MODULE CONTENT

| Unit of Competency | **DIAGNOSE AND REPAIR ENGINE COOLING AND LUBRICATION SYSTEM** |
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| Module Title | **DIAGNOSING AND REPAIRING ENGINE COOLING AND LUBRICATION SYSTEM** |
| Module Descriptor | This unit describes the performance outcomes required to diagnose and repair faults in the cooling systems of  vehicles such as radiator, water pump, and thermostat  and lubrication systems such as oil pump, oil cooler,  hoses and oil pressure switch. It covers the knowledge,  skills, and attitudes required to prepare to diagnose and  repair engine cooling and lubrication systems, diagnose  and repair engine cooling and lubrication system and  complete work processes. |
| Nominal Duration | **hours** |
| Summary of the Learning Outcomes: | |
| Upon completion of this module the student must be able to: | |
| LO1. Prepare to diagnose and repair drive lines | |
| LO2. Diagnose drive lines | |
| LO3. Repair drive lines | |
| LO4. Complete work processes | |

**LEARNING EXPERIENCES**

**LEARNING OUTCOMES NO. 3**

**REPAIR DRIVE LINES**

| **Learning Activities** | **Special Instructions** |
| --- | --- |
| Read Information Sheet 3.1-1 Repair drive lines | If you have some problem on the content of the information sheet don’t hesitate to approach your Trainer.  If you feel that you are now knowledgeable on the content of the information sheet, you can now answer self-check provided in the module. |
| Answer Self-Check 3.1-1 on Repair drive lines | Try to answer the Self-check without looking at the Answer Key  Compare your answer to Answer Key 3.1-1 |
| Observe Trainer’s demonstration on Task Sheet 3.1-1 on Repair drive lines | Listen carefully and attentively so that you may be able to perform a task correctly  Ask questions if are in doubt for clarification |
| Perform the Task Sheet 3.1-1 on Repair drive lines | Remember the step-by-step procedure the Repair drive lines |
| Evaluate the performance using the Performance Criteria Checklist 3.1-1 | Repeat the task in case fail to meet the criteria |

**INFORMATION SHEET 1.1-1**

**REPAIR DRIVE LINES**

**Learning Objectives:**

After reading this **Information Sheet**, you must be able to:

1. Carried out repairs.
2. Carried out post-service testing.
3. Applied safety practices

**DRIVE LINES**

**Driveline Removal**

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**To prevent serious eye injury, always wear eye protection when you perform vehicle maintenance or service.**

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**Do not service a driveline with the engine running. A rotating driveline can cause serious personal injury**

1. The vehicle must be on a level surface.

2. Block the wheels to keep the vehicle from moving.

3. Loosen and remove the four cap screws from the propshaft end of the drive shaft. Support the propshaft end, and separate it from the end yoke.

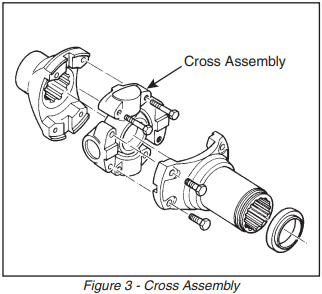
4. Loosen and remove the four cap screws from the slip yoke end of the drive shaft. Support the slip yoke end and separate it from the vehicle.

**Cross Assembly Removal**

Note: Cross assemblies are permanently assembled. Welded steel straps attach the bearing cups to the trunnion to help ensure that the cross assembly fits correctly into the mating yokes. do not cut or remove the welded straps from cross assembly kits.

1. Loosen and remove the four capscrews retaining the cross assembly cross to the weld yoke.

2. Loosen and remove the four capscrews retaining the cross assembly cross to the slip yoke (see Figure 3).



**Cross Assembly Installation**

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**Do not use a steel hammer to seat the bearing cups into the yoke bores. A steel hammer can cause the yoke or bearing cup to crack and break off. Serious personal injury or damage to the trunnion, yoke or bearing cup can result.**

1. Tap the bearing cups lightly with a brass or copper hammer to seat the bearing cups into the yoke pilot.

2. Install the capscrews (see Figure 3).

a. Hand-tighten the capscrews to the yoke pilot.

b. Use a torque wrench to alternately tighten the capscrews to correct specifi cations (see form 80-1057 torque specifi cations chart).

**Driveline Installation**

1. Support the driveline, and install the four capscrews that attach the slip yoke to the end yoke.

2. Tap the bearing cups lightly with a brass or copper hammer to seat the bearing cups into the weld yoke and slip yoke.

3. Install the capscrews (see Figure 3). a. Hand-tighten the capscrews to the yoke pilot. b. Use a torque wrench to alternately tighten the capscrews according to the specifi cations given earlier.

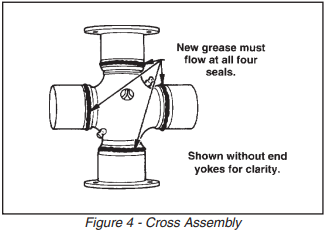
4. Support the weld yoke end of the driveline, and install the four capscrews that attach the cross assembly to the end yoke.

5. Tap the bearing cups lightly with a brass or copper hammer to seat the bearing cups into the weld yoke and slip yoke.

6. Install the cap screws (see Figure 3).

**Cross Assembly Lubrication**

The cross assemblies can be greasable or non greasable. Non-greasable cross assemblies do not have lube fittings, and are permanently lubricated with grease developed with specific wear and temperature properties. However, you must periodically lubricate the slip yoke splines on these drivelines. Refer to “Slip Yoke Splines Lubrication” found immediately after this section for specifications and maintenance procedures.



Greasable cross assemblies have lube fittings and are not permanently lubricated. They need to be lubricated every 50 hours using the following procedure:

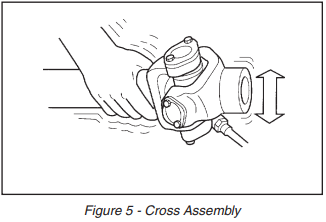
1. After installation into end yokes, lubricate the cross assemblies at the grease fitting until grease flows from the bearing cup seals on all four trunnions (see Figure 4). Refer to the Lumberjack or Carrydozer operator’s manual for appropriate lubricant.

2. If grease does not purge from the seals, try the following steps:

a. Move the assembly up and down or side-to side while you apply grease gun pressure (see Figure 5).

b. Loosen the bearing cap bolts. Add grease until grease purges from the seals.

3. If grease still does not purge from all four trunnion seals, remove the cross assembly and correct the problem. If you cannot determine the problem, replace the cross assembly.



**Slip Yoke Splines Lubrication**

The slip yoke splines can be greasable or non greasable. Non-greaseable driveshafts have a permanent lube sliding section (due to an anti friction coating of the spline) which does not require regreasing for the entire operating life. These slip yoke splines can be identified by not having a lube fitting.

**Greaseable Slip Yoke Splines**

Re-lube greasable slip yoke splines every 1000 hours using the following procedure (see Figure 6):

1. Clean the zerk head very carefully.

2. Sliding section, pump no more than 30 grams of grease. Refer to the Lumberjack or Carrydozer operator’s manual for appropriate lubricant.

Note: Four wheel drive Lumberjacks and Carrydozers bogie should be fully articulated before greasing the driveline between chassis and swivel box (lumberjack) and transmission and swivel box (carry dozer).

