

# Driveline Service & Maintenance

## Driveline Inspection



### WARNING

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



### WARNING

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

For efficient operation, inspect the driveshaft at regular intervals. Loose end yokes, excessive radial looseness, slip spline radial looseness, bent shaft tubing, or missing plugs in the slip yoke can cause driveline failure.

Inspect the driveline as follows:

1. Check the output and input end yokes on both the transmission and axle for axial looseness. Refer to the axle or transmission service information for the correct specifications.
2. If loose, disconnect the driveshaft. Tighten the end yoke retaining nut to the proper specification. Refer to the axle or transmission service information for the correct specifications.
3. Check for worn cross assemblies. Apply vertical force of about 50 lbs. to the driveline near the cross assemblies. If movement is in excess of 0.006 inches (0.152 mm), replace the cross assembly.
4. Using a dial indicator, examine the slip yoke spline for excessive radial movement. Radial looseness between the slip yoke and the tube shaft should not exceed 0.007 inches (0.178 mm). If excessive looseness exists, replace the slip yoke and the propshaft (see Figure 1).
5. Examine the shaft for damaged or bent tubing. Carefully remove any foreign material that has built up on the shaft, such as mud, road contamination, etc.

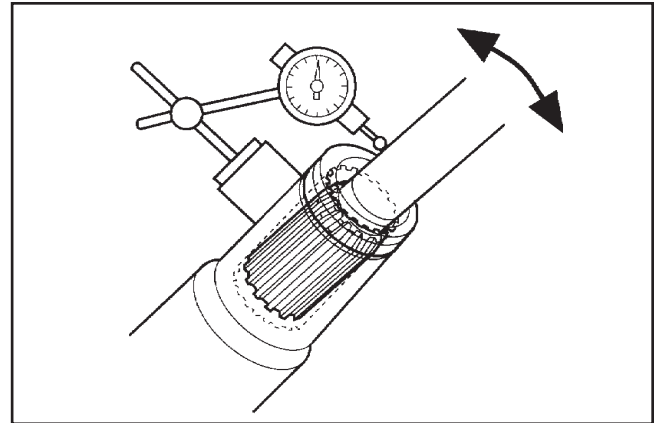
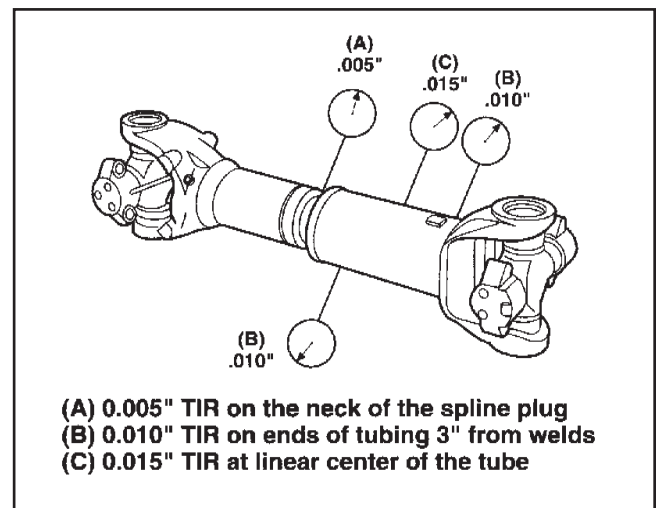


Figure 1 - Dial Indicator

6. If Total Indicator Runout (TIR) readings are required after you examine the shaft, obtain the readings with the driveshaft mounted on the vehicle.
  - a. Put the transmission in NEUTRAL.
  - b. Remove the axle shafts or set the axles on jack stands.
  - c. Rotate the driveshaft by hand to check TIR. Take readings at various positions around the driveshaft. If the readings exceed the manufacturer's specifications, repair or replace the driveline (see Figure 2).



(A) 0.005" TIR on the neck of the spline plug  
(B) 0.010" TIR on ends of tubing 3" from welds  
(C) 0.015" TIR at linear center of the tube

Figure 2 - Driveline



## WARNING

**Inspect drivelines for loose or missing capscrews. Loose or missing fasteners can allow the driveline to separate from the vehicle. Serious personal injury and damage to components can result.**

**If fasteners are loose or missing, install new capscrews and torque (see form 80-1057 torque specifications chart).**

### Cross Assembly Capscrews

As part of regularly scheduled maintenance, Allied Systems Company recommends that you inspect capscrews after the first 50 hours, or at the first engine oil change, whichever comes first.

1. Check that capscrews are installed in all cross assembly positions.
2. If capscrews are missing, check for damage to the cross assembly and yoke.
3. Replace damaged parts.

4. Replace missing capscrews. Refer to the relevant parts coverage for part numbers.
5. Use a torque wrench to verify that capscrews are tightened (see form 80-1057 torque specifications chart).

#### If Capscrews Have Loosened

1. Remove and discard loose capscrews. Install new grade 8 capscrews.
2. Check for damage to the cross assembly and yoke.
3. Replace damaged parts.
4. Use a torque wrench to verify that capscrews are tightened (see form 80-1057 torque specifications chart).

### Driveline Inspection Intervals

The drivelines require regular inspection. Allied Systems Company recommends periodic teardown inspection at the intervals in the following chart, which will help you to determine the hours at which you should replace cross assemblies.

Driveline Inspection Intervals	
Hours	Inspection Maintenance
At initial inspection or no more than 50 hours	<ul style="list-style-type: none"> <li>• Check all bolts for proper torque levels (see form 80-1057 torque specifications chart).</li> </ul>
Every other oil change, or every 1000 hours	<ul style="list-style-type: none"> <li>• Check all bolts for proper torque levels (see form 80-1057 torque specifications chart).</li> <li>• Inspect for any signs of grease leakage or seal damage at the four bearing cup seals on the cross assemblies.</li> <li>• Inspect for grease leakage or seal damage at the slip yoke spline seal.</li> <li>• Inspect for missing balance weights, damaged tubing or missing welch plug at slip yoke.</li> <li>• Inspect cross assemblies for wear as indicated by looseness of the joint in the yoke.</li> </ul>
Every 3000 hours	<ul style="list-style-type: none"> <li>• Inspect slip splines for wear (backlash) using dial indicator method.</li> </ul>

## Driveline Removal

### **WARNING**

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

### **WARNING**

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 capscrews 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 capscrews 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).

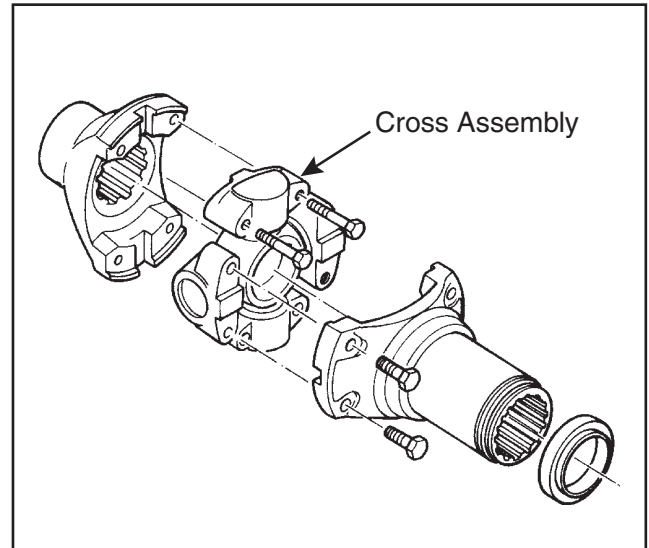


Figure 3 - Cross Assembly

## Cross Assembly Installation

### **WARNING**

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 specifications (see form 80-1057 torque specifications chart).

## Driveline Installation

1. Support the driveline, and install the four cap-screws 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 specifications 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 capscrews (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.

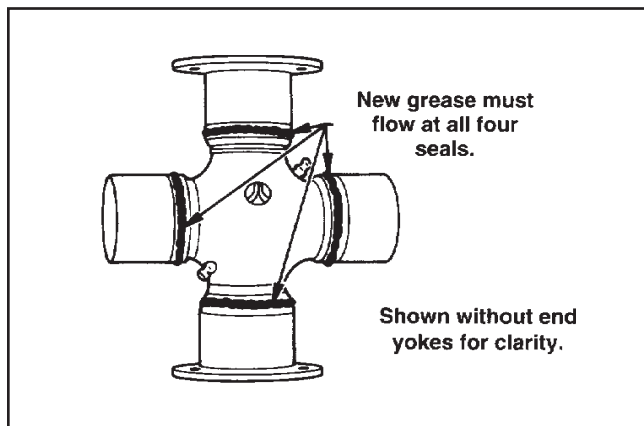


Figure 4 - Cross Assembly

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 to 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.

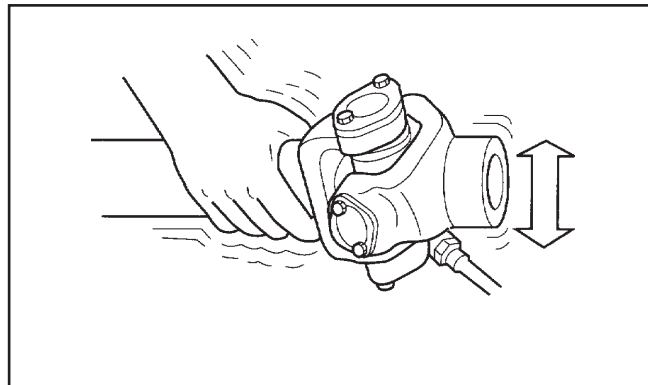


Figure 5 - Cross Assembly

## Slip Yoke Splines Lubrication

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

### Greaseable Slip Yoke Splines

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

1. Clean 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).

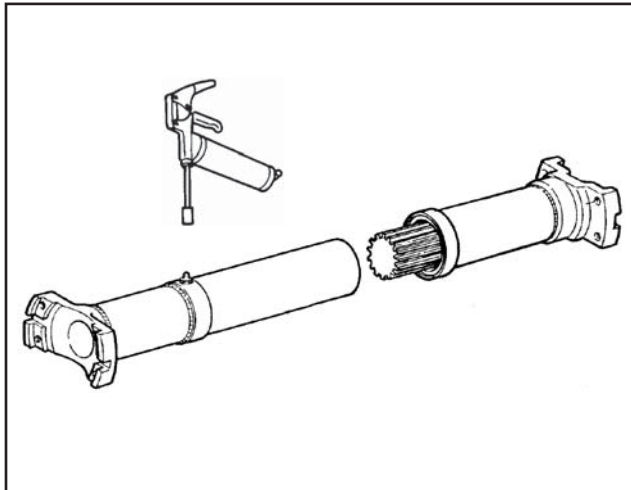


Figure 6 - Serviceable Slip Yoke

## Diagnostics

### Vibration

Condition	Cause	Correction
<b>Low gear shudder at full drive or full coast under light load conditions.</b>	<ol style="list-style-type: none"><li>1. Improper phasing</li><li>2. Loose outside diameter fit on slip yoke spline</li><li>3. Cross assembly loose</li><li>4. Driveshaft out of balance or bent</li><li>5. Worn cross assembly</li></ol>	<ol style="list-style-type: none"><li>1. Reassemble with correct phasing.</li><li>2. Change slip yoke and spline plug.</li><li>3. Inspect cross assembly for looseness; tighten to specification. Replace if necessary.</li><li>4. Rebalance/replace.</li><li>5. Replace cross assembly.</li></ol>

### Premature Wear

Condition	Cause	Correction
<b>Low mileage cross assembly wear</b>	<ol style="list-style-type: none"><li>1. End yoke cross hole misalignment</li><li>2. Improper lubrication</li></ol>	<ol style="list-style-type: none"><li>1. Use alignment bar to check for end yoke cross hole misalignment. Replace end yoke if misaligned.</li><li>2. Lubricate according to specifications (applies only to drivelines with greasable cross assemblies).</li></ol>
<b>Repeat cross assembly wear</b>	<ol style="list-style-type: none"><li>1. Excessive continuous running load</li><li>2. Continuous operation at high angle high speed.</li><li>3. Worn or damaged seals.</li></ol>	<ol style="list-style-type: none"><li>1. Replace with higher capacity universal joint and driveshaft.</li><li>2. Replace with higher capacity universal joint and driveshaft. Check universal joint operating angles. Reduce angles if necessary.</li><li>3. Replace cross assembly kit.</li></ol>

**Slip Yoke Spline Wear**

<b>Condition</b>	<b>Cause</b>	<b>Correction</b>
<b>Seizure</b>	<ol style="list-style-type: none"> <li>1. Improper lubrication</li> <li>2. Worn or damaged part</li> <li>3. Contamination</li> </ol>	<ol style="list-style-type: none"> <li>1. Lubricate slip yoke spline according to specifications. Check seal.</li> <li>2. Replace spline components.</li> <li>3. Lubricate slip yoke spline according to specifications. Check seal.</li> </ol>
<b>Galling</b>	<ol style="list-style-type: none"> <li>1. Worn or damaged part</li> <li>2. Contamination</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace spline components.</li> <li>2. Lubricate slip yoke spline according to specifications. Check seal.</li> </ol>
<b>Outside diameter wear at extremities</b>	<ol style="list-style-type: none"> <li>1. Improper lubrication</li> <li>2. Excessively loose outside diameter fit</li> </ol>	<ol style="list-style-type: none"> <li>1. Lubricate slip yoke spline according to specifications. Check seal.</li> <li>2. Replace spline components.</li> </ol>

**Shaft and/or Tube**

<b>Condition</b>	<b>Cause</b>	<b>Correction</b>
<b>Shaft support bearing wear</b>	Improper lubrication of bearings	Replace center bearing.
<b>Shaft support rubber insulator wear</b>	Shaft support bearing misaligned; interfered with slinger.	Realign mounting bracket to frame crossmember to eliminate interference with slinger.
<b>Tube circle weld fracture</b>	<ol style="list-style-type: none"> <li>1. Balance weight located in apex of weld yoke lug area.</li> <li>2. Balance weight too close to circle weld.</li> <li>3. Improper circle weld</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace tubing and rebalance</li> <li>2. Replace tubing and rebalance</li> <li>3. Replace tubing and rebalance</li> </ol>

