Roadranger®

DANA | EATON

Roadranger® Products

Lubrication Manual

TCMT0021

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General Information

Roadranger Lubrication Philosophy

In promoting component reliability and longevity, proper lubrication is the key to a sound and effective maintenance program. Without effective lubricants at proper levels, remaining maintenance procedures will not keep components functional.

We believe synthetic lubricants have proven to be superior to petroleum products and represent opportunities to promote superior maintenance and bottom line operating performance while significantly extending component service life and reliablity. Certain products and applications, as noted in this manual, require the use of approved synthetic lubricants.

A list of approved lubricants and suppliers can be found at www.roadranger.com in the approved Lubricant Supplier Manual, TCMT0020.

It is important to perform a daily pre-trip inspection of drivetrain components for lubricant leaks. Leaks should be brought to the attention of maintenance and immediate corrective action should be taken.

Standard Drain Lubricants

Transmission and Drive Axle lubricants must meet specific lubricant industry requirements. Refer to the enclosed charts to select the proper lubricant for your application.

Extended Drain Lubricants (Synthetic Lubricants)

Extended Drain synthetic lubricants offer superior thermal and oxidative stability for extended product performance and reliability. The superior performance characteristics of these lubricants enable Eaton and Dana to offer extended drain and extended warranties. Added benefits include a more efficient drivetrain that translates into proven fuel economy savings over mineral based lubricants.

It is important to use the lubricants that meet the current specifications set forth by Eaton and Dana. Look for the appropriate approval code on the container.

Transmission - Eaton Specification: PS-164 Rev 7

Drive Axle - Dana Specification: SHAES-256 Rev C

Drive Axle - Dana Specification: SHAES-429

Use of lubricants meeting these specifications will ensure the highest performing lubricants for maximum performance.

To identify Genuine Roadranger Lubricants - look for the Genuine Lubricants Label on the container to ensure you have Genuine Roadranger Lubricants.

Note: Eaton and Dana discontinued the use of the E500 logo in 2006.

Introduction to Manual

This Lubrication Manual, organized by product, provides easy access to the following lube information:

- Type of lubricant
- Change intervals
- Capacities
- General lubrication procedures
- Warnings and Cautions

Note: Refer to TCMT0020, Approved Lubricant Supplier Manual, to verify approved lubrication trade name and product.

Linehaul - 500,000 Mile Extended Lube Drain Interval

The extended drain interval program applies to the Eaton/Dana transmissions and axles listed below that meet the following conditions:

- Heavy Duty and Medium Duty transmissions and axles
- Line haul service (On-highway)
- Lubricant approval levels
  - Transmission - PS-164 Rev 7
  - Drive Axle - SHAES-256 Rev C
- Factory filled with lubricants approved for 500,000 mile drain cycles (US/Canada) 250,000/400,000Km (Outside US/Canada)
- Refer to charts listed in this manual for transmission and axle drain intervals when using “Extended Drain Lubricants”
- A Roadranger approved lubricant must be used to keep the extended warranty in place. The extended drain program and any extended warranty program are separate programs.

Note: For specific detail on Eaton extended warranty programs, refer to the Roadranger Warranty Guide, TCWY0900, or call 1-800-826-HELP (4357).

Note: For a complete list of Eaton and Dana “approved lubricants” for extended drain, refer to Approved Lubricant Suppliers TCMT0020.

Vocational - 180,000 Mile Lube Drain Interval

This will outline the performance requirements of lubricants intended for use in vocational Eaton transmissions and Spicer® drive axles that are allowed the 180,000 mile or three year extended drain interval. The approved lubricants may be factory installed at the truck manufacturer, or service filled up to 500 miles, and may remain in the transmission and drive axles for the 180,000 mile or three year drain interval, whichever comes first.

Lubricant approval levels

- Transmission - PS-164 Rev 7
- Axle - SHAES-429

Warnings and Cautions

⚠ WARNING

Before working on a vehicle, place transmission in neutral, set brakes, and block wheels.

Never mix engine oils and synthetic transmission oils in the same transmission. When switching between types of lubricants, all areas of each affected component must be thoroughly drained.

Do not introduce additives and friction modifiers.

Do not mix lubricants of different grades.

Do not mix mineral and synthetic lubricants.

Do not mix heavy-duty, multi-purpose lithium based (#2 grade) grease with Sodium based grease.

Operating Temperatures

Transmissions must not be operated at temperatures above 250°F [121°C]. Operation at temperatures above 250°F [121°C] causes loaded gear tooth temperatures to exceed 350°F [177°C] which will ultimately destroy the heat treatment of the gears. If the elevated temperature is associated with an unusual operating condition that will recur, a cooler should be added, or the capacity of the existing cooling system increased.

The following conditions in any combination can cause operating temperatures over 250°F [121°C].

- Operating consistently at high loads / slower speeds
- High ambient temperatures
- Restricted air flow around transmission
- Exhaust system too close to the transmission
- High horsepower operation
- Use of engine retarder

External oil coolers are available to reduce operating temperatures when the above conditions are encountered.

Eaton oil cooler systems must meet a minimum requirement of 3/4 I.D. cooler lines and 8 GPM system flow at 1500 RPM. The end user is ultimately responsible for maintaining transmission lube temperatures below 250°F [121°C].

Oil Cooler Usage

Transmission Oil Coolers are:

Recommended:

- With engines of 350 H.P. and above

Required:

- With engines of 400 H.P. and above and GCW's of 90,000 lbs. [40,823 kg] or greater
- With engines 400 H.P. and above and 1400 lbs. ft. [1898 N•m] or greater torque
- With engines 450 H.P. and above
- With engines 1500 lbs. ft. [2033 N•m] and above

Vehicle Application Definitions

Line Haul (On-highway)

- High mileage operation (over 60,000 miles [96,500 Km] per year).
- On-highway or good to excellent concrete or asphalt.
- More than 30 miles [48 Km] between starting and stopping.
- 4x2, 6x2, 6x4 tractor/trailer combinations and straight trucks.
- Check fluid levels and inspect for leaks at regular PM maintenance intervals, not to exceed 12,000 miles.

Vocational (Off-highway)

- Low mileage operation (under 60,000 miles [96,500 Km] per year).
- Off-highway or areas of unstable or loose unimproved road surfaces.
- Less than 30 miles [48 Km] between starting and stopping.
- Heavy-Duty, off-road or specialized application type vehicles.
- Check fluid levels and inspect for leaks every 50 hours.

Severe Duty Service

- Consistent operation at or near maximum GCW or GVW ratings.
- Dirty or wet environments.
- Consistent operation on grades greater than 8%.

Transmission Lubricants

Eaton Recommends the Use of Roadranger Lubricants for Extended Drain

Use the Heavy-Duty and Medium-Duty charts, starting with transmission type, to locate the correct lubricant and change interval.

Note: For line haul and vocational definitions, see page 3.

⚠ CAUTION

Automated products and transmissions above 1,850 ft. lbs. MUST use PS-164 Rev 7 approved fluid.

Transmission Oil Filters
Transmission filters should be changed during regular lube intervals.
Inspection of the transmission filter should be conducted during preventative maintenance checks for damage or corrosion. Replace as necessary.

Heavy-Duty

Product	Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Automated and above 1,850 ft. lbs.	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 5 years	180,000 miles [288,000 Km] or 3 years (mobile applications) 2,000 hours or 5 years (stationary applications)
Mechanical	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 5 years	180,000 miles [288,000 Km] or 3 years (mobile applications) 2,000 hours or 5 years (stationary applications)
Mechanical	Mineral	Heavy Duty Engine Oil	SAE 50 (HD Engine Oil), Mil 2104H, Cat TO-4 (SAE 40 - SAE 50)	60,000 miles [96,000 Km] or 1 year	60,000 miles [96,500 Km] or 1 year (mobile applications) 500 hours or 1 year (stationary applications)

Note: Ultrashift *PLUS* LAS, MXP, and MHP models would fall into the linehaul interval.

Note: UltraShift *PLUS* VCS, VMS, and VXP models would fall into the vocational interval.

Medium-Duty

Product	Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Automated (Includes Hybrid)	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 10 years	180,000 miles [288,000 Km] or 3 years (mobile applications) 2,000 hours or 5 years (stationary applications)
ASW Clutch Module	Synthetic	Dextron III ATF	N/A	150,000 miles [250,000 Km] or 3 years	150,000 miles [250,000 Km] or 3 years
Mechanical	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 10 years	180,000 miles [288,000 Km] or 3 years (mobile applications) 2,000 hours or 5 years (stationary applications)
Mechanical	Mineral	Heavy Duty Engine Oil	SAE 50 (HD Engine Oil), Mil 2104H, Cat TO-4 (SAE 40 - SAE 50)	60,000 miles [96,500 Km] or 1 year	500 hours or 1 year

Transmission Lubrication Procedures

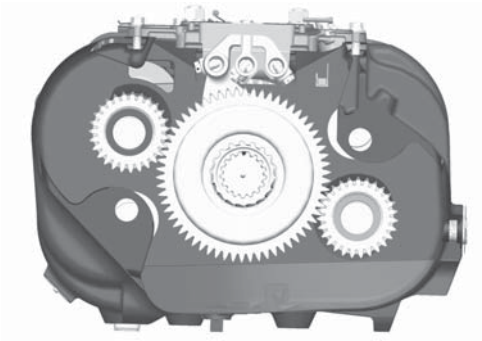
Check Transmission Oil Level

Note: Before checking level, engine must be idling in neutral for at least 2 minutes and lubricant temperature must be between 60° and 120° F [15.5° and 48.8° C].

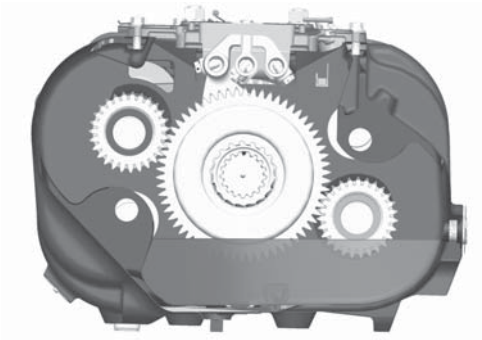
Check lubricant level using the fill hole or sightglass usually located on the right side of the transmission. Inspect oil filter for leaks, rust or damage. Replace as necessary.

Check fluid levels and inspect for leaks at regular PM maintenance intervals, not to exceed 12,000 miles.

1. Turn engine off.
2. Remove fill hole plug.
3. Lubricant must be level with the hole.



Improper Oil Level



Proper Oil Level

Note: For Ceemat Transmissions Only - The proper level is between the cold ADD mark and cold FULL mark.

Change Transmission Oil

Drain Transmission

1. Put drain pan under drain plug at the bottom of the transmission case.
2. Remove drain plug.
3. Clean and reinstall drain plug and torque 45 to 55 ft. lbs. [61 to 75 N•m] (no sealant required).

Drain Transmission Cooler, if equipped

1. Remove both cooler lines at the transmission.
2. Pressurize one line with 30 PSI [0.2 MPa] of air pressure to force the oil out.
3. Reconnect the coolant lines to the transmission, making sure lines are not crossed.

Fill Transmission

1. Remove transmission fill plug.
2. Fill with approved oil until the oil starts flowing out of the fill hole.
3. Clean and replace fill plug and torque 60 to 70 ft. lbs. [81 to 95 N•m].

Fill Transmission Cooler, if equipped

1. Place vehicle in neutral and start engine.
2. Release the clutch pedal so the input shaft of the transmission can rotate, allowing the pump to fill the cooler.
3. After one minute, shut the engine off and recheck the transmission oil level and top off lubricant as necessary.

Transmission Lubricant Capacities

Note: Capacity of transmissions equipped with PTOs or Oil Coolers are greater than capacities listed. These values are approximate. Always use the fill hole as final reference.

Heavy-Duty Transmission Lubricant Capacities

Capacities are sorted by model number only. The prefixes are included when necessary.

The Heavy-Duty (HD) chart includes the following prefixes: AT, FR, FRO, FRLO, RT, RTAO, RTL, RTLO, RTLOM, RTO, RTOM, RTOO, RTX, T, TO and TX.

HD Model Number	Pints	Liters	Quarts	Gallons
1056AA	29	14	14.5	3.6
10710 (-AC, -AS, -AS2)	26	12	13	3.25
10910 (-AS3, -DM2, -DM3)	26	12	13	3.25
1110	25	12	12.5	3.1
11109 (-AT)	88	42	44	11
11210	23.5	11	11.75	3
11509	25	12	12.5	3.1
1157DL	27	13	13.5	3.3
1157DLL	29	14	14.5	3.6
11605	22	10	11	2.75
11606	26	12	13	3.25
11607 (-ASX)	36	17	18	4.5
11607L	28	13	14	3.5
11607LL	31	15	15.5	3.8
11608	26	12	13	3.25
11608LL	29	14	14.5	3.6
11609	27	13	13.5	3.3
11610	26	12	13	3.25
RTLO-11610	28	13	14	3.5
11610 (-T2)	31	15	15.5	3.8
11613	29	14	14.5	3.6
11615	28	13	14	3.5
11707 (DLL, LL)	28	13	14	3.5
11708LL	28	13	14	3.5
11709	27	13	13.5	3.3
11709ALL	28	13	14	3.5
11710	26	12	13	3.25

HD Model Number	Pints	Liters	Quarts	Gallons
RTL-11710 (T2)	28	13	14	3.5
11710 (-AS)	89	42	44.5	11
11715	28	13	14	3.5
11813	29	14	14.5	3.6
11908LL	28	13	14	3.5
11909ALL	28	13	14	3.5
1202	11	5	5.5	1.375
12210	23.5	11	11.75	3
12509	25	12	12.5	3.125
12510	25	12	12.5	3.125
12513	27	13	13.5	3.375
12515	28	13	14	3.5
12508LL	28	13	14	3.5
12609	27	13	13.5	3.375
12610	28	13	14	3.5
12613	29	14	14.5	3.6
12709	27	13	13.5	3.375
12709ALL	28	13	14	3.5
12710 (-AC, -AS, -AS2)	26	12	13	3.25
RTL-12710	28	13	14	3.5
12713	28	13	14	3.5
12813	29	14	14.5	3.6
12909ALL	28	13	14	3.5
12910 (-AS3, -DM2, -DM3)	28	13	14	3.5
12913	28	13	14	3.5
13109 (-AT)	88	42	44	11
13210	23.5	11	11.75	3
13609	27	13	13.5	3.375
13610	28	13	14	3.5
13613	29	14	14.5	3.6
13707 (DLL, MLL)	28	13	14	3.5
13709	27	13	13.5	3.375
13709ALL	28	13	14	3.5
13710	26	12	13	3.25

HD Model Number	Pints	Liters	Quarts	Gallons
RTL-13710	28	13	14	3.5
13710 (-AS)	89	42	44.5	11
13813	29	14	14.5	3.6
13909ALL	28	13	14	3.5
14109 (-AT) (Ceemat)	88	42	44	11
14210	23.5	11	11.75	3
14607 (-ASX)	36	17	18	4.5
14608	28	13	14	3.5
14608LL	29	14	14.5	3.6
14609	27	13	13.5	3.375
14610	28	13	14	3.5
14613	29	14	14.5	3.6
RTLO-14613	28	13	14	3.5
14615	30	14	15	3.75
14618	28	13	14	3.5
14708LL	29	14	14.5	3.6
14709	27	13	13.5	3.375
14709ALL	28	13	14	3.5
14710 (-AC, -AS, -AS2)	26	12	13	3.25
RTL-14710	28	13	14	3.5
14710-AS (CEEMAT®)	89	42	44.5	11
14713	28	13	14	3.5
14713 (-T2)	27	13	13.5	3.375
14715	28	13	14	3.5
14718	28	13	14	3.5
14718 (-T2)	27	13	13.5	3.375
14813	29	14	14.5	3.6
14908LL	28	13	14	3.5
14909ALL	28	13	14	3.5
14910 (-AS3, -DM2, -DM3)	28	13	14	3.5
14913	28	13	14	3.5
14915	28	13	14	3.5
14918 (-A2, -AS3)	28	13	14	3.5
15210	23.5	11	11.75	3

HD Model Number	Pints	Liters	Quarts	Gallons
15610	28	13	14	3.5
15613	29	14	14.5	3.6
15615	30	14	15	3.75
15618	28	13	14	3.5
15709	27	13	13.5	3.375
15710	26	12	13	3.25
15715	28	13	14	3.5
15813	29	14	14.5	3.6
15909ALL	28	13	14	3.5
16210	23.5	11	11.75	3
16610	28	13	14	3.5
16618	28	13	14	3.5
16709	27	13	13.5	3.375
16710 (-AC, -AS, -AS2)	26	12	13	3.25
16710-AS (CEEMAT®)	89	42	44.5	11
16713	28	13	14	3.5
16713 (-T2)	27	13	13.5	3.375
16718	28	13	14	3.5
16718 (-T2)	27	13	13.5	3.375
16908LL	28	13	14	3.5
16909ALL	28	13	14	3.5
16910 (-AS3, -DM2, -DM3)	28	13	14	3.5
16913	28	13	14	3.5
16913L (-DM3)	28	13	14	3.5
16915	28	13	14	3.5
16918 (-AS2, -AS3)	28	13	14	3.5
17210	23.5	11	11.75	3
17610	28	13	14	3.5
18210	23.5	11	11.75	3
18610	28	13	14	3.5
18710 (-AS)	26	12	13	3.25
18718	28	13	14	3.5
18910 (-AS2, -AS3)	26	12	13	3.25
18913 (-T2)	28	13	14	3.5

HD Model Number	Pints	Liters	Quarts	Gallons
18918 (-AS2, -T2, -AS3)	28	13	14	3.5
2-A-92	12	6	6	1.5
20913	28	13	14	3.5
20918 (-AS2, -AS3)	28	13	14	3.5
22918 (-AS2, -AS3)	28	13	14	3.5
6E606B (Hybrid)	20	9	10	2.5
610	12	6	6	1.5
613	16	8	8	2
6406 (-ASX)	19.5	9	9.75	2.4
6609	12	6	6	1.5
6610	12	6	6	1.5
6613	16	8	8	2
7608LL	19.5	9	9.75	2.4
8406 (-ASX)	19.5	9	9.75	2.4
8607	36	17	18	4.5
8608L	27	13	13.5	3.375
8609	12	6	6	1.5
8709	26	12	13	3.25
8908LL	28	13	14	3.5
905	22	10	11	2.75
906	26	12	13	3.25
909	25	12	12.5	3.125
910	25	12	12.5	3.125
913	27	13	13.5	3.375
915	28	13	14	3.5
9508	25	12	12.5	3.125
9509	25	12	12.5	3.125
9513	27	13	13.5	3.375
955AL	28	13	14	3.5
955ALL	25	12	12.5	3.125
958LL	28	13	14	3.5
9710	26	12	13	3.25

Medium-Duty Transmission Lubricant Capacities

The Medium-Duty (MD) model numbers include the following prefixes: FS, FSO, and EH.

MD Model Number	Pints	Liters	Quarts	Gallons
4005	10.5	5	5.75	1.3
4205	12.5	6	6.75	1.6
5005	10.5	5	5.75	1.3
5106	18	9	9	2.25
5205	12.5	6	6.75	1.6
5306	18	9	9	2.25
5406	19.5	9	9.75	2.4
6005	19	9	9.5	2.375
6105	19	9	9.5	2.375
6106	19	9	9.5	2.375
6205	19	9	9.5	2.375
6206	18	9	9	2.25
6305	19.5	9	9.75	2.4
6306	19.5	9	9.75	2.4
6406	19.5	9	9.75	2.4
7206	20	9	10	2.5
8206	20	9	10	2.5
8E306A (Hybrid)	19.5	9	9.75	2.4
8406	19.5	9	9.75	2.4

The Medium-Duty (MD) Automated model numbers including the following prefixes: F and FO.

MD Automated Model Number	Pints	Liters	Quarts	Gallons
5405B-DM3	21	10	10.5	2.625
5406B-DM3	21	10	10.5	2.625
5505B-DM3	21	10	10.5	2.625
5506B-DM3	21	10	10.5	2.625
6405B-DM3	21	10	10.5	2.625
6406B-DM3	21	10	10.5	2.625
6505B-DM3	21	10	10.5	2.625
6506B-DM3	21	10	10.5	2.625

Drive Axle Lubricants

Dana Recommends the Use of Roadranger Lubricants for Extended Drain

Use the chart to locate the correct lubricant and change interval.

Note: For line haul and vocational definitions, see page 3.

Heavy-Duty

Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Synthetic	SHAES-256 Rev C	SAE 75W-90	500,000 miles [800,000 Km] or 5 years	N/A
Synthetic	SHAES-429	SAE 75W-90 SAE 80W-140	N/A	180,000 miles [288,000 Km] or 3 years
Mineral Base*	SAE J2360	75W, 75W-90, 75W-140, 80W-90, 85W-140	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 1 year

Medium-Duty

Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Synthetic	SHAES-256 Rev C	SAE 75W-90	250,000 miles [400,000 Km] or 3 years	N/A
Synthetic	SHAES-429	SAE 75W-90 SAE 80W-140	N/A	180,000 miles [288,000 Km] or 3 years
Mineral Base[1]	SAE J2360	75W, 75W-90, 80W-90, 85W-140	100,000 miles [160,000 Km] or 1 year	60,000 miles [96,500 Km] or 1 year

Drive Axle Lubricant Capacities

Single Drive Axle Lubricant Capacities

Capacities are sorted by model number. The suffixes are included when necessary.

Single Axle Model Number	Pints	Liters	Quarts	Gallons
S110	14	6.6	7	1.75
S130	13.6	6.4	6.8	1.7
S135	24	11.4	12	3
S150	24	11.4	12	3
S21-170	37	17.5	18.5	4.6
S21-170D	37	17.5	18.5	4.6
S23-170	37	17.5	18.5	4.6
S23-170D	37	17.5	18.5	4.6
S25-170	37	17.5	18.5	4.6
S25-170D	37	17.5	18.5	4.6
S23-190	37	17.5	18.5	4.6
S23-190D	37	17.5	18.5	4.6
S26-190	37	17.5	18.5	4.6
S26-190D	37	17.5	18.5	4.6
S30-190	40	18.9	20	5
S30-190D	40	18.9	20	5
S260 (SB)	54	25	27	6.75
15040 (P, T)	24	11.4	12	3
15040 (S)	21	9.9	10.5	2.6
17060 (A, D, S)	28	13	14	3.5
19050 (P, T)	33	15.6	16.5	4.125
19050 (S)	25	11.8	12.5	3.125
19055 (D, S)	34	16.1	17	4.25
19055 (P, T)	35	16.6	17.5	4.375
19060 (A, D, S)	28	13.2	14	3.5
19060 (P, T)	35	16.6	17.5	4.375
21060 (A, D, S)	28	13.2	14	3.5
21060 (P, T)	35	16.6	17.5	4.375
21065 (D, S)	34	16.1	17	4.25
21065 (P, T)	35	16.6	17.5	4.375
21070 (D, S)	40	18.9	20	5

Single Axle Model Number	Pints	Liters	Quarts	Gallons
21080 (A, D, S)	40	18.9	20	5
22060 (A, D, S)	28	13.2	14	3.5
22060 (P, T)	35	16.6	17.5	4.375
22065 (D, S)	34	16.1	17	4.25
22065 (P, T)	35	16.6	17.5	4.375
22080 (A, D, S)	40	18.9	20	5
23070 (D, S)	40	18.9	20	5
23070 (P, T)	39	18.5	19.5	4.8
23080 (A, D, S)	40	18.9	20	5
23080 (P, T)	41	19.4	20.5	5.125
23085 (C, D, S)	40	18.9	20	5
23085 (P, T)	41	19.4	20.5	5.125
23105 (A, D, S)	48	22.7	24	6
26080 (A, D, S)	40	18.9	20	5
26080 (P, T)	41	19.4	20.5	5.125
26085 (P, T)	41	19.4	20.5	5.125
26105 (A, D, S)	48	22.7	24	6
30055 (P)	36	17	18	4.5
30105 (A, D, S)	46	21.5	23	5.75
35055 (P)	36	17	18	4.5

Tandem Drive Axle Lubricant Capacities

Capacities are sorted by model number. The prefixes are included when necessary.

Tandem Axle Model Number	Pints	Liters	Quarts	Gallons
D40-170	39	18.5	19.5	4.8
R40-170	37	17.5	18.5	4.6
D46-170	39	18.5	19.5	4.8
R46-170	37	17.5	18.5	4.6
D50-170	39	18.5	19.5	4.8
R50-170	37	17.5	18.5	4.6
D52-190	42	19.9	21	5.25
R52-190	40	18.9	20	5
D60-190	42	19.9	21	5.25
R60-190	40	18.9	20	5
D52-590	42	19.9	21	5.25

Tandem Axle Model Number	Pints	Liters	Quarts	Gallons
R52-590	40	18.9	20	5
40 DDS(P), DSS(P)	40	18.9	20	5
40 DDH(P), DSH(P)	31	14.7	15.5	3.875
40 RDS, RSS	37	17.5	18.5	4.6
40 RDH, RSH	28	13.2	14	3.5
44 DSH(P)	31	14.7	15.5	3.875
44 RDH, RSH	28	13.2	14	3.5
341 DC, DP, DT(P), DS(P)	39	18.5	19.5	4.8
341 RC, RP, RS, RT	36	17	18	4.5
344 DA(P), DD(P), DS(P)	31	14.7	15.5	3.875
344 RS	28	13.2	14	3.5
402 DP, DT(P), RP, RT	34	16.1	17	4.25
402 DS(P)	39	18.5	19.5	4.8
402 RS	36	17	18	4.5
404 DA(P), DD(P), DS(P)	31	14.7	15.5	3.875
404 RA, RD, RS	28	13.2	14	3.5
405 DA(P), DD(P), DS(P)	31	14.7	15.5	3.875
405 RA, RD, RS	28	13.2	14	3.5
451 DP(P), DT(P), RP, RT	34	16.1	17	4.25
451 DC(P), DS(P)	39	18.5	19.5	4.8
451 RC, RS	36	17	18	4.5
454 DA(P), DD(P), DS(P)	31	14.7	15.5	3.875
454 RA, RD, RS	28	13.2	14	3.5
461 DD(P), DS(P)	43	20.3	21.5	5.375
461 DP(P), DT(P)	46	22	23	5.75
461 RC, RP, RT	39	18	19.5	4.8
461 RD, RS	40	18.9	20	5
462 DD(P), DS(P)	40	18.9	20	5
462 RD, RS	37	17.5	18.5	4.6
463 DD(P), DP(P), DS(P), DT(P)	40	18.9	20	5
463 RD, RP, RS	37	17.5	18.5	4.6
521 DD(P), DP(P), DS(P), DT(P)	42	19.9	21	5.25
521 RC, RD, RP, RS, RT	39	18.5	19.5	4.8
581 DD(P), DP(P), DS(P)	42	19.9	21	5.25

Tandem Axle Model Number	Pints	Liters	Quarts	Gallons
581 RD, RP, RS	39	18.5	19.5	4.8
601 DC(P), DD(P), DP(P)	42	20	21	5.25
601 RP	39	18.5	19.5	4.8
651 DP(P)	41	19.4	20.5	5.125
651 RP	37	18	18.5	4.6
652 DP(P)	41	19	20.5	5.125
652 RP	37	18	18.5	4.6

Drive Axle Lubrication Procedure

Check Drive Axle Lubricant Level

1. Remove fill hole plug, located in the axle housing cover.
2. Lubricant must be level with the hole.

3. Check housing breather. Clean if dirty and replace if damaged.

Change Drive Axle Lubricant

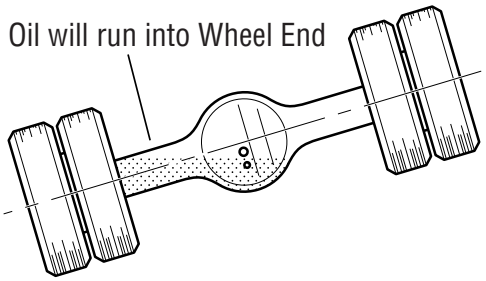
Drain Axle Sump

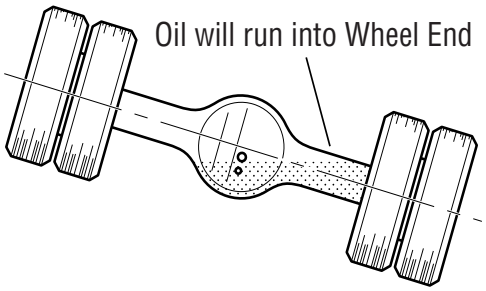
1. Before draining, lubricant temperature must be between 60° and 120° F [15.5° and 48.8° C].
2. Put drain pan under drain plug located on the underside of the axle housing.
3. Unscrew magnetic drain plug and drain the lubricant.
4. Inspect plug for large quantities of metal particles. If present, inspect entire unit.

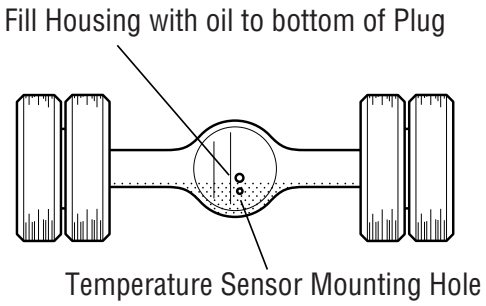
Fill Axle Sump (and Wheel Ends, if necessary)

Note: If wheel ends were removed, they must be filled with the same lubricant as the axle sump.

1. Wipe clean all internal cavities or the hubs.
2. Lubricate the wheel bearings using the same lubricant as in the housing.
   Note: Do not use wheel bearing grease.
3. Fill inner hub cavities before installing onto axle housing spindles.
4. If the hub has a fill hole, add 1.5 pints [0.7 liters].
5. If hub does not have a fill hole, raise the opposite axle end 8 in. [203 mm] for at least 1 minute.
6. If the wheel ends were filled by jacking up the axle ends, recheck the main sump and top off if necessary until oil reaches the bottom of the fill hole.







Steer Axle Lubricants

The standard lubricants specified by the Steer Axle Product Engineering group are as follows

Note: For line haul and vocational definitions, see page 3.

Type of Lubricant System	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Wheel End	Mineral Oil	SAE 75W-90	100,000 miles [161,000 km] or 1 year	30,000 miles [48,000 km] or 6 months
Wheel End	Mineral Grease - NLGI #2	#2 grade	100,000 miles [161,000 km] or 1 year	30,000 miles [48,000 km] or 6 months
LMS-Low Lube[1]	Synthetic Oil	SAE 50 PS-164 Rev 7	250,000 miles [400,000 km] or 1 year	250,000 miles [400,000 km] or 1 year
LMS-Lube Free[1]	Synthetic Oil	SAE 50 PS-164 Rev 7	None (only needed if tear down)	None (only needed if tear down)
LMS-Low Lube[1]	Semi-Fluid Synthetic Grease	Chevron Delo SF	50,000 miles [800,000 km] or 3 years	50,000 miles [800,000 km] or 3 years
LMS-Low Lube[1]	Semi-Fluid Synthetic Grease	Mobilith SHC 007	50,000 miles [800,000 km] or 3 years	50,000 miles [800,000 km] or 3 years
King Pin Joint Grease / Tie Rod Ends	Heavy-Duty, multipurpose lithium based	#1 grade or #2 grade	25,000 miles [40,000 Km] or 6 months	Every 50 hours

[1] For easy identification, note that the Dana LMS-Low Lube brake uses a special “button head” grease fitting and the Dana LMS-Lube Free brake does not have a grease fitting.

Stear Axle Lubrication Procedure

Lubrication

Proper lubrication practices are important in maximizing the service life of your steer axle assembly.

Kingpins, Thrust Bearings and Tie Rod Ends

On-Highway Applications - Standard

Pressure lubricate every 6 months or 25,000 miles (40,000 km).

A more frequent lubrication cycle is required for axles used in on/off highway, refuse, or other severe service applications.

Use heavy-duty, multipurpose lithium base (#2 grade) grease. **Do not mix with sodium base grease**.

Note: If it is difficult to grease either the upper or lower bushing, try greasing the bushings with the vehicle jacked up and supported on axle stands to improve grease flow and help flush out contamination.

Wheel Bearings

Lubricate wheel bearings with an approved drive axle lubricant (oil bath) or heavy duty grease (grease packed) depending on the type of axle lube system. Identify the type of lubrication system on your vehicle before servicing wheel bearings. Improper lubrication can result in reduced seal life and potential damage to bearings and spindles.

Oil Bath

Lubricate wheel end assembly with a drive axle lubricant that meets MIL-L-2105D specifications. Either 80W-90 mineral based or 75W-90 synthetic lube is acceptable. Check lubricant level at each greasing interval. Maintain lube level to center-line of axle or fill line on hub cap. Always check lube level on flat ground.

⚠ CAUTION

Do not mix lubricants of different grades. Do not mix mineral and synthetic lubes. Different brands of same grade may be mixed. Do not pack bearings with grease when using an oil bath system. This practice can restrict the flow of lubricant to the wheel seal.

Grease Packed

Thoroughly clean bearings, spindle, hub cap, and hub cavity. Parts may be washed in a suitable commercial solvent. Be certain parts are free of moisture or other contaminants. Refer to vehicle and/or wheel seal manufacturer's recommendations when using grease. Fill wheel hub with grease to inside diameter of bearing cups. Fill hub cap. Grease bearing cones by forcing grease between rollers, cones, and cage.

⚠ CAUTION

Never mix oil bath and grease packed wheel ends.

LMS Bearing System

Refer to Dana Spicer information Bulletin ABIB-9606.

Clutch Lubricants

Use the chart, starting with clutch type, to locate the correct lubricant and change interval.

Note: For line haul and vocational definitions, see page 3.

Product	Lubricant	Service Interval for Line Haul	Service Interval for Vocational
Stamped Angle Spring	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	10,000 miles [16,000 Km] or 1 month	250 hours or 1 month
Medium-Duty Solo™	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	10,000 miles [16,000 Km] or 1 month	250 hours or 1 month
365 mm	No Lubricant Needed	Not Applicable	Not Applicable
395 mm	No Lubricant Needed	Not Applicable	Not Applicable
EverTough	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	25,000 miles [40,000 Km] or 3 months	250 hours or 1 month
Heavy-Duty ECA Clutch	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	50,000 miles [80,000 Km] or 3 months	250 hours or 1 month
Solo™ Advantage	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	50,000 miles [80,000 Km] or 3 months	250 hours or 1 month
Easy Pedal™ Advantage	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	25,000 miles [40,000Km]	250 hours or 1 month
Value Clutch	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	20,000 miles [32,000 Km] or 2 months	250 hours or 1 month
DM	No Lubricant Needed	Not Applicable	Not Applicable
Pedal Shaft / Bushings	NLGI #2 Lithium - Complex Roadranger Grease MP-2	At every chassis lubrication	At every chassis lubrication

Clutch Lubrication Procedure

1. If a lube tube assembly is used, remove the inspection cover to verify it is attached and functional.

Note: Failed lube lines will prevent grease from reaching the release bearing, causing premature clutch release bearing failure.

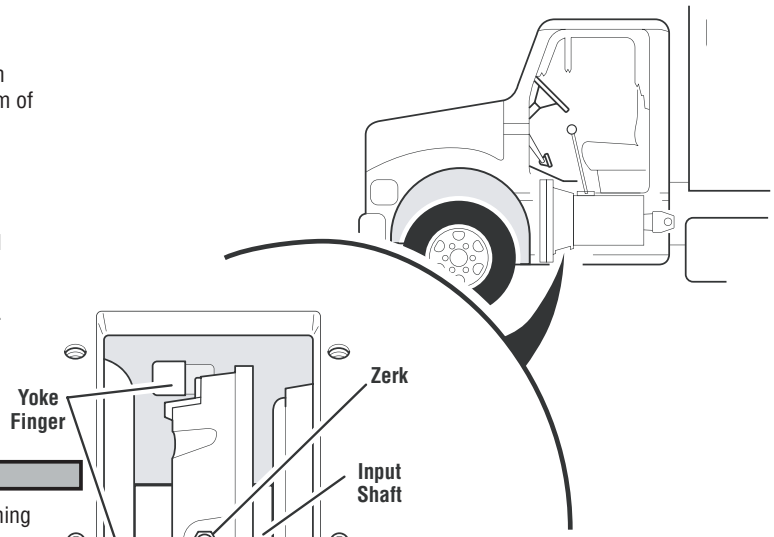
2. Apply grease through either the lube tube or a grease fitting, and continue to apply lube to cause enough grease to purge out of the release bearing housing onto the transmission input shaft.
3. Apply extra lube onto the transmission input shaft between the release bearing housing and the clutch brake.

Note: Do not be concerned if excess grease gets onto the clutch brake friction surface. It will not affect the brake's stopping ability.

4. Apply lube to the release yoke fingers to reduce wear to the pads on the release bearing housing.
5. Apply grease to the cross shaft bushings and linkage pivot points.

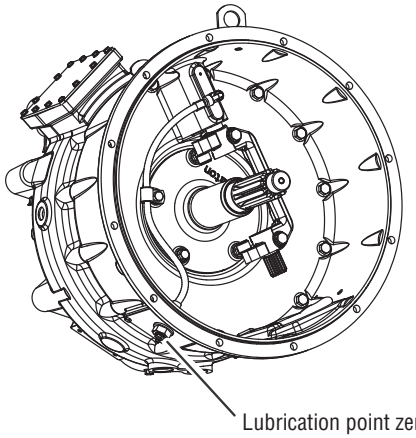
NOTE: All clutches use a lithium complex grease with a minimum of 325°F (163°C) operating range meeting N.L.G.I. grade #2 or #3 specs.

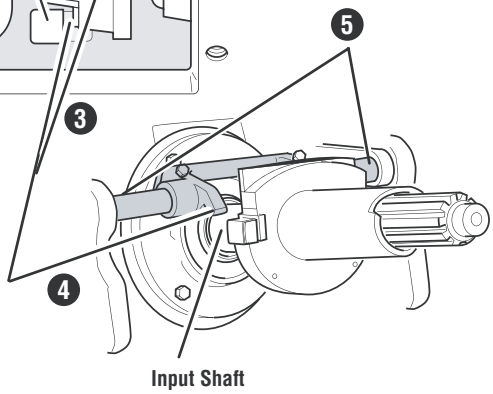
NOTE: Apply ample grease that is visibly exiting the opening and contacting the transmission shaft. This will lube the clutch brake when the pedal is pressed.



⚠ CAUTION

Failure to properly lubricate the bearing/bushing will result in bearing and sleeve failures.





⚠ IMPORTANT

Do not add lube to the input shaft splines (Never seize or grease). The discs must be free to slide.

Brake Lubricants

Use the chart to locate the correct lubricant and change interval.

Product	Lubricant	Change Interval with Zerks	Change Interval without Zerks
Brake, Standard	NLGI #2 EP Lithium	Not Applicable	50,000 miles [80,000 Km] or 3 months
Brake, LMS-Low Lube[1]	SHC 460 Synthetic	Not Applicable	1 year
Brake Adjusters, Standard	NLGI #2 EP Lithium	At chassis lubrication	Not Applicable
Brake Adjusters, Spicer Haldex Self-Adjusting	NLGI #2 or #3 EP Lithium	50,000 miles [80,000 Km] or 3 months	Not Applicable

[1] For easy identification, note that the Dana LMS-Low Lube brake uses a special "button head" grease fitting and the Dana LMS Lube Free brake does not have a grease fitting.

Brake Lubrication Procedure

⚠ CAUTION

Do not use moly-disulfide loaded grease or oil because this may shorten service life.

Do not apply excessive lubricant. It could cause damage to friction surface pads, disc brakes, boots and bellows.

Do not lubricate cam head surface or related parts that contact cam head surface. Cam head surface must remain free of oil and other contaminants.

Lubricate the following components:

- **One-Piece Roller**
  Lubricate the shoe roller recess.
- **Two-Piece Roller**
  Lubricate shoe roller inside dimension.
- **Roller and Anchor Pin**
  Lubricate the recesses of each shoe on the ES and ED 150-4L models.
- **Camshaft Bracket**
  Lubricate until grease comes out at the brake adjuster end. The seal is installed at this end with the air side in so that grease purges out.
- **Brake Adjuster**
  Pressure lubricate according to manufacturer's instructions.

Driveline Lubricants

For assistance identifying the driveshaft model, see DSMT0100.

Product	Service Interval for Line Haul	Service Interval for Vocational
10-Series (1480 thru 1810 & SPL90) Note: Slip member also requires lubrication.	10,000/15,000 miles [16,000/24,000 Km] or 3 mos. (which ever comes first)	5,000/8,000 miles [8,000/12,800 Km] or 3 mos. (which ever comes first)
Spicer Life Series (SPL55, 70, & 100) Booted and permanently lubricated slip member.	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)
Spicer Life Series (SPL140, 170, & 250) Std. Spicer Life Series U-Joint. Booted and permanently lubricated slip member.	100,000 miles [160,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)
Spicer Life XL[1] **(SPL170XL & 250XL) FIRST LUBRICATION CYCLE**[2] Extended lubrication U-Joint. Booted and permanently lubricated slip member.[3]	350,000 miles [560,000 Km] or 3 yrs. (which ever comes first)	100,000 miles [160,000 Km] or 1 year (which ever comes first)
Spicer Life XL[1] **(SPL170XL & 250XL) RE-LUBRICATION CYCLE**[2] Extended lubrication U-Joint. Booted and permanently lubricated slip member.[3]	100,000 miles [160,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)

[1] Spicer Life XL universal joints are best identified by the rubber seal guards (a soft, pliable “boot”) fitted to the bearing cups. Spicer Life XL universal joints have a plastic zerk cover attached prior to the required initial 350,000 mile re-lubrication. Standard Spicer Life Series universal joints have a hard plastic slinger fitted to the bearing cups.

[2] Spicer Driveshaft Division recommends re-lubrication with grease meeting NLGI Grade 2 specifications with an operating range of +325°F/+163°C to -10°F/-23°C.

[3] After initial miles (km) or time is reached, the plastic grease zerk cover must be removed and the joints re-lubricated. Once the grease zerk cover has been removed, the “Re-Lubrication Cycle” interval must be followed.

Steering Shafts

Series	Service Interval for Line Haul	Service Interval for Vocational
SPL 6 (Aluminum with greaseable u-joints and permanently lubricated slip member design)	50,000 miles [80,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 3 mos. (which ever comes first)
1000 (Steel with greaseable universal joints) **Note: Slip member requires the same lubrication intervals**)	50,000 miles [80,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 3 mos. (which ever comes first)

⚠ WARNING

ROTATING DRIVESHAFTS

- Rotating auxiliary driveshafts are dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death.
- Do not go under the vehicle when the engine is running.
- Do not work on or near an exposed shaft when engine is running.
- Shut off engine before working on power take-off or driven equipment.
- Exposed rotating driveshafts must be guarded.

Lubrication for Universal Joints

Standard Application - Use a good quality E.P. (Extreme Pressure) grease (Timken Test Load 45 lbs. min.) meeting NLGI (National Lubricating Grease Institute) Grade 2 specification. Grease must have an operating range of +325°F/+163°C to -10°F/-23°C and be compatible with commonly used multipurpose greases such as lithium soap types.

Low Speed Application - For driveshaft applications involving shaft speeds below 500 RPM, a mineral oil in the SAE 140 to 250 viscosity range should be used.

Recommended Lubricants for Universal Joints

- Ultra-Duty EP-2 (Chevron)
- Heavy-Duty EP-2 (Chevron)
- Rykon Premium EP-2 (Amoco)
- EP-2BG (Chemplus)

Lubrication for Center Bearings

Initial lubrication is done by Spicer manufacturing. (No attempt should be made to add or change grease within the bearing itself.) However, when servicing a driveshaft in the field with a new center bearing, it is necessary to fill the entire cavity around the bearing with waterproof grease to shield the bearing from water and contaminants. The quantity should be sufficient to fill the cavity to the extreme edge of the slinger surrounding the bearing.

Note: Lubricants must be waterproof.

Recommended Lubricants for Center Bearings

- **Rykon Premium No. 3 (Amoco)**
- **Amolith 8516 (Amoco)**
- **Van Talgar No. 4 (Exxon)**

Lubrication for Slip Splines

Always use a good E.P. grease meeting NLGI Grade 2 specifications on Glidecote™ and steel splines. The same lubricant used for universal joints is satisfactory for slip splines.

Re-lube splines as the interval prescribed in the “Driveline Lubricants” section. Apply grease gun pressure to lubrication zerk **until lubricant appears at pressure relief hole in welch plug** at slip yoke end of spline (Photo 1). At this point, cover pressure relief hole with finger and continue to apply pressure until grease appears at slip yoke seal (Photo 2). This will insure complete lubrication of spline.

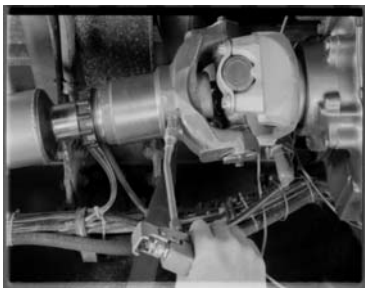


Figure 1

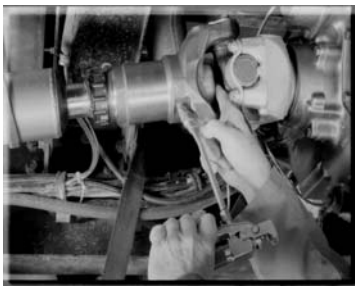


Figure 2

⚠ CAUTION

In cold winter months, activate the slip spline assembly by driving the vehicle sufficiently to cause displacement of the grease prior to its stiffening. Otherwise, the slip yoke plug may be forced out due to hydraulic pressure causing loss of grease and allowing abrasive contaminants to enter the slip spline.

Driveline Lubrication Procedure

⚠ WARNING

Inadequate lubrication can cause driveline failure which can result in separation of the driveline from the vehicle. A separated driveline can result in serious injury or death. In order to avoid driveline failure, including driveline separation, you must:

Among the most common causes of universal joint and slip spline failure is lack of proper lubrication. Properly sized Spicer universal joints that are adequately re-lubricated at recommended intervals will normally meet or exceed fleet operational requirements. Inadequate re-lube cycles and failure to lubricate the joints and slip spline properly not only cause joint failures, but lead to other problems such as slip spline seizures. Proper re-lubrication flushes the universal joints, thus removing abrasive contaminants from the universal joint bearings.

1. Carefully review the lubrication specifications in the manual.
2. Re-lubricate at recommended intervals.
3. Only use approved lubricants.

Spicer replacement universal joint kits contain only enough grease to provide needle bearing protection during storage. It is, therefore, necessary to completely lubricate each replacement kit prior to assembly into the driveshaft yokes. Each journal cross lube reservoir should be fully packed with a grease listed on the previous page. Each bearing assembly should also be wiped with the same grease, filling all the cavities between the rollers and applying a liberal grease coating to the bottom of each race. After the kits are installed into the driveshaft yokes and, prior to placing into service, they should be re-lubed, through the zerks, using the same grease.

Lubrication Procedure for Universal Joints

1. Use the proper lubricant to purge all four bearing seals of each universal joint. This flushes abrasive contaminants from each bearing and assures all four bearings are filled properly. Pop the seals. Spicer seals are made to be popped.
2. If any of the seals fail to purge, move the driveshaft from side-to-side while applying gun pressure. This allows greater clearance on the thrust end of the bearing that is not purging. (On two-headed zerk fittings, try greasing from the opposite lube fitting.)
3. Because of the superior sealing capability of the Spicer Seal design on the 1610, 1710, 1760, 1810, and 1880 Series, there will occasionally be one or more bearing seals of a universal joint that may not purge. Seal tension then has to be released. Bearing seals must purge to ensure adequate lubrication at all four universal joint bearings.

   To Release Seal Tension:

4. On Quick Disconnect™ half round end yokes, remove the universal joint kit from the yoke and apply grease. Re-install the universal joint kit, **with new bolts**, in the yoke and torque to specifications as listed in DSSM-3264..
5. On full round closed hole yokes, loosen the bolts holding the bearing assembly that does not purge to release seal tension. It may be necessary to loosen the bearing assembly approximately 1/16” minimum. If loosening does not cause purging, remove the bearing assembly to determine cause of blockage.
6. Remove bolts and replace.

Note: The self-locking bolt design for full round yokes uses serrated bolts with lock patch and does not require a lock strap. DO NOT reuse any retaining bolt. If loosening or removal of a bolt is necessary, replace it with a new one.

Torque Specifications

Bearing Plate (Full Round) Universal Joints

Series	Self Locking Bolt	Lock Strap Bolt*	Lock Strap*	Thread Size	Recommended Bolt Torque NOTE: All torque values are with dry threads.
1610	5-73-709	5-73-109	98-1741	.312-24	26-35 lbs. ft. (35.3 - 47.5 N•m)
1710	6-73-209	6-73-109	230323	.375-24	38-48 lbs. ft. (51.5 - 65.1 N•m)
1760	6-73-209	6-73-109	230323	.375-24	38-48 lbs. ft. (51.5 - 65.1 N•m)
1810	6-73-209	6-73-109	230323	.375-24	38-48 lbs. ft. (51.5 - 65.1 N•m)
1880	7-73-315	7-73-115	231009	.438-20	60-70 lbs. ft. (81.3 - 94.9 N•m)

The bolt torque specifications refer to Spicer bearing straps and bearing plates only. If using original-equipment bearing straps and bearing plates, refer to manufacturer's service manual for proper bolt torque specifications.
* These bolts are only to be used with the old style lock strap.

Quick Disconnect™ (Half Round) Universal Joints

Series	Bolt Part No	Kit Part No	Thread Size	Recommended Bolt Torque NOTE: All torque values are with dry threads.
SPL90	6-73-412	90-70-18X	.375-24	45-60 lbs. ft. (61 - 81.3 N•m)
1310	231401	2-70-18X	.375-24	13-18 lbs. ft. (17.6 - 24.4 N•m)
1330	231401	2-70-18X	.375-24	13-18 lbs. ft. (17.6 - 24.4 N•m)
1350	231142	3-70-18X	.375-24	30-35 lbs. ft. (40.7 - 46.5 N•m)
1410	231142	3-70-18X	.375-24	30-35 lbs. ft. (40.7 - 46.5 N•m)
1480	6-73-412	3-70-28X	.375-24	45-60 lbs. ft. (61 - 81.3 N•m)
1550	6-73-412	3-70-28X	.375-24	45-60 lbs. ft. (61 - 81.3 N•m)
1610	6-73-412	5-70-28X	.375-24	45-60 lbs. ft. (61 - 81.3 N•m)
1710	8-73-316	6.5-70-18X	.500-20	120-135 lbs. ft. (162.7 - 183 N•m)
1760	8-73-316	6.5-70-18X	.500-20	120-135 lbs. ft. (162.7 - 183 N•m)
1810	8-73-316	6.5-70-18X	.500-20	120-135 lbs. ft. (162.7 - 183 N•m)

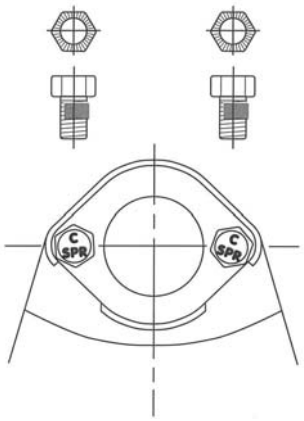
The bolt torque specifications refer to Spicer bearing straps and bearing plates only. If using original-equipment bearing straps and bearing plates, refer to manufacturer's service manual for proper bolt torque specifications.

Serrated Bolt Design

The new self-locking design for full-round yokes uses serrated bolts with lock patch and does not require a lock strap. When re-installing this type, it is important that the old serrated bolt be replaced with a new one.

⚠ WARNING

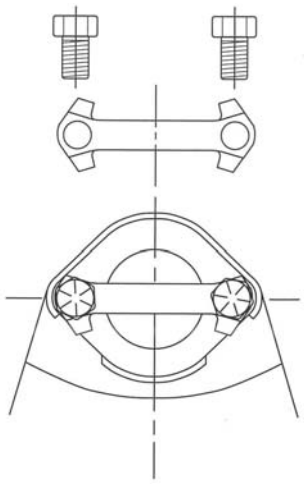
Failure to properly tighten bolts, and reuse of serrated bolts, could cause the driveshaft to loosen and separate from the vehicle or machine, which could cause a loss of control and could result in serious personal injury or death.



New Design
Serrated Bolt with Lock Patch

Installing Serrated Bolts:

Loosely install the bolts, lubricate the joint making sure that lubricant purges from all four bearings and then run the bolts down until the bearing plates are flush to the yoke faces. Finally, torque the bolts per specifications shown for serrated bolts.



Old Design
Lock Strap

Retightening of Bolts - Lock Strap Design:

After lubricating the joint, run the bolts down until the bearing plates are flush to the yoke faces. Torque bolts to specification and then bend the tabs of the lock strap against the side of the bolt heads to lock the bolts in place.

Wheel End Lubricants

Use the chart to locate the correct lubricant and change interval.

Note: For line haul and vocational definitions, see page 3.

Product	Lubricant Type	SAE	Change Interval for Line Haul	Change Interval for Vocational
Drive Axle LMS	Synthetic[1] SHAES 256 Rev C SHAES 429	SAE 75W-90, 80W-140	500,000 miles [800,000 Km] or 5 years	180,000 miles [288,000 Km] or 3 years
Drive Axle (Adjustable)[5]	Synthetic SHAES 256 Rev C SHAES 429	SAE 75W-90, 80W-140	250,000 miles [400,000 Km] or 3 years	180,000 miles [288,000 Km] or 3 years
Drive Axle (Adjustable)[5]	Mineral Base SAE J2360	SAE 75W-90, 75W-140, 80W-90, 85W-140	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 1 year
Steer Axle Oil Bath LMS	Synthetic[1] SHAES 256 Rev C	SAE 75W-90	500,000 miles [800,000 Km] or 5 years	120,000 miles [193,000 Km] or 2 years
Steer Axle Oil Bath (Adjusted)	Synthetic SHAES 256 Rev C SHAES 429	SAE 75W-140, 75W-90	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Steer Axle Oil Bath (Adjusted)	Mineral Base SAE J2360	75W, 75W-90, 80W-90, 85W-140	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Steer Axle Semi-fluid (Adjusted)	Semi-fluid Synthetic Grease	Delo SF, Mobil SHC 007[3]	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Steer Axle Grease Pack (Adjusted)	Heavy-Duty Multipurpose Lithium Based[3]	#2 Grade	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Oil Bath LMS	Synthetic[4] SHAES 256 Rev C	SAE 75W-90	500,000 miles [800,000 Km] or 5 years	180,000 miles [288,000 Km] or 3 years
Trailer Axle Oil Bath (Adjusted)	Synthetic SHAES 256 Rev C SHAES 429	SAE 75W-90, 80W-140	120,000 miles [193,000 Km] or 1 year	180,000 miles [288,000 Km] or 3 years
Trailer Axle Oil Bath LMS	Mineral Base J-2360	75W, 75W-90	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 1 year
Trailer Axle Grease LMS	Heavy-Duty Multipurpose Lithium Based[3]	#2 Grade	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Grease (Adjusted)	Heavy-Duty Multipurpose Lithium Based[3]	#2 Grade	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months

Product	Lubricant Type	SAE	Change Interval for Line Haul	Change Interval for Vocational
Trailer Axle Semi-fluid LMS	Semi-fluid Synthetic Grease	Chevron Delo SF[4]	500,000 miles [800,000 Km] or 5 years	120,000 miles [193,000 Km] or 2 years
Trailer Axle Semi-fluid LMS	Semi-fluid Synthetic Grease	Mobil SHC 007[2]	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Semi-fluid (Adjusted)	Semi-fluid Synthetic Grease	Delo SF, Mobil SHC 007[2]	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months

[1] Only approved lubricant for LMS wheel ends

[2] Use of this grease requires a signed waiver from the customer

[3] Do not mix with sodium base grease

[4] Specified by MGM-113 as only approved lubricants for LMS trailer axles

[5] Refer to maintenance manual for inspection and adjustment intervals

Wheel End Lubrication Procedure

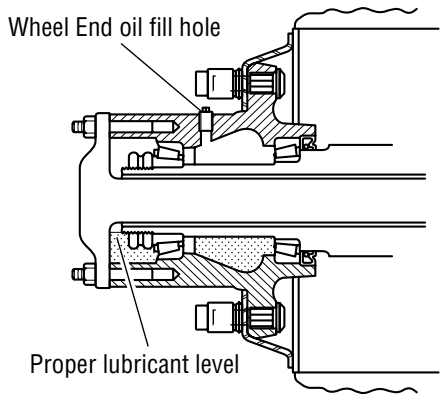
⚠ CAUTION

Before operating the axle, the wheel hub cavities and bearings must be lubricated to prevent failure.

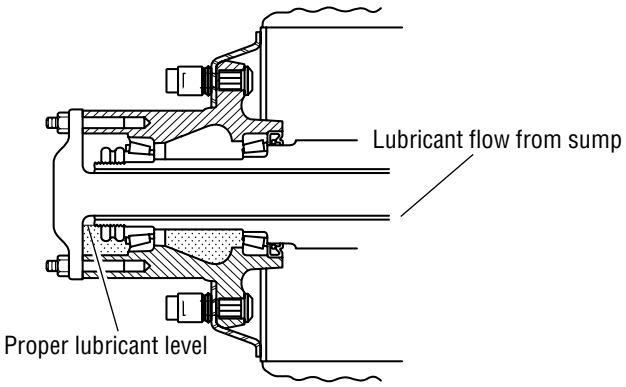
When wheel ends are serviced, follow Eaton's wheel end lubrication procedure before operating the axle.

Eaton axles may be equipped with either of two wheel end designs:

- Wheel ends with an oil fill hole



- Wheel ends without an oil fill hole

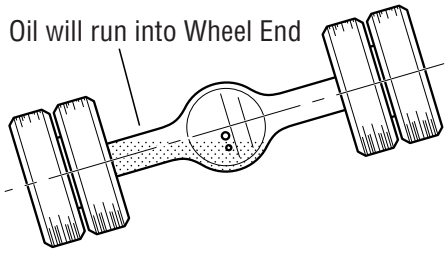


Wheel End Lubrication Procedure (with oil fill hole)

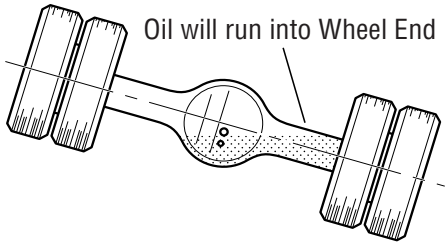
1. Rotate the wheel end hub until the oil fill hole is up.
2. Remove the oil fill plug.
3. Pour 0.5 pint [0.2 liter] of axle sump lubricant into each hub through the wheel end fill hole.
4. Install oil fill plug and tighten to specified torque.

Wheel End Lubrication Procedure (without oil fill hole)

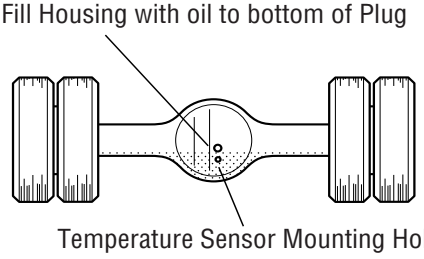
1. With axle level and wheel ends assembled, add lubricant through filler hole in axle housing cover until fluid is level with the bottom of filler hole.
2. Raise the left side of the axle 6 in. [152 mm] or more. Hold axle in this position for one minute.



3. Raise the right side of the axle 6 in. [152 mm] or more. Hold axle in this position for one minute.



4. With axle on a level surface, add lubricant through housing cover oil filler hole until fluid is level with the bottom of the hole.



Note: Axles without wheel end fill holes require approximately 2.5 pints [1.2 liters] of additional lubricant to bring the lubricant level even with the bottom of the fill hole.

European Lubricants - Transmission

Models affected: All transmission product

Lubrication Recommendations

The following are the recommended lubricants for Eaton transmissions.

Mineral Oils

Lubrication Change and Inspection	
ON HIGHWAY USE	
First 5,000 to 10,000 Km	Change transmission oil on new units at operator's discretion
Every 20,000 Km	Inspect oil level. Check for leaks.
Every 100,000 Km or one year	Change transmission oil.
OFF HIGHWAY USE	
First 30 hours	Change transmission oil on new units at operator's discretion.
Every 40 hours	Inspect oil level. Check for leaks.
Every 500 hours	Change transmission oil where severe dirt conditions exist.
Every 1,000 hours	Change transmission oil (normal off-highway use)

Recommended Lubricants		
Type	Grade (SAE)	Ambient Temperature
Heavy-Duty Engine Oil API - CD	50 40 30	Above - 12° C Above - 12° C Below - 12° C
Mild EP Gear Oil API - GL - 4	90 80W	-12° C to 38° C -26° C to 21° C

⚠ CAUTION

- Multi-viscosity engine oils (such as 15W40) are not recommended without consultation with Eaton.
- Do not mix engine oils and gear oils in the same transmission.
- Eaton does not approve mineral oil lubricants by brand name.
- Additives or friction modifiers which are not part of the original lubricant are not recommended.

Semi and Full Synthetic Oils

Semi-Synthetics

The following brands of semi-synthetic oils are now approved for use in Eaton transmissions:

- TEXACO MULTIGEAR MTF 75W80W
- ELF TRANSELF 75W80W, (also known as RVI Longevia)
- MOBIL MOBILUBE XHP
- BP ENERGEAR XHP 75W80
- KUWAIT Q8 T 60
- FUCHS DEA DEAGEAR LD & TITAN CYTRAC LD
- FIAT LUBRIFICANTI TUTELA TRUCK GEAR FE
- DE OLIEBRON TOR MT/LD GEAR OIL
- OMV AKTIENGESELLCHAFT OMVLDL 75W-80
- PAKELO MOTOR OIL PAKELO GOLDENGEAR LD
- YACCO BVX Z-500 SAE 75W80
- REPSOL CARTAGO CAJAS FE LD

Lubrication Change and Inspection - Semi-Synthetic Oils	
ON HIGHWAY USE	
All brands - every 20,000 Km	Inspect oil level. Check for leaks.
Every 300,000 Km or 3 years	Change transmission oil.
OFF HIGHWAY USE	
All brands - every 40 hours	Insepect oil level. Check for leaks.
Every 500 hours	Change transmission oil where severe dirt conditions exist.
Every 3 years	Change transmission oil (normal off-highway use)

Synthetic Oils

The following brands of synthetic oils are now approved for use in Eaton transmissions:

- COGNIS / ROADRANGER SAE 50
- COGNIS MTF 4200
- CASTROL SYNTRANS
- BP ENERGEAR SHX 30
- SHELL SPIRAX GSX 75W80
- CHEVRON TEXACO MULTIGEAR MTF HD 75W80
- MOBILUBE 1 SHC
- BP ENERGEAR SHX-M 75W-90
- CASTROL SAF XM 75W-90
- ANGLAMOL 2005

Lubrication Change and Inspection - Synthetic Oils	
ON HIGHWAY USE	
COGNIS / ROADRANGER SAE 50 Every 800,000 Km or 5 years	Change transmission oil.
COGNIS / ROADRANGER MTF 4200 Every 500,000 Km or 3 years	Change transmission oil.
CASTROL SYNTRANS Every 500,000 Km or 3 years	Change transmission oil.
BP ENERGEAR SHX 30 Every 500,000 Km or 3 years	Change transmission oil.
SHELL SPIRAX GSX 75W80 Every 500,000 Km or 3 years	Change transmission oil.
CHEVRON TEXACO MULTIGEAR MTF HD 75W80 Every 500,000 Km or 3 years	Change transmission oil.
MOBILUBE 1 SHC Every 300,000 Km or 3 years	Change transmission oil.
BP ENERGEAR SHX-M 75W-90 Every 300,000 Km or 3 years	Change transmission oil.
CASTROL SAF XM 75W-90 Every 300,000 Km or 3 years	Change transmission oil.
ANGLAMOL 2005 Every 300,000 Km or 3 years	Change transmission oil.
OFF HIGHWAY USE	
All brands - Every 40 hours	Inspect oil level. Check for leaks.
All brands - Every 500 hours	Change transmission oil where severe dirt conditions exist.
All brands - Every 3 years	Change transmission oil (normal off-highway use)

Australian Lubricants - Transmission

Use the chart to locate the correct lubricant and change interval.

Synthetic or Mineral	Lubricant	SAE	Change Interval
Synthetic	PS-164 R7 (Roadranger)	50W	400,000 Km [250,000 miles][1]
Mineral	Heavy-Duty Engine Oil MIL-L-21040D or Cat TO-4	30W, 40W, 50W	80,000-100,000 Km [50,000-60,000 miles]

[1] Oil samples should be taken from the center of the transmission with oil at operating temperature using a suitable syringe. Oil sampling to take place at 80,000-100,000 Km.

Oil analysis is required to determine exact oil change interval which can vary depending on the application.

DO NOT USE ADDITIVES OR FRICTION MODIFIERS.

China Lubricants - Transmission

Use the chart to locate the correct lubricant and change interval.

Synthetic or Mineral	Lubricant	Grade	Transmission Torque Rating	Change Interval
Synthetic	Roadranger PS-164 R7	SAE 50	All	500,000 Km[2]
Mineral[1]		CD SAE 50 MIL 2104H Cat TO-4 SAE 40, SAE 50 API-GL4 80W-90	860 through 1250 lbs. ft. [116-1695 N•m]	Initial drain 2,000-5,000 Km Subsequent drain 100,000 Km or 1 year
Mineral[1]		CD SAE 50 MIL 2104H Cat TO-4 SAE 40, SAE 50	1650 lbs. ft. [approximately 2237 N•m]	Initial drain 2,000-5,000 Km Subsequent drain 100,000 Km or 1 year

[1] For vocational applications - 500 hr drain interval / For hot climate applications - 1000 hr drain interval

[2] Oil samples should be taken from the center of the transmission with oil at operating temperature using a suitable syringe. Oil sampling to take place at 80,000-100,000 Km.

Oil analysis is required to determine exact oil change interval which can vary depending on the application.

DO NOT USE ADDITIVES OR FRICTION MODIFIERS.

Quick Reference Charts

Use the chart to locate the correct lubricant and change interval.

Note: For line haul and vocational definitions, page 3.

Transmission

Heavy-Duty

Product	Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Automated and above 1,850 ft. lbs.	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 5 years	2,000 hours or 5 years
Mechanical	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 5 years	2,000 hours or 5 years
Mechanical	Mineral	Heavy Duty Engine Oil	SAE 50 (HD Engine Oil) Mil 2104H Cat TO-4 (SAE 40 - SAE 50)	60,000 miles [96,500 Km] or 1 year	500 hours or 1 years

Medium-Duty

Product	Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Automated (Includes Hybrid)	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 5 years	2,000 hours or 5 years
ASW Clutch Module	Synthetic	Dextron III ATF	N/A	150,000 miles [250,000 Km] or 3 years	150,000 miles [250,000 Km] or 3 years
Mechanical	Synthetic	PS-164 Rev 7	SAE 50	500,000 miles [800,000 Km] or 5 years	2,000 hours or 5 years
Mechanical	Mineral	Heavy Duty Engine Oil	SAE 50 (HD Engine Oil) Mil 2104H Cat TO-4 (SAE 40 - SAE 50)	60,000 miles [96,500 Km] or 1 year	500 hours or 1 year

Drive Axle Lubricants

Heavy-Duty

Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Synthetic[1]	SHAES-256 Rev C	SAE 75W-90	500,000 miles [800,000 Km] or 5 years	N/A
Synthetic[2]	SHAES-429	SAE 75W-90 SAE 80W-140	N/A	180,000 miles [288,000 Km] or 3 years
Mineral Base	SAE J2360	75W, 75W-90, 80W-90, 85W-140	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 1 year

Medium-Duty

Synthetic or Mineral	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Synthetic	SHAES-256 Rev C	SAE 75W-90	250,000 miles [400,000 Km] or 3 years	N/A
Synthetic	SHAES-429	SAE 75W-90 SAE 80W-140	N/A	180,000 miles [288,000 Km] or 3 years
Mineral Base[1]	SAE J2360	75W, 75W-90, 80W-90, 85W-140	100,000 miles [160,000 Km] or 1 year	60,000 miles [96,500 Km] or 1 year

[1] Axles using LMS wheel end system

[2] Axles using adjustable wheel bearing system

Steer Axle

Type of Lubricant System	Lubricant	SAE	Change Interval for Line Haul	Change Interval for Vocational
Wheel End	Mineral Oil SAE J2360	SAE 75W-90	100,000 miles [161,000 Km] or 1 year	30,000 miles [48,000 Km] or 6 months
Wheel End	Mineral Grease - NLGI #2	AW 2	100,000 miles [161,000 Km] or 1 year	30,000 miles [48,000 Km] or 6 months
LMS-Low Lube[1]	Synthetic Oil PS-164 Rev 7	SAE 50	250,000 miles [400,000 Km] or 1 year	250,000 miles [400,000 Km] or 1 year
LMS-Lube Free[1]	Synthetic Oil PS-164 Rev 7	SAE 50	None (only needed if tear down)	None (only needed if tear down)
LMS-Low Lube[1]	Semi-Fluid Synthetic Grease	Chevron Delo SF	50,000 miles [800,000 Km] or 3 years	50,000 miles [800,000 Km] or 3 years
LMS-Low Lube[1]	Semi-Fluid Synthetic Grease	Mobilith SHC 007	50,000 miles [800,000 Km] or 3 years	50,000 miles [800,000 Km] or 3 years
King Pin Joint Grease / Tie Rod Ends	Heavy-Duty, multipurpose lithium based	NLGI #2	25,000 miles [40,000 Km] or 6 months	Every 50 hours

[1] For easy identification, note that the Dana LMS-Low Lube brake uses a special “button head” grease fitting and the Dana LMS-Lube Free brake does not have a grease fitting.

Clutch

Product	Lubricant	Service Interval for Line Haul	Service Interval for Vocational
Stamped Angle Spring	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	10,000 miles [16,000 Km] or 1 month	250 hours or 1 month
Medium-Duty Solo™	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	10,000 miles [16,000 Km] or 1 month	250 hours or 1 month
365 mm	No Lubricant Needed	Not Applicable	Not Applicable
Easy Pedal 2000	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	25,000 miles [32,000 Km] or 3 months	250 hours or 1 month
Heavy-Duty Solo™	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	25,000 miles [40,000 Km] or 3 months	250 hours or 1 month
Solo™ XL	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	50,000 miles [80,000 Km] or 6 months	250 hours or 1 month
Value Clutch	NLGI #2 or #3 Lithium - Complex Roadranger Grease MP-2	20,000 miles [32,000 Km] or 2 months	250 hours or 1 month
DM	No Lubricant Needed	Not Applicable	Not Applicable
Pedal Shaft	NLGI #2 Lithium - Complex Roadranger Grease MP-2	At every chassis lubrication	At every chassis lubrication

Brake

Product	Lubricant	Change Interval with Zerks	Change Interval without Zerks
Brake, Standard	NLGI #2 EP Lithium	Not Applicable	50,000 miles [80,000 Km] or 3 months
Brake, LMS-Low Lube[1]	SCH 460 Synthetic	Not Applicable	1 year
Brake Adjusters, Standard	NLGI #2 EP Lithium	At chassis lubrication	Not Applicable
Brake Adjusters, Spicer Haldex Self-Adjusting	NLGI #2 or #3 EP Lithium	50,000 miles [80,000 Km] or 3 months	Not Applicable

[1] For easy identification, note that the Dana LMS-Low Lube brake uses a special "button head" grease fitting and the Dana LMS Lube Free brake does not have a grease fitting.

Steering Shafts

Series	Service Interval for Line Haul	Service Interval for Vocational
SPL 6 (Aluminum with greaseable u-joints and permanently lubricated slip member design)	50,000 miles [80,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 3 mos. (which ever comes first)
1000 (Steel with greaseable universal joints) **Note: Slip member requires the same lubrication intervals**)	50,000 miles [80,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 3 mos. (which ever comes first)

Driveline

Series	Service Interval for Line Haul	Service Interval for Vocational
10-Series **(1480 thru 1810 & SPL90)** Note: Slip member also requires lubrication.	10,000/15,000 miles [16,000/24,000 Km] or 3 mos. (which ever comes first)	5,000/8,000 miles [8,000/12,800 Km] or 3 mos. (which ever comes first)
Spicer Life Series **(SPL55, 70, & 100)** Booted and permanently lubricated slip member.	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)
Spicer Life Series **(SPL140, 170, & 250)** Std. Spicer Life Series U-Joint. Booted and permanently lubricated slip member.	100,000 miles [160,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)
Spicer Life XL* **(SPL170XL & 250XL)** **FIRST LUBRICATION CYCLE**** Extended lubrication U-Joint. Booted and permanently lubricated slip member.***	350,000 miles [560,000 Km] or 3 yrs. (which ever comes first)	100,000 miles [160,000 Km] or 1 year (which ever comes first)

Series	Service Interval for Line Haul	Service Interval for Vocational
Spicer Life XL* **(SPL170XL & 250XL)** **RE-LUBRICATION CYCLE**** Extended lubrication U-Joint. Booted and permanently lubricated slip member.***	100,000 miles [160,000 Km] or 6 mos. (which ever comes first)	25,000 miles [40,000 Km] or 6 mos. (which ever comes first)

Wheel End

Product	Lubricant Type	SAE	Change Interval for Line Haul	Change Interval for Vocational
Drive Axle LMS	Synthetic[1] SHAES 256 Rev C	SAE 75W-90	500,000 miles [800,000 Km] or 5 years	180,000 miles [288,000 Km] or 3 years
Drive Axle (Adjusted)	Synthetic SHAES 256 Rev C	SAE 75W-90	250,000 miles [400,000 Km] or 3 years	60,000 miles [96,500 Km] or 6 months
Drive Axle (Adjusted)	Mineral Base SAE J2360	SAE 75W-90, 80W-90, 85W-140	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Steer Axle Oil Bath LMS	Synthetic[1] SHAES 256 Rev C	SAE 75W-90	500,000 miles [800,000 Km] or 5 years	180,000 miles [288,000 Km] or 3 years
Steer Axle Oil Bath (Adjusted)	Synthetic SHAES 256 Rev C	SAE 75W-90	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Steer Axle Oil Bath (Adjusted)	Mineral Base SAE J2360	75W, 75W-90, 75W-140, 80W-90, 85W-140	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Steer Axle Semi-fluid (Adjusted)	Semi-fluid Synthetic Grease	Delo SF, Mobil SHC 007 [3]	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Steer Axle Grease Pack (Adjusted)	Heavy-Duty Multipurpose Lithium Based[3]	NLGI #2	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Oil Bath LMS	Synthetic[4] SHAES 256 Rev C	SAE 75W-90	500,000 miles [800,000 Km] or 5 years	180,000 miles [288,000 Km] or 3 years
Trailer Axle Oil Bath (Adjusted)	Synthetic SHAES 429 SHAES 256 Rev C	SAE 75W-90	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Oil Bath LMS	Mineral Base SAE J2360	SAE 75W, 75W-90	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Grease LMS	Heavy-Duty Multipurpose Lithium Based[3]	NLGI #2	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months

Product	Lubricant Type	SAE	Change Interval for Line Haul	Change Interval for Vocational
Trailer Axle Grease (Adjusted)	Heavy-Duty Multipurpose Lithium Based[3]	NLGI #2	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Semi-fluid LMS	Semi-fluid Synthetic Grease	Chevron Delo SF[4]	500,000 miles [800,000 Km] or 5 years	120,000 miles [193,000 Km] or 2 years
Trailer Axle Semi-fluid LMS	Semi-fluid Synthetic Grease	Mobil SHC 007[2]	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months
Trailer Axle Semi-fluid (Adjusted)	Semi-fluid Synthetic Grease	Delo SF, Mobil SHC 007 [2]	120,000 miles [193,000 Km] or 1 year	60,000 miles [96,500 Km] or 6 months

[1] Only approved lubricant for LMS wheel ends

[2] Use of this grease requires a signed waiver from the customer

[3] Do not mix with sodium base grease

[4] Specified by MGM-113 as only approved lubricants for LMS trailer axles

Change Control Log

Last Revised Date	Description of Clarifications and Updates
3/03/10	Added MD DM3 volume requirements for units w/inertia brakes
3/03/10	Added ECA Clutch intervals
12/8/08	Major updates.
5/22/08	Added information to the Transmission Lubrication Procedures section ; Under "Check Transmission Oil Leve", added "Inspect oil filter for leaks, rust or damage. Replace as necessary."
8/23/07	Added Quarts and Gallons to the Lubrication Capacities sections
5/7/07	Add Rev C to all SHAES-256 Add Medium-Duty Drive Axle Lubricants Update Drive Axle Lubricant Capabilities Update Steer Axle Lubricants Update Wheel End Lubricants
10/18/06	Update Drive Axle Lubricants and Steer Axle Lubricants Add Wheel Ends Lubrication chart
8/28/06	Add new Roadranger Grease MP-2
4/13/06	Gear Box update from 3 yr/150k to 5 yr/500k

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