

2008 Ford Mustang

2008 GENERAL INFORMATION Driveline System - General Information - Mustang

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SPECIFICATIONS

Material

Item	Specification	Fill Capacity
Additive Friction Modifier XL-3 (US); CXL-3 (Canada)	EST-M2C118-A	118 ml (4 oz.)
Motorcraft SAE 75W-140 Synthetic Rear Axle Lubricant XY-75W140-QL (US); CXY-75W140-1L (Canada)	WSL-M2C192-A	8.8-in rear axle ^a
Motorcraft SAE 80W-90 Premium Rear Axle Lubricant XY-80W90-QL (US); CXY-80W90-1L (Canada)	WSP-M2C197-A	7.5-in rear axle ^b
Premium Long-Life Grease XG-1-C or XG-1-K (US); CXG-1-C (Canada)	ESA-M1C75-B	-

^a Service refill capacities are determined by filling the axle to the bottom of the filler hole. The vehicle must be on a level surface.

^b Service refill capacities are determined by filling the axle 11.1-12.7 mm (0.4375-0.515 in) below the bottom of the filler hole. The vehicle must be on a level surface.

GENERAL SPECIFICATIONS

Item	Specification
Maximum driveshaft runout	0.89 mm (0.035 in)
Maximum flange runout	0.25 mm (0.009 in)
Minimum rotational torque (Traction-Lok®)	27 Nm (20 lb-ft)

DESCRIPTION AND OPERATION

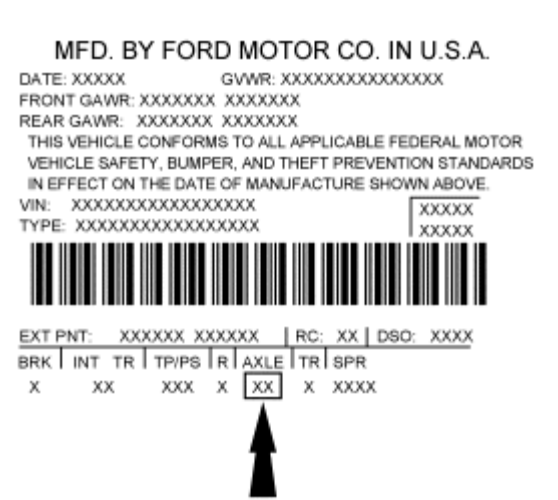
DRIVELINE SYSTEM

The driveline system consists of the following components:

- Rear drive axles with varying diameter ring gears and differential designs
- One-piece rear driveshaft with 2 U-joints and a front slip yoke or flange
- Two-piece rear driveshaft with a CV joint and a center support bearing
- Conventional axle - Ford 7.5-in ring gear
- Conventional axle - Ford 8.8-in rear axle
- Limited slip axle - Ford 8.8-in rear axle

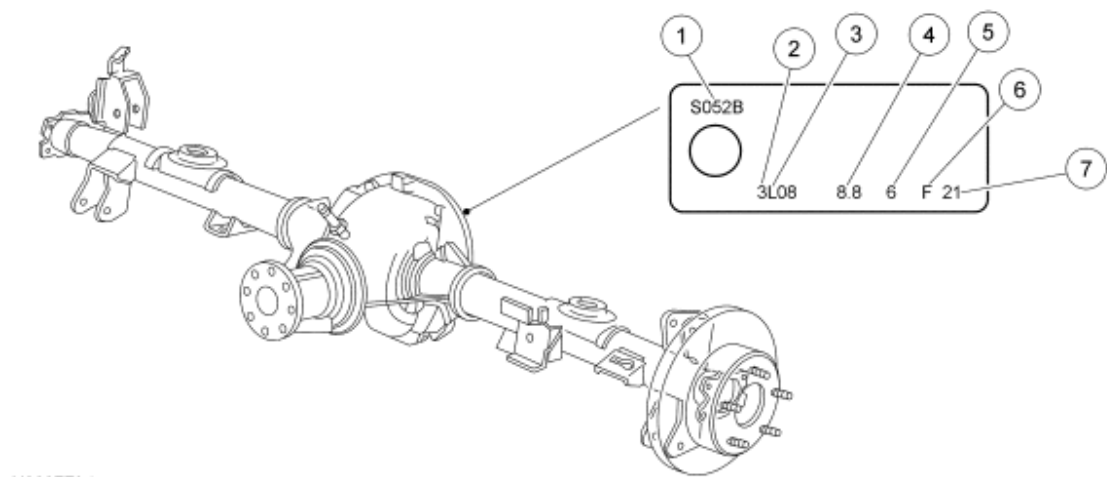
The source of the drivetrain's power is generated by the engine and delivered to the transmission. The driveline transfers the engine torque through the driveshaft to the axle. The driveshaft is connected to the output shaft of the transmission and to the axle. Vehicles with 4.0L engines use U-joints at both ends of the driveshaft to allow for angular motion. A slip-in-tube driveshaft is used to allow for any changes to the length of the driveshaft. Vehicles with 4.6L or 5.4L engines use a CV joint in the rear of the driveshaft and a U-joint in the front. A center bearing and the CV joint allow for length changes to the driveshaft. The engine torque enters the axle through the drive pinion, which rotates the ring gear. The ring gear is mounted to the differential case, which contains the gears that transmit power to the axle shafts. These shafts rotate the drive wheels.

The Vehicle Certification (VC) label is located in the driver door jamb. The axle code is on the VC label. Refer to **IDENTIFICATION CODES** article.



DY0190-B

Fig. 1: Vehicle Certification (VC) Label Example
Courtesy of FORD MOTOR CO.



N0037734

Fig. 2: Rear Axle Identification Label
 Courtesy of FORD MOTOR CO.

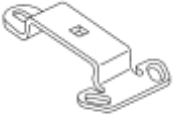
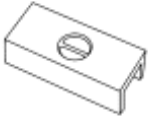
Item	Description
1	Plant code
2	Axle ratio
3	Denotes Traction-Lok®
4	Ring gear diameter (inch)
5	Build year
6	Build month
7	Build day

DIAGNOSTIC TESTS

DRIVELINE SYSTEM

Special Tools

Illustration	Tool Name	Tool Number
 ST1268-A	Clamp Plate, Driveshaft	205-320 (T92L-4851-C)
 ST2634-A	Dial Indicator Gauge with Holding Fixture	100-D002 (D78P-4201-B) or equivalent

 ST1863-A	Gauge, Differential (Traction-Lok®)	205-385 (T97T-4205-B)
 ST1254-A	Runout Gauge, Drive Pinion Flange	205-319 (T92L-4851-B)

Principles of Operation

The driveline system enables the power generated by the engine and transferred through the transmission to place the vehicle in motion. Rotational torque received from the transmission is delivered to the rear drive axle by way of the driveshaft. The U-joints or CV joints at the ends of the shafts allow the shafts to rotate smoothly in an allowable angle plane. The rotational torque is introduced into the axle drive pinion which drives the differential ring gear. The ring gear is bolted to the differential case flange on the differential. The differential divides the torque between the right and left axle shaft while permitting the axle shafts to turn at different speeds when required, such as when cornering.

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical damage.

VISUAL INSPECTION CHART

Mechanical
• U-joints • CV joints • Center bearings • Driveshaft tubes • Mounting brackets • Flanges • Housing and cover damage • Differential bearings • Differential gear sets • Pinion bearings

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and Go to **Symptom Chart - Driveline** or Go to

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Symptom Chart - NVH.

Symptom Chart - Driveline

Symptom Chart - Driveline

Condition	Possible Sources	Action
• Traction-Lok® does not work in snow, mud or on ice	• Differential	• CARRY OUT the <u>TRACTION-LOK® Differential Operation Check</u>. REPAIR as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article.
• Lubricant leaking from the pinion seal, axle shaft oil seals or support arm to the housing	• Vent • Damage in the seal contact area or dust slinger on the pinion flange dust shield	• CLEAN the axle housing vent. • INSTALL a new pinion flange and the pinion seal if damage is found.
• Differential side gears/pinion gears are scored • Axle overheating	• Insufficient lubrication • Incorrect or contaminated lubricant type • Lubricant level too low • Incorrect or contaminated lubrication type • Bearing preload adjusted too tight • Excessive gear wear	• INSTALL new gears. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. FILL the axle to specification. • INSTALL new gears. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. CLEAN and REFILL the axle to specification. • CHECK the lubricant level. FILL the axle to specification. • INSPECT the axle for damage. REPAIR as necessary. CLEAN and REFILL the axle to specification. • CHECK the ring and pinion for damage. INSPECT the ring and pinion wear pattern. ADJUST the preload as necessary. • INSPECT all the axle gears for wear or damage. INSTALL new components as necessary. • INSPECT the ring gear for scoring.

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	Incorrect ring gear backlash	INSPECT the ring and pinion wear pattern. ADJUST the ring gear backlash as necessary.
Broken gear teeth on the ring gear or pinion	Overloading the vehicle	INSTALL a new ring and pinion. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article.

Symptom Chart - NVH

NOTE: NVH symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, refer to **NOISE, VIBRATION AND HARSHNESS** article. Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system for the symptom, refer back to **NOISE, VIBRATION AND HARSHNESS** article for the next likely system and continue diagnosis.

Symptom Chart - NVH

Condition	Possible Sources	Action
Axle howling or whine	- Axle lubricant low - Axle housing damage - Damaged or worn wheel hub bearings	- CHECK the lubricant level. FILL the axle to specification. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. - INSPECT the axle housing for damage. REPAIR or INSTALL a new axle as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. - CHECK for abnormal wheel hub bearing play or roughness. REFER to <u>FRONT SUSPENSION</u> article or <u>REAR SUSPENSION</u> article. - INSPECT and INSTALL a new

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• Driveline clunk - loud clunk when shifting from REVERSE to DRIVE	• Damaged or worn differential ring and pinion • Damaged or worn differential side or pinion bearings • Incorrect axle lubricant level • Excessive backlash in the axle • Damaged or worn pinion bearings • Damaged or worn U-joints	differential ring and pinion as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • INSPECT and INSTALL new differential side or pinion bearings as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • CHECK the lubricant level. FILL the axle to specification. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • CHECK the axle backlash. REPAIR as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • REPAIR or INSTALL new pinion bearings as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • INSPECT the U-joints for wear or damage. INSTALL new U-joints or driveshaft as necessary. REFER to <u>DRIVESHAFT</u> article.
• Driveline clunk - occurs as the vehicle starts to move	• Worn driveshaft CV joint or U-joints	• INSPECT the CV joint and U-joints for a worn condition. INSTALL a new driveshaft or U-joints as

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forward following a stop • High pitched chattering - noise from the axle when the vehicle is turning • Buzz - buzzing noise is the same at cruise or coast/deceleration	with excessive play • Loose axle mount • Incorrect or contaminated lubricant • Damaged or worn differential (differential side gears and pinion gears) • Incorrect driveline angles	necessary. REFER to <u>DRIVESHAFT</u> article. • CHECK the axle for loose bolts. TIGHTEN to specification. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • CHECK the vehicle by driving in tight circles (5 clockwise, 5 counterclockwise). FLUSH and REFILL with the specified rear axle lubricant and friction modifier as necessary. • REPAIR or INSTALL new differential side gears or pinion gears as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • CHECK for correct driveline angles. REPAIR as necessary. REFER to <u>Driveline Angle Measurement</u>.
• Rumble or boom - noise occurs at coast/deceleration, usually driveshaft speed-related and noticeable over a wide range of speeds • Grunting - normally associated with a shudder experienced during acceleration from a complete stop	• Driveshaft is out-of-balance • U-joints are binding or seized • Driveshaft CV joint binding	• CHECK the driveshaft for damage, missing balance weights or undercoating. REFER to <u>Driveshaft Runout and Balancing</u>. • ROTATE the driveshaft and CHECK for rough operation or seized U-joints. INSTALL new U-joints or driveshaft as necessary. REFER to <u>DRIVESHAFT</u> article. • CLEAN the CV joint and INSTALL a new driveshaft as necessary. REFER to <u>DRIVESHAFT</u> article. • INSPECT the rear suspension and

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Howl - can occur at various speeds and driving conditions. Affected by acceleration and deceleration	- Loose axle mount bolts or suspension fasteners - Incorrect ring and pinion contact, incorrect bearing preload or gear damage	axle. TIGHTEN the fasteners to specification. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. INSPECT and REPAIR as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article.
Chuckle - heard at coast/deceleration. Also described as a knock	Incorrect ring and pinion contact or damaged teeth on the coast side of the ring and pinion	INSPECT and REPAIR as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article.
Knock - noise occurs at various speeds. Not affected by acceleration or deceleration	Gear tooth damage to the drive side of the ring and pinion	INSTALL a new ring and pinion. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article.
Scraping noise - a continuous low pitched noise starting at low speeds	Worn or damaged pinion bearings	INSPECT and REPAIR or INSTALL new pinion bearings. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article.
Driveline shudder - occurs during acceleration from a slow speed or stop	Drive axle assembly mispositioned	CHECK the axle mounts and the rear suspension for damage or wear. REPAIR as necessary. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article.

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	• Loose axle bolts • Driveline angles out of specification • U-joints binding or seized • Binding or damaged driveshaft CV joint	• CHECK the axle for loose bolts. TIGHTEN the bolts to specification. REFER to <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR</u> article or <u>REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR</u> article. • CHECK for correct driveline angles. REFER to <u>Driveline Angle Measurement</u>. • ROTATE the driveshaft and CHECK for rough operation or seized U-joints. INSTALL new U-joints or driveshaft as necessary. REFER to <u>DRIVESHAFT</u> article. • INSPECT the driveshaft CV joint and coupling shaft for wear or damage. INSTALL a new driveshaft as necessary. REPAIR as necessary. REFER to <u>DRIVESHAFT</u> article.
• Driveline vibration - occurs at cruising speeds	• Worn U-joints • Worn or damaged driveshaft center bearing support • Loose axle pinion flange bolts • Excessive axle pinion flange runout • Driveshaft is out-of-balance	• CHECK for wear or incorrect seating. INSTALL new U-joints or driveshaft as necessary. REFER to <u>DRIVESHAFT</u> article. • CHECK the insulator for damage or wear. ROTATE the driveshaft and CHECK for rough operation. INSTALL a new driveshaft as necessary. REFER to <u>DRIVESHAFT</u> article. • INSPECT the axle pinion flange. TIGHTEN the pinion flange bolts to specification. REFER to <u>DRIVESHAFT</u> article. • CARRY OUT a runout check. REPAIR as necessary. REFER to <u>Component Tests</u>. • CHECK the driveshaft for damage, missing balance weights or undercoating. CHECK the driveshaft balance. CARRY OUT a driveline vibration test. REFER to <u>Driveshaft Runout and Balancing</u>.

	• Binding or damaged driveshaft CV joint • Excessive driveshaft runout • Driveline angles out of specification	• INSPECT the driveshaft CV joint for wear or damage. INSTALL a new driveshaft as necessary. REFER to <u>DRIVESHAFT</u> article. • CARRY OUT a runout check. REFER to <u>Driveshaft Runout and Balancing</u>. • CHECK for correct driveline angles. REPAIR as necessary. REFER to <u>Driveline Angle Measurement</u>.
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Analysis of Leakage

Clean up the leaking area enough to identify the exact source.

A plugged axle housing vent can cause excessive pinion seal lip wear due to internal pressure buildup.

Verify the lubricant level is at specification.

Axle Vent

A plugged vent will cause excessive seal lip wear due to internal pressure buildup. If a leak occurs, check the vent. If the vent cannot be cleared, install a new vent.

Drive Pinion Seal

Leaks at the drive pinion seal originate from the following causes:

- Damaged seal
- Worn seal journal surface

Any damage to the seal bore (dings, dents, gouges or other imperfections) distorts the seal casing and allows leakage past the outer edge of the drive pinion seal.

The drive pinion seal can be torn, cut or gouged if it is not installed correctly. The spring that holds the drive pinion seal against the pinion flange may be knocked out and allow fluid to pass the lip.

Metal chips trapped at the sealing lip can cause oil leaks. These can cause a wear groove on the drive pinion flange and result in pinion seal wear.

When a seal leak occurs, install a new drive pinion seal and check the vent to make sure it is clean and free of foreign material.

A new drive pinion flange must be installed if any of these conditions exist.

Drive Pinion Nut

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NOTE: Install the drive pinion nut to the correct torque specifications or damage to the differential components may occur.

On some high-mileage vehicles, oil may leak through the threads of the drive pinion nut. This condition can be corrected by installing a new nut and applying threadlock and sealer on the threads and nut face.

Differential Seals

NOTE: When installing shafts, do not allow splines to contact seals during installation or damage to the seals may occur.

Axle shaft housing seals are susceptible to the same types of damage as drive pinion seals if incorrectly installed. The seal bore must be clean and the lip handled carefully to avoid cutting or tearing it. The seal journal surface must be free of nicks, gouges and rough surface texture.

For information on differential seals, refer to [REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR](#) article or [REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR](#) article.

Component Tests

Traction-Lok® Differential Operation Check

A Traction-Lok® differential can be checked for correct operation without removing it from the rear axle housing.

Raise and remove only one rear wheel. Install the Differential Gauge on the wheel bolts.

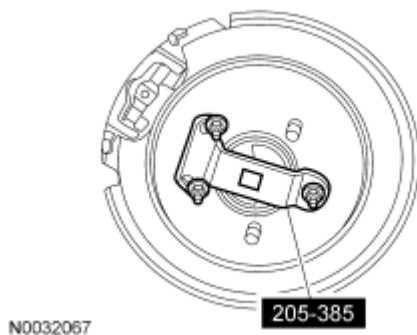
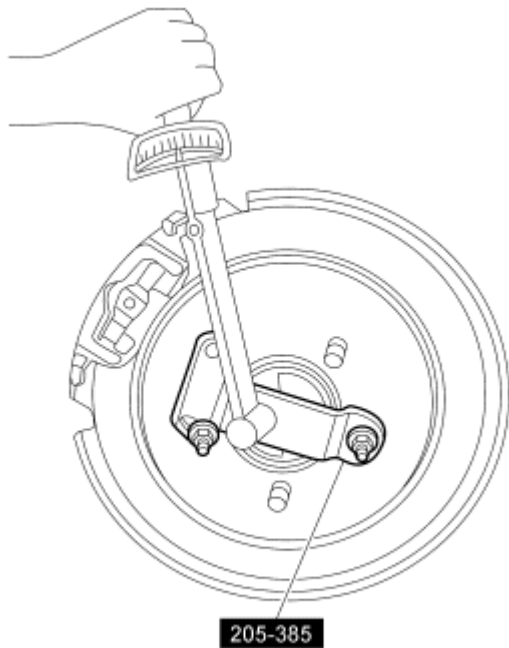


Fig. 3: Installing Special Tool (205-385) On Wheel Bolts
Courtesy of FORD MOTOR CO.

Use a torque wrench with the capacity of at least 271 N.m (200 lb-ft) to rotate the axle shaft. Make sure that the transmission is in NEUTRAL, and that one rear wheel is on the floor while the other rear wheel is raised off the floor. The breakaway torque required to start rotation must be at least 27 N.m (20 lb-ft). The initial breakaway torque may be higher than the continuous turning torque.



N0032068

Fig. 4: Rotating Axle Shaft
Courtesy of FORD MOTOR CO.

The axle shaft must turn with even pressure throughout the check without slipping or binding. If the torque reading is less than specified, check the differential case for incorrect assembly.

Traction-Lok® Differential Check Road Test

1. Place one wheel on a dry surface and the other wheel on ice, mud or snow.
2. Gradually open the throttle to obtain maximum traction prior to break away. The ability to move the vehicle demonstrates correct performance of a Traction-Lok® rear axle assembly.
3. When starting with one wheel on an excessively slippery surface, a slight application of the parking brake may be necessary to help energize the Traction-Lok® feature of the differential. Release the brake when traction is established. Use light throttle on starting to provide maximum traction.
4. If, with unequal traction, both wheels slip, the limited slip rear axle has done all it can possibly do.
5. In extreme cases of differences in traction, the wheel with the least traction may spin after the Traction-Lok® has transferred as much torque as possible to the non-slipping wheel.

Pinion Flange Runout Check - Circular

NOTE: Pinion bearing preload must be reset if the pinion nut has been loosened or removed for pinion flange reindexing or replacement or damage to the component may occur.

1. Raise the vehicle on a twin-post hoist that supports the rear axle.

2. Remove the driveshaft. Refer to **DRIVESHAFT** article.
3. Check the pinion flange for damage.

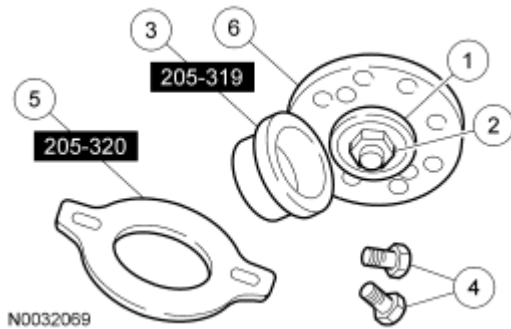


Fig. 5: Identifying Pinion Flange Runout Check Tools
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Pilot (part of 205-319) (T92L-4851-B)
2	354845	Pinion nut
3	205-319	Runout Gauge, Drive Pinion Flange (T92L- 4851-B)
4	-	Bolts (2 required) (part of 205-320) (T92L-4851-C)
5	205-320	Clamp Plate, Driveshaft (T92L-4851-C)
6	4851	Pinion flange

4. Position the Drive Pinion Flange Runout Gauge and Driveshaft Clamp Plate onto the pinion flange.

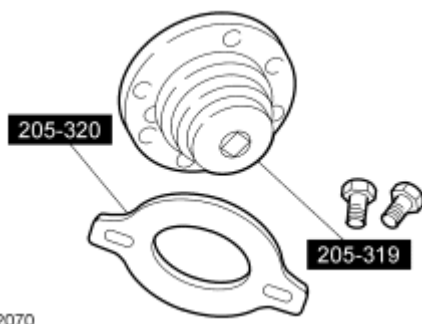


Fig. 6: Identifying Clamp Plate
Courtesy of FORD MOTOR CO.

5. Align the holes on the Driveshaft Clamp Plate with the holes in the pinion flange and install the bolts. Snug the bolts evenly.

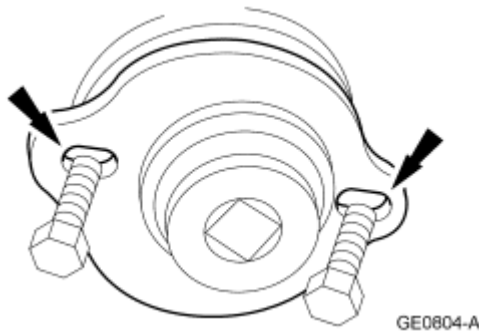


Fig. 7: Aligning Clamp Plate Holes
Courtesy of FORD MOTOR CO.

6. Position the Dial Indicator Gauge with Holding Fixture as shown. Turn the Drive Pinion Flange Runout Gauge and locate and mark the high spot on the pinion flange with yellow paint.

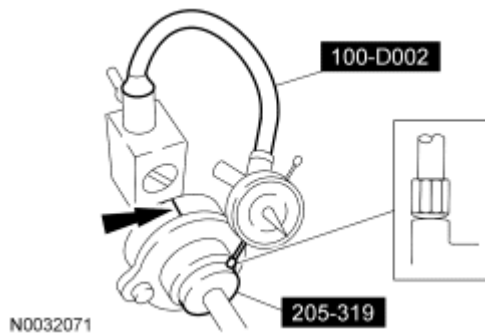


Fig. 8: Marking High Spot On Pinion Flange
Courtesy of FORD MOTOR CO.

If the flange runout exceeds 0.25 mm (0.010 in), remove the pinion flange, reindex the flange one-half turn on the pinion, and reinstall it. Refer to **REAR DRIVE AXLE/DIFFERENTIAL - FORD 7.5-INCH RING GEAR** article or **REAR DRIVE AXLE/DIFFERENTIAL - FORD 8.8-INCH RING GEAR** article for the flange removal and installation procedures.

7. Check the runout again. If necessary, rotate the flange until an acceptable runout is obtained. If the flange runout is still more than 0.25 mm (0.010 in), install a new pinion flange.

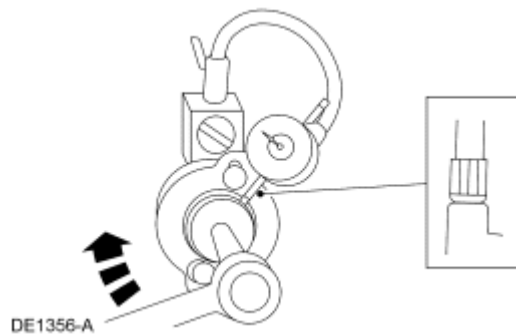


Fig. 9: Checking Runout
Courtesy of FORD MOTOR CO.

8. If excessive runout is still evident after replacement of the pinion flange, install a new ring and pinion. Repeat the above checks until the runout is within specifications.
9. Install the driveshaft. Refer to **DRIVESHAFT** article.

Tooth Contact Pattern Check - Gearset

1. To check the gear tooth contact, paint the gear teeth with the special marking compound. A mixture that is too wet will run and smear; a mixture that is too dry cannot be pressed out from between the teeth.
2. Use a box wrench on the ring gear bolts as a lever to rotate the ring gear several complete revolutions in both directions or until a clear tooth contact pattern is obtained.
3. Certain types of gear tooth contact patterns on the ring gear indicate incorrect adjustment. Incorrect adjustment can be corrected by readjusting the ring gear or the pinion.

Contact Pattern Location

In general, desirable ring gear tooth patterns must have the following characteristics:

- Drive pattern on the drive side ring gear well centered on the tooth.
- Coast pattern on the coast side ring gear well centered on the tooth.
- Clearance between the pattern and the top of the tooth.
- No hard lines where the pressure is high.

Acceptable ring gear tooth patterns for all axles.



GE0807-A

Fig. 10: Identifying Acceptable Ring Gear Tooth Pattern
Courtesy of FORD MOTOR CO.

Correct backlash with a thinner pinion position shim required.



GE0808-A

Fig. 11: Identifying Thinner Pinion Position Shim Required
Courtesy of FORD MOTOR CO.

Correct backlash with a thicker pinion position shim required.



GE0809-A

Fig. 12: Identifying Thicker Pinion Position Shim Required
Courtesy of FORD MOTOR CO.

Correct pinion position shim that requires a decrease in backlash.



GE0810-A

Fig. 13: Identifying Required Decrease In Backlash
Courtesy of FORD MOTOR CO.

Correct pinion position shim that requires an increase in backlash.



GE0811-A

Fig. 14: Identifying Required Increase In Backlash
Courtesy of FORD MOTOR CO.

GENERAL PROCEDURES

DRIVELINE ANGLE MEASUREMENT

Special Tools

Illustration	Tool Name	Tool Number
	Anglemaster II Driveline Inclinometer/Protractor	164-R2402 or equivalent

NOTE: This procedure does not apply to CV joints, flex couplers or double cardan joints that are used in some driveshafts. This check is for single-cross and roller-style joints found in the driveshaft.

NOTE: Prior to checking driveline angularity, inspect the U-joints for correct operation.

- NOTE:** An incorrect driveline angle can cause a vibration or shudder. For additional information, refer to **NOISE, VIBRATION AND HARSHNESS** article.
- NOTE:** Driveline angularity is the angular relationship between the engine crankshaft, the driveshaft and the rear axle pinion. Factors determining driveline angularity include ride height, rear spring and engine mounts.

All vehicles

1. Carry out the following preliminary setup steps:
 - Inspect the U-joints for correct operation.
 - Park the vehicle on a level surface such as a drive-on hoist, or back onto a front end alignment rack.
 - Verify the curb position ride height is within specifications with the vehicle unloaded and all of the tires are inflated to their normal operating pressures.
 - Calibrate the Anglemaster II Driveline Inclinometer/Protractor by placing it on a clean, flat level section of the frame rail and press the ALT-ZERO button.

Vehicles with flat-flanged, split-pin or slip-flanged U-joints

- NOTE:** If equipped, remove the snap ring to allow access to the base of the U-joint cup. Make sure the Anglemaster II Driveline Inclinometer/Protractor is seated against the U-joint cup.
- NOTE:** Rotate the driveshaft until the flange U-joint cup is parallel with the floor. This will simplify taking measurements.
2. To check the U-joint operating angle, install the Anglemaster II Driveline Inclinometer/Protractor. Check and record the flange angle as angle A.

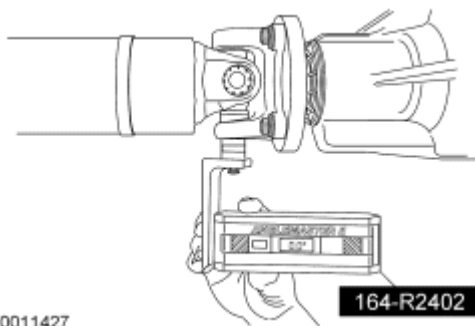


Fig. 15: Checking Flange Angle (1 Of 2)
Courtesy of FORD MOTOR CO.

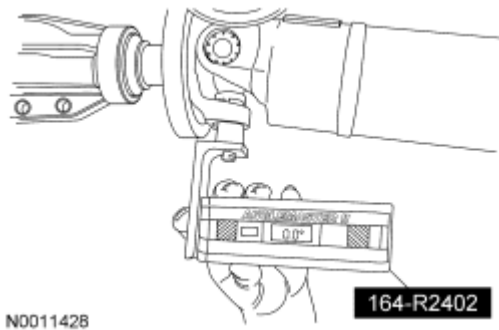


Fig. 16: Checking Flange Angle (2 Of 2)
Courtesy of FORD MOTOR CO.

3. Using the Anglemaster II Driveline Inclinator/Protractor, measure the slope of the connecting component. Record the measurements of the component's angle as angle B.

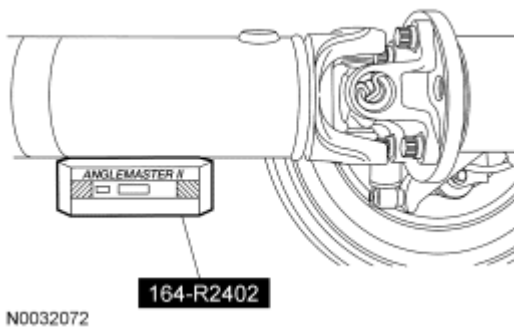


Fig. 17: Checking Driveshaft Angle
Courtesy of FORD MOTOR CO.

Multiple piece driveshaft

NOTE: Repeat this step for each center support bearing on the driveshaft.

NOTE: It is not necessary to remove the U-joint snap ring, if equipped, for these measurements.

4. Using the Anglemaster II Driveline Inclinator/Protractor, measure the slope of the components in front and behind the center support bearing U-joint in the area indicated. Record the front component as angle A and the rear component as angle B.

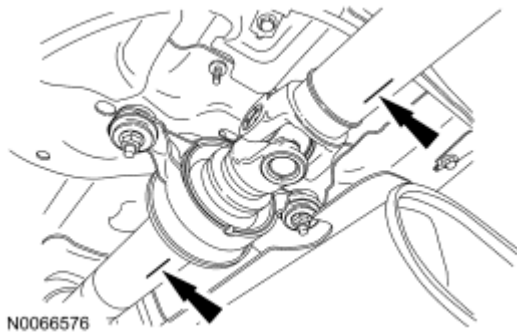


Fig. 18: Locating Index Mark On Driveshaft
Courtesy of FORD MOTOR CO.

All vehicles

NOTE: When 2 connected components slope in the same direction, subtract the smallest number from the larger number to find the U-joint operating angle. When 2 connected components slope in the opposite direction, add the measurements to find the U-joint operating angle.

5. Calculate the difference in the slope of the components to determine the U-joint operating angle.
 - The U-joint operating angle is the angle formed by 2 yokes connected by a cross and bearing kit. Ideally, the operating angles on each connection of the driveshaft must:
 - be equal or within one degree of each other.
 - have a 3 degree maximum operating angle.
 - have at least 1/2 of one degree continuous operating angle.
6. If the angle is not within specifications, repair or adjust to obtain the correct angle. Inspect the engine mounts, transmission mounts, center support bearing mounting, rear suspension, rear axle, rear axle mounting or the frame for wear or damage.

DRIVESHAFT INDEXING

NOTE: If indexing the driveshaft does not eliminate the vibration, balance the driveshaft. For additional information, refer to Driveshaft Runout and Balancing.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to JACKING AND LIFTING article.

NOTE: Do not reuse the bolts for the pinion flange. Install new bolts or damage to the vehicle may occur.

NOTE: Index-mark the pinion flange and driveshaft flange.

2. Disconnect the rear driveshaft U-joint flange.

2008 Ford Mustang

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- Discard the 4 bolts.

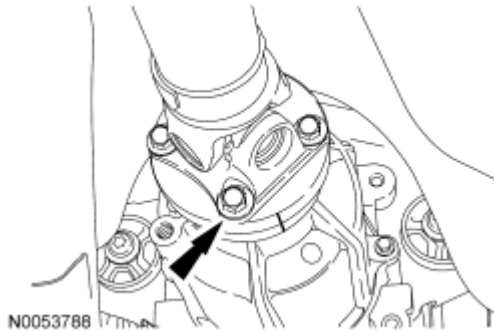


Fig. 19: Locating Rear Driveshaft Universal Joint Flange Bolts
Courtesy of FORD MOTOR CO.

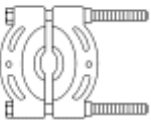
3. Rotate the rear pinion flange 90 degrees clockwise.

NOTE: The index mark on the flanges will not align.

4. Connect the rear driveshaft and install 4 new bolts.
 - Tighten to 112 Nm (83 lb-ft).
5. Test drive the vehicle.
6. Repeat the procedure if necessary.

DRIVESHAFT RUNOUT AND BALANCING

Special Tools

Illustration	Tool Name	Tool Number
 ST1137-A	Dial Indicator Gauge with Holding Fixture 100-02 (TOOL-4201-C) or equivalent	
 ST1895-A	Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix)	257-00018 or equivalent

Driveshaft Inspection

NOTE: Driveline vibration exhibits a higher frequency and lower amplitude than high-speed shake. Driveline vibration is directly related to the speed of the vehicle and is noticed at various speeds. Driveline vibration can be perceived as a

2008 Ford Mustang

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tremor in the floorpan or heard as a rumble, hum or boom.

NOTE: Refer to SPECIFICATIONS for all runout specifications.

NOTE: Do not make any adjustments before carrying out a road test. Do not change the tire pressure or the vehicle load.

1. Carry out a visual inspection of the vehicle. Operate the vehicle and verify the condition by reproducing it during the road test.
 - The concern should be directly related to vehicle road speed, not affected by acceleration or deceleration or could not be reduced by coasting in NEUTRAL.
2. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to JACKING AND LIFTING article.
 - The driveshaft should be kept at an angle equal to or close to the curb-weighted position. Use a twin-post hoist or a frame hoist with jackstands.
3. Inspect the driveshaft for damage, undercoating or incorrectly seated U-joints. Rotate the driveshaft slowly by hand and feel for binding or end play in the U-joint trunnions. Remove the driveshaft. For additional information, refer to DRIVESHAFT article. Inspect the slip yoke splines for any galling, dirt, rust or incorrect lubrication. Clean the driveshaft or install new U-joints as necessary. Install a new driveshaft if damaged. After any corrections or new components are installed, recheck for the vibration at the road test speed.
 - If the vibration is gone, test drive the vehicle.
 - If the vibration persists or the driveshaft passes visual inspection, measure the driveshaft runout.

Driveshaft Runout

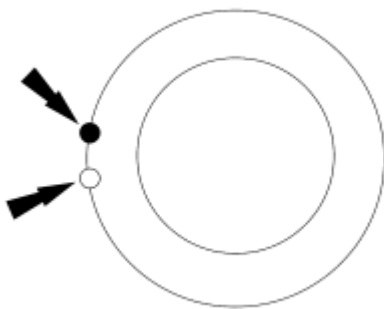
1. Install the suitable Dial Indicator Gauge with Holding Fixture. Rotate the driveshaft by turning the axle and measure the runout at the front, the center and the rear of the driveshaft.
 - If the runout exceeds 0.89 mm (0.035 in) at the front or center, install a new driveshaft.
 - If the front and center is within 1 mm (0.254 in), but the rear runout is not, index-mark the rear runout high point and proceed to Step 2.
 - If the runout is within 0.89 mm (0.035 in) at all points, recheck for vibration at road test speed. If the vibration persists, balance the driveshaft. For additional information, refer to Driveshaft Balancing in this procedure.

NOTE: Circular pinion flanges can be turned in 90 degree or 1/4 increments. Half-round pinion flanges are limited to 2 positions.

2. Index-mark the driveshaft to the pinion flange. Disconnect the driveshaft and rotate it 180 degrees. Reconnect the driveshaft. Recheck the runout at the rear of the driveshaft.
 - If the runout is still over specification, mark the high point and proceed to Step 3.
 - If the runout is within specification, check for the vibration at the road test speed. If the vibration is still present, balance the driveshaft. For additional information, refer to Driveshaft Balancing in this

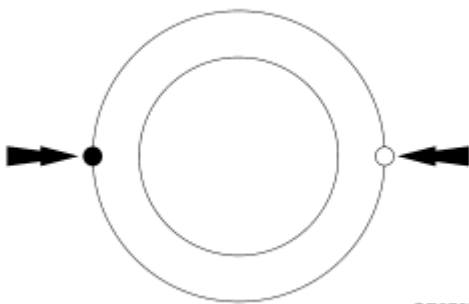
procedure.

3. Excessive driveshaft runout can originate in the driveshaft itself or from the pinion flange. To find the source, compare the 2 high points previously determined.
 - If the index marks are close together, within 25 mm (1 in), the driveshaft is eccentric. Install a new driveshaft.
 - If the marks are on opposite sides of the driveshaft, 180 degrees apart, the slip yoke or pinion flange is responsible. Check the pinion flange runout. If the pinion flange runout exceeds specifications, a bent pinion is indicated.
 - If the pinion flange and pinion runouts are within specifications, road test and check for the vibration at the road test speed. If the vibration persists, balance the driveshaft. For additional information, refer to Driveshaft Balancing in this procedure.



GE0796-A

Fig. 20: Finding Excessive Driveshaft Runout (1 Of 2)
Courtesy of FORD MOTOR CO.



GE0797-A

Fig. 21: Finding Excessive Driveshaft Runout (2 Of 2)
Courtesy of FORD MOTOR CO.

Driveshaft Balancing - Using the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix)

All vehicles

1. Install the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix) to the vehicle.
2. Working under the vehicle, install an accelerometer. The accelerometer can be attached and mounted near either the transmission or differential end of the driveshaft.

3. Clean an area of the driveshaft and install the reflective tape, then install the photo-tachometer sensor. The sensor should be placed at approximately a 20-degree angle from perpendicular to the surface of the reflective tape. Make sure the sensor does not get moved during the balance procedure.
 1. Reflective tape.
 2. Photo-tachometer sensor.

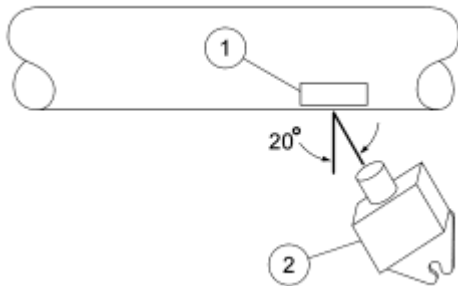


Fig. 22: Driveshaft Balancing - Using the MTS 4000
Courtesy of FORD MOTOR CO.

4. Using the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix), run a driveshaft balance test with the driveshaft unmodified.

Vehicles with tapped pinion flanges

5. Label the tapped holes in the pinion flange numerically, starting at the top hole as 1. Mark the remaining holes 2, 3 and 4. Label in the direction of rotation.

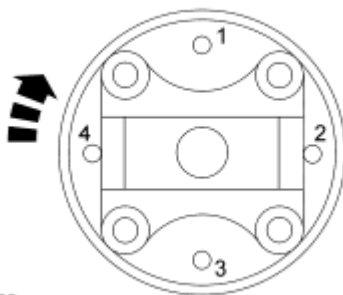
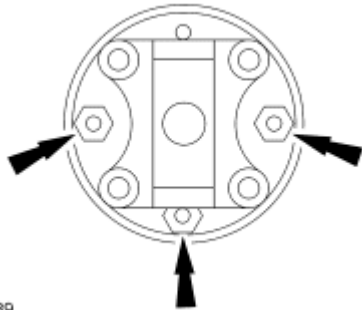


Fig. 23: Labeling Tapped Holes In Pinion Flange
Courtesy of FORD MOTOR CO.

6. Using the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix), run a second test with the 12 mm (0.47 in) test weight set screw in the No. 1 hole, previously marked on the pinion flange.
7. Remove the test weight, then install the weight combination directed by the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix).

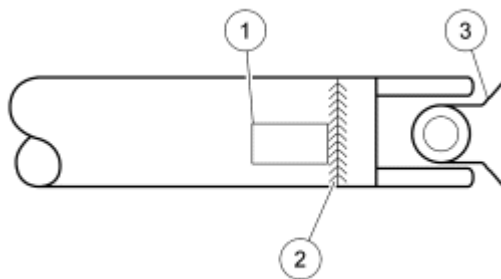


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Fig. 24: Installing Weight Combination
Courtesy of FORD MOTOR CO.

Vehicles without tapped pinion flanges

8. Using the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix), run a second test with a test weight. Using a metal band, secure the test weight to the end of the driveshaft. The weight should be placed at the end of the driveshaft tube, as close to the tube-to-yoke weld seam as possible. Mark the location of the test weight on the driveshaft, as shown in the figure below.
 1. Test weight.
 2. Tube-to-yoke weld seam.
 3. Driveshaft pinion flange.
 4. Select the test weight based on driveshaft size. Larger driveshaft use 10 g (0.353 oz.). Smaller driveshaft use 5 g (0.176 oz.).



N0067276

Fig. 25: Test Weight, Tube-To-Yoke Weld Seam, And Driveshaft Pinion Flange
Courtesy of FORD MOTOR CO.

9. Remove the test weight, then install the recommended weight at the position directed by the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix). Using a metal band and epoxy, secure the test weight to the driveshaft, as shown in the figure below.
 1. Test weight.
 2. Measure in this direction.
 3. Driveshaft diameter.
 4. Directional rotation.

5. Balance weight relative to test weight centerline.
6. The results are displayed with respect to the location to where the test weight was placed.

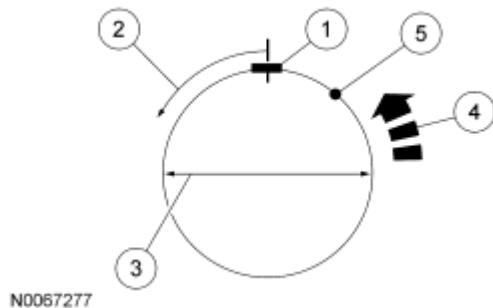


Fig. 26: Installing Weight In Recommended Position
 Courtesy of FORD MOTOR CO.

All vehicles

10. Using the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix), run a third test to verify the repair.

Driveshaft Balancing - Hose Clamp Method

1. Install 1 or 2 hose clamps on the driveshaft, near the rear. Position of the hose clamp head(s) can be determined through trial and error.
2. Mark the rear of the driveshaft into 4 approximately equal sectors and number the marks 1 through 4. Install a hose clamp on the driveshaft with its head at position No. 1, as shown in the figure below. Check for vibration at road speed. Recheck with the clamp at each of the other positions to find the position that shows minimum vibration. If 2 adjacent positions show equal improvement, position the clamp head between them.

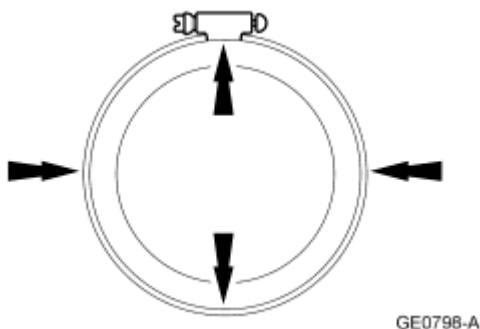


Fig. 27: Marking Rear Driveshaft Into Four Equal Sections
 Courtesy of FORD MOTOR CO.

3. If the vibration persists, add a second clamp at the same position and recheck for vibration.

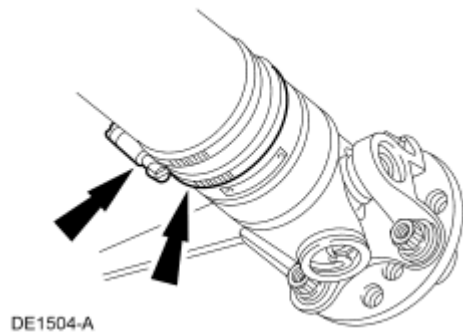


Fig. 28: Adding A Second Clamp
Courtesy of FORD MOTOR CO.

4. If no improvement is noted, rotate the clamps in opposite directions, equal distances from the best position determined in Step 2. Separate the clamp heads about 13 mm (1/2 in) and recheck for vibration at the road speed.

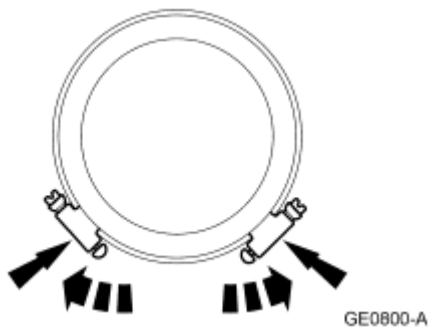


Fig. 29: Rotating Clamps In Opposite Directions
Courtesy of FORD MOTOR CO.

5. Repeat the process with increasing separation until the best combination is found or the vibration is reduced to an acceptable level.