



Service Bulletin

File in Section: -

Bulletin No.: PI1354

Date: November, 2014

PRELIMINARY INFORMATION

Subject: Information on Vibration Analysis and Diagnostic

Models: 2014 Chevrolet Silverado 1500
2014 GMC Sierra 1500

Training Available

US Courseware			
Course	Delivery Platform	Course Description	Length
13042.14D1	Virtual Classroom Training (VCT)	Noise, Vibration and Harshness (NVH) 1	1.5 hrs
13042.14D2	Virtual Classroom Training (VCT)	Noise, Vibration and Harshness (NVH)	2.0 hrs
13042.14H	Hands-On Training (est. avl. December 2014)	Noise, Vibration and Harshness (NVH)	8.0 hrs
13042.12W	Web-Based Training	Noise, Vibration and Harshness (NVH)	2.0 hrs
13042.13V	Video On Demand (VOD)	PicoScope Noise, Vibration, and Harshness Diagnostics Overview	15:05 minutes
GMCL Courseware			
13042.12W	Web-Based Training	Noise, Vibration and Harness	—
13042.05D1	Virtual Classroom Training (VCT)	Noise Vibration & Harshness - Session 1	—
13042.05D2	Virtual Classroom Training (VCT)	Noise Vibration & Harshness - Session 2	—
13025.16H	Hands-On Training	Vibration Diagnosis (2 day classroom training)	—
13042.13V	Video On Demand (VOD)	PicoScope Noise, Vibration, and Harshness Diagnostics Overview - VOD	—

Condition/Concern

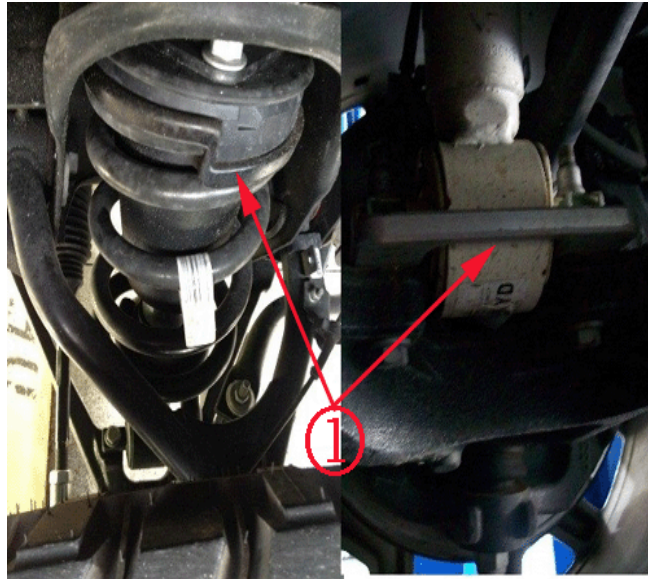
Some customers may comment about a vibration at speeds of 56-72 km/h (35-45 mph) or 96-120 km/h (60-70 mph), which can be felt in either the seat or steering wheel.

The purpose of this bulletin is to outline the recommendations and procedures for diagnosing and repairing vibrations caused by wheel and tire, axle components and/or propeller shafts.

Recommendation/Instructions

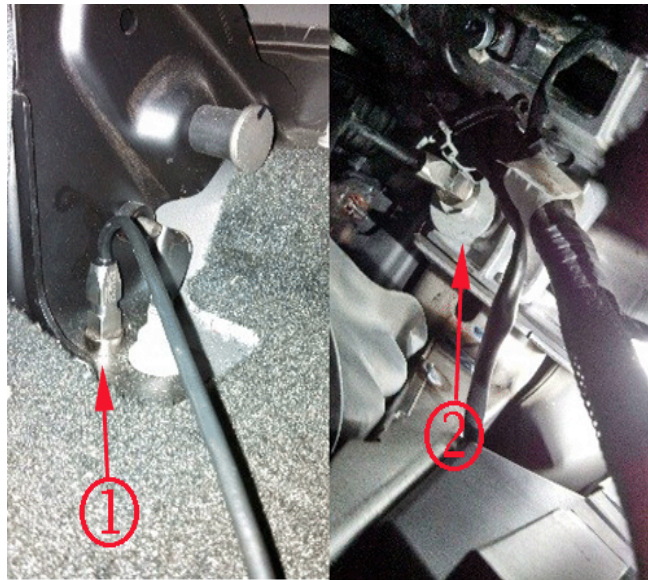
Important: The first step in determining the cause of the vibration is a test drive with the appropriate diagnostic equipment installed on the vehicle. If the correct tools and procedures are not followed, an incorrect diagnosis will result.

Full Size Truck Vibration Analysis:



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1. Inspect the truck for any aftermarket equipment installations. For example: non factory tires, wheels and/or lift kits or leveling kits – shims (1) installed as shown above. Aftermarket equipment does include running boards, bug deflectors, and window shades, etc. Remove any aftermarket that might cause vibration transmission paths.
2. Mark each tire valve stems location on the tire. This will be utilized to check for tire slippage on the rim.



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3. Using a Pico Oscilloscope Diagnostic Kit, mount the PicoScope vibration sensor on one of the two locations shown above.

Note: Only the use of the Pico Oscilloscope Diagnostic Kit with NVH should be utilized, available from GM Dealer equipment (P/N 733-CH-51450). Previous vibrations tools are NOT recommended due to the types and frequencies producing these vibrations.

- Seat Vibration – mount the sensor to the rear seat bracket (1).
- Steering Wheel Vibration – mount the sensor to the steering wheel bracket (2) under dash.

Note: In some cases, moving the sensor from a vertical position to a horizontal position may indicate higher amplitude and may be beneficial to help in diagnosis.



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4. This step should be only be used if the vibration can be felt while running the vehicle on the rack. Mount the sensor on the steering shaft (1), under the hood as illustrated above.
5. Measure the vibration. Typically trucks should be driven in M5 to keep from switching in and out of active fuel management (AFM).

Note: At the bottom of this bulletin is a required Vibration Diagnostic Worksheet that MUST be completed and is required for the claim payment. Vibration Diagnostic must be retained by the dealership. This worksheet is required to be filled out before calling TAC.

6. After the road test, verify that the tires have not slipped on the rim (step #2). If slippage has been found, correct the condition prior to any other repair. Refer to the latest version of Corporate Bulletin Number 12-03-10-001: Vibration Shortly After Tires are Mounted/Preventing Vibration from Wheel Slip (Tire Sliding on Wheel).
7. Once the condition has been duplicated on a test drive and the vibration readings have been recorded, bring the vehicle back into the shop and test the vehicle on four jack stands or a suitable hoist. The hoist must support the suspension at the same trim heights as the vehicle would normally sit on the road.
8. With the vehicle properly supported, bring the speed up to the complaint speed and verify that the previously recorded vibration data matches current vibration data being displayed.
9. The test should be performed in both 2 wheel drive and 4 wheel drive, if equipped. If vibration can be duplicated on the rack, the test should be performed a second time with the wheels and tire assemblies removed from the vehicle and the wheel nuts installed to retain the brake discs and/or brake drums. If the vibration has been eliminated with the wheel and tire assemblies removed, focus on the wheel and tire assemblies as the source of the vibration. If the vibration is still present, focus on the vehicle driveline as the source of the vibration.

Additional Notes for Testing

- Phasing is typical on these trucks. Test drives should include many turns that can prevent phasing.
- Same test should be conducted after dealer correction to ensure vibration is eliminated throughout the entire test repair phase.

Use the chart below to determine which type of vibration the truck has and what repair procedure should be utilized.

Type of Vibration	Go to Condition
1st Order Tire	1
1st Order Prop Shaft	2
2nd Order Prop Shaft	3
3rd Order Tire Combined with 1st Order Prop	4
Vibration Felt in 4 cylinder mode (AFM) – V6 Engine Only	5
Vibration Felt at Idle Only	6*
*For vibration related to AFM in 4 cylinder mode – refer to PIP5211A: Rough Idle.	

Important: Prior to any Road Force Balancing done with the Hunter 9700, please make sure that the wheel assemblies pass the centering test, which is performed using the Hunter 9700 machine.

Condition 1: 1st Order Tire Suggestions (Freq 11-14 hz at 60 mph or 97 km/h)

Measurements

1. Remove the tire and wheel assemblies from the vehicle and perform the Road Force Variation (RFV) measurement.

Important: Prior to taking any measurements, the assemblies MUST all pass a center check.

Note: Rule of Thumb for vibrations.

- Steering Wheel = Front Wheels
 - Floor/Seat Track/Body = Rear Wheels
2. Document the before and after Road Force Variation (RFV) numbers on the vibration worksheet located at the end of this bulletin.

Road Force Specifications

P-Metric tires on passenger cars	15 lbs (68 kg) or less
P-Metric tires on light trucks	15 lbs (68 kg) or less
LT - tires on light trucks	15 lbs (68 kg) or less

Note: These numbers are lower than what is currently published in service information as some vehicles react to parts that are near the high limit. These numbers SHOULD NOT be used if you do not have a tire speed related disturbance.

Repair:

- For any assembly that has an out of balance condition (greater than 0.25 oz), remove the weights and correct the condition utilizing normal balancing techniques.
- For any assembly having RFV measurements beyond the specification above, vectoring the tire on the rim should be utilized prior to tire replacement. If this does not bring the assembly within specification, the tire should be replaced.

Additional Notes on Balancing:

- Always perform a centering check.
- The Hunter Balancer/Road Force Balancer should not be set to "Smart Weight."
- All tires need to be balanced under 0.25 oz (both static and dynamic).
- When using the Hunter – Balancer/Road Force Balancer, removal and remounting to the tire balancer should be performed to re-check balance and verify that results are repeatable to 0.25 oz or less.
- Check Wheel Runout.

Important: When replacing tires, the road force should be checked before a test drive and after a test drive (min of 10-15 miles or 16-24 km/h). Road force on new tires will change dramatically after being warmed up (as much as a 20 lb reduction). After the test drive, the tire's road force should be checked. If acceptable RFV cannot be achieved, first try vectoring the tire on the rim before an alternate tire is utilized. Also refer to the Information in the latest version of Corporate Bulletin Number 13-03-10-002: Diagnostic Tips for Difficult to Resolve Tire/Wheel Vibration Concerns. Some more information is needed on how to check the assemblies for 2nd, 3rd, and 4th order RFV.

Condition 2: 1st Order Prop Shaft (Freq 38-44 hz at 60 mph or 97 km/h)

Perform Prop Shaft Run out Measurement (Refer to the SI Document ID# 2084709)

Specification	0.50"
Actual Measurement	
*For Best Result, the maximum run out should be under 0.20." If over, then replace the driveshaft.	

Note: These numbers are lower than what is currently published in service information as some vehicles react to parts that are near the high limit. These numbers SHOULD NOT be used if you do not have a Prop speed related disturbance.

Check Pinion Flange Runout Measurement (SI Document ID# 2084715)

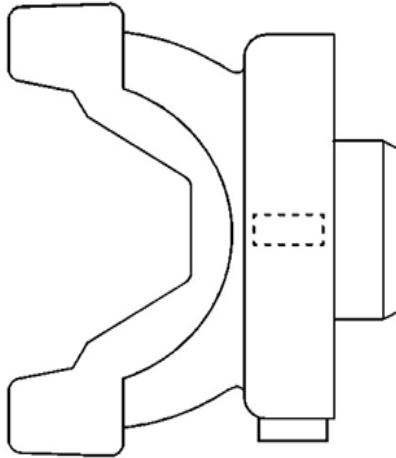
Special Tools:

- GE-8001 Dial Indicator Set, or equivalent
- J-23409 Dial Indicator Extension, or equivalent
- J-35819 Flange Runout Gauge

Note: This measurement procedure is intended to measure drive axle pinion flanges with 1-piece U-joint yokes only, not bolt-on yokes.

If equipped with a system balanced flange, use the following procedure in System Balanced Flange. If equipped with a non-system balanced flange, use the second procedure in Non-System Balanced Flange below.

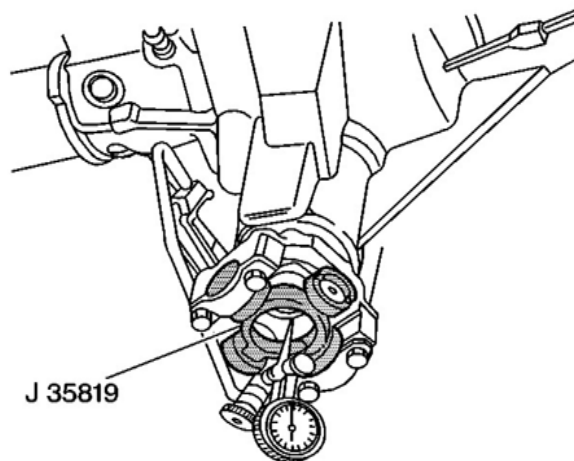
System Balanced Flange



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System balanced drive axles utilize a deflector design on the pinion flange that is able to hold system balance weights on its outside diameter.

1. Raise and support the vehicle with the wheels free to rotate. Refer to the Lifting and Jacking the Vehicle in SI.
2. Remove the propeller shaft from the pinion flange.



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3. Install the J-35819 Flange Runout Gauge to the pinion flange.
4. Assemble and install the GE-8001 Dial Indicator Set and the J-23409 Dial Indicator.

Note: The dial indicator will display inverted readings. You are measuring the inside diameter of the flange, not the outside diameter. The highest reading on the dial indicator is the low spot; the lowest reading is the high spot.

5. Rotate the pinion flange 360 degrees and zero the dial indicator on the low spot.
6. Rotate the pinion flange again and record the total runout.

Note: All runout measurement tolerances provided are to be used as guidelines. The measurement tolerances provided and their effect on vibration correction may vary for each vehicle.

7. If the system balanced pinion flange runout measurement is between 0.00-0.38 mm (0.00-0.015 in), the pinion flange is considered within acceptable runout limits.
8. If the system balanced pinion flange runout measurement exceeds 0.00-0.38 mm (0.00-0.015 in), the pinion flange must be re-indexed 180 degrees or replaced.

If the drive axle utilizes a crush-type sleeve to achieve pinion bearing preload, the pinion flange can only be removed and installed 1 time before the crush-type sleeve must be replaced. Sleeve replacement requires removal and installation of the ring and pinion gear set. If there is evidence that the pinion has been removed and installed previously, replace the sleeve.

9. If the pinion flange has been re-indexed, re-measure the pinion flange runout.
10. If the runout re-measurement of the re-indexed pinion flange still exceeds the tolerance guidelines, the pinion flange requires replacement.

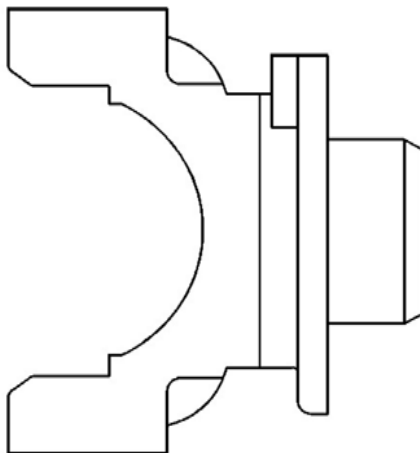
Note: Inspect the runout of any replacement pinion flange.

11. If the pinion flange was replaced, check the runout of the replacement pinion flange.

Note: If the pinion flange was re-indexed or replaced, the driveline **MUST** be system balanced.

12. If the pinion flange was re-indexed or replaced, system balance the driveline. Refer to the Driveline System Balance Adjustment (SI Document ID# 3753593) in SI.

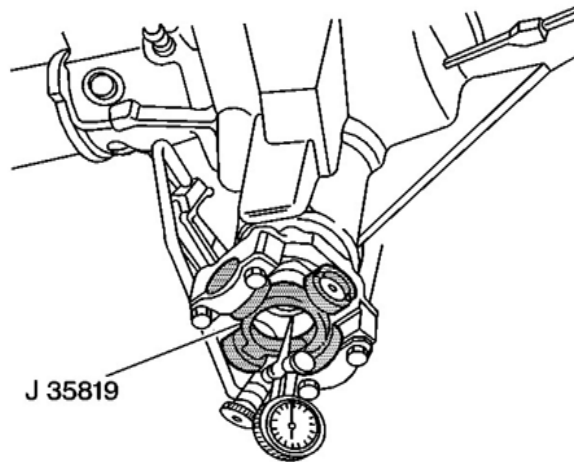
Non-System Balanced Flange



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Drive axles that are non-system balanced use a pinion flange dust slinger design that is able to hold a runout compensation weight on the face of the dust slinger.

1. Raise and support the vehicle with wheels free to rotate. Refer to the Lifting and Jacking the Vehicle in SI.
2. Remove the propeller shaft from the pinion flange.



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3. Install the J-35819 Flange Runout Gauge to the pinion flange.
4. Assemble and install the GE-8001 Dial Indicator Set and the J-23409 Dial Indicator Extension to the drive axle and to the J-35819 Flange Runout Gauge.

Note: The dial indicator will display inverted readings. You are measuring the inside diameter of the flange, not the outside diameter. The highest reading on the dial indicator is the low spot; the lowest reading is the high spot.

5. Rotate the pinion flange 360 degrees and zero the dial indicator on the low spot.
6. Rotate the pinion flange again and record the total runout.

Note: All runout measurement tolerances provided are to be used as guidelines. The measurement tolerances provided and their effect on vibration correction may vary for each vehicle.

7. If the pinion flange runout is 0.15 mm (0.006 in) or less, there should not be a runout compensation weight. If there is a compensation weight, remove the weight.
8. If the pinion flange runout is greater than 0.15 mm (0.006 in) but less than 0.28 mm (0.011 in) and the Run-out compensation weight is at or near the low spot, no further action is necessary. If the runout compensation weight is not at or near the low spot, remove the weight.
9. If the pinion flange runout is greater than 0.28 mm (0.011 in) but not greater than 0.38 mm (0.015 in) and the runout compensation weight is at or near the low spot, no further action is necessary. If the runout compensation weight is not at or near the low spot, remove the weight and re-index the pinion flange until the runout is 0.25 mm (0.010 in) or less.

Note: If the drive axle utilizes a crush-type sleeve to achieve pinion bearing preload, the pinion flange can only be removed and installed 1 time before the crush-type sleeve must be replaced. Sleeve replacement requires removal and installation of the ring and pinion gear set. If there is evidence that the pinion has been removed and installed previously, replace the sleeve.

10. If after re-indexing the pinion flange, it is not possible to achieve runout of 0.25 mm (0.010 in) or less, the pinion flange requires replacement.

Note: Inspect the runout of any replacement pinion flange.

11. If the pinion flange was replaced, check the runout of the replacement pinion flange.

Perform Balance Measurement using “Adjustment Procedure Using Oscilloscope” (PicoScope) (Refer to the SI Document ID# 3753593)

Specification	10 g-cm
Actual Measurement	

For vehicles that are out of balance, perform a system balance. Using the two hose clamp method, the best driveline balance results are obtained under 10 g-cm.

Suggestions:

1. Perform Runout Measurement.
2. Disassembly/reassembly rear yoke joint – checks for shift in u-joint.
3. Evaluation Drive.

4. Perform Runout Measurement.
5. Index 180.
6. Evaluation Drive.
7. Perform Run Out Measurement.
8. Evaluation Drive.
9. Balance Shaft with PicoScope.

Diagnostic Aid:



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- Inspect the propeller shaft for dents or damage. There have been many cases of dented propeller shafts.
- For 4WD Trucks, remove the rear propeller shaft, seal output shaft and drive the vehicle in 4WD. If the vibration is gone, the rear prop shaft could be the problem.
- For vehicles with a 3:08 with a one-piece steel shaft, this can be replaced with a one-piece aluminum one that is utilized on all 3:42 and 3:73 ratios (K15543 and K15753 Models only).
- PIP5140: Low Speed Vibration 30-35 mph (48-56 km/h).
- Inspect the transmission output shaft bushing for irregular wear.

Condition 3: 2nd Order Prop Shaft (Normally a launch shudder or left under hard acceleration)

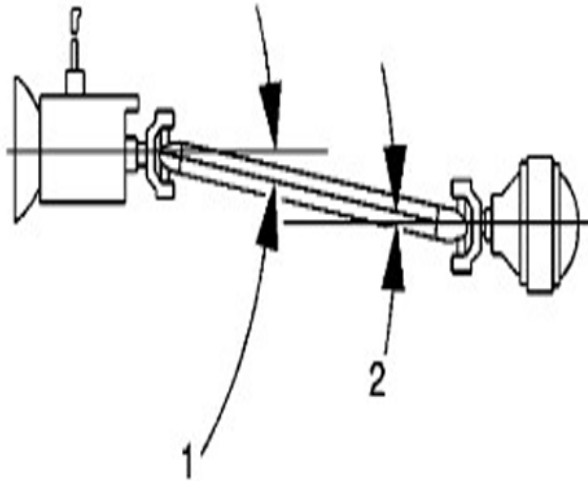
Note: Vehicle rear suspension must be properly supported during the Driveline Angle measurement process in order to record true Driveline Angle measurements.

Check Driveline Angles (Refer to SI Document ID# 2084724)

Suggestion:

1. Check Angle.
2. Disassembly/reassembly rear yoke – check for shift in u-joint.
3. Check Angle.
4. Evaluation Drive.

	Measurement	Notes:
Yoke to Shaft		The first (forward most) u-joint action on a two piece driveshaft system is not canceled out by another u-joint. Because of this, the first u-joint working angle should be between 0.5 and 0.75 degrees.
Front Shaft to Center Support Bearing (if equip)		U-joint pairs cancel each other. Neither u-joint working angle should exceed 4 degrees, nor the allowable range of difference between cancelling u-joint working angles is 0.00 to 1.0 degrees.
Shaft to Diff Yoke		



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Propeller systems containing only 1 u-joint: The u-joint working angle should be between 1/2 and 3/4 degrees. Allowable range of difference between cancelling u-joint working angles: 0.25 to 1.0 degrees.

Shimming

Important: This is only be used for trucks that have incorrect working angles.

Options:

1. Originally, trucks were built with a 14 mm spacers under the transfer case (4WD only). In some cases, reducing this shim to a 7 mm shim may correct the condition.
2. A 2 degree axle shim (P/N 23469809 – Qty 2) can be placed between the leaf spring pack and the axle perch. To rotate the pinion up to correct this; the “fat end” of the shim must face backwards, to the rear of the truck.

Center Support Bearing - Two Piece Propeller Only

Change center support bearing shim from 12 mm (0.47 in) to 6 mm (0.24 in) using washers or other means. (If replacing the propeller, the new one will come with 6 mm or 0.24 in shim).

Condition 4: 3rd Order Tire with 1st Order Prop

- 3rd Order Tire combined with 1st Order Prop. This type will create a phasing boom. Need to focus on the 1st Order Prop – condition above.

Condition 5: Vibration Felt in 4 Cyl Mode (AFM) – V6 Engine Only

Several customers have commented on a vibration felt in the steering wheel or seat during 4 Cylinder Active Fuel Management (AFM) operation. This can be noticed more at 64-72 km/h (40-45 mph) and by lightly accelerating to the point where the engine transitions to 6-cyl mode.

- This type of vibration can be the result of exhaust cross pipe ground out and/or cab mount ground out.

To repair this condition, the three-way catalytic converter settling procedure in PIP5228: Vibration During Active Fuel Management V4 Mode Operation 1200–1400 Engine RPM should be completed.

Condition 6: Vibration Felt at Idle Only

- Refer to the PIP5137A: Rough Idle or Vibration In Drive.

Other Sources of Vibrations

1. Exhaust resonance – PI1201A: Exhaust Rattle, Buzz, Pop or Whistle.
2. Pitchline runout – Pitchline runout will normally show as a 1st order tire vibration on the PicoScope. If after correcting tire(s) with excessive Road Force, a vibration exists, remove differential cover and check ring gear backlash. Every tooth should be checked for excessive backlash. If there is more than 0.0762 mm (0.003 in) of variation, the ring gear and/or differential should be replaced to correct the condition (SI Document ID# 3269088, 3620298) (PIP4148A).

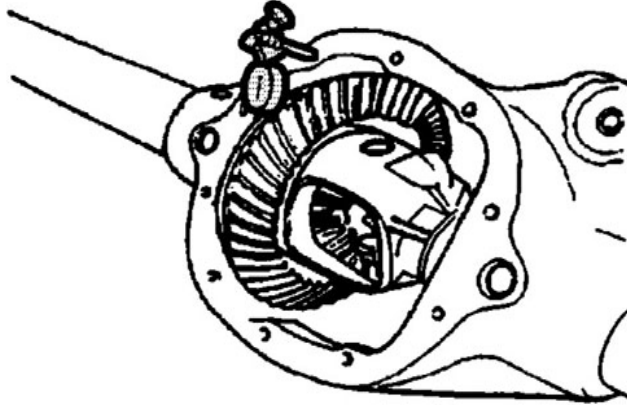
Backlash Adjustment Procedure

Special Tools:

- J-8001 Dial Indicator Set
- J-25025 Guide Pins

Note:

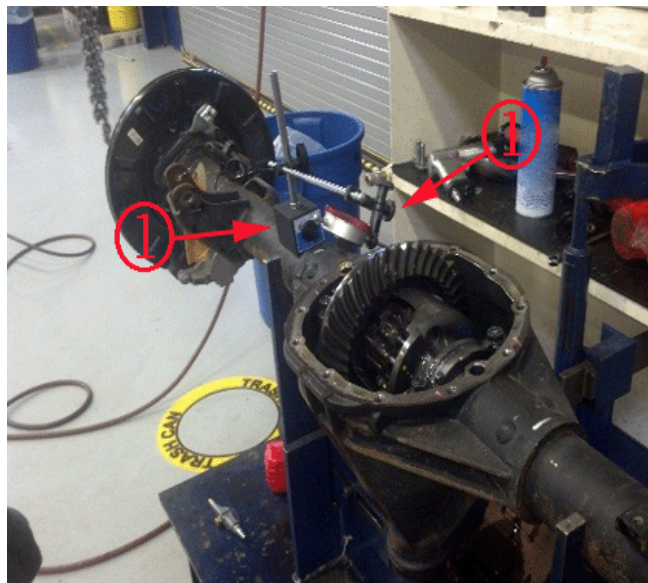
- Ensure that the side bearing surfaces in the axle housing are clean and free of burrs. If the original bearings are to be reused, the original bearing cups must also be used.
 - The differential side bearings must be initially preloaded in order to determine the backlash of the gear set. After the backlash is set, the final bearing preload is set.
 - Mark the bearing caps left or right sides.
1. Measure the rotating torque of the drive pinion and differential assembly. Refer to the Differential Drive Pinion Gear Bearing Replacement in SI.



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2. Install the J-25025 pins and the J-8001 indicator to the axle housing.

Note: Preload the dial of the J-8001-3 indicator approximately $\frac{3}{4}$ of a turn and zero the gauge.



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Note: The illustration above is for reference only. The differential does NOT need to be removed from the vehicle.

3. Set the J-8001-3 indicator (1) so that the stem is aligned with the gear rotation (1) and square to the tooth angle.
4. Hold the drive pinion stationary and move the ring gear back and forth.
5. Repeat the measuring procedure at **each tooth** around the ring gear.
6. The difference between the backlash at all of the measuring points should not vary by more than 0.05 mm (0.002 in).
7. If the difference between the backlash at all of the measuring points varies by more than 0.05 mm (0.002 in), inspect for burrs, a distorted case flange or uneven bolting.

8. If the difference between all the measuring points is within specifications, the backlash at the minimum lash point measured should be 0.08-0.25 mm (0.003-0.010 in) with a preferred backlash of 0.13-0.18 mm (0.005-0.007 in).

Note:

- Increasing or decreasing the shim thickness by 0.05 mm (0.002 in) will change the backlash adjustment approximately 0.03 mm (0.001 in).
- If the backlash is less than, select a smaller shim than the one that was removed. For example, to INCREASE the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thinner than the shim that was removed.
- If the backlash is larger than, select a larger shim than the one that was removed. For example, to DECREASE the backlash by 0.05 mm (0.002 in), select a shim that is 0.10 mm (0.004 in) thicker than the shim that was removed.

9. Install the selected shim.

Caution: Use the correct fastener in the correct location. Replacement fasteners must be the correct part number for that application. Do not use paints, lubricants, or corrosion inhibitors on fasteners, or fastener joint surfaces, unless specified. These coatings affect fastener torque and joint clamping force and may damage the fastener. Use the correct tightening sequence and specifications when installing fasteners in order to avoid damage to parts and systems. When using fasteners that are threaded directly into plastic, use extreme care not to strip the mating plastic part(s). Use hand tools only, and do not use any kind of impact or power tools. Fastener should be hand tightened, fully seated, and not stripped.

10. If the backlash is too small, increase the backlash using the following procedure:

- 10.1. Remove the bearing cap bolts and the bearing caps.

Note: Mark the bearing cups and the shims left or right.

- 10.2. Remove the differential case assembly with the bearing cups and the shims.

Note: Measure the production shim or the shim and service spacer in 3 locations.

Measure each shim separately.

- 10.3. Measure the thickness of left side shim pack.

Note: If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness from the left side shim pack.

- 10.4. Calculate the average of the 3 measurements for each shim.

Note: If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness from the left side shim pack.

- 10.5. Assemble a new left side shim pack by decreasing the appropriate amount of thickness from the original left side shim pack.

Note: Measure each shim separately.

- 10.6. Measure the thickness of right side shim or the shim and service spacer in 3 locations.

Note: Add the average of each of the shim measurements together. Record the measurement. This is the thickness for the right side shim pack.

- 10.7. Calculate the average of the 3 measurements for each shim.

- 10.8. Assemble a new right side shim pack by increasing the appropriate amount of thickness to the original right side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), add 0.10 mm (0.004 in) of thickness to the right side shim pack.

11. Use the following procedure to decrease the backlash if the backlash is too large:

- 11.1. Remove the bearing cap bolts and the bearing caps.

Note: Mark the bearing cups and the shims left or right.

- 11.2. Remove the differential case assembly with the bearing cups and the shims.

Note: Measure the production shim or the shim and service spacer in 3 locations. Measure each shim separately.

- 11.3. Measure the thickness of left side shim pack.

Note: Add the average of each of the shim measurements together. Record the measurement. This is the thickness for the left side shim pack.

- 11.4. Calculate the average of the 3 measurements for each shim.

- 11.5. Assemble a new left side shim pack by increasing the appropriate amount of thickness to the original left side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to increase the backlash by 0.05 mm (0.002 in), add 0.10 mm (0.004 in) of thickness to the left side shim pack.

Note: Measure the shim or the shim and service spacer in 3 locations. Measure each shim separately.

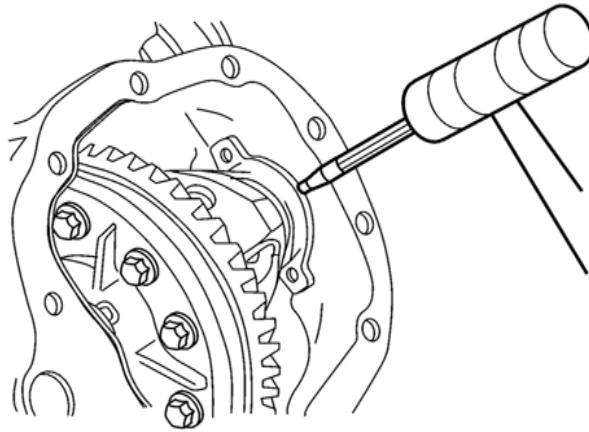
- 11.6. Measure the thickness of right side shim pack.

Note: Add the average of each of the shim measurements together. Record the measurement. This is the thickness for the right side shim pack.

- 11.7. Calculate the average of the 3 measurements for each shim.

- 11.8. Assemble a new right side shim pack by decreasing the appropriate amount of thickness to the original right side shim pack. If the original shim is cast iron production shim, assemble the shim pack using a service spacer and service shims. For example, to decrease the backlash by 0.05 mm (0.002 in), remove 0.10 mm (0.004 in) of thickness to the right side shim pack.

12. Install the differential case assembly with the bearing cups.
13. Install the left side service shims between the axle housing and the differential case.
14. Install the right side service shims between the axle housing and the differential case.



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Note: The service spacers must be installed between the service shim(s) and the axle housing.

15. Using the brass drift for 9.5/9.76 axle, install the left side service spacer.
16. Recheck the backlash and adjust, if necessary.
17. Install the bearing caps and bolts and tighten to 85 Nm (63 lb ft).
18. Recheck the backlash and adjust, if necessary.
19. Once backlash is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to the Gear Tooth Contact Pattern Inspection in SI.

Note: Recheck the backlash following the steps above to verify that the backlash is within specifications.

20. Tighten the differential bearing cap bolts to 85 Nm (63 lb ft).
21. Measure the drive pinion and differential case side bearing preload and adjust, if necessary following the steps above.
22. Once the backlash and bearing preload is correct, perform a gear tooth contact pattern check in order to ensure proper alignment between the ring and pinion gears. Refer to the Gear Tooth Contact Pattern Inspection in SI.

Once all areas of vibrations has been reduced, if there is still vibration that the customer is concerned about, the following diagnosis maybe helpful to determine if a shock issue exists.

Warning: *The following items should NOT be utilized until the source of the problem has been corrected.*

Potential Vibration/Rough Ride:

Condition/Concern

The shock issues below DO NOT cause a vibration, it will only make an existing vibration feel worse. In some cases, a vibration that would not normally be a customer concern may now be felt due to a bad shock. But in general, the original source of the vibration, whether it is the wheels, tires, propeller shaft, etc, will have to be corrected. When

diagnosing a vibration issue, there have been reports of the shocks amplifying the vibration felt inside the truck. Engineering has found that some shocks may have been built with contaminated shock oil. This may cause the shocks to dampen incorrectly.

This only applies to the following shocks:

- Rear- Only trucks listed with the Z71 option (RPO Z71, these shocks will be white in color)

Recommendation/Instructions:

Two checks are needed to be performed to verify if the shocks could be an issue:

1. Check the date code located on the bottom of the shock. The first 8 digits are the GM part number. The next 5 digits are the supplier part number. The last 5 digits will be the date code. Any shock built before A1474 could have an issue. The date code format is as follows: 1st digit is the plant, next 3 digits are the day of the year and the last digit is the last number of the year.

Example:

- A1474
- A = Plant
- 147 = 147th Day of the Year
- 4 = 2014

2. If the rear shocks are built before this date code, they will have to be removed for a dynamic test.

Dynamic Test (Rear Shock – Z71 option only)

Starting with a fully extended shock, compress the rod taking notice of the first 10 millimeters of travel. A good shock will not have any free play and there will be immediate resistance to being compressed. A shock with an issue will have several millimeters of free play (no resistance) before feeling the resistance from being compressed. Replace any shocks with excessive free play. In most cases, the rear shocks will be the issue.

Warranty Information

For vehicles repaired under warranty, use:

Labor Operation	Description	Labor Time
8080108*	Perform Road Force Measurement	0.9 hr
	Add time to vector each tire correction (Before and after Road force number should be noted on Vibration worksheet)	0.2 hr
3080088*	Perform Prop Shaft Measurement and Balance (two hose clamp method)	0.8 hr
8060420	Replace Tire(s)	Use Published Labor Operation Time
8033641	Front Shock Absorber, Shock Absorber Component, or Spring Replacement - Both Sides	1.2 hrs
8044751	Rear Shock Absorber Replacement - Both Sides	0.7 hr
*This is a unique Labor Operation for Bulletin use only. It will not be published in the Labor Time Guide.		

Vibration Diagnostic Worksheet

Vibration Felt In:			
Seat:		Steering Wheel:	
Complaint Speed:		Other:	
VIN:		Year:	
Model:		Symptom:	
Engine:		Engine Speed:	
Tire Brand:		Tire Size:	
Axle Ratio:		Gear:	
TPC Spec:			
Primary			
Frequency:		Type (circle): T1 T2 T3 E1 E4 P1 P2	
		Other:	
Measurement of vibration is M/g's (# of runs? Peak, Average, and Avg of Peaks?)			
Source of Vibration (Based PICO)			
Secondary			
Frequency:		Type (circle): T1 T2 T3 E1 E4 P1 P2	
		Other:	
Measurement of vibration is M/g's (# of runs? Peak, Average, and Avg of Peaks?)			
Source of Vibration (Based PICO)			

Condition 1: Road-Force measurements

Before Repairs		
	Ounces	Road Force (Lbs)
Right Front		
Left Front		
Right Rear		
Left Rear		
After Repairs		
	Ounces	Road Force (Lbs)
Right Front		
Left Front		
Right Rear		
Left Rear		