior performance.

CAUTION

Always use the correct tools and procedures when replacing seals. If the correct tools and procedures are not used, the seal can be installed incorrectly and leak.

Temperature Indicators

Rockwell axles may operate above 190° F (88°C) without damage. However, when the oil temperature reaches 250°F (121°C), the vehicle must be stopped immediately and checked for the cause of overheating.

Many Rockwell axles have a tapped hole in the housing for the installation of a lubricant temperature indicator that will help reduce the failure of axle parts from overheated oil.

Section 4 — Front Driving Axle

Checking and Adjusting the Oil Level

1. Make sure the vehicle is parked on a level surface.
2. Remove the fill plug from the axle.
3. The oil level must be even with the bottom of the hole for the fill plug.

If oil flows from the hole when the plug is loosened, the oil level is high. Let the oil drain to the correct level.

If the oil level is below the bottom of the hole for the fill plug, add the specified oil.

4. Install and tighten the fill plug to 35-50 lb-ft (48-67 N.m).

Draining and Replacing the Oil

1. Make sure the vehicle is parked on a level surface. Put a large container under the axle.
2. Remove the drain plug from the bottom of the axle.
Drain the oil. Discard the oil.

3. Clean, install and tighten the drain plug to 35-50 lb-ft (48-67 N.m).
4. Remove the fill plug from the axle.
5. Fill the axle to the bottom of the fill plug hole with the specified oil. Allow enough time for oil to circulate through the axle assembly.
6. Install and tighten the fill plug to 35-50 lb-ft (48-67 N.m).

Wheel Ends and Wheel Bearings

See Section 12, "Wheel Bearings and Wheel Ends", for lubrication information on oil and grease lubricated wheel bearings and wheel ends.

Section 4 — Front Driving Axle

Greasing the Universal Joint

1. Check the universal joint for looseness. If loose, service as necessary.
2. Apply the specified grease at the grease fitting on the universal joint. Apply grease until new grease purges from all the seals.
3. If new grease does not purge at every seal, move the driveline while applying grease at the fittings until new grease purges at every seal. If new grease still does not purge, disassemble the universal joint. Inspect the grease and the components. Service as necessary.

Greasing the Cross Tube End Assembly

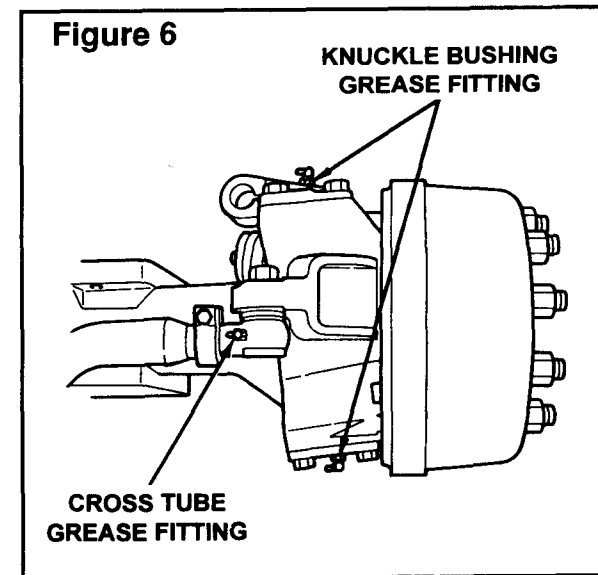
See Figure 6

1. Check the cross tube for looseness. If loose, service as necessary.
2. Apply the specified grease at the grease fitting on the cross tube. Apply grease until new grease purges from all the seals.
3. If new grease does not purge at the seals, move the cross tube while applying grease at the fittings until new grease purges at the seals. If new grease still does not purge, disassemble the cross tube. Inspect the grease and the components. Service as necessary.

Greasing the Knuckle Bushing

See Figure 6

1. Check the knuckle for looseness. If loose, service as necessary.
2. Apply the specified grease at the grease fitting on the knuckle. Apply grease until new grease purges from all the seals.
3. If new grease does not purge at the seals, move the knuckle while applying grease at the fittings until new grease purges at the seals. If new grease still does not purge, disassemble the knuckle. Inspect the grease and the components. Service as necessary.



Section 4 — Front Driving Axle

Front Driving Axle Oil Change Intervals and Specifications ^①

On-Highway Operation Intervals				Off-Highway Operation Intervals				Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Initial Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change	Initial Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change				F°		C°	
											Min.	Max.	Min.	Max.
3,000 miles (4,800 km)	3,000 miles (4,800 km) or 200 operating hours (whichever comes first)	30,000 miles (48,000 km) or twice a year or 2,000 operating hours (whichever comes first)	-----	3,000 miles (4,800 km)	3,000 miles (4,800 km)	30,000 miles (38,000 km) or twice a year or 2,000 operating hours (whichever comes first)	-----	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
								O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
								O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
								O-76J, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W	-40	35	-40	2
								O-76L, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None

NOTES:

- ① If the front drive axle is the only axle on the vehicle, change the oil every 15,000 miles (24,000 km) or 1,000 hours of operation, whichever comes first.

Front Driving Axle Greasing Intervals and Specifications

Component	Greasing Interval	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
Universal Joints, Cross Tube End Assemblies and Knuckle Bushings	3,000 miles (4,800 kilometers) or 200 hours of operation	Multi-Purpose Grease	O-617-A or O-617-B	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.

Section 4 — Front Driving Axle

Front Driving Axle Oil Capacities

Axle Model	Oil Capacity	
	Pints	Liters
FDS-75	13.0	6.2
FDS-78	13.0	6.2
FDS-85	13.0	6.2
FDS-90	13.0	6.2
FDS-93	13.0	6.2
FDS-750	13.9	6.2
FDS-1600	21.0	9.9
FDS-1800	28.0	13.2
FDS-1805	28.0	13.2
FDS-1807	28.0	13.2
FDS-1808	28.0	13.2
FDS-2100	28.0	13.2
FDS-2101	28.0	13.2
FDS-2102	43.0	20.3

Axle Model	Oil Capacity	
	Pints	Liters
FDS-2107	43.0	20.3
FDS-2110	43.0	20.3
FDS-2111	43.0	20.3
FDS-2117	43.0	20.3
RF-7-106 ①	14.0	6.6
RF-9-106 ①	14.0	6.6
RF-12-125 ①	15.3	7.2
RF-16-145 ①	36.4	17.2
RF-21-155 ①	27.9	13.2
RF-21-156 ①	27.9	13.2
RF-21-160 ①	43.7	20.7
RF-21-355 ①	28.0	13.2
RF-23-180 ①	39.3	18.6

NOTES:

- ① Oil capacities are for standard track axles that have been measured at various common drive pinion angles. The quantities listed include enough oil for both wheel ends. These oil capacities will change if the track or the drive pinion angle is different.

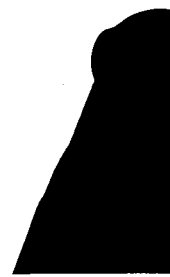
References

For more information on Rockwell front driving axles see the Maintenance Manuals:

- | | |
|------------|--|
| MM. No. 5 | Single Reduction Differential Carriers |
| MM. No. 6 | Double Reduction Drive Unit (Front Mounted Type) |
| MM. No. 12 | Front Driving Axles |

Section 4 — Front Driving Axle

NOTES:



Section 5 — Front Non-Driving Axle

Greasing the King Pins

NOTE

This procedure applies to 901, 903, 910, 935 and 970 front conventional axles. See the identification tag on the front of the axle beam.

On conventional front axles, the grease fittings are on the side of the knuckle.

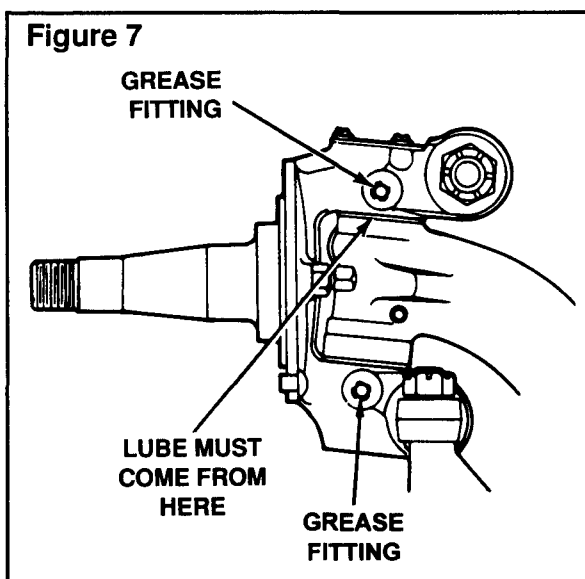
WARNING

Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury.

1. Lift the vehicle so that the tires are off the ground. The tires should be off the ground when the king pins are lubricated. Support the vehicle with safety stands. Put

blocks in front and in back of the rear wheels to keep the vehicle from moving.

2. Lubricate the king pins through the top and the bottom grease fittings on the side of the knuckle. **Figure 7.**
3. Apply lubricant to the top fitting until new lubricant comes from between the upper shim pack and thrust bearing seal.
4. Lower the vehicle so that the wheels touch the ground.
5. Apply lubricant to the bottom fitting until new lubricant purges and fills the thrust bearing.



Section 5 — Front Non-Driving Axle

Greasing the King Pins - Sealed and Easy Steer™ Front Axles

NOTE

This procedure applies to 911, 921, 931, 932, 933, 934, 941, 942, 943, 944, 951, 952, 961, 963, 971 and 975 Series sealed front axles. See the identification tag on the front of the axle beam.

On sealed and Easy Steer™ front axles, the grease fittings are on the top and bottom king pin caps of the knuckle.

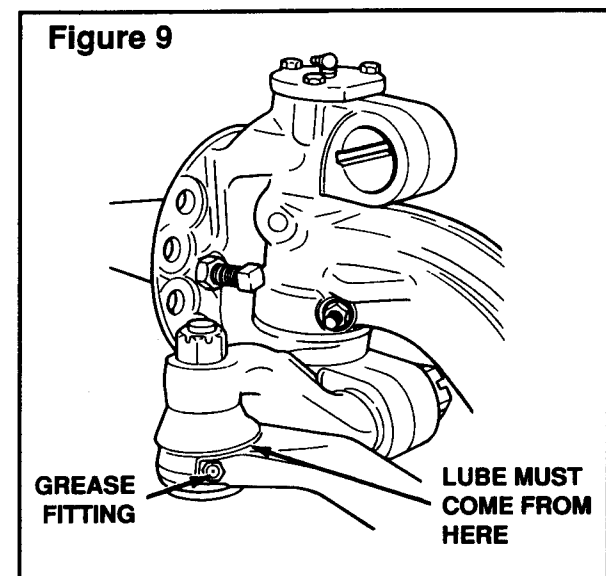
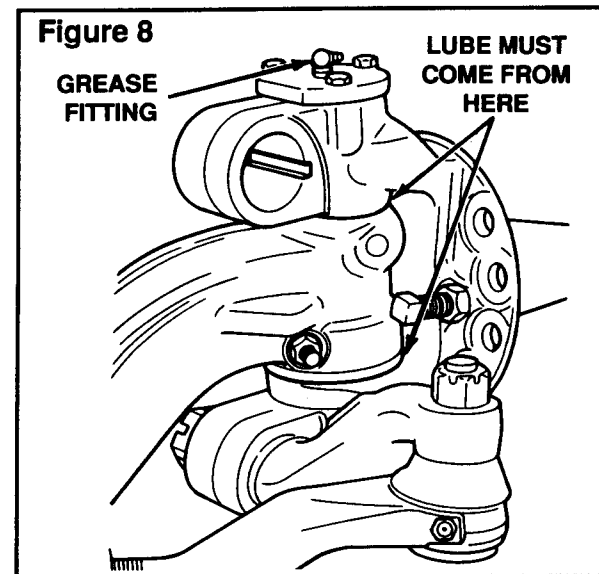
1. Make sure the tires touch the ground.
2. Lubricate the king pins through the grease fittings on the top and bottom of the knuckle. **Figure 8.**
3. Apply lubricant until new lubricant comes from the thrust bearing seal and the upper shim pack.

Greasing the Ball Studs on the Steering Arm, the Tie Rod Arm Ends and the Drag Link

1. Make sure the tires touch the ground.
2. Apply lubricant until new lubricant comes from the boot. **Figure 9.**

Greasing the Wheel Ends and Wheel Bearings

See Section 14, Wheel Ends, for oil and grease lubricated wheel ends and wheel bearing lubrication.



Section 5 — Front Non-Driving Axle

Front Non-Driving Axle Greasing Intervals and Specifications

APPLIES TO FC-901, FC-903, FD-901, FE-970, FU-910 AND FU-935 AXLES

Component	Greasing Interval	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
King Pins and Bushings	3,000 miles (4,800 kilometers)	Multi-Purpose Grease	O-617-A	1	6% Lithium 12-Hydroxy Stearate	-----
Ball Studs on Steering Arm. Tie Rod Arm Ends and Drag Link ①	50,000 miles (80,000 kilometers) or once a year whichever comes first		O-617-B	2	8% Lithium 12-Hydroxy Stearate	-----

NOTES:

- ① Applies to ball studs on conventional and Easy Steer front axles. For sealed axles, inspect the boot on the ball stud every 96,000 miles (154,000 km) for wear and damage. Service as necessary

Section 5 — Front Non-Driving Axle

Front Non-Driving Axle Greasing Intervals and Specifications

APPLIES TO ALL EXCEPT FC-901, FC-903, FD-901, FE-970, FU-910 AND FU-935 AXLES

Component	Greasing Interval	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
King Pins and Bushings	50,000 miles (4,800 kilometers) or once a year whichever comes first	Multi-Purpose Grease	O-617-A	1	6% Lithium 12-Hydroxy Stearate	-----
Ball Studs on Steering Arm, Tie Rod Arm Ends and Drag Link ①			O-617-B	2	8% Lithium 12-Hydroxy Stearate	-----

NOTES:

- ① Applies to ball studs on conventional and Easy Steer axles. For sealed axles, inspect the boot on the ball stud every 96,000 miles (154,000 km) for wear and damage. Service as necessary

References

For more informational on Rockwell front non-driving axles see Maintenance Manuals:

MM. No. 2 Front Non-Drive Steering Axles

Section 6 — On-Highway Brakes

For complete information on brake lubrication procedures and intervals, see the following maintenance manuals:

MM No. 4	Cam Brakes
MM No. 4B	Automatic Slack Adjusters
MM No. 4M	Air Disc Brakes
MM No. 4R	Wedge Brakes

For manual slack adjusters, see the vehicle manufacturer's specifications.

CAUTION

Grease or oil on the brake disc, drum or linings can cause poor brake performance. If necessary, clean the disc or the drum and replace contaminated linings.

Cam Brake Grease Specifications

Component	Rockwell Specification	NLGI Grade	Grease Type	Outside Temperature
Hold Down Clips, Anchor Pins, Rollers (Journals only), Camshaft Bushings	O-616-A	1	Clay Base	Down to -40°F (-40°C)
	O-617-A or O-617-B	1 2	Lithium 12-Hydroxy Stearate or Lithium Complex	See grease manufacturer's specifications.
	O-645	2	Synthetic Oil, Clay Base	Down to -65°F (-54°C)
	O-692	1 and 2	Lithium Base	Down to -40°F (-40°C)
Camshaft Splines	Any of Above	See Above	See Above	See Above
	O-637	1-1/2	Calcium Base	See grease manufacturer's specifications.
	O-641	---	Anti-Seize	

Section 6 — On-Highway Brakes

Air Disc Brake Grease Specifications

Component	Rockwell Specification	NLGI Grade	Grease Type	Outside Temperature
Caliper *	O-616-A	1	Clay Base	Down to -40°F (-40°C)
	O-645	2	Synthetic Oil, Clay Base	Down to -65°F (-54°C)
Slide Pin Retainers	O-637	1-1/2	Calcium Base	See grease manufacturer's specifications.
	O-641	---	Anti-Seize	
Powershaft Splines	Any of Above	See Above	See Above	See Above

* The grease used inside the caliper must be non-melting and also allow proper brake function at the cold temperatures listed.

Wedge Brake Grease Specifications

Component	Rockwell Specification	NLGI Grade	Grease Type	Outside Temperature
All Actuating Components, All Areas Where Shoes Contact Spider, Anchor Plungers, Adjusting Bolts or Retaining Hardware	O-616-A	1	Clay Base	Down to -40°F (-40°C)
	O-645	2	Synthetic Oil, Clay Base	Down to -65°F (-54°C)

Section 6 — On-Highway Brakes

Automatic Slack Adjuster Grease Specifications

Component	Rockwell Specification	NLGI Grade	Grease Type	Outside Temperature
Automatic Slack Adjuster	O-616-A	1	Clay Base	Down to -40°F (-40°C)
	O-692	1 and 2	Lithium Base	Down to -40°F (-40°C)
	O-645	2	Synthetic Oil, Clay Base	Down to -65°F (-54°C)
Clevis Pins	Any of Above	See Above	See Above	See Above
	O-637	1-1/2	Calcium Base	See grease manufacturer's specifications.
	O-641	---	Anti-Seize	

Manual Slack Adjuster Grease Specifications

Component	Rockwell Specification	NLGI Grade	Grease Type	Outside Temperature
Manual Slack Adjuster	O-616-A	1	Clay Base	Down to -40°F (-40°C)
	O-617-A or O-617-B	1 2	Lithium 12-Hydroxy Stearate or Lithium Complex	See grease manufacturer's specifications.
	O-645	2	Synthetic Oil, Clay Base	
	O-692	1 and 2	Lithium Base	Down to -40°F (-40°C)
Clevis Pins	Any of Above	See Above	See Above	See Above
	O-637	1-1/2	Calcium Base	See grease manufacturer's specifications.
	O-641	---	Anti-Seize	

Section 6 — On-Highway Brakes

Approved Greases

Lubricant Specification	Recommendation
O-616-A	Shell Darina Grease No. 1 Texaco Thermatex EP-1 Texaco Hytherm EP-1 Aralub 3837
O-617-A O-617-B	Multipurpose Chassis Grease
O-637	Witco Chemical Corp. SA-824946
O-641	Never-Seez Anti-Seize
O-645	Mobilgrease 28 (Military) Mobiltemp SHC 32 (Industrial) Aerospace Lubricants Inc. Tribolube 12 - Grade 1
O-692	Amoco Super Permalube #2 Citgo Premium Lithium EP-2 #2 Exxon Ronex MP-2 #2 Kendall L-427 Super Blu #2 Mobilith AW-1 #1 Sohio Factran EP-2 #2

Section 7 — Planetary Drive Axle

General Information

Drive axles generate small metal wear particles at a fairly steady rate, especially during the break-in period.

If these fine, but hard, particles are allowed to circulate in the lubricant, internal components will wear at a much faster rate than normal.

Magnets and Magnetic Drain Plugs

Planetary axles are equipped with magnetic drain plugs having a minimum pick-up capacity of 20 ounces (0.57 kilograms) of low carbon steel.

The drain plug must be checked for metal particles at every oil change interval.

NOTE:

Rockwell recommends replacing the magnetic drain plug each time the oil is changed. Use the correct part. Pipe plugs will leak if used as a drain plug.

The **magnetic drain plug** can be reused if, after cleaning, the plug has a minimum pick-up capacity of 20 ounces (0.57 kilograms) of low carbon steel.

Breather



Cover the breather when steam cleaning the housing. If the breather is not covered, water goes in the housing and contaminates the oil.

Breathers release pressure and vacuum condensation which can cause premature oil and component failure.

Seals

Seals keep **lubricant in and dirt out** of a component. When they are worn or damaged, seals leak and produce damaging low lubricant levels.



Always use the correct tools and procedures when replacing seals. If the correct tools and procedures are not used, the seal can be installed incorrectly and leak.

Temperature

Rockwell axles may operate above 190° F (88°C) without damage. However, when the oil temperature reaches 250°F (121°C), the vehicle must be stopped immediately and checked for the cause of overheating.

Section 7 — Planetary Drive Axle

Checking and Adjusting the Oil Level

NOTE:

Fill and drain plugs are located in the axle housing bowl and the wheel ends. Most axles have a common oil level. All steering axles and some rigid axles have separate oil levels in each wheel end and the axle housing bowl.

1. Make sure the vehicle is on a level surface.

NOTE:

For axles with a common oil level that have drain and fill plugs only in the axle assembly, go to step 3.

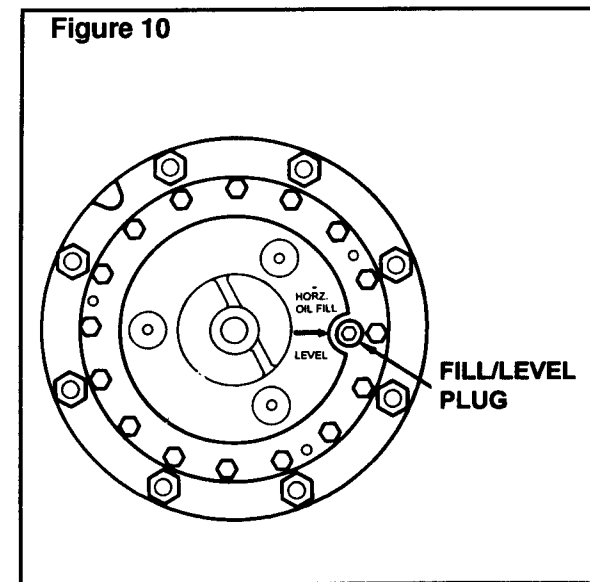
2. Rotate the wheels so that the "oil level lines" on the wheel ends are parallel to the ground.
3. Clean the area around the fill/level plug. Remove the fill/level plug from the wheel ends and the axle housing bowl. **Figure 10.**
4. The oil level must be even with the bottom of the hole of the fill/level plug.

If oil flows from the hole when the plug is loosened, the oil level is high. Let the oil drain to the correct level.

If the oil level is below the bottom of the hole of the fill/level plug, add the specified oil. See the following

- a. For axle with separate oil levels in the wheel ends and the axle housing bowl, fill each area to the bottom of the fill plug hole with the specified oil.
 - b. For axles with a common oil level, fill the axle at each wheel end and the axle housing bowl to the bottom of the fill plug hole with the specified oil. **DO NOT FILL ONLY THROUGH THE AXLE HOUSING BOWL.** Wait and allow the oil to flow through the axle. Check the oil level again and fill to the specified level if necessary.
5. Install and tighten the fill/level plugs.

Figure 10



Section 7 — Planetary Drive Axle

Draining and Replacing the Oil

NOTE:

Fill and drain plugs are located in the axle housing bowl and the wheel ends. Most axles have a common oil level. All steering axles and some rigid axles have separate oil levels in each wheel end and the axle housing bowl.

1. Make sure the vehicle is on a level surface. Put large containers under the axle and wheel ends.



WARNING

Support the vehicle with safety stands. Do not work under a vehicle only supported by jacks. Jacks can slip or fall over and cause serious personal injury.

2. Raise the vehicle so that the wheels are off the ground. Support the vehicle with safety stands.
3. Rotate the wheels so that the "fill/level" plugs in the wheel ends are toward the ground.
4. Remove the drain plugs from the wheel ends and axle housing bowl. Drain and discard the oil. Clean the plug.
5. Install and tighten the drain plug in the axle housing bowl and the wheel ends.
6. Rotate the wheels so that the "oil level lines" on the wheel ends are parallel to the ground. Lower the vehicle.
7. Clean the area around the fill/level plug. Remove the fill/level plug from the wheel ends and the axle housing bowl.
8. Add the specified oil until the oil level is even with the bottom of the fill/level hole. See the following.
 - a. For axle with separate oil levels in the wheel ends and the axle housing bowl, fill each area to the bottom of the fill/level plug hole with the specified oil.
 - b. For axles with a common oil level, fill the axle at each wheel end and the axle housing bowl to the bottom of the fill/level plug hole with the specified oil. **DO NOT FILL ONLY THROUGH THE AXLE HOUSING BOWL.** Wait and allow the oil to flow through the axle. Check the oil level again and fill to the specified level if necessary.
9. Install and tighten the fill/level plugs.

Section 7 — Planetary Drive Axle

Planetary Drive Axle Oil Change Intervals and Specifications

On-Highway Operation Intervals				Off-Highway Operation Intervals ①				Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Initial Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change	Initial Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change				F°		C°	
											Min.	Max.	Min.	Max.
2,500 miles (4,000 km)	5,000 miles (8,000 km)	25,000 miles (40,000 km) or once a year (which- ever comes first)	-----	100 operating hours ①	250 operating hours ①	1,500 operating hours or twice a year (which- ever comes first) ①	-----	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
								O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
								O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
								O-76L, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None

NOTES:

① The checking interval depends on the individual operating conditions, speeds and loads. Severe operating conditions may require more frequent intervals.

Planetary Drive Axle Oil Capacities

Axle Model	Axle Housing Approximate Oil Capacity		Wheel Ends Approximate Oil Capacity		Axle Model	Axle Housing Approximate Oil Capacity		Wheel Ends Approximate Oil Capacity	
	Pints	Liters	Pints	Liters		Pints	Liters	Pints	Liters
PR-53	33.0	15.6	3.0	1.4	PR-207	45.0	21.3	6.0	2.8
PR-60	27.0	12.8	3.0	1.4	PR-208	43.0	20.3	8.0	3.8
PR-100	22.0	10.4	3.5	1.6	PR-209	56.0	26.4	5.0	2.4
PR-108	29.0	13.7	7.0	3.3	PR-251	42.0	19.9	12.0	5.7
PR-111	27.0	12.8	4.6	2.2	PR-253	39.0	18.5	13.0	6.2
PR-112	44.0	20.8	6.0	2.8	PR-256	44.0	20.8	18.0	8.5
PR-145	32.0	15.1	5.0	2.4	PR-270	44.0	20.8	18.0	8.5
PR-150	29.0	13.7	5.0	2.0	PR-350	28.0	13.2	14.0	6.6
PR-151	30.0	14.2	8.0	3.8	PR-400	32.0	15.1	16.0	7.6
PR-153	31.0	14.7	7.5	3.6	PR-500	56.0	26.5	28.0	13.2
PR-200	40.0	18.9	6.0	2.8	PR-501	64.0	30.3	28.0	13.2
PR-205	46.0	21.8	7.0	3.3	PR-502	62.0	29.3	31.0	14.7

Section 7 — Planetary Drive Axle

Planetary Drive Axle Oil Capacities

Axle Model	Axle Housing Approximate Oil Capacity		Wheel Ends Approximate Oil Capacity	
	Pints	Liters	Pints	Liters
PR-700	64.0	30.3	30.0	14.19
PRC-1925	32.0	15.1	16.0	7.57
PRC-3795	28.0	13.2	14.0	6.62
PRC-3796	28.0	13.2	14.0	6.62
PRC-4805	62.0	29.3	31.0	14.66
PRM-672	29.0	13.7	5.0	2.37
PRM-673	29.0	13.7	5.0	2.37
PRM-676	46.0	21.8	7.0	3.31
PRM-677	46.0	21.8	7.0	3.31
PRM-1314	44.0	20.8	18.0	8.51
PRM-1315	44.0	20.8	18.0	8.51
PRM-1615	44.0	20.8	18.0	8.51
PRM-1756	43.0	20.3	13.0	6.15
PRM-1757	43.0	20.3	13.0	6.15
PRS-16	27.0	12.8	3.0	1.42
PRLC-344	44.0	20.8	6.0	2.84
PRLC-614	29.0	13.7	7.0	3.31
PRLC-675	56.0	26.5	5.0	2.37
PRLC-823	44.0	20.8	18.0	8.51
PRLC-1756	39.0	18.5	13.0	6.15
PRLC-1757	39.0	18.5	13.0	6.15
PS-100	20.0	9.5	3.5	1.66
PS-150	22.0	10.4	5.0	2.37
PS-200	38.0	18.0	6.0	2.84
PS-260	44.0	20.8	8.0	3.25
PS-270	44.0	20.8	8.0	3.78
PS-310	36.0	17.0	14.0	6.62
PS-500	58.0	27.4	29.0	13.72
PSC-593	28.0	13.2	4.0	1.89
PSC-594	28.0	13.2	4.0	1.89
PSC-1615	40.0	18.9	8.0	3.78
PSC-1617	40.0	18.9	8.0	3.78
PSC-4564	58.0	27.4	29.0	13.72

Axle Model	Axle Housing Approximate Oil Capacity		Wheel Ends Approximate Oil Capacity	
	Pints	Liters	Pints	Liters
PSM-826	42.0	19.9	6.0	2.8
PSM-1044	44.0	20.8	6.0	2.8
PSM-1045	44.0	20.8	6.0	2.8
PSM-1614	44.0	20.8	8.0	3.7
EPRC-1356				
Forward	32.0	15.1	14.0	6.6
Middle	32.0	15.1	14.0	6.6
Rear	32.0	15.1	14.0	6.6
SPRC-1356				
85" Track	32.0	15.1	14.0	6.6
90" Track	33.5	15.9	14.0	6.6
100" Track	36.0	17.0	14.0	6.6
SPRC-1357				
Forward	36.0	17.0	14.0	6.6
Rear	36.0	17.0	14.0	6.6
SPRC-1357				
85" Track	32.0	15.1	14.0	6.6
90" Track	33.5	15.9	14.0	6.6
100" Track	36.0	17.0	14.0	6.6
SPRC-1735				
85" Track	32.0	15.1	15.0	7.1
90" Track	33.5	15.9	15.0	7.1
100" Track	36.0	17.0	15.0	7.1
SPRC-1736				
Forward	36.0	17.0	15.0	7.1
Rear	36.0	17.0	15.0	7.1
SPRC-1736				
85" Track	32.0	15.1	15.0	7.1
90" Track	33.5	15.9	15.0	7.1
100" Track	36.0	17.0	15.0	7.1
SPRC-1926	32.0	15.1	16.0	7.6
SPRC-4806	64.0-72.0	31.0-34.0	32.0	15.1

Section 7 — Planetary Drive Axle

References

For more information on Rockwell planetary axles see the following Maintenance Manuals:

MM. No. 5	Single Reduction Differential Carriers
MM. No. 5B	Tandem Axle Forward Rear Drive Units
MM. No. 5E	Tandem Axle Forward Rear Drive Units
MM. No. 5P	Tandem Axle Forward Rear Drive Units
MM. No. 9	Planetary Axle Wheel Ends

Section 8 — Rear Drive Axle

General Information

Drive axles generate small metal wear particles at a fairly steady rate, especially during the break-in period.

If these fine, but hard, particles are allowed to circulate in the lubricant, along with external moisture and dirt, internal components will wear at a much faster rate than normal.

Magnets and Magnetic Drain Plugs

Although Rockwell axles are normally equipped with magnetic plugs having a minimum pick-up capacity of 1.5 pounds (0.7 kilograms) of low carbon steel, Rockwell **“Advanced Lube Axles”** have stronger magnetic ‘cleansing’ features. They are equipped with strong 5-pound (2.2 kilograms) pull magnets and high grade magnetic fill and drain plugs that collect the damaging particles at the bottom of the axle housing.

- **Tandem Axles** have four magnets in each housing and high grade magnetic fill and drain plugs.
- **Single Axles** have six magnets in each housing and high grade magnetic drain and fill plugs.

The drain plug must be checked for metal particles every 100,000 miles (160,000 kilometers).

NOTE:

Rockwell recommends replacing the magnetic drain plug each time the oil is changed. Use the correct part. Pipe plugs will leak if used as a drain plug.

The **drain plug** can be reused if, after cleaning, the plug has a minimum pick-up capacity of 1.5 pounds (0.7 kilograms) of low carbon steel.

Breather



CAUTION

Cover the breather when steam cleaning the housing. If the breather is not covered, water goes in the housing and contaminates the oil.

Baffle type breathers release pressure and vacuum condensation which can cause premature oil and component failure.

“Advanced Lube Axles” have a membrane type breather, chemically compatible with various oils. The design increases the ability to keep the lubricant environment clean, which is essential in completing the ‘extended’ interval between the oil changes

Seals

Seals keep **lubricant in and dirt out** of a component. When they are worn or damaged, seals leak and produce damaging low lubricant levels.

Durable triple-lip pinion seals, standard in Rockwell axles, protect the quality and levels of the lubricant and provide superior performance between parts.

Rockwell **“Advanced Lube Axles”** have triple-lip seals designed to work with current and future oils. They have a longer life and meet the special demands of an extended drain environment.



CAUTION

Always use the correct tools and procedures when replacing seals. If the correct tools and procedures are not used, the seal can be installed incorrectly and leak.

Section 8 — Rear Drive Axle

Temperature Indicators

Rockwell axles may operate above 190° F (88°C) without damage. However, when the oil temperature reaches 250°F (121°C), the vehicle must be stopped immediately and checked for the cause of overheating.

Many Rockwell axles have a tapped hole in the housing for the installation of a temperature indicator. Monitoring the oil temperature will help reduce component failure caused by overheated oil.

The indicator is particularly useful in thru-drive tandem axles where severe operating conditions and mismatched or unequally inflated tires, may cause an unacceptably high change in lubricant temperatures.

Advanced Lube Axles

“Advanced Lube Axles” have different drain intervals than other axles. See the Oil Change Intervals and Oil Specifications Charts in this section.

“Advanced Lube Axles” (at the manufacturer of the vehicle's option) may have a tag on the fill hole in the axle or on the inside of the door. The tag identifies if the axle is filled with semi-synthetic or full synthetic gear oil.

Traction Equalizers

Applies to R-170 Axles Only

Rockwell Traction Equalizers normally operate with either standard petroleum, semi-synthetic or full synthetic oils.

Occasionally, however, the traction equalizer will tend to slip and produce irregular intervals of sharp noises when the vehicle is operating at low speeds on fairly sharp turns.

This 'slip-stick' condition can often be corrected by the addition of certain 'friction modifiers'. These modifiers generally deteriorate faster than the conventional EP (Extreme Pressure) additives, so the lubricant change schedule should be shortened.

For axles equipped with Rockwell Traction Equalizers, the following are approved additives and quantities.

NOTE:

Additives are typically referred to as 'Limited Slip Friction Modifiers' by lubricant suppliers:

1. For all GL-5 oils (petroleum oil or synthetic), other than Mobil, add one of the following materials:

- DSL 178, Guardsman Products.
- Elco #2, Elco Corporation.
- Equa-Torque #2411, Sta-Lube Corporation
- Equa-Torque #2414, Sta-Lube Corporation
- Hi-Tec 363, Ethyl Corporation.
- Lubrizol #6178, Lubrizol Corporation

Section 8 — Rear Drive Axle

NOTE:

The R-170 series axle requires 43 pints (20.3 liters) of oil. With a Rockwell Traction Equalizer, the axle requires 40 pints (18.9 liters) plus 3 pints (1.4 liters) of one of the above additives.

2. For Mobilube HD (petroleum oil) and Mobilube SHC (synthetic) oil use:

- Mobil #204, Mobil Oil Corporation.

NOTE:

When using Mobilubes in the R-170 series axle with a Rockwell Traction Equalizer, use 41 pints (19.3 liters) of oil plus 2 pints (0.9 liters) of Mobil #204 additive.

At the initial change interval, the original factory installed lubricant should be replaced with approved lubricants and the above recommended additives.

Thereafter the recommended lubrication change interval, including additive, on axles equipped with Rockwell Traction Equalizers should be no more than 50,000 miles (80,000 kilometers).

Wheel Bearings and Wheel Ends

For greasing the grease lubricated wheel bearings, see Section 12, "Wheel Bearings and Wheel Ends."

For checking the oil level on oil lubricated wheel bearings, see Section 12, "Wheel Bearings and Wheel Ends".

Section 8 — Rear Drive Axle

Checking and Adjusting the Oil Level

NOTE:

See the following for the location of the fill plug.

- A. If the fill plug is only in the axle housing bowl, use that fill plug. Do not use the temperature sending unit hole (Figure 12).
- B. If the drive pinion angle is 7° or less, use the fill plug in the differential carrier (Figures 13 and 17).
- C. If the drive pinion angle is more than 7°, use the fill plug in the axle housing bowl (Figures 14, 15, 16 and 18).

1. Make sure the vehicle is parked on a level surface.

CAUTION

Check the oil level when the axle is at room temperature. When hot, the oil temperature may be 190° F (88° C) or more and can cause burns. Also, a correct reading is not obtained when the axle is warm or hot.

2. Make sure the axle is "cold" or at room temperature.
3. Clean the area around the fill plug. Remove the fill plug from the differential carrier or the axle housing bowl (depending on the axle). See Figures 12-18.

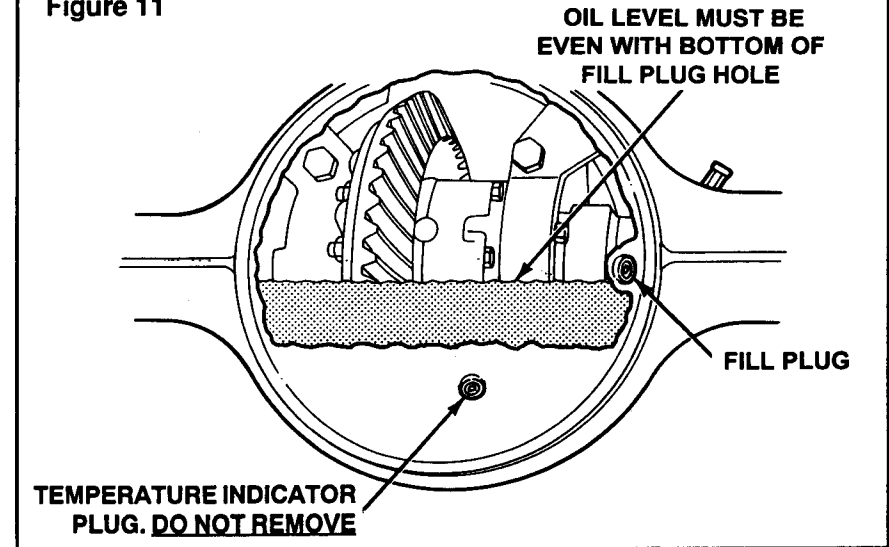
4. The oil level must be even with the bottom of the hole of the fill plug. **Figure 11.**

If oil flows from the hole when the plug is loosened, the oil level is high. Let the oil drain to the correct level.

If the oil level is below the bottom of the hole of the fill plug, add the specified oil.

5. Install and tighten the fill plug to 35-50 lb-ft (48-67 N.m).

Figure 11



Section 8 — Rear Drive Axle

Draining and Replacing the Oil

NOTE:

Drain plugs are located in the bottom of the axle housing . See the following for the location of the fill plug.

- A. If the fill plug is only in the axle housing bowl, use that fill plug. Do not use the temperature sending unit hole (Figure 12).*
 - B. If the drive pinion angle is 7° or less, use the fill plug in the differential carrier (Figures 13 and 17).*
 - C. If the drive pinion angle is more than 7°, use the fill plug in the axle housing bowl (Figures 14, 15, 16 and 18).*
1. Make sure the vehicle is parked on a level surface. Put a large container under the axle.

NOTE:

Drain the oil when the axle is warm.

2. Remove the drain plug from the bottom of the axle. Drain the oil. Discard the oil.
3. Install and tighten the drain plug to 35-50 lb-ft (48-67 N.m).
4. If an oil pump is used, remove and replace the oil filter. The oil filter is replaced each time the oil is drained and for "Advanced Lube Axles", replace the oil filter every 100,000 miles (160,000 kilometers).

5. Clean the area around the fill plug. Remove the fill plug from the differential carrier or the axle housing bowl (depending on the axle).
6. Add the specified oil until the oil level is even with the bottom of the hole of the fill plug. Wait and allow the oil to flow through the axle. Check the oil level again and fill to the specified level if necessary.
7. Install and tighten the fill plug to 35-50 lb-ft (48-67 N.m).

NOTE:

The design of some Rockwell forward/rear tandem axle carriers (SLHD, SQHD, STDD, SFDD) include separate housings for inter-axle differential assemblies.

The baffles and dams used in these housings keep a reservoir of oil that may also trap wear particles and debris. Always purge the oil in these assemblies whenever the axle oil is changed.

These carriers have separate drain and fill holes in either the inter-axle differential cover or the inter-axle differential housing.

8. If the inter-axle differential has a top fill plug hole, put an additional 2 pints (0.946 liters) of the same oil into the inter-axle differential housing.

Section 8 — Rear Drive Axle

Drain and Fill Plug Locations

Figure 12
FILL PLUG LOCATION IN BACK OF
AXLE HOUSING BOWL

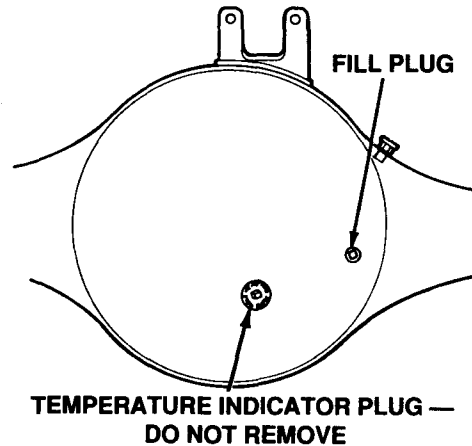
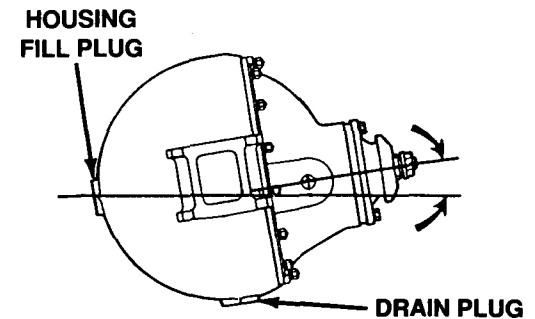
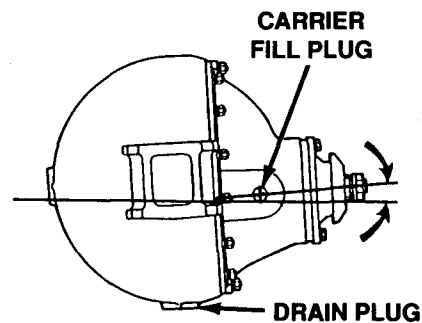


Figure 14
FRONT MOUNTED SINGLE
REDUCTION AXLES



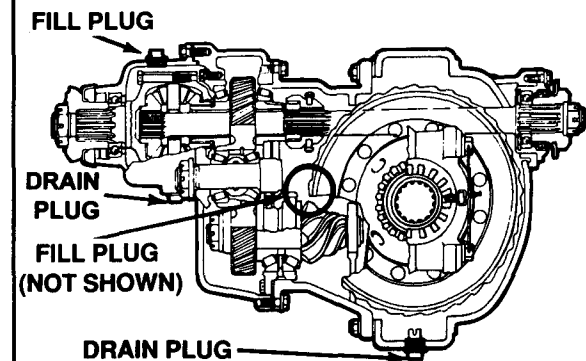
DRIVE PINION ANGLE MORE THAN 7°
USE AXLE HOUSING FILL PLUG

Figure 13
FRONT MOUNTED SINGLE
REDUCTION AXLES



DRIVE PINION ANGLE 7° OR LESS
USE CARRIER FILL PLUG

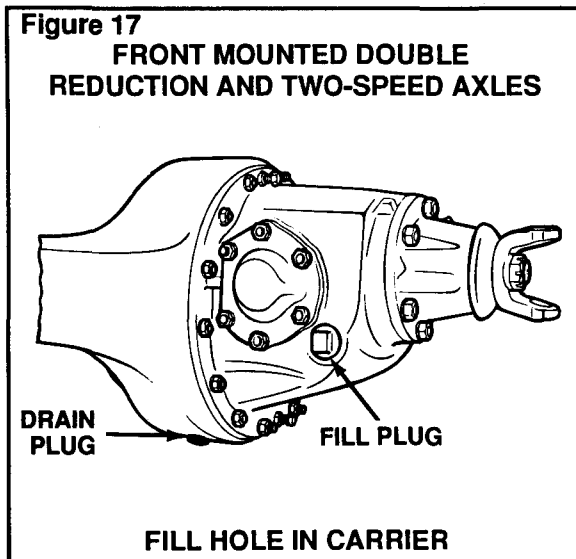
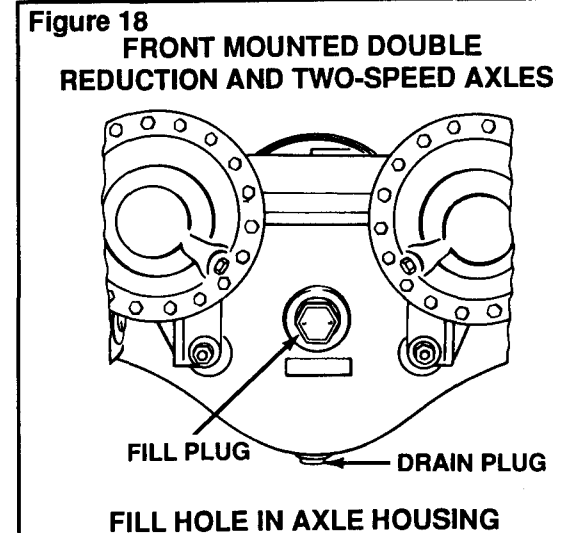
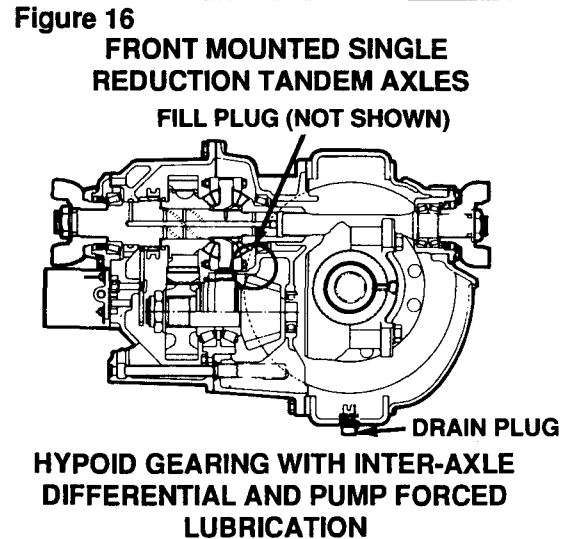
Figure 15
FRONT MOUNTED SINGLE
REDUCTION TANDEM AXLES



HYPOID GEARING WITH INTER-AXLE
DIFFERENTIAL

Section 8 — Rear Drive Axle

Drain and Fill Plug Locations (Continued)



Section 8 — Rear Drive Axle

Single Rear Drive Axle Oil Change Intervals and Specifications

APPLIES TO ALL SINGLE REAR AXLES EXCEPT "ADVANCED LUBE" AXLES.

On-Highway Operation Intervals				Off-Highway Operation Intervals ①				Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Initial Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change	Initial Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change				F°		C°	
											Min.	Max.	Min.	Max.
1,000 miles (1,600 km)	3,000 miles (4,800 km), once a month or the fleet maintenance interval (whichever comes first)	100,000 miles (160,000 km) or once a year (which- ever comes first)	250,000 miles (400,000 km)	1,000 miles (1,600 km)	1,000 miles (4,800 km)	25,000 miles (40,000 km) or twice a year (which- ever comes first)	50,000 miles (80,000 km)	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
								O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
								O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
								O-76J, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W	-40	35	-40	2
								O-76L, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
								O-76M, Full Syn- thetic Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
								O-76N, Full Syn-	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None

NOTES:

① Includes heavy-duty on-highway and on/off-highway applications.

Section 8 — Rear Drive Axle

Single “Advanced Lube” Rear Drive Axle Oil Change Intervals and Specifications ①

APPLIES TO SINGLE REAR AXLES MANUFACTURED AFTER JANUARY 1, 1993 EQUIPPED WITH “MEMBRANE” TYPE BREATHERS AND ADVANCED MATERIAL TRIPLE LIP SEALS: RS-17-145, RS-19-145, RS-21-145, RS-23-160, RS-23-161, RS-23-180 AND RS-26-180

On-Highway Operation Intervals			On-/Off-Highway Operation Intervals ②			Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Check Oil Level	Petroleum Oil Change ③	Synthetic Oil Change ④	Check Oil Level	Petroleum Oil Change ③	Synthetic Oil Change ④				F°		C°	
									Min.	Max.	Min.	Max.
3,000 miles (4,800 km), once a month or the fleet maintenance interval (whichever comes first)	100,000 miles (160,000 km)	250,000 miles (400,000 km)	3,000 miles (4,800 km) or 200 hours of operation	40,000 miles (64,000 km)	80,000 miles (128,000 km)	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
						O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
						O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
						O-76J, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W	-40	35	-40	2
						O-76L, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
						O-76M, Full Synthetic Gear Oil	MIL-L-2105-D	GL-5,SAE 75W/140	-40	None	-40	None
						O-76N, Full Synthetic Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None

NOTES:

- ① If a No-Spin differential is installed, oil (petroleum or synthetic) must be changed at minimum interval of 40,000 miles (64,000 km) or a maximum interval of 50,000 miles (80,000 km).
- ② Applies to heavy-duty on-highway and on-/off-highway applications. Does not apply to off-highway applications.
- ③ For petroleum oil with extended drain additives, use “Synthetic Oil Change” interval.
- ④ Applies to semi-synthetic and full-synthetic oils. For list of approved synthetic oils, see the “Approved Oil Charts” in this section.

Section 8 — Rear Drive Axle

Tandem Rear Drive Axle Oil Change Intervals and Specifications ①

APPLIES TO ALL TANDEM REAR AXLES EXCEPT THE "ADVANCED LUBE" REAR AXLES.

On-Highway Operation Intervals				Off-Highway Operation Intervals ②				Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Initial Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change	Initial Oil Change	Check Oil Level	Petroleum Oil Change ③	Synthetic Oil Change				F°		C°	
											Min.	Max.	Min.	Max.
3,000 miles (4,800 km)	3,000 miles (4,800 km), once a month or the fleet maintenance interval (whichever comes first)	If annual mileage is less than 100,000 miles (160,000 km) change oil once a year.	250,000 miles (400,000 km)	1,000 miles (1,600 km)	1,000 miles (4,800 km)	If annual mileage is less than 60,000 miles (96,000 km) change oil twice a year.	50,000 miles (80,000 km)	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
								O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
		O-76E, Gear Oil				MIL-L-2105-D		GL-5, SAE 75W/90	-40	None	-40	None		
		O-76J, Gear Oil				MIL-L-2105-D		GL-5, SAE 75W	-40	35	-40	2		
		O-76L, Gear Oil				MIL-L-2105-D		GL-5, SAE 75W/140	-40	None	-40	None		
		O-76M, Full Synthetic Gear Oil				MIL-L-2105-D		GL-5, SAE 75W/140	-40	None	-40	None		
		O-76N, Full Synthetic Gear Oil				MIL-L-2105-D		GL-5, SAE 75W/90	-40	None	-40	None		
		If annual mileage is more than 100,000 miles (160,000 km), change oil every 100,000 miles (160,000 km).				If annual mileage is more than 60,000 miles (96,000 km), change oil every 30,000 miles (48,000 km).								

NOTES:

- ① If oil pump and filter is used, change filter every 100,000 (160,000 km). Check oil level. Add correct oil as required.
- ② Includes heavy-duty on-highway and on/off-highway applications.
- ③ For continuous heavy-duty operation, check oil level every 1,000 miles (1,600 kilometers).

Section 8 — Rear Drive Axle

Tandem “Advanced Lube” Rear Drive Axle without Oil Pump and Filter Oil Change Intervals and Specifications ①

APPLIES TO TANDEM REAR AXLES MANUFACTURED AFTER JANUARY 1, 1993 EQUIPPED WITH “MEMBRANE” TYPE BREATHERS AND ADVANCED MATERIAL TRIPLE LIP SEALS: RT-34-145, RT-40-140, RT-40-145, RT-44-145, RT-46-160 AND SQ-100 (ALUMINUM)

On-Highway Operation Intervals			On-/Off-Highway Operation Intervals ②			Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Check Oil Level	Petroleum Oil Change ③	Synthetic Oil Change ④	Check Oil Level ⑤	Petroleum Oil Change ③	Synthetic Oil Change④				F°		C°	
									Min.	Max.	Min.	Max.
3,000 miles (4,800 km), once a month or the fleet maintenance interval (whichever comes first)	100,000 miles (160,000 km)	250,000 miles (400,000 km)	3,000 miles (4,800 km) or 200 hours of operation	40,000 miles (64,000 km)	80,000 miles (128,000 km)	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
						O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
						O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
						O-76J, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W	-40	35	-40	2
						O-76L, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
						O-76M, Full Synthetic Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
						O-76N, Full Synthetic	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None

NOTES:

- ① If a No-Spin differential is installed, oil (petroleum or synthetic) must be changed at minimum interval of 40,000 miles (64,000 km) or a maximum interval of 50,000 miles (80,000 km).
- ② Also applies to heavy-duty on-highway applications. Does not apply to off-highway applications.
- ③ For petroleum oil with extended drain additives, use the “Synthetic Oil Change” interval.
- ④ Applies to semi-synthetic oils and full-synthetic oils. For a list of approved synthetic oils, see the “Approved Lubricant Charts” in this section.
- ⑤ For continuous heavy-duty operation, check the oil level every 1,000 miles (1,600 km). Add the correct oil as required.

Section 8 — Rear Drive Axle

Tandem “Advanced Lube” Rear Drive Axle with Oil Pump and Filter Oil Change Intervals and Specifications^{① ②}

APPLIES TO TANDEM REAR AXLES MANUFACTURED AFTER JANUARY 1, 1993 EQUIPPED WITH “MEMBRANE” TYPE BREATHERS AND ADVANCED MATERIAL TRIPLE LIP SEALS: RT-34-145P, RT-40-145P, RT-44-145P, RT-46-160P AND SQ-100P (ALUMINUM)

On-Highway Operation Intervals			On-/Off-Highway Operation Intervals ③			Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Check Oil Level	Petroleum Oil Change④	Synthetic Oil Change ⑤	Check Oil Level⑥	Petroleum Oil Change ④	Synthetic Oil Change ⑤				F°		C°	
									Min.	Max.	Min.	Max.
3,000 miles (4,800 km), once a month or the fleet maintenance interval (whichever comes first)	100,000 miles (160,000 km)	500,000 miles (800,000 km)	3,000 miles (4,800 km) or 200 hours of operation	50,000 miles (80,000 km)	100,000 miles (160,000 km)	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
						O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
						O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
						O-76J, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W	-40	35	-40	2
						O-76L, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
						O-76M, Full Synthetic Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
						O-76N, Full Synthetic Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None

NOTES:

- ① Replace oil filter every 100,000 miles (160,000 km). Check oil level. Add specified oil as required.
- ② If No-Spin differential is installed, oil (petroleum or synthetic) must be changed at minimum interval of 40,000 miles (64,000 km) or a maximum interval of 50,000 miles (80,000 km).
- ③ Applies to heavy-duty on-highway applications and to on/off highway applications. Does not apply to off-highway applications
- ④ For petroleum oil with extended drain additives, use the “Synthetic Oil Change” interval.
- ⑤ Applies to semi-synthetic and full-synthetic oils. For list of approved synthetic oils, see the “Approved Lubricant Charts” in this section.
- ⑥ For continuous heavy-duty operation, check oil level every 1,000 miles (1,600 km). Add correct oil as required.

Section 8 — Rear Drive Axle

Single Rear Drive Axle Oil Capacities

Axle Model	Oil Capacity ①	
	Pints	Liters
A-150	5.5	2.6
B-100	10.0	4.7
B-140	12.0	5.7
B-150	3.5	1.7
C-100	12.5	5.9
D-100	12.5	5.9
D-140	12.5	5.9
E-100	15.0	7.1
E-105	12.5	5.9
E-150	9.0	4.3
F-100	13.0	6.2
F-106	13.0	6.2
F-120	15.0	7.1
F-121	15.0	7.1
F-140	14.0	6.6
G-161	21.0	9.9
H-100	20.0	9.5
H-140	21.0	9.9
H-150	11.0	5.2
H-162	20.0	9.5
H-170	27.0	12.8
H-172	27.0	12.8
L-100	23.0	10.9
L-140	24.0	11.4
L-155	24.0	11.4
L-172	27.0	12.8
M-172	27.0	12.8
Q-100	31.0	14.7
Q-145	24.0	11.4
QT-140	24.0	11.4
R-100	30.0	14.2
R-140	28.0	13.3
R-155	28.0	13.3
R-160	28.0	13.3
R-163	34.0	16.1

Axle Model	Oil Capacity ①	
	Pints	Liters
R-170	43.0	20.3
R-270	55.0	26.0
RL-170	48.0	22.7
RS-13-120	18.4	8.7
RS-15-120	18.4	8.7
RS-15-210	14.3	6.8
RS-17-140	28.6	13.5
RS-17-145	33.6	15.9
RS-17-220	30.7	14.5
RS-19-145	33.2	15.7
RS-21-145	32.3	15.3
RS-21-230	38.9	18.4
RS-23-160	39.5	18.7
RS-23-161	37.2	17.6
RS-23-180	47.3	22.4
RS-23-240	37.4	17.7
RS-23-380	63.6	30.1
RS-26-160	47.5	22.5
RS-26-180	46.6	22.0
RS-26-380	58.2	27.5
RS-30-180	46.6	22.0
RS-30-380	58.2	27.5
RS-38-380	53.1	25.1
S-170	43.0	20.3
U-140	24.0	11.4
U-170	43.0	20.3
U-270	55.0	26.0
W-170	43.0	20.3
W-270	55.0	26.0
59722	30.5	14.4
59723	30.5	14.4
59732	30.5	14.4
59733	30.5	14.4
59843	30.5	14.4
61142	42.0	19.8
61143	41.0	19.3

① Oil capacities are for standard track axles that have been measured at various common drive pinion angles. The quantities listed include enough oil for both wheel ends. These oil capacities will change if the track or the drive pinion angle is different.

Section 8 — Rear Drive Axle

Tandem Rear Drive Axle Oil Capacities

Axle Model	Carrier	Oil Capacity ①	
		Pints	Liters
RT-34-140	Forward	26.0	12.3
	Rear	35.0	16.6
RT-34-145	Forward	29.6	14.0
	Rear	25.4	12.0
RT-34-145P	Forward	25.7	12.1
	Rear	23.4	11.1
RT-40-140	Forward	30.2	14.3
	Rear	22.8	10.8
RT-40-145	Forward	30.2	14.3
	Rear	25.8	12.2
RT-44-145	Forward	29.3	13.9
	Rear	25.1	11.9
RT-44-145P	Forward	25.2	12.0
	Rear	22.9	11.0
RT-46-160	Forward	39.1	18.5
	Rear	34.4	16.3
RT-46-160P	Forward	39.3	18.6
	Rear	34.7	16.4
RT-48-180 ②	Forward	61.1	28.9
	Rear	36.8	17.4
RT-48-380 ②	Forward	61.1	28.9
	Rear	63.6	30.1
RT-52-160	Forward	44.1	20.9
	Rear	41.2	19.5
RT-52-160P	Forward	44.1	20.9
	Rear	41.2	19.5
RT-52-180 ②	Forward	56.1	26.5
	Rear	36.1	17.1
RT-52-380 ②	Forward	56.1	26.5
	Rear	58.2	27.5
RT-58-180 ②	Forward	56.1	26.5
	Rear	36.1	17.1

Axle Model	Carrier	Oil Capacity ①	
		Pints	Liters
RT-58-380 ②	Forward	56.1	26.5
	Rear	58.2	27.5
RT-70-380 ②	Forward	54.4	25.7
	Rear	53.1	25.1
SFHD	Forward	17.0	8.0
	Rear	16.5	7.8
SL-100	Forward	39.6	18.7
	Rear	37.7	17.8
SLHD	Forward	32.5	15.3
	Rear	32.0	15.1
SQ-100	Forward	39.6	18.7
	Rear	37.7	17.8
SQ-100A	Forward	39.3	18.6
	Rear	37.6	17.8
SQHD	Forward	34.0	16.0
	Rear	31.0	14.7
SR-170	Forward	55.0	26.0
	Rear	43.0	20.3
SRHD	Forward	39.0	18.5
	Rear	36.0	17.0
SSHHD	Forward	34.0	16.0
	Rear	28.0	13.2
ST-170	Forward	55.0	26.0
	Rear	43.0	20.3
STHD	Forward	34.0	16.0
	Rear	28.0	13.2
SU-170	Forward	55.0	26.0
	Rear	43.0	20.3
SUHD	Forward	34.0	16.0
	Rear	28.0	13.2
SW-170	Forward	55.0	26.0
	Rear	43.0	20.3

NOTES:

- ① Oil capacities are for standard track axes that have been measured at various common drive pinion angles. The quantities listed include enough oil for both wheel ends. These oil capacities will change if the track or the drive pinion angle is different.
- ② Forward carrier with oil pump system.

Section 8 — Rear Drive Axle

Approved Limited Slip Friction Modifiers

Friction Modifier	Supplier
DSL 178	Guardsmen Products, Inc. 411 North Darling Avenue Freemont, MI 49412
Elco #2	Elco Corporation 1000 Belt Line Cleveland, Ohio 44109

Friction Modifier	Supplier
Equa-Torque #2411	Sta-Lube 3039 Anna Street Box 5746 Rancho Dominguez, CA 90224
Hi-Tec 336	Ethyl Corporation 1530 South 2nd Street St. Louis, MO 63104

Friction Modifier	Supplier
Lubrizol #6178	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092
Mobil #204	Mobil Corporation

Approved Full Synthetic Gear Oils

Gear Oil	Viscosity	Supplier
Agadif	75W/90 80W/140	AGA Fleet Products Corp. 3758 West Morris Street Indianapolis, IN 46241
Allied Mag	75W/90 80W/140	Allied Oil and Supply Co. P.O. Box 3687 Omaha, NE 68103
Altra Syntec GT-7	75W/90 80W/140	Allegheny Petroleum Products Co. 104 River Road McKeesport, PA 15132
Anchor 2000 Synthetic	75W/90 80W/140	Jenkin-Guerin, Inc. 4480 Hunt Avenue St. Louis, MO 63110
Arctic	75W/90 80W/140	Maine Lubrication Service P.O. Box 732 Portland, ME 04104
Champion HTS 4314 Champion HTS 4315	75W/90 80W/140	Lowe Oil Company 510 Price Lane Clinton, MO 64735
Chevron RPM Synthetic Gear Lube	75W/90 90W/140	Chevron Company 575 Market Street San Francisco, CA 94105

Gear Oil	Viscosity	Supplier
Citgo Synthetic Gear Lube	75W/90 80W/140	Citgo Petroleum Corp. P.O. Box 3758 One Warren Place Tulsa, OK 74102
DOC ETD Syn	75W/90 80W/140	D.O.C. Lubrication Specialties Dennis Grease and Oil Co. 1101-03 East Tampa Springfield, MO 65801
DR Lubricants SYN	75W/90	DR Lubricants 209 Lincoln Highway East New Haven, IN 46774
Drydene Syn-Gear GL-5	75W/90 80W/140	Dryden Oil Company, Inc. 9300 Pulaski Highway Baltimore, MD 21220-2495
Durex Synlube Gear Oil	75W/90 89W/140	Morrison Oil Company P.O. Box 17339 Portland, OR 97217
Dyna-Plex 21C Synzol	75W/90 80W/140	Universal Motor Oils Co. , Inc. 2824 North Ohio Wichita, KS 67201
DY Synthetic Lube	75W/90 80W/140	Dyson Oil Company P.O. Box 658 Cabot, AR 72023

Section 8 — Rear Drive Axle

Approved Full Synthetic Gear Oils (Continued)

Gear Oil	Viscosity	Supplier
EMGARD EP Synthetic Axle Lube	75W/90 80W/140	Henkel Corporation Emery Group 11501 Nothlake Drive Cincinnati, OH 45249
ERSYN EP ERSYN SP	75W/90 80W/140	Monarch Oil Limited P.O. Box 653 Victoria Street North Kitchener, Ontario N2G 4B6
Exxon Synthetic Gear Lubricant	75W/90 80W/140	Exxon P.O. Box 2180 Houston, TX 77252
Gear Plus Super EW	75W/90 80W/140	Pennzoil Products Co. P.O. Box 2967 Houston, TX 77252-2967
Hydrotex Synthetic	75W/90 80W/140	Hydrotex, Inc. P.O. Box 560707 Dallas, TX 75356-0707
Luberite EP	75W/90 80W/140	Hackney Petroleum P.O. Box 9 Louisville, TN 37777
Lubsoil Synthetic Gear EP	75W/90 80W/140	Tulco Oils Inc. 2401 East Roosevelt Little Rock, AR 72206
Minuteman Syn-Gear EP-4 EP 5/6	75W/90 80W/140	Minuteman Lubricants, Inc. 539 Marwood Road Cabot, PA 16023
Mobilube SHC	75W/90 80W/140	Mobil Corporation
Moore Flo Syn EP	75W/90 80W/140	Moore Oil Company 4033 West Custer Avenue Milwaukee, WI 53209
MP Synthetic Gear Lube	75W/90 80W/140	Cenex P.O. Box 43089 St. Paul, MN 55164

Gear Oil	Viscosity	Supplier
Mystik Dimension Synthetic Gear Oil	75W/90 80W/140	Cato Oil and Grease Co. P.O. Box 26868 Oklahoma City, OK 73126
Nemco Synthetic EP	75W/90 80W/140	Nemco Resources LTD 11471 Madison Street Winnipeg, Manitoba R3J 1J2
NEO	75W/90 80W/140	Neo Lubricants 2865 Gundry Avenue Long Beach, CA 90806
Northland Synergy Synthetic Gear Lubrication EP	75W/90 80W/140	Northland Products Co. 100 Rainbow Drive P.O. Box 418 Waterloo, IA 50704-0418
Philgard	75W/90	Phillips 66 Co. Adams Building Bartlesville, OK 74004
Premium EP	75W/90 80W/140	Premium Oil Company P.O. Box 60598 Nashville, TN 37206-0598
Premium Express EP	75W/90 80W/140	Rosemead Oil Products 12912 Lakeland Road Sante Fe Springs, CA 90670-4577
Red Ram Syn-Go	75W/90	Canadian Turbo, Inc 815-8th Avenue, S.W. Calgary, Alberta T2P 3P2
Schaeffer Synthetic Lube EP	75W/90 80W/140	Schaeffer Manufacturing Co. 102 Barton Street St. Louis, MO 63104
SEN SYN EP	75W/90 80W/140	Sentinel Canada 7300 rue St-Jacques Montreal, Quebec H4B 1W1

Section 8 — Rear Drive Axle

Approved Full Synthetic Gear Oils (Continued)

Gear Oil	Viscosity	Supplier
SGE	75W/90 80W/140	Summit Oil Company P.O. Box 131359 Tyler, TX 75707
Shell Dentax S	75W/90 80W/140	Shell Oil Corp. Royal Lubricants Division East Hanover, NJ 07936
SHP Gear Lube	75W/90	Kendall Refining Co. Division of Witco Corp. Bradford, PA 16701
Sunoco Duragear EP	75W/90	Sun Refining and Marketing Ten Pen Center 1801 Market Street Philadelphia, PA 19103-1699
SYN EP	75W/90 80W/140	Western Fleet Service, Inc. P.O. Box 51261 Phoenix, AR 85076
Syngard EP	75W/90 80W/140	Seeco, Inc. P.O. Box 807 Edenton, NC 27932
Syn-O-Gen EP 745 Syn-O-Gen EP746	75W/90 80W/140	Primrose Oil Company 11444 Denton Drive Dallas, TX 75229
Synpro	75W/90 80W/140	Fina Oil and Chemical Co. P.O. Box 2159 Dallas, TX 75221
Synquest Gear Lubricant	75W/90	Quaker State Corp. P.O. Box 989 Oil City, PA 16301
SYN-EP Gear Lubricant	75W/90 80W/140	Black Bear Company, Inc. 27-10 Hunters Point Ave. Long Island, NY 11101-4498

Gear Oil	Viscosity	Supplier
Syn-Star GL	75W/90 80W/140	Texaco Lubricants Co. P.O. Box 4427 Houston, TX 77210-4427
Syn-Tech EP	75W/90 80W/140	Benz Oil 2724 West Hampton Milwaukee, WI 53209
Syntex 2700	75W/90 80W/140	Texas Refinery Corp. P.O. Box 711 Forth Worth, TX 76101
Transgear S	75W/90 80W/140	BP Oil Company 200 Public Square Cleveland, OH 44114-2375
Triton Synthetic Lubricant	75W/90 80W/140	Unocal Refining and Marketing Unocal Corp. P.O. Box 7600 Los Angeles, CA 90051
Ultimate Multi-Purpose Gear Lube	75W/90	Amoco Oil Company 2021 Spring Road, Suite 500 Oak Brook, IL 60521-1857
United EP	75W/90 80W/140	McCollister and Company P.O. Box 587 Council Bluffs, IA 51502
Walters EP	75W/90 80W/140	Walters Oil Company P.O. Box 747 Canton, IL 61520
XL-2837/759 XL-2835/801	75W/90 80W/140	Thermal-Lube Inc. 1130 Claire Crescent Lachine, Quebec H8S 1A1

Section 8 — Rear Drive Axle

Approved Semi-Synthetic Gear Oils

Gear Oil	Viscosity	Supplier
Unigear Semi-Synthetic	75W/90	Century Oil 2140 South 88th Street Kansas City, KS 66111

Approved Petroleum Gear Oils with Extended Drain Additives

Gear Oil	Viscosity	Supplier
Ultra Gear Lubricant	80W/90	Chevron Company 575 Market Street San Francisco, CA 94105

References

For more information on Rockwell single rear axles see Maintenance Manuals:

MM. No. 5	Single Reduction Differential Carriers
MM. No. 6	Double Reduction Drive Unit (Front Mounted Type)
MM. No. 6C	270 Series Double Reduction Differential Carriers
MM. No. 7	Two-Speed Double-Reduction Drive Unit
MM. No. 7A	Hypoid Planetary Two-Speed Differential Carriers
MM. No. 23A	Bus and Coach Front and Rear Axles

For more information on Rockwell tandem rear axles see Maintenance Manuals:

MM. No. 5	Single Reduction Differential Carriers
MM. No. 5B	Tandem Axle Forward Rear Drive Units
MM. No. 5C	Tandem Axle Forward Rear Drive Units
MM. No. 5E	Tandem Axle Forward Rear Drive Units
MM. No. 5L	Tandem Axle Forward Rear Drive Units
MM. No. 5P	Tandem Axle Forward Rear Drive Units
MM. No. 6A	Double Reduction Drive Unit
MM. No. 6B	Double Reduction Drive Unit
MM. No. 6C	270 Series Double Reduction Differential Carriers

Section 9 — Trailer Axle

Greasing the Wheel Bearings

See Figure 19.

WARNING

Support the vehicle with safety stands. Do not work under a vehicle only supported by jacks. Jacks can slip or fall over and cause serious personal injury.

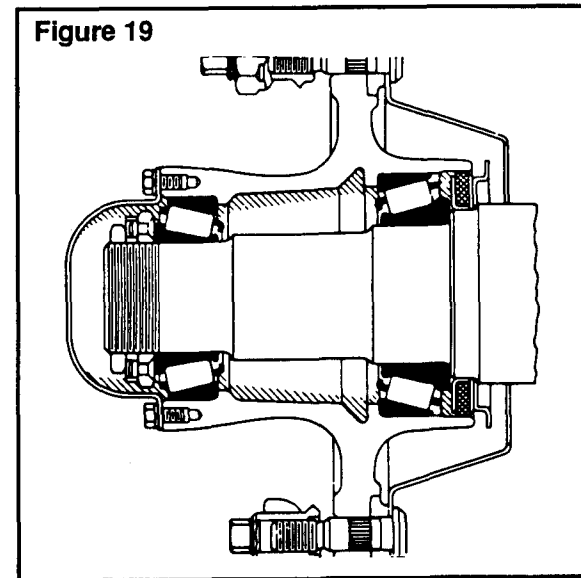
1. Raise the vehicle so that the wheels are off the ground. Support the vehicle with safety stands.
2. Remove the tire and wheel assembly. Remove and disassemble the hub.
3. Use the correct cleaning solvent to remove the old grease from all parts. Discard the seals. Inspect the wheel bearings for wear or damage. Replace worn or damaged bearings.
4. Lubricate the bearing journals on the spindle with the grease that is used for the bearings.
5. Use a pressure packer to force the specified grease from the large end of the cones into the cavities between the rollers and cage.

If a pressure packer is not available, grease the bearings by hand. Pack the hub between the bearing cups with grease to the level of the smallest diameter of the cups.

NOTE:

Inner bearing cones and seals are installed in the hub or on the spindle, depending on the trailer axle. For specific service information for steps 6-9, see Maintenance Manual No. 14, "Trailer Axles".

6. Install the inner bearing cones and the wheel seals.
7. Install the hub and the wheel and tire assembly. Install the outer wheel bearing cone in the hub. Install the adjusting nut.
8. Adjust the wheel bearings.



Section 9 — Trailer Axle

Checking the Oil Level

See Figure 20.

1. Check the level on the cap. If the oil level is more than 1/4 inch (6 mm) below specified level on the cap, remove the fill plug. Add new, specified oil until the oil is at the specified level. Install the fill plug.

Lubricating the Camshaft Bushings

See Figure 21.

1. Apply the specified grease at the grease fitting on the spider. Apply grease until new grease purges from all the seals.

Figure 20

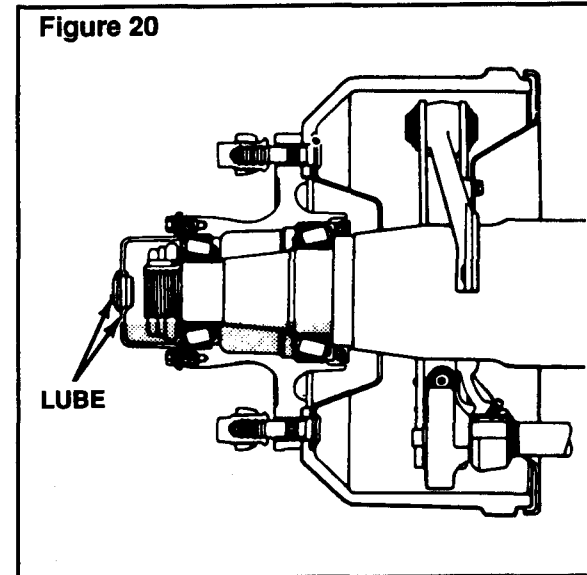
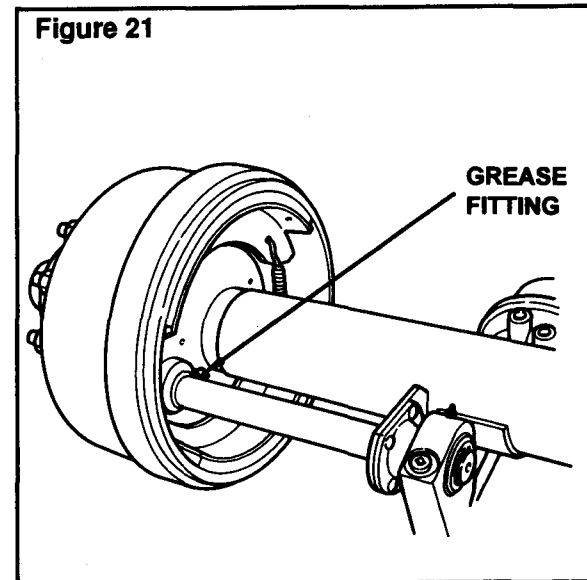


Figure 21



Section 9 — Trailer Axle

Trailer Axle Wheel End Oil Change Intervals and Specifications

Check Oil Level	Oil Change ①	Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
					F°		C°	
					Min.	Max.	Min.	Max.
1,000 miles (1,600 km)	General Service: Change oil if the wheel end is disturbed during wheel or hub removal or if the oil is contaminated. Standard-Duty Service: For 100,000 miles (160,000 km) or more a year, change the oil every 100,000 miles (160,000 km). For less than 100,000 miles (160,000 km) a year, change the oil once a year. Heavy-Duty Service: For 60,000 miles (96,000 km) or more a year, change oil every 30,000 miles (48,000 km). For less than 60,000 miles (96,000 km) a year, change the oil every 6 months.	O-76A, Gear Oil	MIL-L-2105-D	GL-5, SAE 85W/140	10	None	-12	None
		O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
		O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
		O-76J, Gear Oil	MIL-L-2105-D	GL-5, SAE 75	-40	+35	-40	+2
		O-76L, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
		O-76M, Full Synthetic Oil	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
		O-76N, Full Synthetic Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None

NOTES:

- ① The recommended oil change interval is based on operating conditions, speeds and loads. Limited service applications may allow the recommended interval to be increased. Severe service applications may require the recommended interval to be reduced. For more information, contact a Rockwell service representative.

Section 9 — Trailer Axle

Trailer Axle Greasing Intervals and Specifications

Greasing Interval ①	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
General Service: Grease the bearings if the wheel end is disturbed during wheel or hub removal or if the grease is contaminated. Standard-Duty Service: For 100,000 miles (160,000 km) or more a year, grease the bearings every 100,000 miles (160,000 km). For less than 100,000 miles (160,000 km) a year, grease the bearings once a year. Heavy-Duty Service: For 60,000 miles (96,000 km) or more a year, grease the bearings every 30,000 miles. For less than 60,000 miles a year, grease the bearings every 6 months.	Multi-Purpose Grease	O-617-A or -B	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.
	Trailer Axle Bearing	O-647	00	Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.

NOTES:

- ① The recommended greasing interval is based on operating conditions, speeds and loads. Limited service applications may allow the recommended interval to be increased. Severe service applications may require the recommended interval to be reduced. For more information, contact a Rockwell service representative.

Section 9 — Trailer Axle

Camshaft Bushing Greasing Intervals and Specifications

Greasing Interval ①	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
Use the schedule below that gives the most frequent lubrication: <ul style="list-style-type: none">• The lubrication schedule of the fleet.• The lubrication schedule of the vehicle manufacturer.• A minimum of four times during the life of the brake linings.	Multi-Purpose Grease	O-617-A or -B	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the grease manufacturer's specifications for the temperature service limits.

NOTES:

- ① Applies to standard-duty on-highway service. Lubricate more frequently for heavy-duty applications. Determine intervals by inspecting lubricant every two weeks for a four month period. Look for hard, contaminated or missing grease. Choose an interval based on the inspection.

References

For more information on Rockwell trailer axles see Maintenance Manual:

MM. No.14 Trailer Axles

Section 9 — Trailer Axle

NOTES:



Section 10 — Transfer Case

General Information

Transfer cases generate small metal wear particles at a fairly steady rate, especially during the break-in period.

If these fine, but hard, particles are allowed to circulate in the lubricant, internal components will wear at a much faster rate than normal.

Magnets and Magnetic Drain Plugs

Most Rockwell transfer cases are equipped with magnetic plugs having a minimum pick-up capacity of 20 ounces (0.57 kilograms) of low carbon steel.

NOTE:

Rockwell recommends replacing the magnetic drain plug each time the oil is changed. Use the correct part. Pipe plugs will leak if used as a drain plug.

The magnetic drain plug can be reused if, after cleaning, the plug has a minimum pick-up capacity of 20 ounces (0.57 kilograms) of low carbon steel.

Breather



CAUTION

Cover the breather when steam cleaning the housing. If the breather is not covered, water goes in the housing and contaminates the oil.

Breathers release pressure that builds up inside the transfer case during vehicle operation.

Seals

Seals keep lubricant in and dirt out of a component. When they are worn or damaged, seals leak and produce low lubricant levels which may damage components.



CAUTION

Always use the correct tools and procedures when replacing seals. If the correct tools and procedures are not used, the seal can be installed incorrectly and leak.

Temperature Indicators

Rockwell transfer cases may operate above 190° F (88°C) without damage. However, when the oil temperature reaches 250°F (121°C), the vehicle must be stopped immediately and checked for the cause of overheating.

Section 10 — Transfer Case

Checking and Adjusting the Oil Level

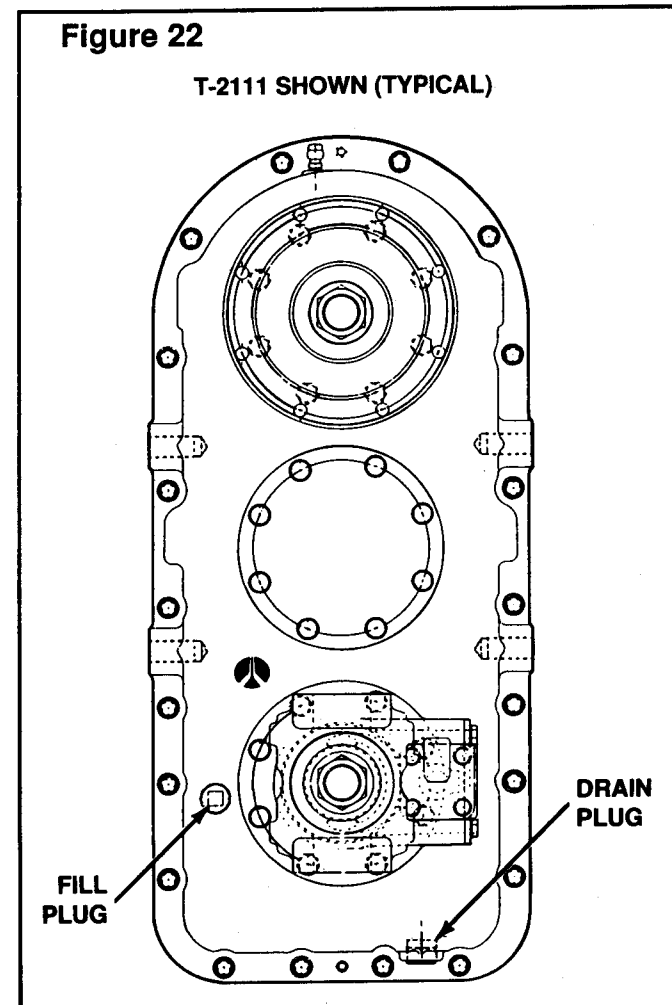
1. Make sure the vehicle is parked on a level surface.
2. Clean the area around the fill plug. Remove the fill plug from the transfer case. **Figure 22.**
3. The oil level must be even with the bottom of the hole for the fill plug.

If oil flows from the hole when the plug is loosened, the oil level is high. Let the oil drain to the correct level.

If the oil level is below the bottom of the hole of the fill plug, add the specified oil.
4. Install and tighten the fill plug to 35-50 lb-ft (47-68 N.m).

Draining and Replacing the Oil

1. Make sure the vehicle is parked on a level surface. Put a large container under the transfer case.
2. Remove the drain plug from the bottom of the transfer case. Drain and discard the oil. Clean the plug. **Figure 22.**
3. Install and tighten the drain plug to 35-50 lb-ft (47-68 N.m).
4. Clean the area around the fill plug. Remove the fill plug from the transfer case.
5. Add the specified oil until the oil level is even with the bottom of the fill plug hole.
6. Install and tighten the fill plug to 35-50 lb-ft (47-68 N.m).



Section 10 — Transfer Case

Transfer Case Oil Change Intervals

On-Highway Intervals			Off-Highway Intervals		
Check Oil Level	Initial Oil Change	Scheduled Oil Change	Check Oil Level	Initial Oil Change	Scheduled Oil Change
2,000 miles (3,200 km)	2,500 miles (4,000 km)	12,000-25,000 miles (19,000-40,000 km)	40 operating hours	40-100 operating hours	200-300 operating hours

Transfer Case Oil Specifications ^①

Oil Description	Rockwell Specification	A.P. I. Specification	Military Specification	SAE Grade	Outside Temperature
Petroleum GL-1 Oil with Rust and Oxidation Inhibitor	-----	A.P.I. - GL-1	-----	90 80	Above 10°F (-12°C) Above -15°F (-26°C)

NOTES:

- ① Multi-Viscosity and EP (Extreme Pressure) GL-5 gear oils are not recommended. **DO NOT MIX OILS IN THE TRANSFER CASE.**

Section 10 — Transfer Case

Transfer Case Oil Capacities

Transfer Case Model	Oil Capacity	
	Pints	Liters
T-32 ②	2.0	0.95
T-136 ②	14.0	6.62
T-215 ①	3.0	1.42
T-219-SD ①	5.4	2.36
T-221 ②	4.0	1.89
T-223 ②	5.0	2.37
T-226 ②	6.5	3.07
T-228 ②	21.0	9.93

Transfer Case Model	Oil Capacity	
	Pints	Liters
T-232 ②	6.2	1.50
T-232 w/P.D. ②	5.3	1.26
T-1138 ②	13.5	6.64
T-2111 ①	3.0	1.42
T-2111-PD ②	10.0	4.73
T-2120-RS ①	3.0	1.42
T-600 ②	6.2	1.50
T-600 w/P.D. ②	7.0	1.66

NOTES:

- ① Add 1 pint (0.47 liters) for each lower mounted PTO/declutch/oil pump option.
- ② Includes bottom mounted lock-up or declutch assembly.

References

For more information on Rockwell transfer cases see Maintenance Manuals:

MM. No.3	Transfer Cases - Three Shaft Design
MM. No.3A	Transfer Cases - "Clover Leaf" Design" - Four Shaft Type
MM. No.3B	T-215 Series Transfer Cases
MM. No.3D	T-2111 Series Transfer Cases

Section 11 — Transmission

General Information

Transmissions generate small metal wear particles at a fairly steady rate, especially during the break-in period.

If these fine, but hard, particles are allowed to circulate in the lubricant, along with external moisture and dirt, internal components will wear at a much faster rate than normal.



CAUTION

To prevent transmission damage, make sure of the following:

- **THE CORRECT OIL IS USED.** Do not use Multi-Viscosity or EP (Extremem Pressure) GL-5 gear oils.
- **USE THE SAME OIL THAT IS IN THE TRANSMISSION.** Do not mix oils.
- **MAKE SURE THE OIL LEVEL IS EVEN WITH THE BOTTOM OF THE FILL PLUG.** A low oil level will not distribute the oil throughout the complete transmission.

Magnets and Magnetic Drain Plugs

All Rockwell transmissions have four magnets in the bottom of the main case.

Rockwell “Advanced Lube Transmissions” have magnetic drain and fill plugs.

The magnets and magnetic plugs having a minimum pick-up capacity of 1.5 pounds (0.7 kilograms) of low carbon steel.

NOTE:

Rockwell recommends replacing the magnetic drain plug each time the oil is changed. Use the correct part. Pipe plugs will leak if used as a drain plug.

The **magnetic drain plug** can be reused if, after cleaning, the plug has a minimum pick-up capacity of 1.5 pounds (0.7 kilograms) of low carbon steel.

Breather



CAUTION

Cover the breather when steam cleaning the transmission. If the breather is not covered, water goes in the main case and contaminates the oil.

Baffle type breathers help keep Rockwell transmissions free from external moisture and dirt which can cause premature oil and component failure.

Seals

Seals keep **lubricant in and dirt out** of a component. When they are worn or damaged, seals leak and produce damaging low lubricant levels.

Durable triple-lip seals, standard in Rockwell transmissions, protect the quality and levels of the lubricant and provide superior performance between parts.



CAUTION

Always use seal driver, 3256-Z-1014 (Kent-Moore Number J-39161), when replacing seals. If the correct tools and procedures are not used, the seal can be installed incorrectly and will leak.

Section 11 — Transmission

Transmission Oil Coolers

Use a transmission oil cooler for any of the following.

- The transmission operating temperature is always more than 225°F (107°C) at continuous operation or 275°F (135°C) at intermittent operation.
- The engine has a horsepower rating of 399 HP or more. Some aerodynamic vehicles with less than 399 HP may require a cooler due to the amount of air which flows over the transmission to dissipate heat.

Temperature Indicator

The temperature indicator is optional on Rockwell transmissions. The temperature sending unit is on the bottom right side of the main case. The normal operating temperature range is less than 225° F(107° C).

Use the temperature indicator gauge to check transmission operation. For example:

- When the temperature suddenly rises to 275° F (135° C) or more, check the transmission for cause of the increase.
- When going up a mountain grade, the temperature increases 50-75% but returns to the normal operating temperature indicates a normal operating condition. If the temperature does not return to the normal range, check the transmission.

Advanced Lube Transmissions

"Advanced Lube Transmissions" do not require an initial oil change and use magnetic drain and fill plugs.

"Advanced Lube Transmissions" may have a tag near the fill hole in the transmission. The tag indicates the transmission is filled with the approved oil.

Checking and Adjusting the Oil Level

See Figure 23.

1. Make sure of the following before checking the oil level:
 - a. The oil is at room temperature.
 - b. Wait ten minutes after the vehicle is parked before checking the level.
2. Make sure the vehicle is parked on a level surface.
3. Clean the area by the fill plug. Remove the fill plug from the side of the transmission.



CAUTION

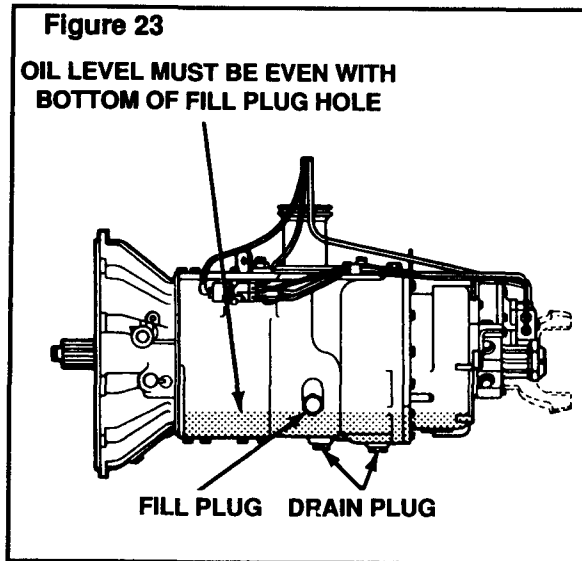
Use the same type of oil that is used in the transmission. Mixing different types of oil damages the transmission.

4. Check the oil level. The oil level must be even with the bottom of the hole of the fill plug.

If foam appears when the plug is removed, the oil is too hot to be checked. Install the plug and let the oil cool.

If oil flows from the hole when the plug is removed, the oil level is high. Let the oil drain until the oil is at the specified level.

Section 11 — Transmission



If the oil level is below the bottom of the hole of the fill plug, add the specified oil.

5. Install and tighten the fill plug to 35-50 lb-ft (48-67 N.m).
6. Operate the vehicle for 5 minutes. Check for leaks and correct operation.

Draining and Replacing the Oil

See Figure 23.

NOTE:

Drain the oil when the transmission is hot.

1. Make sure the vehicle is parked on a level surface. Put a large container under the transmission. Put a screen on top of the container.

2. Remove the drain plugs from the bottom of the transmission. Drain and discard the oil.

Inspect the screen on the top of the drain container for metal particles and damaged parts. Service the transmission as necessary.

3. If the transmission is disassembled or replaced and an oil cooler is used, remove the cooler. Remove and discard the oil from the cooler and the oil lines. Install the oil cooler and the lines. Tighten the fittings to the specification of the vehicle manufacturer.
4. Install and tighten the drain plug to 35-50 lb-ft (48-67 N.m).
5. Clean the area by the fill plug. Remove the fill plug from the side of the transmission.

CAUTION

Use the specified oil. Do not use multi-viscosity or EP (Extreme Pressure) GL-5 gear oils. The wrong oil will damage the transmission.

6. Add the specified transmission oil through the hole for the fill plug.
Add the oil until the oil level is even with the bottom of the hole of the fill plug.
7. Install and tighten the fill plug to 35-50 lb-ft (48-67 N.m).
8. Operate the vehicle for five minutes. Check for correct operation.

Section 11 — Transmission

Manual Transmission Oil Change Intervals

Initial Oil Change	Check Oil Level	Heavy Duty Engine Oil Change	Petroleum GL-1 Oil Change	Synthetic Oil Change
5,000 miles (8,000 kilometers) ①	10,000 miles (16,000 kilometers)	50,000 miles (80,000 kilometers)	50,000 miles (80,000 kilometers)	250,000 miles (400,000 kilometers)

NOTES:

- ① Initial oil change **does not apply** to “Advanced Lube Transmissions” with magnetic drain and fill plugs manufactured after January 1, 1993.

Manual Transmission Oil Specifications ①

Oil Description	Rockwell Specification	A.P.I. Specification	Military Specification	SAE Grade	Outside Temperature
Heavy-Duty Engine Oil	-----	A.P.I. -CD, -CE -SF or -SG ②	MIL-L-2104B, C, D or E ②	50 40 30	Above 10°F (-12°C) Above 10°F (-12°C) Above -15°F (-26°C)
Petroleum GL-1 Oil with Rust and Oxidation Inhibitor	-----	A.P.I. - GL-1	-----	90 80	Above 10°F (-12°C) Above -15°F (-26°C)
Full-Synthetic Oil	O-81	-----	-----	50	Above -40°F (-40°C)

NOTES:

- ① Do not use multi-viscosity and EP (Extreme Pressure) GL-5 gear oils are not recommended. **DO NOT MIX OILS IN THE TRANSMISSION.**
- ② Current designations are acceptable.

Section 11 — Transmission

Manual Transmission Oil Capacities ①

Transmission Model	U.S Pints	Liters	Transmission Model	U.S Pints	Liters
RM9-115A	18.0	8.5	RMX9-115B	18.0	8.5
RM9-125A	18.0	8.5	RMX9-125B	18.0	8.5
RM9-135A	18.5	8.8	RMX9-135B	18.5	8.8
RM9-145A	18.5	8.8	RMX9-145B	18.5	8.8
RM9-155A	18.5	8.8	RMX9-155B	18.5	8.8
RMO9-125A	18.0	8.5	RMX9-115R	18.0	8.5
RMO9-135A	18.5	8.8	RMX9-125R	18.0	8.5
RMO9-145A	18.5	8.8	RMX9-135R	18.5	8.8
RMX9-125A	18.0	8.5	RMX9-145R	18.5	8.8
RMX9-135A	18.5	8.8	RMX10-115A	18.0	8.5
RMX9-145A	18.5	8.8	RMX10-125A	18.0	8.5
RMO9-115B	18.0	8.5	RMX10-135A	18.5	8.8
RMO9-125B	18.0	8.5	RMX10-145A	18.5	8.8
RMO9-135B	18.5	8.8	RMX10-155A	18.5	8.8
RMO9-145B	18.5	8.8	RMO13-145	20.0	9.5

NOTES:

- ① Oil capacities are approximate. Fill the transmission to the bottom of the fill plug hole. On transmissions equipped with an oil pump and/or oil cooler, operate the engine for five minutes after the initial fill and check the oil level again.

Section 11 — Transmission

Approved Full Synthetic Oils

Oil	Supplier
Agtran CD 50	AGA Fleet Products Corp. 3758 West Morris Street Indianapolis, IN 46241
Allied Mag Synthetic 50	Allied Oil and Supply Co. P.O. Box 3687 Omaha, NE 68103
Altra Syntec CD-50	Allegheny Petroleum Products Co. 104 River Road McKeesport, PA 15132
Amoco CD-50 Synthetic Transmission Fluid	Amoco Oil Company 2012 Spring Road Suite 500 Oak Brook, IL 60521-1857
Anchor 2000 Synthetic Gear Lube SAE 50 Synthetic CD-50	Jenkin-Guerin, Inc. 4480 Hunt Avenue St. Louis, MO 63110
Arctic CD-50	Maine Lubrication Service P.O. Box 732 Portland, ME 04104
Champion HTS 4316 CD-50	Lowe Oil Company 510 Price Lane Clinton, MO 64735
Chevron RPM Synthetic Transmission Fluid SAE 50	Chevron Company 575 Market Street San Francisco, CA 94105
Citgo Synthetic Gear Lube CD 50	Citgo Petroleum Corp. P.O. Box 3758 One Warren Place Tulsa, OK 74102
DOC Syn CD-50	D.O.C. Lubrication Specialties Dennis Grease and Oil Co. 1101-03 East Tampa Springfield, MO 65801

Oil	Supplier
DR Lubricants SYN 50	DR Lubricants 209 Lincoln Highway East New Haven, IN 46774
Drydene Syn-Gear CD-50	Dryden Oil Company, Inc. 9300 Pulaski Highway Baltimore, MD 21220-2495
Durex Transmission Fluid SAE 50	Morrison Oil Company P.O. Box 17339 Portland, OR 97217
Dyna-Plex 21C Synzol SAE 50	Universal Motor Oils Co. , Inc. 2824 North Ohio Wichita, KS 67201
DY -50 Synthetic Lube	Dyson Oil Company P.O. Box 658 Cabot, AR 72023
Eaton Roadranger CD-50	Eaton Corporation
EMGARD SAE 50 Synthetic Transmission Lubricant	Henkel Corporation Emery Group 11501 Northlake Drive Cincinnati, OH 45249-1643
ERSYN CD-50	Monarch Oil Limited P.O. Box 653 Victoria Street North Kitchener, Ontario N2G 4B6
Exxon Synthetic Gear Lubricant 50	Exxon P.O. Box 2180 Houston, TX 77252
High Performance Synthetic Transmission Oil CD-50	Conoco, Inc. P.O. Box Houston, TX 77252
Hydrotex Synthetic SAE 50	Hydrotex, Inc. P.O. Box 560707 Dallas, TX 75356-0707

Section 11 — Transmission

Approved Full Synthetic Oils (Continued)

Oil	Supplier
Luberite CD-50	Hackney Petroleum P.O. Box 9 Louisville, TN 37777
Lubsoil Synthetic Lube 50	Tulco Oils Inc. 2401 East Roosevelt Little Rock, AR 72206
Minuteman Synthetic Transmission Lubricant SAE 50	Minuteman Lubricants, Inc. 539 Marwood Road Cabot, PA 16023
Moore Flo Syn CD-50	Moore Oil Company 4033 West Custer Avenue Milwaukee, WI 53209
Mystik Dimension Synthetic Gear Oil 50	Cato Oil and Grease Co. P.O. Box 26868 Oklahoma City, OK 73126
Nemco Synthetic MO 50	Nemco Resources LTD 11471 Madison Street Winnipeg, Manitoba R3J 1J2
NEO CD-50	Neo Lubricants 2865 Gundry Avenue Long Beach, CA 90806
Northland Synergy Synthetic Transmission Fluid 50W	Northland Products Co. 100 Rainbow Drive P.O. Box 418 Waterloo, IA 50704-0418
Power Tranz 50	Pennzoil Products Co. P.O. Box 2967 Houston, TX 77252-2967
Premium CD-50	Premium Oil Company P.O. Box 60598 Nashville, TN 37206-0598

Oil	Supplier
Premium Express MO 50	Rosemead Oil Products 12912 Lakeland Road Sante Fe Springs, CA 90670-4577
Red Ram Syn-Tran CD-50	Canadian Turbo, Inc 815-8th Avenue, S.W. Calgary, Alberta T2P 3P2
Schaeffer Synthetic Lube 50	Schaeffer Manufacturing Co. 102 Barton Street St. Louis, MO 63104
SEN SYN CD-50 E	Sentinel Canada 7300 rue St-Jacques Montreal, Quebec H4B 1W1
STE-50	Summit Oil Company P.O. Box 131359 Tyler, TX 75707
Shell Dentax S	Shell Oil Corp. Royal Lubricants Division East Hanover, NJ 07936
SHP Manual Transmission Lube CD-50	Kendall Refining Co. Division of Witco Corp. Bradford, PA 16701
Sunoco Duratrans SAE 50	Sun Refining and Marketing Ten Pen Center 1801 Market Street Philadelphia, PA 19103-1699
SYN CD-50	Western Fleet Service, Inc. P.O. Box 51261 Phoenix, AR 85076
Syngard CD SAE 50	Seeco, Inc. P.O. Box 807 Edenton, NC 27932
Syn-O-Gen EP 744 CD 50 Transmission	Primrose Oil Company 11444 Denton Drive Dallas, TX 75229

Section 11 — Transmission

Approved Full Synthetic Oils (Continued)

Oil	Supplier
Synpro 50	Fina Oil and Chemical Co. P.O. Box 2159 Dallas, TX 75221
Synquest CD-50 Transmission Oil	Quaker State Corp. P.O. Box 989 Oil City, PA 16301
SYN-CD Gear Lubricant SAE 50	Black Bear Company, Inc. 27-10 Hunters Point Ave. Long Island, NY 11101-4498
Syn-StarTL 50	Texaco Lubricants Co. P.O. Box 4427 Houston, TX 77210-4427
Syn-Tech CD-50	Benz Oil 2724 West Hampton Milwaukee, WI 53209
Synthetic MT 50	Cenex P.O. Box 43089 St. Paul, MN 55164
Syntex 2000	Texas Refinery Corp. P.O. Box 711 Forth Worth, TX 76101

Oil	Supplier
Transmission Oil S-CD 50	BP Oil Company 200 Public Square Cleveland, OH 44114-2375
Transoil 50 (CD-50)	Phillips 66 Co. Adams Building Bartlesville, OK 74004
Triton Synthetic Lubricant CD-50	Unocal Refining and Marketing Unocal Corp. P.O. Box 7600 Los Angeles, CA 90051
United CD-50	McCollister and Company P.O. Box 587 Council Bluffs, IA 51502
Walters CD-50	Walters Oil Comapny P.O. Bos 747 Canton, IL 61520
XL-2836/050	Thermal-Lube Inc. 1130 Claire Cresent Lachine, Quebec8S 1A1H

References

For more information on Rockwell transmissions see Maintenance Manuals:

- | | |
|-------------|--|
| MM. No.26A | Nine-Speed Manual Transmissions |
| MM. No. 26B | Air Shift Systems Nine-Speed Manual Transmissions |
| MM. No. 26C | Thirteen-Speed Manual Transmissions |
| MM. No. 26D | Air Shift SystemsThirteen-Speed Manual Transmissions |

Section 12 — Wheel Bearings and Wheel End

Greasing the Wheel Bearings

See Figure 24.

! WARNING

Support the vehicle with safety stands. Do not work under a vehicle only supported by jacks. Jacks can slip or fall over and cause serious personal injury.

1. Raise the vehicle so that the wheels are off the ground. Support the vehicle with safety stands.
2. Remove the tire and wheel assembly. Remove and disassemble the hub. See the information in the correct Maintenance Manual. See "References" in this Section.
3. Remove the old grease from all parts. Discard the seals. Inspect the wheel bearings for wear or damage. Replace worn or damaged bearings.
4. Before installing the wheel bearings, lubricate the bearing journals on the spindle with the grease that is used for the bearings.
5. Use a pressure packer to force the specified grease from the large end of the cones into the cavities between the rollers and cage. Pack the hub between the bearing cups with grease to the level of the smallest diameter of the cups. If a pressure packer is not available, grease the bearings by hand.

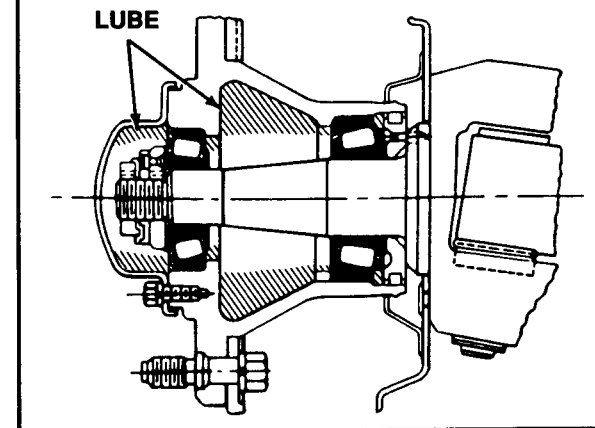
NOTE:

For specific service information for steps 5-8, see the information in the correct Maintenance Manual. See "References" in this section.

6. Install the inner and outer bearing cones into the cups in the hubs. The bearing cups must be pressed tight against the shoulder in the hubs.
7. Install new wheel seals in the hubs.
8. Install the hub and the wheel and tire assembly. Install the outer wheel bearing cone in the hub. Install the adjusting nut.
9. Adjust the wheel bearings.

Figure 24

**TYPICAL GREASE LUBRICATED
WHEEL BEARINGS**



Section 12 — Wheel Bearings and Wheel End

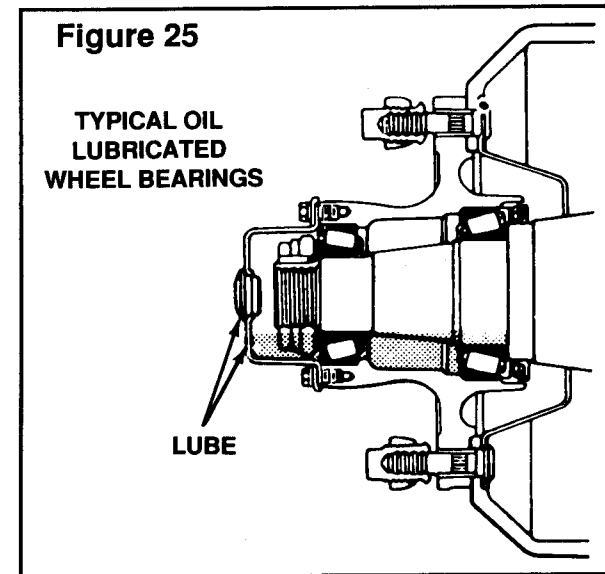
Checking the Oil Level on Wheel Bearings

See Figure 25.

1. Check the level on the cap. If the oil level is not at the specified level on the cap, remove the fill plug. Add the specified oil until the oil is at the specified level. Install the fill plug.

On Drive Axle Hubs without Fill Holes, do the following:

- a. Pour the specified amount of the lubricant through the carrier or housing bowl oil fill hole.
- b. Tilt the axle to the right and to the left to let the oil flow into the hub cavities. Keep the axle tilted for one minute in each position.
- c. With the axle in the level position, add the specified oil so that the level is even with the bottom of the fill plug hole.
- d. Install and tighten the fill plug.



Section 12 — Wheel Bearings and Wheel End

Wheel End Axle Greasing Intervals and Specifications

Greasing Interval	Grease	Rockwell Specification	NLGI Grade	Grease Classification	Outside Temperature
Whichever comes first: Replacing Seals. Relining Brakes. On-Highway:30,000 miles (48,000 kilometers) On-/Off Highway and Off-Highway: Twice a Year.	Multi-Purpose Grease	O-617-A (preferred) or O-617-B (acceptable)	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	Refer to the manufacturer's specifications for the temperature service limits

Wheel End Oil Change Intervals and Specifications

On-Highway Operation Intervals			Off-Highway Operation Intervals			Rockwell Specification	Military Specification	Oil Description	Outside Temperature			
Check Oil Level	Petroleum Oil Change	Synthetic Oil Change	Check Oil Level	Petroleum Oil Change	Synthetic Oil Change				F°		C°	
									Min.	Max.	Min.	Max.
1,000 miles (1,600 kilometers)	Whichever comes first: Seals replaced. Brakes relined. 100,000 miles (160,000 kilometers) Once a year.	-----	1,000 miles (1,600 kilometers)	Whichever comes first: Seals replaced. Brakes relined. Once a year.	-----	O-76A, Gear Oil	MIL-L-2105-D	GL-5,SAE 85W/140	10	None	-12	None
						O-76D, Gear Oil	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
						O-76E, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
						O-76J, Gear Oil	MIL-L-2105-D	GL-5, SAE 75W	-40	35	-40	2
						Heavy-Duty Engine Oil	MIL-L-2104-B, -C,-D or -E	A.P.I. -CD, -CE, -SF or -SG, SAE 40 or 50 Ⓢ	10	None	-12	None
						Heavy-Duty Engine Oil	MIL-L-2104-B -C, -D or -E	A.P.I. -CD, -CE, -SF or -SG, SAE 30 Ⓢ	-15	None	-26	None

NOTES:

- ① Current designations are acceptable. Multi-Weight engine oils are acceptable if the SAE rating ends in a 40 or 50.
- ② Current designations are acceptable. Multi-Weight engine oils are acceptable if the SAE rating ends in a 30.

Section 12 — Wheel Bearings and Wheel End

References

For more information on Rockwell front driving axles see Maintenance Manuals:

MM. No.5	Single Reduction Differential Carriers
MM. No. 6	Double Reduction Drive Unit (Front Mounted Type)
MM. No. 12	Front Driving Axles

For more information on Rockwell front non-driving axles see Maintenance Manuals:

MM. No.2	Front Non-Driving Steering Axle
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For more information on Rockwell single rear axles see Maintenance Manuals:

MM. No.5	Single Reduction Differential Carriers
MM. No. 6	Double Reduction Drive Unit (Front Mounted Type)
MM. No. 6C	270 Series Double Reduction Differential Carriers
MM. No.7	Two-Speed Double-Reduction Drive Unit
MM. No.7A	Hypoid Planetary Two-Speed Differential Carriers
MM. No. 23A	Bus and Coach Front and Rear Axles

For more information on Rockwell tandem rear axles see Maintenance Manuals:

MM. No.5	Single Reduction Differential Carriers
MM. No. 5B	Tandem Axle Forward Rear Drive Units
MM. No. 5C	Tandem Axle Forward Rear Drive Units
MM. No. 5E	Tandem Axle Forward Rear Drive Units
MM. No. 5L	Tandem Axle Forward Rear Drive Units
MM. No. 5P	Tandem Axle Forward Rear Drive Unit
MM. No. 6A	Double Reduction Drive Unit
MM. No. 6B	Double Reduction Drive Unit
MM. No. 6C	270 Series Double Reduction Differential Carriers

Section 13 — List of Lubricants

Grease Lubricants ①

Rockwell Specification	Grease	Typical Application	NLGI Grade	Grease Classification	Outside Temperature
O-616	Brake Grease	Cam Brake Anchor Pins, Mechanical Brake Anchor Pins	2	Clay Base	②
O-616-A	Brake Grease	Air Disc Brake Caliper, Automatic Slack Adjuster, Wedge Brake Components	1	Clay Base	Down to -40°F (-40°C)
O-617-A or O-617-B	Multi-Purpose Grease	Cam Brake Chamber Brackets, Cam Brake Hold Down Clips, Cross Tube Ends, Drag Link, Wheel Bearings, Front Drive Universal Joints, King Pins and Bushings, Knuckle Bushings, Manual Slack Adjuster, Steering Arm, Ball Studs, Tie Rod End Ball Studs, Trailer Axle Wheel Bearings, Wedge Brake Hold Down Clips, Wedge Brake Shoe Contacts at Anchors,	1 or 2	Lithium 12-Hydroxy Stearate or Lithium Complex	②
O-634-B	Universal Joint Grease	Driveshaft Slip Yokes, Driveshaft Splines, Driveshaft Universal Joints	2	Lithium 12-Hydroxy Stearate with Molybdenum	②
O-637	Special Rust Preventing Brake Grease	Air Disc Brake Slide Pin, Splines and Clevis Pins, Cam Brake Camshaft Splines	1-1/2	Calcium	②
O-645	Low Temperature Brake Grease	Air Disc Brake Caliper, Automatic Slack Adjuster, Wedge Brake Components	2	Synthetic	Down to -65°F (-54°C)
O-647	Trailer Axle Bearing Grease	Trailer Axle Wheel Bearings	00	Synthetic	②
O-661	High-Temperature Multi-Purpose Wheel Bearing Grease	Clutch Release Bearing	3	Lithium Complex	②
O-692	Automatic Slack Adjuster Grease	Automatic Slack Adjuster	1 & 2	Lithium Base	Down to -40°F (-40°C)

NOTES:

① Grease recommendations are based on commercial products that have given satisfactory results in normal operation. However, there are many proprietary grease products on the market which will perform satisfactorily and may be preferable because of supply problems, common usage for other truck components, etc. Where such products are recommended by reputable suppliers for the specific lubrication of our components, Rockwell has no objections, provided that these substitute products are equal or better than Rockwell recommendations in lubrication properties, water resistance, corrosion protection, high and low temperature characteristics, oxidation stability, shear stability, etc. All substitute products are subject to Rockwell approval. For more information, contact a Rockwell service representative.

② Refer to the manufacturer's specifications for the temperature service limits.

Section 13 — List of Lubricants

Oil Lubricants

Rockwell Specification	Oil	Typical Application	Military Specification	Oil Description	Outside Temperature			
					F°		C°	
					Min.	Max.	Min.	Max.
O-62	Petroleum Oil	Transfer Case	-----	SAE 90	10	None	-12	None
O-63	Petroleum Oil	Transfer Case	-----	SAE 140	40	None	4	None
O-76A	Gear Oil	Front Driving Axle, Front Driving Axle Wheel Bearings, Non-Driving Axle Wheel Bearings, Planetary Axle, Rear Driving Axle	MIL-L-2105-D	GL-5, SAE 85W/140	10	None	-12	None
O-76D	Gear Oil	Front Driving Axle, Front Driving Axle Wheel Bearings, Non-Driving Axle Wheel Bearings, Planetary Axle, Rear Driving Axle, Trailer Axle Wheel Bearings	MIL-L-2105-D	GL-5, SAE 80W/90	-15	None	-26	None
O-76E	Gear Oil	Front Driving Axle, Front Driving Axle Wheel Bearings, Non-Driving Axle Wheel Bearings, Planetary Axle, Rear Driving Axle	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
O-76J	Gear Oil	Front Driving Axle, Front Driving Axle Wheel Bearings, Non Driving Axle Wheel Bearings, Planetary Axle, Rear Driving Axle, Trailer Axle Wheel Bearings.	MIL-L-2105-D	GL-5, SAE 75W	-40	35	-40	2
O-76L	Gear Oil	Front Driving Axle, Front Driving Axle Wheel Bearings, Non-Driving Axle Wheel Bearings, Planetary Axle, Rear Driving Axle	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
O-76M	Full Synthetic Oil	Rear Driving Axle, Trailer Axle Wheel Bearings	MIL-L-2105-D	GL-5, SAE 75W/140	-40	None	-40	None
O-76N	Full Synthetic Oil	Rear Driving Axle, Trailer Axle Wheel Bearings	MIL-L-2105-D	GL-5, SAE 75W/90	-40	None	-40	None
O-81	Full Synthetic Oil	Transmission	-----	SAE 50	-40	None	-40	None
-----	Heavy Duty Engine Oil	Transmission	MIL-L-2104-B,C,D or E	A.P.I. -CD, -CE, -SF, or -SG, SAE 50	10	None	-12	None
-----	Heavy Duty Engine Oil	Transmission	MIL-L-2104-B,C,D or E	A.P.I. -CD, -CE, -SF, or -SG, SAE 40	10	None	-12	None
-----	Heavy Duty Engine Oil	Transmission	MIL-L-2104-B,C,D or E	A.P.I. -CD, -CE, -SF, or -SG, SAE 30	-15	10	-26	-12
-----	Petroleum Gear	Transmission	-----	A.P.I. - GL-1, SAE90	10	None	-12	None
-----	Petroleum Gear	Transmission	-----	A.P.I. - GL-1, SAE80	-15	None	-26	None

Section 14 — Glossary

GLOSSARY

ADDITIVE: Substance added to lubricant to improve characteristics of original product.

API: American Petroleum Institute.

DROPPING POINT: Temperature where grease changes from a semi-solid state to a liquid.

EP: Extreme Pressure designation for lubricant compounded to withstand very heavy loads imposed on gears.

GL: Gear Lubricant.

MIL: MILitary specifications.

MOLECULE: Smallest particle of an element capable of retaining its chemical identity.

NLGI; National Lubricating Grease Institute classification.

O: Rockwell's Organic lubricant specification.

OFF-HIGHWAY: Vehicle designed for use only on unpaved surfaces or rough terrain. E.g., Agriculture, construction.

ON/OFF HIGHWAY: Vehicle designed for use on well-maintained public highways as well as unpaved surfaces or rough terrain.

ON-HIGHWAY: Vehicle designed exclusively for use on well-maintained public highways.

PETROLEUM: Raw mineral hydrocarbons from which petroleum-base lubrication is manufactured.

POUR POINT: Lowest temperature where oil will flow under specified conditions.

PURGE: Remove old grease from component.

SAE: Society of Automotive Engineers .

SOLVENT: Liquid used to dissolve or thin another material.

SYN: SYNthetic oil designation.

VARNISH: A lacquer-like deposit composed of products from lubricant breakdown.

VISCOSITY: Measure of oil's ability to flow.

VISCOSITY INDEX: The measurement of an oil's resistance to change in viscosity due to changes in temperature. The higher the viscosity index, the smaller the change of viscosity with temperature.

W: Designation for oil formulated and tested for low temperature (Winter).