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Title: LT vibration at highway speeds

Applies To: LT Series

CHANGE LOG

Please refer to the change log text box below for recent changes to this article:

02/02/2018- Removed carrier bearing info
01/30/2018- Revised title and "applies to"; removed build dates, added tips
12/14/2017 - Added a 1 page instruction document on how the road force balancing procedure is to be and added the complete manual for the road rodrce machine to the other resources section.
11/07/2017- Add link to IK0600020 "Determine Wheel Speed or Driveline Vibration using a Smart Phone and Free VibSensor Application"
10/30/2017 - Reformat to step based. Reordered and steps.
10/13/2017- Added inspect for driveshaft balance weights present
10/09/2017- Added sheet for tire shop to use
10/05/2017- improved links, added tire flat-spot inspection, added torque arm
09/29/2017 - Initial Article Release

DESCRIPTION

This article applies to LT vehicles that experience an objectionable vibration felt in the seat, floor, or the steering wheel.

SYMPTOM(s)

An objectionable vibration is felt in the seat, floor, or the steering wheel. Mirror shaking might also occur.

SPECIAL TOOL(s) / SOFTWARE

Tool Description	Tool Number	Comments	Instructions
Tire runout gauge	4532000		
Tire pressure gauge			
Tire marker / grease pen			
masking tape			
Smartphone		with VibSensor ap	IK0600020

Tools Resource Center

SERVICE PARTS INFORMATION

Kit Description	Part Number	Quantity Required	Notes
KIT U-JT BOLT & RET SPL-250	2500675C91	as needed	

DIAGNOSTICS

WARNING! To prevent property damage, personal injury, and / or death, park vehicle on a hard, flat surface, turn the engine off, set the parking brake, and install wheel chocks to prevent the vehicle from moving in either direction.

WARNING! To prevent property damage, personal injury, and / or death, if the vehicle must be raised, do not work under the vehicle supported only by jacks. Jacks can slip or fall over.

WARNING! To prevent personal injury and / or death, always wear safe eye protection when performing vehicle maintenance.

WARNING! To prevent property damage, personal injury, and / or death, keep flames or sparks away from vehicle and do not smoke while servicing the vehicle's batteries. Batteries expel explosive gases.

WARNING! To prevent property damage, personal injury, and / or death, remove the ground cable from the negative terminal of the battery box before disconnecting any electrical components. Always connect the ground cable last.

Step	Action	Decision
1	**DIAGNOSTIC:** Does the LT have a validated objectionable highway speed (45 mph+) vibration (and not at lower speeds)?	**Yes**. Go to Step 2
		No. Article does not Apply

Step	Action	Decision
2	**DIAGNOSTIC:** Determine the ***location*** of the Vibration	A steering wheel "buzz" sensation in your hands is often driveline related. Go to Step 3
		A "backslap" sensation in the seat is often rear wheels balance / runout related. Go to Step 11.
		Smartphones with a free App have proven very accurage in determining if the vibration source is wheel related or driveline related. See IK0600020. If unable to determine the location or source of the vibration, Go to Step 3

Step	Action	Decision
3	**DIAGNOSTIC:** Determine the ***type*** of vibration	**1**. Up and down indicates run-out or imbalance or both . If it gets worse as speed increases its often balance related. If vibration changes when vehicle is put in neutral OR clutch is depressed (during the vibration) then accelerate ABOVE the vibration speed so that you can coast down through the speed region of the vibration. Vibrations that change when clutch is depressed (or transmission is in neutral) are likely **driveline related.** Proceed to step 6.
		2. Side to side indicates run-out, balance and possibly irregular wear.

	[redacted]	Steering wheel shimmy often indicates steer tire dynamic imbalance. Up and down indicates run-out or imbalance or both. If it gets worse as speed increases its often balance related. If it occurs at only one speed it is often run-out related. Proceed to tires step 10.
		3. Low speed wobble is not a balance problem. A vibration while braking only indicates a brake system problem. Proceed to Other Resources section for additional help.

Were you able to identify the source of the vibration?

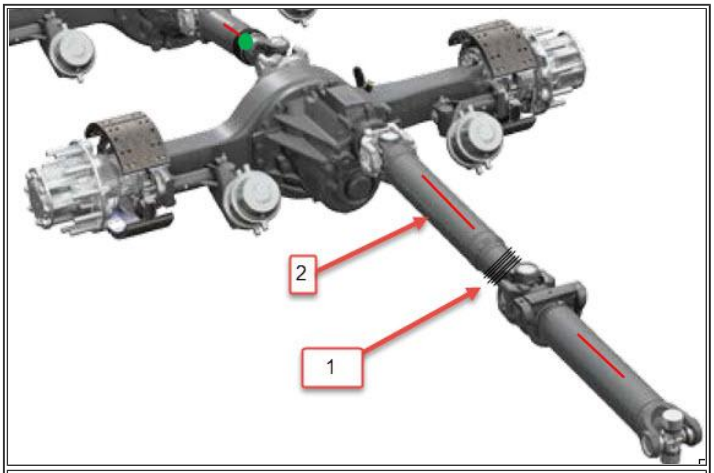

Figure 1: Typical LT Axle Setup

Item 1:Slip joint section of prop shaft.
Item 2: Indexing marks added by the technician.

NOTE:

It is ok for the bellows to point in either direction.

Step	Action	Decision
6	**DIAGNOSTIC:** Clearly mark the driveshaft for phasing purposes. (See Figure 1) Flip the long shaft (Item 2) 180 degrees so that the slip shaft section of the driveline is closer to the rear axle. (see Figure 2). When installing, make sure your phasing marks still line up as in Figure 1 & 2. Test drive. Is the vibration better but still objectionable?	**Yes, vibration is better but still objectionable:** Go to Step 7 **No, Vibration is gone:** Return unit to customer, End dagnostics **No change at all:** Proceed to Step 10

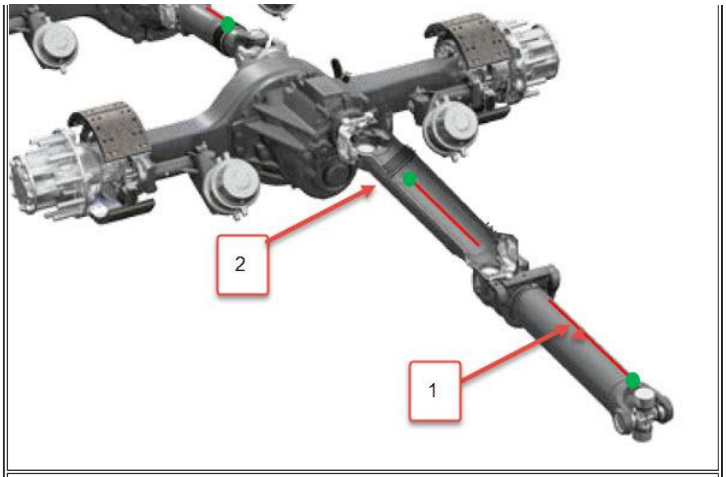

Figure 2: Prop Shaft Flipped

Item 1: Slip joint section of prop shaft.
Item 2: Indexing marks added by the technician stil lined up.

NOTE:

It is ok for the bellows to point in either direction.

Step	Action	Decision
7.	**DIAGNOSTIC:** Rotate long drive shaft so that the phasing marks are now 180 degrees apart from each other. Road test and determine if vibration is stil objectionable.	**Yes**. Go to Step 8. **No:** End diagnostics and return to service. **No change in vibration:** Go to Step 9

Step	Action	Decision
8.	**DIAGNOSTIC:** Disconnect the long shaft at the rear differential. Rotate shaft assembly 180 degrees at the differential yolk. Re-install and road test. Is the vibration still objectionable?	**Yes**. Go to Step 9. **No**. End diagnostics and return to service.

Step	Action	Decision
9	**DIAGNOSTIC:** NOTE: **Only follow this action if you know that you have a vibration that is caused by the driveline.** Reference Navistar Driveshaft Balance Requirements Print out the balance requirements specifications and take with you to your local drive line store. Have them build a new shaft to the specifications listed in the sheet. Make sure they use new yolks and U-joints. Do not re-use any part of the driveshaft. Send the #1 drive shaft out as well for balancing. If the driveshaft will mark the high spots on both shafts that would help with install. NOTE: **When re-installing the shafts make sure the high spots of the 2 shafts are 180 degrees from each other. Or make sure the balance weights are 180 degrees from each other and not on the same plane.** After shafts are installed, road test and determine if the vibation is still present.	**Yes**. Proceed to the driveline resource center document in the Other Resources section of this article. **No**. Return to service.

Step	Action	Decision
10	**DIAGNOSTIC:** Check pressures on all tires. Are both steer tires and all drive tires within 5 psi of each other?	**Yes**. Go to Step 11

		No. Correct the air pressure and test drive. If vibration concern is not resolved, go to Step 12. If resolved, end procedure and return unit to customer.

Step	Action	Decision
11	**DIAGNOSTIC:** Check the tightness of the torque arm fasteners, See Figure 3. It may be located behind the cab. Are the fasteners tight?	**Yes**. Go to Step 12 **No**. Torque fasteners. Test drive to see if complaint is resolved. If resolved, End Procedure and return unit to customer. If not, go to Step 12

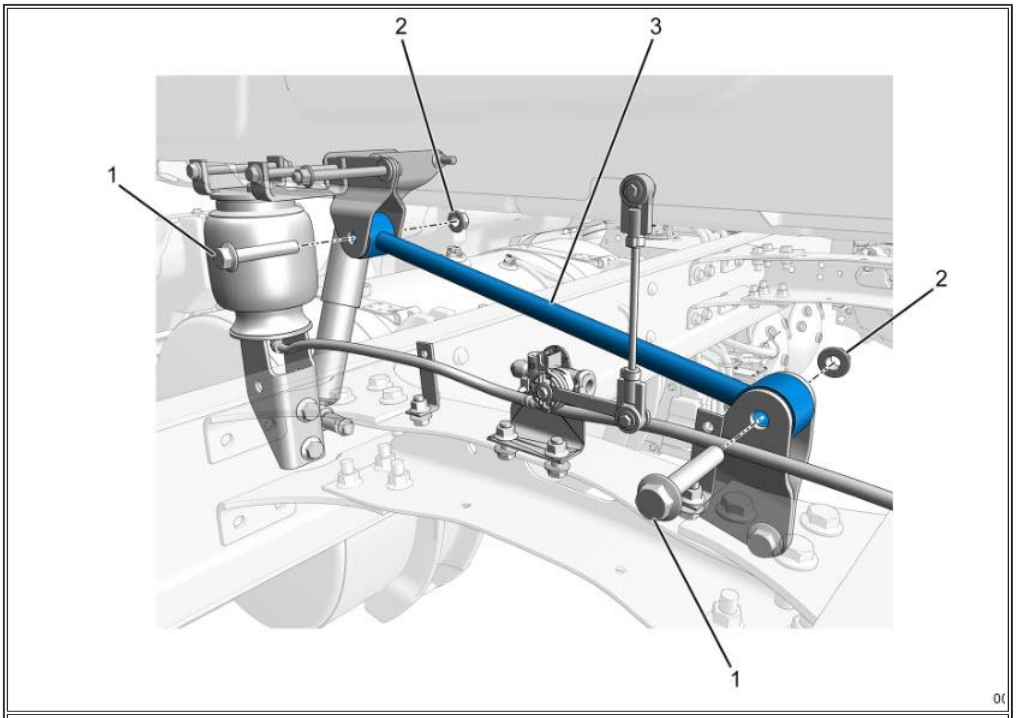

Figure 3: Torque Arm Fastener

Item 1: Torque Rod Bolt

Item 2: Torque Rod Nut

Item 3: Torque Rod

NOTE:

A loose torque rod or cross member can transmit a vibration produced from the driveline or tires and exaggerate the feel in the cab. Always make sure all joints with bolts on the truck are tight and torqued to spec.

Step	Action	Decision
12	**DIAGNOSTIC:** Inspect each tire for flat spotting caused by a brake lock-up event. Are flat spots present?	**Yes**. Replace any wheel/tire assemblies with an identical sized assembly from a donor truck and repeat test drive. If vibration concern is resolved, end Procedure and return unit to customer. **No**. Go to Step 13

Step	Action	Decision
13	**DIAGNOSTIC:** Check suspension ride height by measuring on the same axle and side as the leveling valve is located.	**Yes**. Go to Step 14 **No**. Adjust ride height per Technician Manual. Retest to see if vibration is still

	NOTE: To properly perfrom this operation, ease the truck into the bay and apply wheel chocks. Do not set the parking brake and do not come to an abrupt stop. Make sure there is over 100 psi of air in the tank. Deflate the suspension all the way, than reinflate. Verify pressure is again above 100 psi. Measure from the top of the axle to the bottom of the frame rail. This measurement should be 6 1/2". Is ride height adjusted properly?	present. If still present, go to Step 14. If vibration conern is resolved, end Procedure and return unit to customer.

NOTE:

Prior to performing any type of balance procedure on the vehicle always refer to the lineset ticket and verify how the truck was ordered.

0029TAK - Yellow dot aligned to valve stem

0029TAG - Unidirectional tires

0029TAD - Do Not Balance (contact your CSE for direction on repair)

Step	Action	Decision
14	**DIAGNOSTIC:** Use Hunter Engineering locator tool http://www.hunter.com/heavy-duty/forcematch-hd/search to see if a ForceMatch HD wheel balancer is in your immediate area. Is a wheel balancer nearby? Note: For run-out problems, the matchmounting procedure is often an effective method to eliminate the concern. Matchmounting isolates the tire, wheel, and bolt circle of the wheel to determine where the problem may be. It can also determine if a combination of variables is responsible because the tolerances “stack” to create an unacceptable condition. Since all tires and wheels are likely to have some run-out and all bolt circles are not perfectly centered, it is important that these factors do not “add up” to create a ride vibration even when individual components are within spec. 	**Yes**. Have all wheels rebalanced and check radial runout on Hunter ForceMatch HD Machine. Rotate tire on the rim to achieve .040" or less runtout on all wheels. Ask tire shop to provide the before and after runout value for each tire. Enter the information in a Case File if one is open. PRINT Tire Shop Worksheet Mark the peak point of runout on each tire so it can be properly oriented when installed on the truck Road Force Balance Highlights Go to Step 15 **No**. At a commercial tire shop, have all wheels rebalanced and check radial runout on the balance machine. Dismount tire as needed and rotate on the rim to reduce runout as needed. Match Mounting Instructions PRINT Tire Shop Worksheet Mark the peak point of runout on each tire so it can be properly oriented when installed on the truck Go to Step 15

Step	Action	Decision
15	**DIAGNOSTIC:** Reinstall front tires with the point of peak runout at the top (12 o'clock). Install the front tire with the least runout on the driver's side. Do not use any centering devices. Reinstall rear tires with the points of peak runout 180 degrees from each other, see Figure 4. Retest. Is Vibration still present?	**Yes**. Follow IK1400005 Driveline Information Center and Troubleshooting Procedures **No**. Procedure complete.

Figure 4 - Example of match mounting

Identify the high spots of both tires on the dual and make sure those high spots are 180 degrees from each other when installing on the truck.

WARRANTY INFORMATION

Warranty Claim Coding:
Refer to the Warranty Coding Manual for Group and Noun Codes.

Standard Repair Time(s):
Refer to the SRT Manual for Repair Times

TBD

OTHER RESOURCES

IK0600020 Determine Wheel Speed or Driveline Vibration using a Smart Phone and Free VibSensor Application

IK1400005 Driveline Information Center and Troubleshooting Procedures

IK0500038 Steering Shake, Shimmy, Shudder, or Steering Vibration

IK0400102 ProStar-Vibration While Braking

Go back!

GoodYear Tire training videos related to wheel induced vibrations	Goodyear Tire Website	Michelin Tire Manual
• Understanding Vehicle Vibrations ◦ https://www.youtube.com/watch?v=QmPgJ3eXK_w • Controlling Vehicle Vibrations ◦ https://www.youtube.com/watch?v=1PRqSy0hZ3A • Minimize Vehicle Vibrations	Goodyear tire manual	Road Force Balance Tire Manual Click Here Hunter Engineering **MatchForce HD** tire balance machine video https://www.youtube.com/watch?v=xqxrX2k9QYw Locate a MatchForce HD tire machine near your dealer

◦ https://www.youtube.com/watch?v=6ZWsuS4esQ8 • Reduce tire runout using Match Mounting ◦ https://www.youtube.com/watch?v=kuuYJPtzzC8		http://www.hunter.com/heavy-duty/forcematch-hd/search

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