

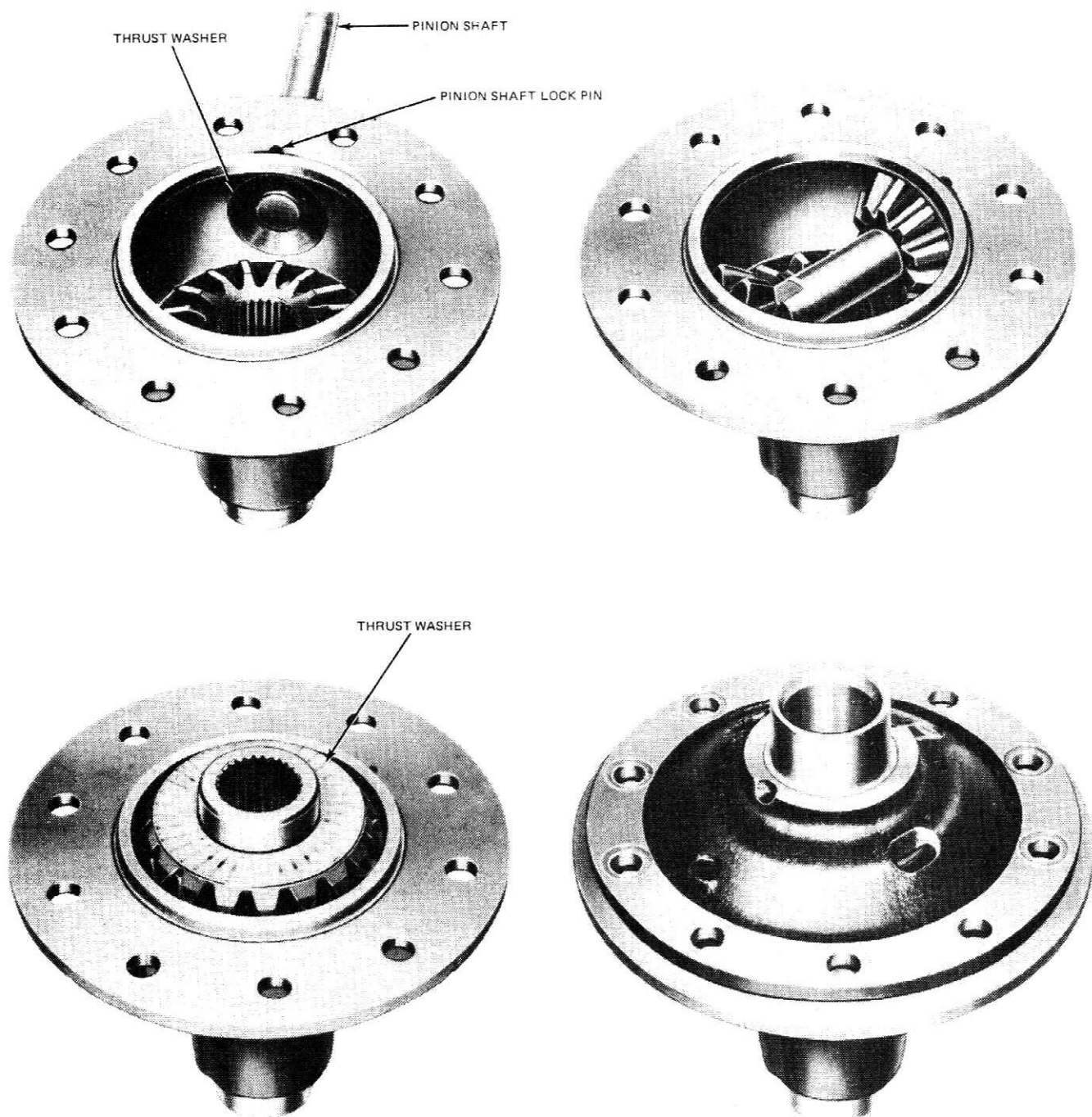


FIG. 49 Assembling Differential Case

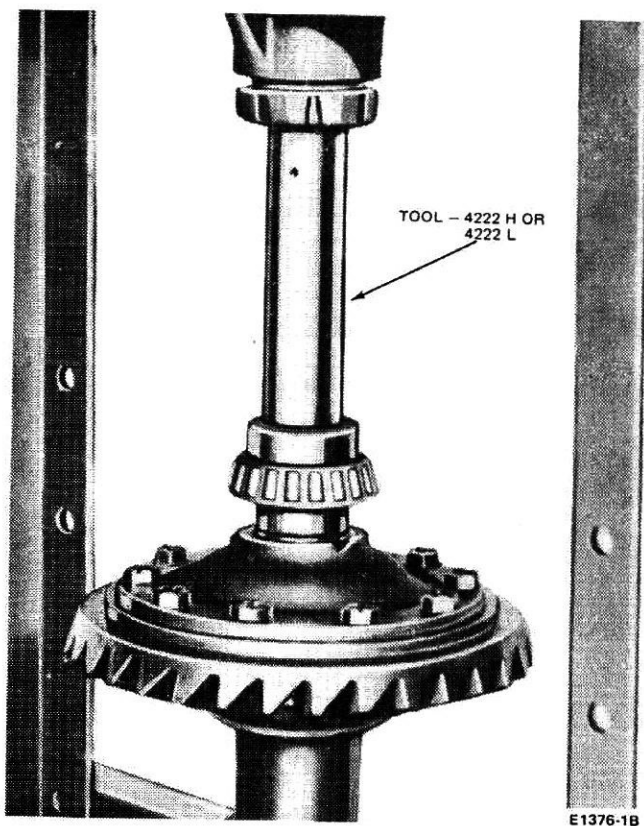
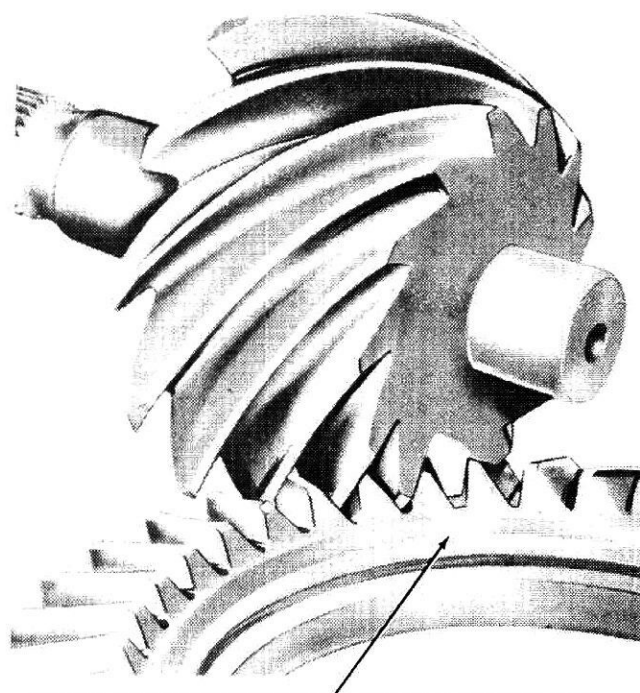


FIG. 50 Installing Differential Bearing



PAINT MARKING INDICATES POSITION IN WHICH GEARS WERE LAPPED

E1722-1A

FIG. 51 Gear Set Timing Marks

SPECIFICATIONS

DRIVING AXLE IDENTIFICATION – LINCOLN CONTINENTAL AND CONTINENTAL MARK V

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type		Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type
WGB-V	2.75:1	9	C2		WGC-K	2.50:1	9	C2
WGB-W	3.00:1	9	C2		WGC-N	2.75:1	9	C2
WGB-AB	2.50:1	9	C2		WV-F-T	2.75:1	9	T4
WGB-AD	2.75:1	9	C2		WV-F-A	2.75:1	9	T4
WGC-A	2.75:1	9	C2		WV-F-K	3.00:1	9	T4

① Type: C4 – Conventional 4-Pinion T4 – Traction-Lok 4-Pinion

CE2579-2E

DRIVING AXLE IDENTIFICATION – FORD AND MERCURY

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type		Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type
WDC-DW	2.75:1	9	C2		WDC-EL	2.50:1	9	C2
WDC-EB	2.75:1	9	C2		WDC-EM	2.50:1	9	C2
WDC-EE	3.00:1	9	C2		WFG-AL	3.00:1	9	T4
WDC-EH	2.75:1	9	C2		WFG-AA	2.75:1	9	T4
WDC-EK	3.00:1	9	C2		WFG-BJ	2.75:1	9	T4

① Type: C4 – Conventional 4-Pinion C2 – Conventional 2-Pinion
T4 – Traction-Lok 4-Pinion T2 – Traction-Lok 2-Pinion

CE2580-2D

DRIVING AXLE IDENTIFICATION — LTD II, COUGAR AND THUNDERBIRD

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type		Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type
WEB-BF	2.50:1	9	C2		WFA-AA	3.00:1	9	T4
WEB-BK	3.00:1	9	C2		WFA-AH	3.00:1	9	T4
WEB-BM	2.75:1	9	C2		WFA-AL	2.75:1	9	T4

① Type: C4 — Conventional 4-Pinion C2 — Conventional 2-Pinion
 T4 — Traction-Lok 4-Pinion T2 — Traction-Lok 2-Pinion

CE2581-2E

DRIVING AXLE IDENTIFICATION—MUSTANG II, PINTO, BOBCAT, GRANADA, MONARCH AND VERSAILLES

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type		Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential ① Type
WDW-AB	2.79:1	8	C2		WDY-S	3.40:1	8	C2
WDW-Z	3.00:1	8	C2		WDY-W	3.40:1	8	C2
WDX-E	2.75:1	9	C2		WFB-G	2.50:1	9	T4
WDY-AA	3.00:1	8	C2		WFB-K	2.50:1	9	T4
WDY-AH	3.40:1	8	C2					

① Type: C4 — Conventional 4-Pinion C2 — Conventional 2-Pinion
 T2 — Traction-Lok 2-Pinion T4 — Traction-Lok 4-Pinion

CE2582-2D

ATTACHING TORQUE SPECIFICATIONS (REMOVABLE CARRIER)

Description	Torque (Ft-Lb)	Description	Torque (Ft-Lb)
Differential Bearing Cap Bolts – 8.9 Inch	70-85	Rear Axle Shaft Bearing Retainer Bolt Nuts: Mustang, Pinto, Bobcat, Granada and Monarch	20-40
Differential Bearing Adjusting Nut Lock Bolts (All)	12-25	LTD II, Thunderbird and Cougar	20-40
Carrier to Housing Stud Nuts (All)	25-40	Ford, Meteor, Mercury, Lincoln Continental and Continental Mark V	50-70
Pinion Retainer to Carrier Bolts (All)	30-45	Universal Joint to Drive Pinion Companion Flange Bolt Nuts All Except Circular Flange:	8-15
Ring Gear Attaching Bolts (All) Except 6% Using Loctite	70-85	Circular Flange:	70-90
Oil Filler Plug (All)	25-50		

ADJUSTMENT TORQUE SPECIFICATIONS (REMOVABLE CARRIER)

Description	Torque		Description	Torque	
	In-Lb	Ft-Lb		In-Lb	Ft-Lb
Minimum torque required to tighten pinion flange nut to obtain correct pinion bearing preload 8.9 (collapsible spacer)		170 ①	Pinion Bearing Preload	13-33	
Pinion Bearing Preload (collapsible spacer) ②			Rotating Torques required during bench check after assembly or in vehicle with one wheel on the ground.		
Original Bearings 8.9	8-14		Original Clutch Plates Traction-Lok and Borg Warner Locker (All)		40 Min.
New Bearings 8.9	17-27		New Clutch Plates Traction-Lok and Borg Warner Locker (All)		100-250 ③

① If pinion bearing preload exceeds specification before this torque is obtained, install a new spacer.

② With Oil Seal

③ Rotating torque may fluctuate up to 40 Ft-Lbs.

CLEARANCE, TOLERANCE AND ADJUSTMENTS SPECIFICATIONS (REMOVABLE CARRIER)

Description	Inches	Description	Inches
Maximum Runout of Backface of Ring Gear (All)	0.003	Nominal Pinion Locating Shim 9 Ring Gear 8 Ring Gear	0.015 0.022
Differential Side Gear Thrust Washer Thickness (All)	0.030-0.032	Available Pinion Gear Shims in steps of 0.001 8, 9	0.010-0.029
Differential Pinion Gear Thrust Washer Thickness (All)	0.030-0.032	Backlash between Ring Gear and Pinion Teeth (All)	0.008-0.012
Drive Pinion Bearing Solid Spacers – 6 spacers in increments of 0.002 14 spacers in increments of 0.001	0.466-0.476 0.477-0.490	Maximum Backlash Variation Between Teeth (All)	0.003
Differential Bearing Preload (Case spread across Differential)		Maximum Radial Runout of U-joint Flange in Assembly All Except Circular Piloted Flange:	0.012 T.I.R.
New Bearings (All) Except Mustang and Pinto	0.008-0.012	Circular Piloted Flange:	0.005 T.I.R.
Original Bearings Mustang and Pinto 6% Ring Gear 8, 9 Ring Gear	0.004-0.008 0.003-0.005 0.005-0.008	Circular Piloted Flange Lateral Runout	0.005 T.I.R.

SPECIAL TOOLS

Tool Number	Description	Usage	Tool Number	Description	Usage
T50T-100-A	Impact Slide Hammer	(1)	T68P-4602-AB	Vial	(1)
T57L-500-A	Bench Mounted Holding Fixture	(1)	T68P-4602-AC	Magnet	(1)
T00L-1175-AB	Grease Seal Remover (Use with Slide Hammer T50T-100-A)	(1)	T57-4614-A	Pinion Front Bearing Remover	(1)
T60K-1225-A	Rear Axle Shaft Bearing Remover and Replacer	(5)	T55P-4616-A2	Drive Pinion Bearing Cup Remover and Replacer	
T00L-1225-DA	Axle Shaft Bearing Remover	(3)	T56T-4616-A	Drive Pinion Bearing Cup Replacer Adapters	(2)
T75P-1165-A, -B, -C, -D	Axle Shaft Bearing (Tapered) and Seal — Remover and Replacer	(8)	T57-4616-A use with T00L T57L-4614-A	Drive Pinion Bearing Cup Remover and Replacer	(3)
T76P-1165-E	Axle Bearing Seal Remover	(8)	T60K-4616-A	Pinion Bearing Cups Replacer (Inner and Outer)	(5)
T75P-4020-A	Rear Axle Pinion Depth Gauge Tool	(3)	T67P-4616-A	Pinion Bearing Cups Replacer	(2) (5)
T57L-4067-A	Differential Bearing Adjuster Wrench	(1)	T00L-4621-A	Wheel Bearing Installer	(1)
T60K-4067-A	Differential Bearing Adjuster Nut Wrench	(5)	T71P-4621-B or T69P-4621-A	Pinion Bearing Cone Replacer	(1)
T00L-4201-C	Differential Backlash and Runout Gauge, With Universal Bracket Dial Indicator and Bracket	(1)	T57L-4625-A use with T00L T53L-200-A	Drive Pinion Pilot Bearing and Retaining Ring Remover and Replacer	(3) (6)
T57L-4220-A	Differential Bearing Assembly Remover	(2) (5)	T62F-4625-A	Drive Pinion Pilot Bearing and Retaining Ring Remover and Replacer	(5)
T66P-4220-A	Remover — Differential Bearing Assembly	(3) (6)	T00L-4625-AA	Drive Pinion Bearing Cup — Rear Remover	(5)
T57L-4221-A	Differential Side Bearing Cone Replacer	(1)	T00L-4625-AB	Drive Pinion Bearing Cup — Rear Replacer	(5)
T00L-4221-AF	Differential Bearing Cone Remover — Pilot (Use with T00L-4221-C)	(1)	T00L-4625-K	Drive Pinion Pilot Bearing — Remover and Replacer	(3)
T00L-4221-AH	Differential Bearing Cone Remover — Conventional Axle	(3)	T00L-4625-L	Drive Pinion Rear Bearing Cup Remover	(5)
T00L-4221-AJ	Differential Bearing Cone Remover	(3)	T55P-4676-A	Companion Flange Oil Seal Replacer	(5)
T00L-4221-AL	Differential Bearing Cone Remover — Pilot (Use with 4221-C)	(5)	T58L-4676-A or 4676-F	Companion Flange Oil Seal Replacer	(1)
T00L-4221-C	Differential Side Bearings Remover	(1)	T62F-4676-A	Drive Pinion Oil Seal Replacer	(5)
T00L-4222-H	Differential Bearing Cones Replacer	(3)	T65L-4851-A or T65L-4851-B	Flange (Universal Joint) Remover	(1)
T00L-4222-L	Differential Side Bearing Cones Replacer	(3)	T68P-4851-A	Universal Joint — Flange Holder — (circular)	(4)
T66L-4234-A	Rear Axle Shaft Assembly Remover Adapter (Use with T50T-100-A)	(1)	T00L-4851-K	Universal Joint — Flange Holder	(2) (5)
T73L-1177-C	Rear Wheel Bearing Oil Seal Replacer	(6)	T00L-4858-E	Companion Flange and Pinion Bearing Replacer	(3)
T00L-1177	Rear Wheel Bearing Oil Seal Replacer	(7)			
T68P-4602-A	Pinion Angle Level Gauge	(1)			
T68P-4602-AA	Frame	(1)			
T90P-4067-A	Differential Bearing Adjuster Nut Wrench	(1)			
(1) All		(5) Mustang II, LTD II, Thunderbird, Cougar, Granada, Monarch, Versailles			
(2) Ford, Mercury		(6) Continental Mark V			
(3) Ford, Mercury, Lincoln Continental, Continental Mark V		(7) Ford, Mercury, Lincoln Continental			
(4) Lincoln Continental, Continental Mark V		(8) Vehicles with Tapered Axle Shaft Bearings			

LUBRICANT CAPACITIES AND CHECKING PROCEDURES (REMOVABLE CARRIER)

Vehicle	Engine (C.I.D.)	Axle	U.S. Measure- Capacity (Pints)	Imperial Capacity (Pints)
Pinto, Bobcat, Mustang II ①	2.8L	8 inch	4.0	3-3/8
Granada, Monarch, Versailles ①	3.3/4.1L (200/250 CID) 5.0L (302 CID)	All	4.0	3-3/8
Ford, Mercury, LTD II, Thunderbird, Cougar ②	5.8L (351 CID) 6.6L (400 CID)	All	5.0	4.0
Lincoln Continental and Continental Mark V ②	7.5L (460 CID)	All	5.0	4.0
All conventional axles use ESW-M2C-105-A lubricant. All limited slip axles use ESW-M2C-119-A lubricant. ① Approximate refill capacity—Actual lubricant capacities are determined by filling to 3/8 inch below filler plug hole. ② 1/2 inch below bottom of filler hole.				

CE2199-2J

Traction — Lok Limited Slip Differential—Ford

**PART
15-40****Does Not Apply to Vehicles with Integral Carrier Axles**

SUBJECT	PAGE	SUBJECT	PAGE
ADJUSTMENTS	40-3	REMOVAL AND INSTALLATION	40-3
DESCRIPTION	40-1	SPECIFICATIONS	40-7
DISASSEMBLY AND ASSEMBLY	40-3	TESTING	40-3
OPERATION	40-3		

CF2515-2A

DESCRIPTION

The axle assembly, except for the differential case and its internal components, is identical to the conventional axle.

The Traction-Lok differential (Fig. 1) employs a multiple disc clutch to control differential action. The side gear mounting distance is controlled by 9 plates; 4 steel, 4 friction, and one composite plate (steel on one side, friction material on the other). These plates are stacked on the clutch hub and along with 4 ear guides

are housed in the differential cover. Also located in the differential case, between the side gears, is a one-piece pre-load plate and block and four calibrated pre-load springs, which apply an initial force to the clutch pack. Additional clutch capacity is derived from the side gear thrust loads. The four friction plates are splined to the clutch hub which in turn is splined to the left axle-shaft, and the eared steel plates are dogged to the case; thus, the clutch is always engaged.

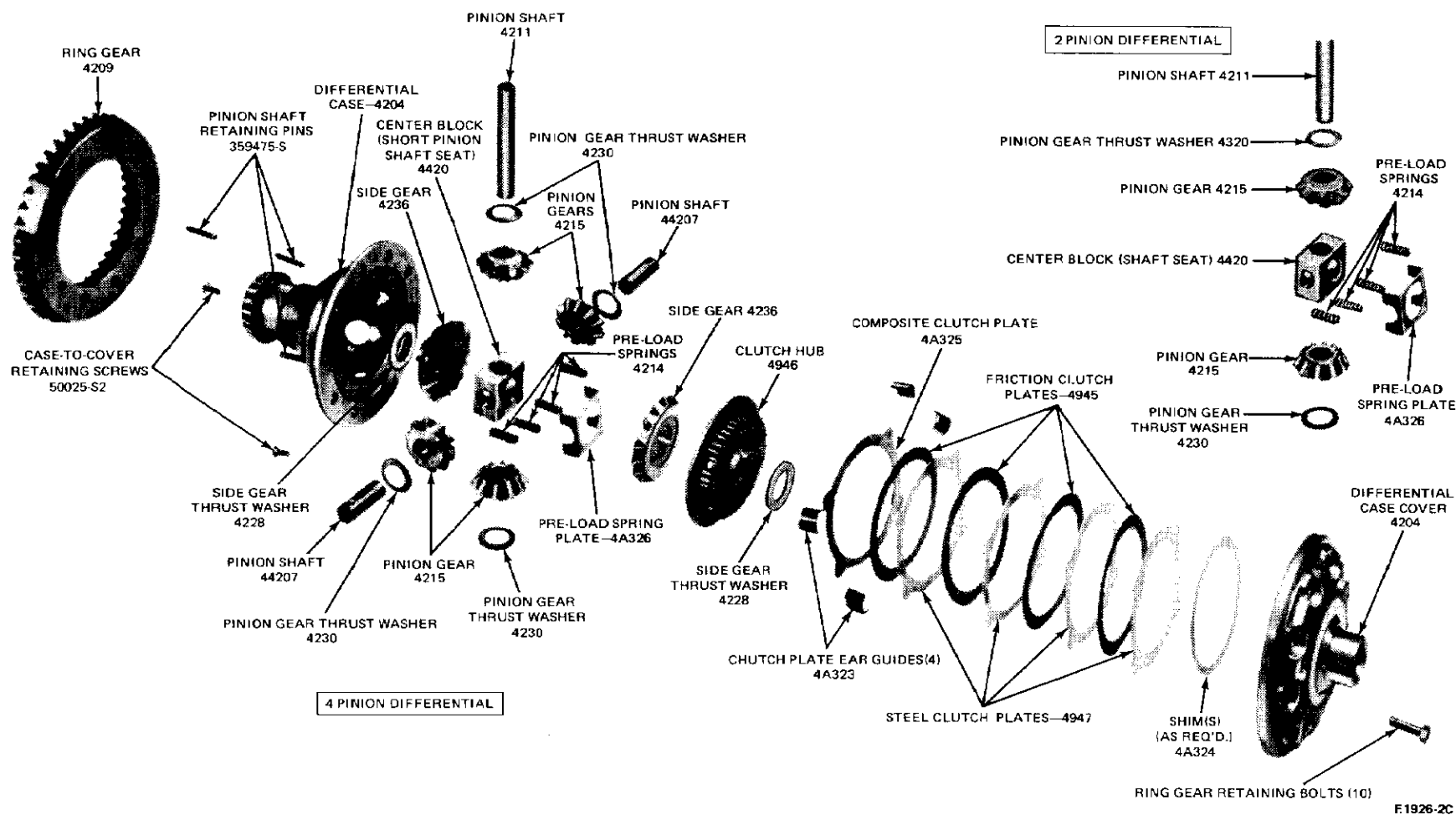


FIG. 1 Traction-Lok Differential

OPERATION

In operation, the clutch will transfer power to whichever wheel is not dipping in cases where one wheel is on ice or a slippery surface. In other words, resistance to rotating increases the clutch action.

On a totally icy surface, both wheels can be made to rotate together by lightly applying the hand brake. Once again, resistance to rotation increases the clutch action.

TESTING

Test procedures for the Traction-Lok differential are given in Part 15-01.

ADJUSTMENTS

No in-vehicle adjustments are possible on this unit. Refer to Part 15-10 for adjustments to the axle in which it is installed.

REMOVAL AND INSTALLATION

Refer to Part 15-10 for removal of this differential, which is removed and installed in the same manner as a conventional differential.

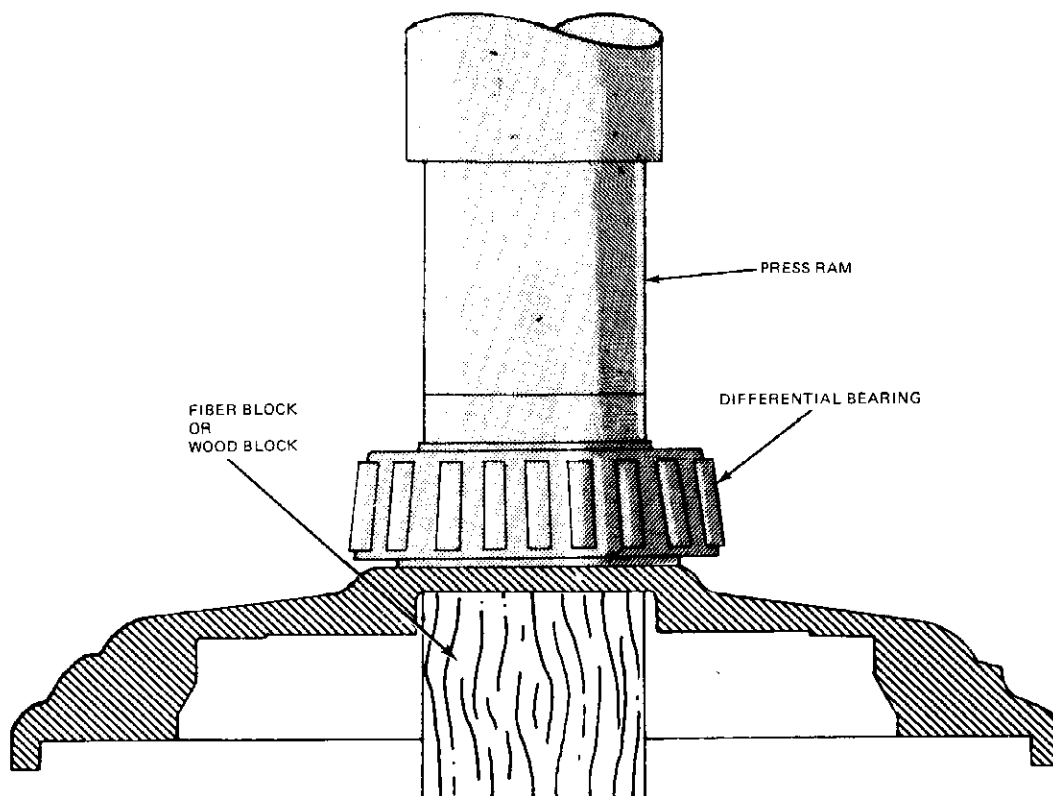
DISASSEMBLY AND ASSEMBLY

DISASSEMBLY

1. Remove **and discard** the ten bolts and flat washers securing the ring gear to the differential case assembly. The ring gear must be removed in order to separate the case halves.
2. Remove the ring gear by tapping the gear with a soft hammer or press the gear from the case.
3. Place the differential case in a press to load the case at the bearing journals so that the pre-load of the springs is overcome (approx. 1,500 lbs). **If a press is not available, two 7/16-inch bolts and nuts can be used in the ring gear mounting holes (one on each side) to compress the case halves together and overcome preload spring tension.** Then, while the case is still under pressure, loosen the two Allen or Phillips head screws, which hold the case halves together, until one or two threads of the screw remain engaged. Remove the case assembly from the press. Tap on the cover to spring it loose; then, remove both screws.
4. With the cover facing down, lift off the case. Remove the pre-load spring plate and four pre-load springs.
5. From the cover, remove the side gear, four clutch plate car guides, clutch hub, friction and steel clutch plates and shims.
6. With a suitable drift, drive out the pinion shaft lock pins from the case.
7. With a brass drift, drive out the long pinion shaft from the case. Drive from the end opposite the lock pin hole.
8. Remove the two short pinion shafts using a drift, driving each shaft from the center outward. Lift out the center block, then remove the pinion gears, thrust washers and side gear and thrust washer.
9. If the differential bearings are removed, the bearings can be installed in one of the following ways:
 - a. With the differential case and cover completely assembled.
 - b. On the case or cover when disassembled. However, when pressing the bearing on the cover, a block of wood or fiber must be used as shown in Fig. 2 in order to avoid damage to the cover.

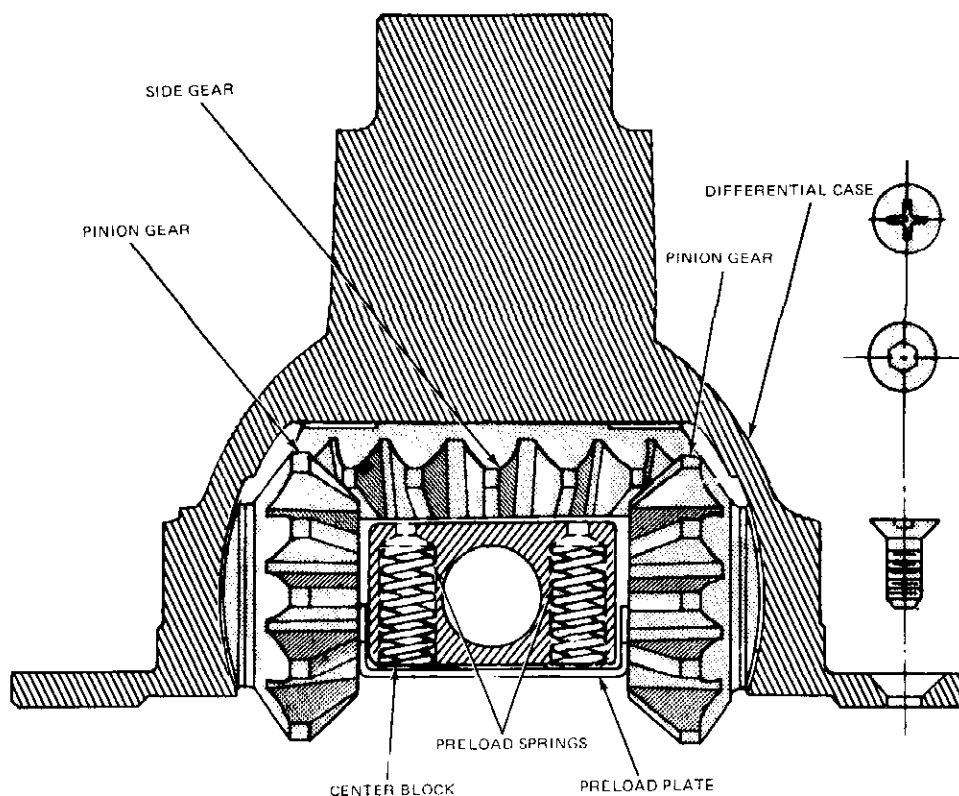
ASSEMBLY

1. Lubricate all parts with **C9AZ-19580-A lubricant (or equivalent) during assembly.**
2. Mount the differential case in a soft jaw vise and place a side gear thrust washer and side gear in the counterbore of the case.
3. Install the pinion thrust washers and place the pinion gears on the side gear aligning the holes in the washers and gears with the holes in the case.
4. Install the center block so that the shaft holes are aligned with the holes in the pinion gears and case. **The center block has two machined sides and two rough sides.**
5. With a brass drift, drive in the long pinion shaft from the *outside of the case*, aligning the lock pin holes in the shaft with the holes in the case. **The**



E1892-2A

FIG. 2 Installing Differential Bearing



E1893-2A

FIG. 3 Center Block and Pre-load Springs Installation

center block should be positioned so the long shaft is driven through the rough side and short shafts driven through the machined side (Fig. 3).

6. With a suitable drift, install the shaft lock pins. Make sure the pinion and side gears move freely.
7. Place the four pre-load springs in the holes provided in the center block.

8. Position the pre-load plate over the four springs, making sure the springs are properly seated. The preload plate straddles the center block over its narrower or machined width.
9. Mount the differential cover in a soft jawed vise or holding fixture.
10. Insert shim(s) of 0.050 total thickness in the cover cavity.
11. Install the composite plate (friction material on one side and steel on the opposite) on the back side of the clutch hub with the friction material against the hub; next, install a friction plate, then steel, friction, steel, friction, steel, friction, and lastly a steel plate (Figures 1 and 4). **When new clutch plates are used, soak the plates in Ford Hypoid Lubricant (C9AZ-19580-A or equivalent) for approximately 30 minutes before installation.**
12. Place the clutch hub with the clutch plates into the clutch ear cavities in the differential cover. Make sure that the splines on the last friction plate are engaged on the hub.
13. Obtain locally a 5/8" x 2-1/2" or 9/16" x 2-1/2" bolt, a nut and two 1-1/2" outside diameter flat washers approx. 1/8" in thickness. These parts are required to compress the clutch pack in order to obtain the proper shim selection. Install a flat washer on the bolt, and place the bolt through the clutch hub. Hold the bolt in position and turn the cover over. Place a flat washer on the bolt and then install the nut. Be sure the washers are centered, and torque the nut 10 or 15 ft-lb. (Fig. 5).
14. Place the shim template tool (T68P-4946-A) in the clutch hub (Fig. 5), allowing some clearance between the shim tool and the cover-to-case mating surface. **Using a feeler gauge, determine the exact amount of clearance.** The shim pack thickness chart will indicate the correct amount of shims to subtract from the 0.050 shim originally installed. **In order to correctly select the proper shim(s), the shim template tool and the chart must be used. Refer to Specifications.**
15. After the proper shim selection is determined, remove the bolt, nut and flat washers. If it is necessary to revise the shim thickness, remove the clutch hub and clutch plates.
16. Install the selected shim(s) in the cover cavity, re-install the components as outlined in Steps 11 and 12.
17. Install the four steel clutch ear guides and side gear.
18. Place both assemblies in a press, and press the two halves together; then, insert the two Allen head or Phillips head screws, and tighten evenly until tight. If a press is not available, use any two stock bolts and nuts, opposite each other in the ring gear retaining holes, to compress both halves.
19. Clean tapped holes in the ring gear with a suitable solvent. If the new bolts to be used show a green coating over approximately 1/2-inch of the threaded area, use as is. If not coated, apply a small amount of Loctite (Part Number C3AZ-19554-A or equivalent). Torque to specification. **It is mandatory that bolts used once should not be used again.**
20. Prior to installation of the torque sensitive-locking differential into a vehicle, a bench torque check must be made. With currently released locker tools, check the torque required to rotate one side gear

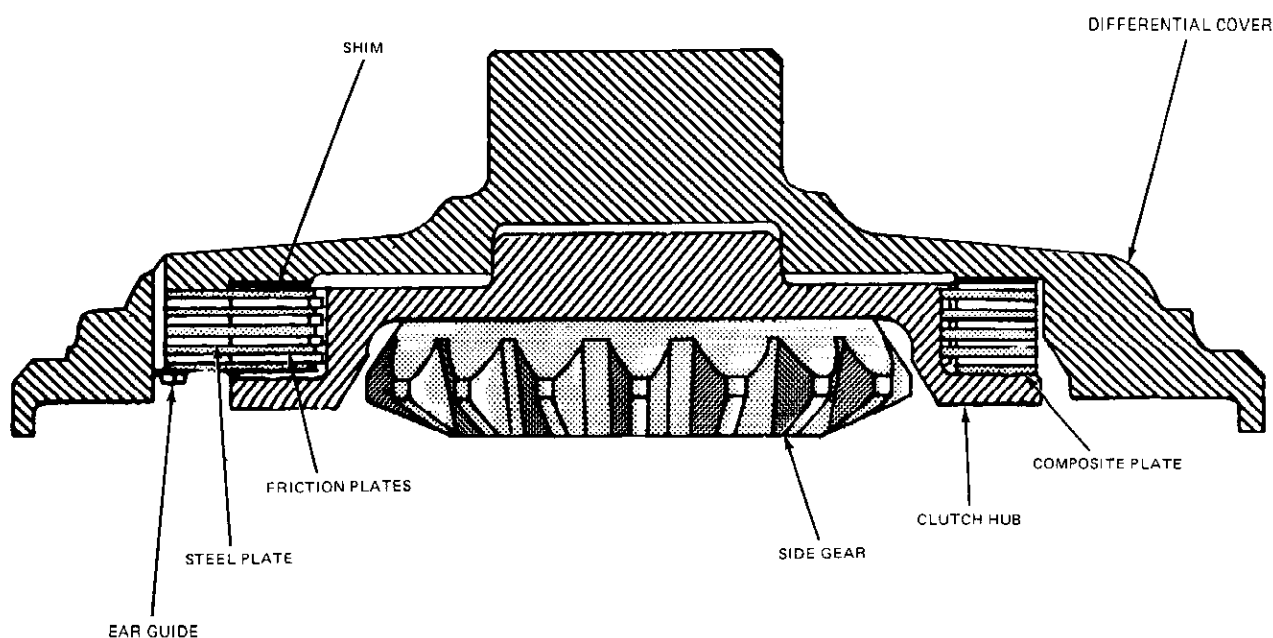
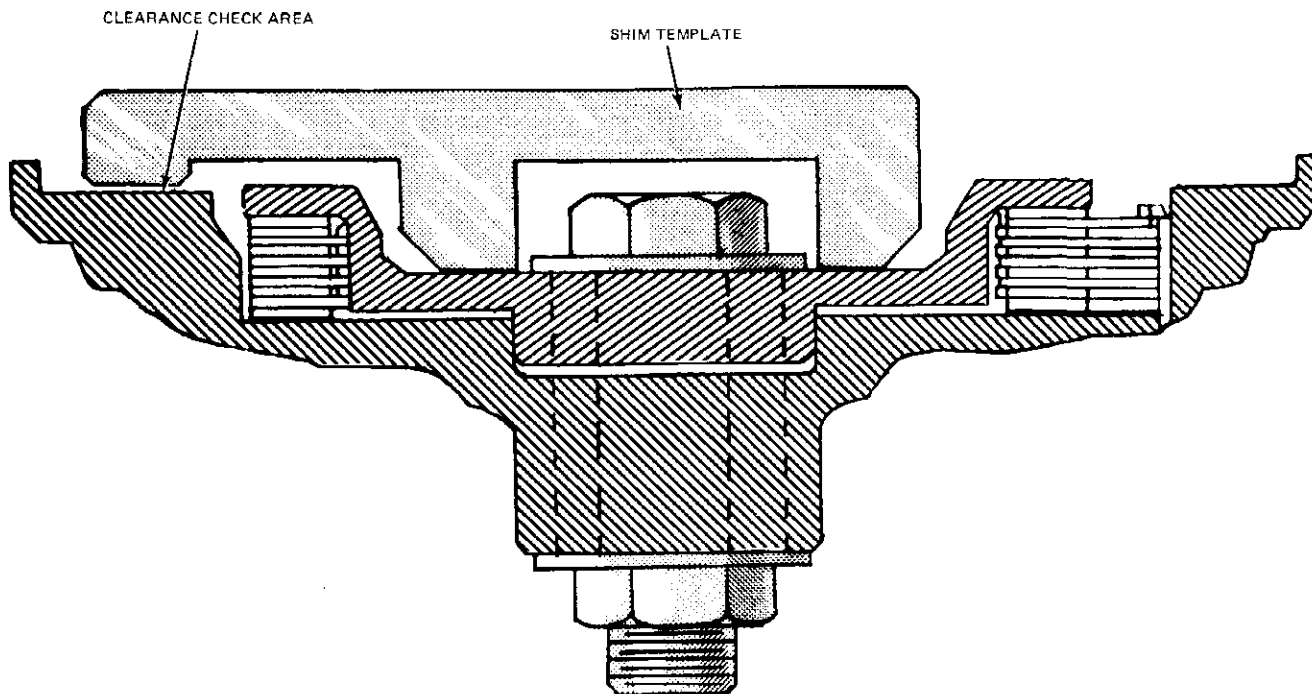


FIG. 4 Clutch Pack Installation



E 1895-2A

FIG. 5 Shim Template Tool Application

while the other is held stationary. The initial break-away torque, if the original clutch plates are used, should be no less than 40 ft-lb. If new clutch plates are used, the break-away torque should run from

100-250 ft-lb. The rotating torque required to keep the side gear turning with new clutch plates may fluctuate up to 40 ft-lb.

SPECIFICATIONS

GRANADA, MONARCH, VERSAILLES

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential Type
WFB-G	2.50:1	9	T4
WFB-K	2.50:1	9	T4

LTD II, COUGAR, THUNDERBIRD

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential Type
WFA-AA	3.00:1	9	T4
WFA-AH	3.00:1	9	T4
WFA-AL	2.75:1	9	T4

LINCOLN CONTINENTAL, CONTINENTAL MARK V

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential Type
WFV-I	2.75:1	9	T4
WFY-A	2.75:1	9	T4
WFY-K	3.00:1	9	T4

FORD, MERCURY

Identification Tag	Ratio	Ring Gear Diameter (Inches)	Differential Type
WFG-AL	3.00:1	9	T4
WFG-AA	2.75:1	9	T4
WFG-BJ	2.75:1	9	T4

SPECIAL TOOLS

Tool No.	Description	Usage
T59L-4204-A	Locking Differential Torque Check	(1) (2) (3)
T65K-4204-A	Locking Differential Torque Check	(2) (3)
T66L-4204-A	Locking Differential Torque Check	(1)
T68P-4946-A	Locking Differential Gauge	

- (1) Ford, Mercury, Lincoln Continental, Continental Mark V
 (2) LTD II, Cougar, Thunderbird
 (3) 9-Inch Ring Gear

TRACTION-LOK DIFFERENTIAL SHIM PACK THICKNESS CHART

Feeler Gauge Reading (Inches) (1)	Remove Shim(s) From Nominal	Total Req'd. Shim Pack Thickness (Inches) (2)	Feeler Gauge Reading (Inches) (1)	Remove Shim(s) From Nominal	Total Req'd. Shim Pack Thickness (Inches) (2)
0.001-0.002	None	0.050	0.028-0.032	0.030	0.020
0.003-0.007	0.005	0.045	0.033-0.037	0.035	0.015
0.008-0.012	0.010	0.040	0.038-0.042	0.040	0.010
0.013-0.017	0.015	0.035	0.043-0.047	0.045	0.005
0.018-0.022	0.020	0.030	0.048-0.050	0.050	0.000
0.023-0.027	0.025	0.025			

- (1) With clutch hub, shims and clutch plates compressed 10-15 ft-lbs.
 (2) Service shims are available in 0.010 inch and 0.005 inch thicknesses.

Drive Shaft — Single Cardan Type U-Joint

**PART
15-60**

Applies To All Models Except Lincoln Continental and Versailles

SUBJECT	PAGE	SUBJECT	PAGE
ADJUSTMENTS		REMOVAL AND INSTALLATION	60-5
Drive Shaft Balancing	60-2	TESTING	
DESCRIPTION	60-1	Drive Line Angle Check	60-2
DISASSEMBLY AND ASSEMBLY	60-5	Drive Line Balance Check	60-1
		Drive Shaft Runout Check	60-2

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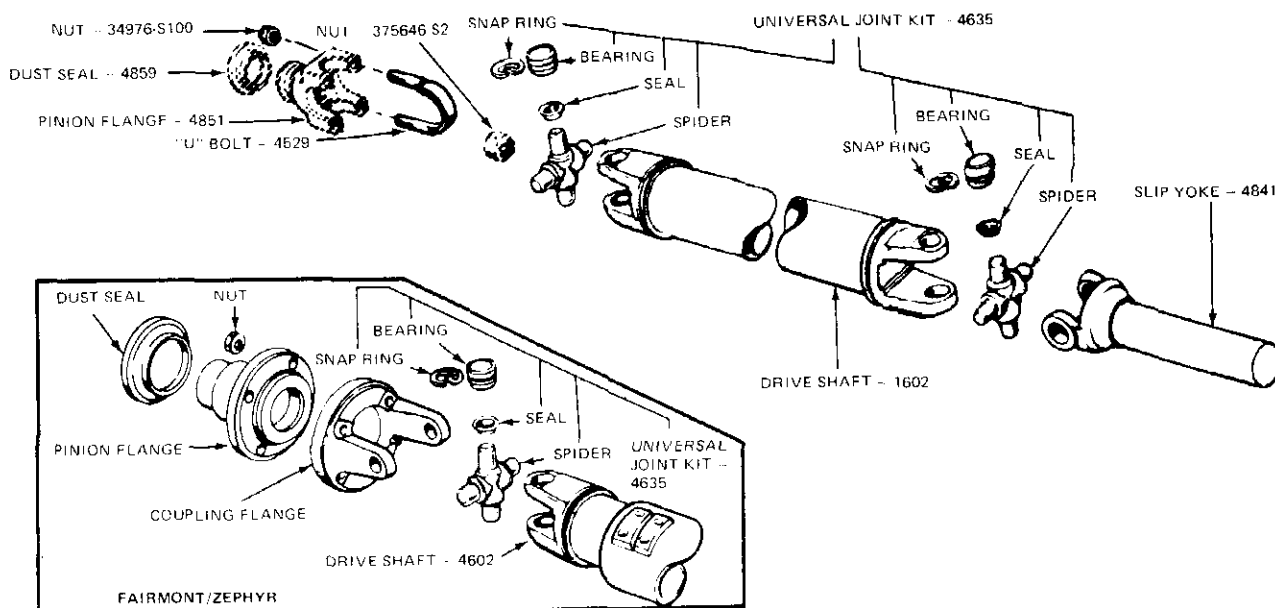
DESCRIPTION

The drive shaft is the means of transferring power from the engine, through the transmission, to the differential in the rear axle, which transmits it to the rear wheels.

The drive shaft incorporates two universal joints and a slip yoke (Fig. 1).

The splines in the yoke and on the transmission output shaft permit the drive shaft to move forward and rearward as the axle moves up and down. This provides smooth operation under all driving conditions.

All drive shafts are balanced. If the vehicle is to be undercoated, cover the drive shaft and universal joints to prevent application of the undercoating material.



E2096 2F

FIG. 1 Drive Shaft and Universal Joints Disassembled

TESTING

DRIVE LINE BALANCE CHECK

If detailed parts of the drive shaft are replaced and shaft vibration is encountered after installation, disconnect the shaft at the slip yoke. Rotate the slip

yoke 180 degrees; then, reconnect the shaft to the slip yoke. If the vibration persists, disconnect the shaft at the rear axle companion flange. Rotate the companion flange 180 degrees and reconnect the shaft to the flange.

DRIVE LINE ANGLE CHECK

Vibration or shudder which is noticeable either on fast acceleration, when coasting, or when using the engine for braking, may be caused by the rear axle housing being loose on the rear springs or by improper pinion angle. Refer to Group 14, for pinion angle checking procedures. If the rear axle U-bolts (Pinto/Bobcat/Mustang, Granada/Monarch/ only) are loose, torque the nuts to specification.

ADJUSTMENTS

DRIVE SHAFT BALANCING

Without Using Special Equipment

If an out-of-balance condition exists and if the vehicle has been undercoated, any such excess material should first be cleaned off the drive shaft.

The vehicle should then be road tested. If the problem still exists, the driveshaft should be rotated 180 degrees and the vehicle road tested again.

If rotating the drive shaft 180 degrees does not eliminate vibration, the drive shaft may be balanced using the following procedure:

1. Place the vehicle on a twin-post hoist so that the rear of the vehicle is supported on the rear axle housing with the wheels free to rotate. Remove the rear wheels to eliminate any tire unbalance.
2. With the drive shaft rotating at a speedometer speed of 40-50 mph, carefully bring a crayon or colored pencil up until it just barely contacts the rear end of drive shaft (Fig. 2). The mark made by the crayon or pencil will indicate the heavy side of the shaft. **Care should be exercised when working near the balance weights to prevent injury to the hands.**

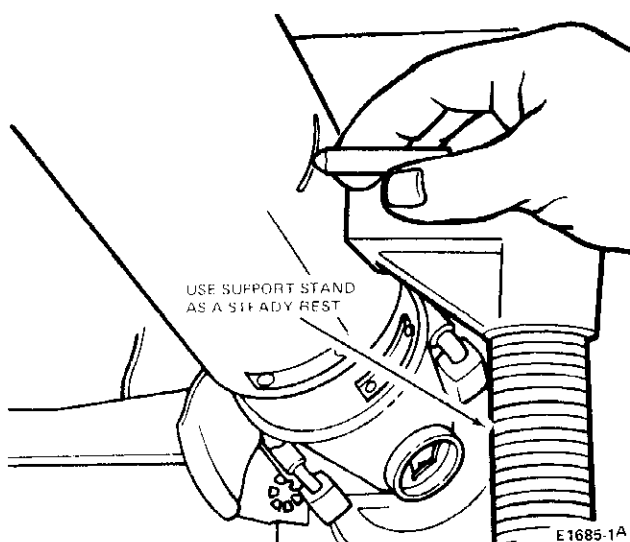


FIG. 2 Marking Drive Shaft

3. Install two hose clamps (screw-drive type) on the drive shaft so that the heads are located 180 degrees from the chalk marking (Fig. 3). Tighten the clamps.

DRIVE SHAFT RUNOUT CHECK

Using a dial indicator, check the runout at each end and in the middle of the drive shaft. The rear check should be made on the small tube section of the shaft between the balance weights and the yoke welds. Drive shaft runout should not exceed 0.035 inch at any one point.

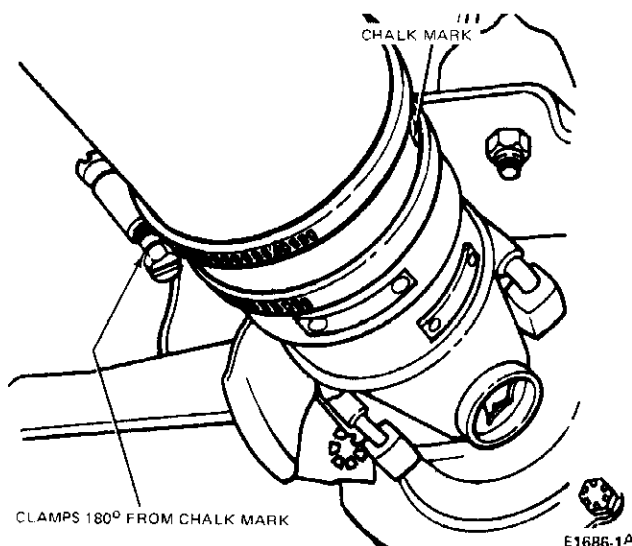


FIG. 3 Installing Screw-Drive Clamps

4. Run the vehicle up to 65-70 mph speedometer speed. If no vibration is felt, lower the vehicle and road test. If unbalance still exists, rotate the clamp heads approximately 45 degrees away from each other and test for vibration (Fig. 4).

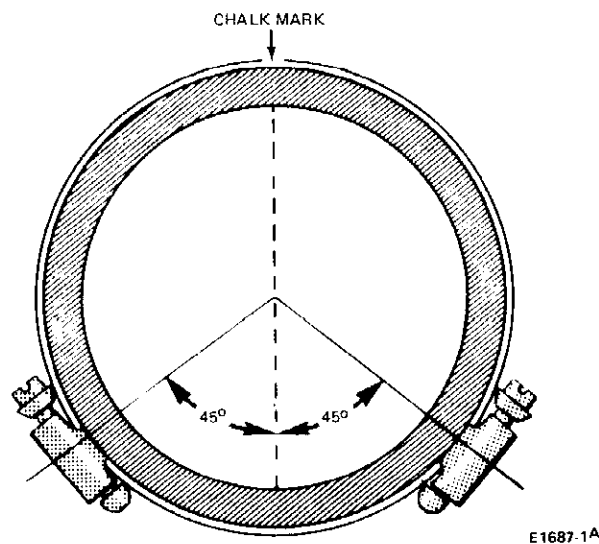


FIG. 4 Rotating Screw-Drive Clamps

5. Continue to rotate the clamp heads apart in smaller amounts until vibration is eliminated. To prevent overheating, do not run the vehicle on the hoist for an extended period.
6. Reinstall the wheels and road test the vehicle.

DRIVE SHAFT BALANCING

Using Special Equipment

1. Road test the vehicle. Evaluate and record road speed at which vibration occurs.
 2. Raise vehicle on a frame contact hoist, and re-evaluate, by accelerating to the indicated speeds at which vibration was most severe during the road test. *Allowing the rear axle to suspend makes the driveline more sensitive to vibration.*
 3. Rotate the driveshaft 180 degrees relative to the companion flange and evaluate by again running the driveline at the vibration speed. Install the driveshaft in the best position. **NOTE: In some cases, rotating the driveshaft 180 degrees may decrease the vibration to an acceptable level, and no further work is necessary.** If no improvement is noted, proceed to Step 4.
 4. A vehicle is more sensitive to excessive unbalance and/or runout at the rearward end of the driveshaft. Therefore, locate the heavy side of the driveshaft by use of the strobe light and transducer furnished with the Rotunda Dynamic Wheel Balancer (or equivalent) equipment, using the following procedure: Remove rear wheels and tires, reinstall all wheel lug nuts in reverse. Scribe an axial chalk line (at any radial location) approximately 4 inches long at the rear of the driveshaft (Step 1, Fig. 5). Locate the transducer on the bottom side of the carrier (Step 2, Fig. 5) and secure it in place. Run the vehicle at the worst vibration speed and visually note the position of the chalk line by use of the strobe light. This provides a starting point for initial location of the hose clamps.
 5. Stop the vehicle and rotate the driveshaft so that the chalk line is in the same location as it was noted under the strobe light.
 6. Install two screw-drive (stainless steel) hose clamps on the driveshaft. Position the clamps 180 degrees from the transducer and tighten (Step 3, Fig. 5).
 7. Run the vehicle through the speed range. If no vibration is felt, proceed to Step 9. However, if *vibration still exists, the combined weight of the two hose clamps may be in excess.* To reduce this excess weight, rotate the clamp heads away from each other approximately 15 degrees (one each way from the original position). Run the vehicle and note if the vibration has been reduced (Step 4, Fig. 5).
- CAUTION: Do not run the vehicle on the hoist for extended periods due to the danger of overheating the engine and/or transmission.**
8. Continue to rotate the clamp heads apart in smaller angular increments until the vehicle feel for balance (vibration) is best. At this point, the vehicle should be road tested to determine the actual degree of improvement. If satisfactory improvement has been obtained, proceed with Step 9. If no improvement has been obtained, **the clamps must be removed** and diagnosis should be redirected to other areas, such as wheels, tires, driveline angle and companion flange runout.
 9. When the vehicle has been corrected to a satisfactory level, as determined by a road test evaluation, tighten the clamps securely. Clean thoroughly with lacquer thinner, and spray the clamps with a commercially available black paint for a finished appearance.

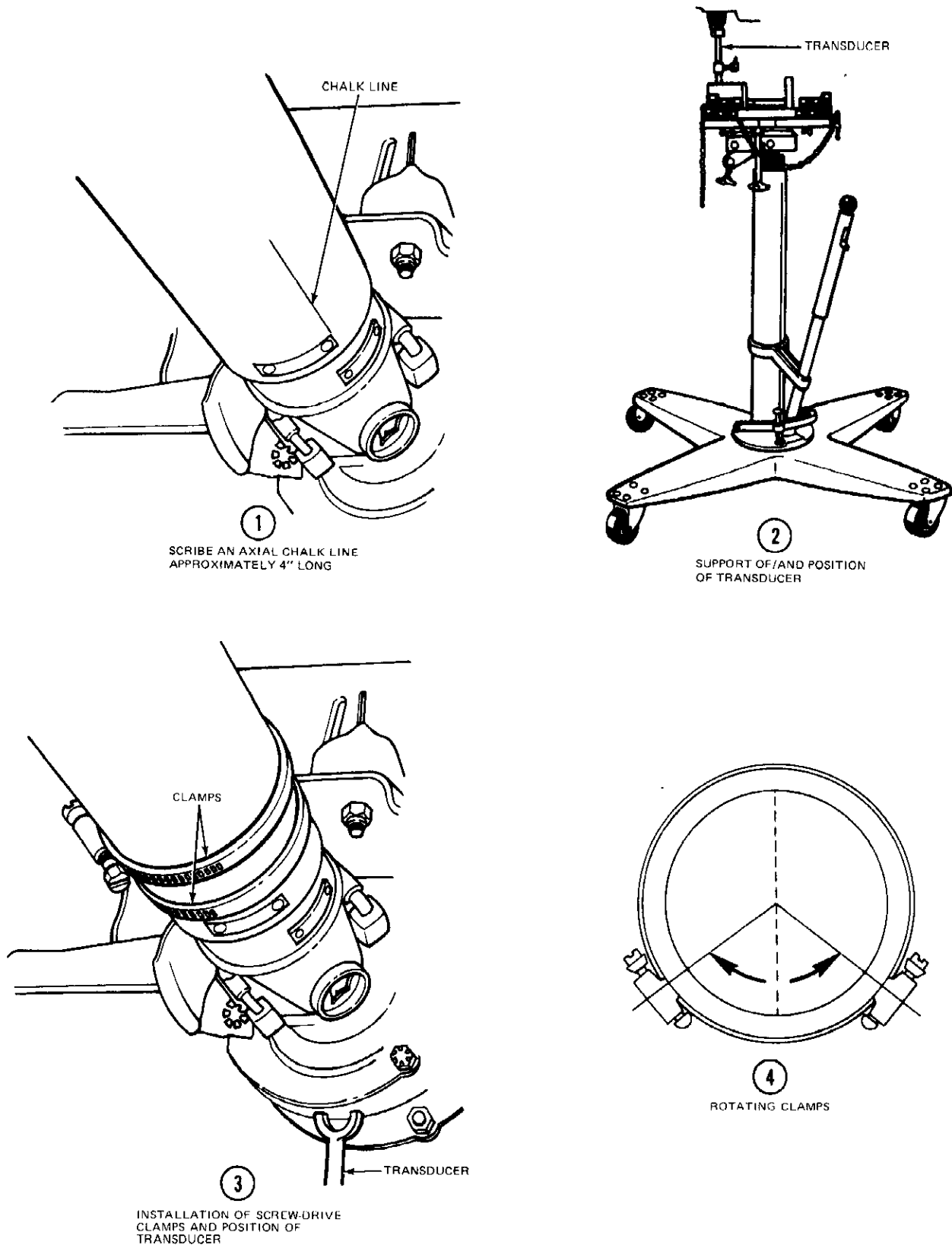


FIG. 5 Balancing Driveshaft Using Special Equipment

E2614-2B

REMOVAL AND INSTALLATION

STANDARD DRIVE SHAFT

Removal

1. To maintain drive line balance, mark the rear drive shaft yoke and the drive pinion flange of the axle (if the yellow alignment marks are not visible), in relation to the shaft, so that they may be installed in their original positions.
2. Disconnect the rear U-joint from the companion flange. Tape the loose bearing caps to the spider to prevent loss. Pull the drive shaft toward the rear of the vehicle until the slip yoke clears the transmission extension housing and the seal. Install the appropriate tool in the extension housing to prevent lubricant leakage.

Installation

1. If the seal in the end of the transmission extension housing is damaged, replace the seal or seals as required. Also, if the lugs on the axle pinion flange are shaved or distorted so that the bearings slide, replace the flange.

2. Lubricate the yoke spline with B8A-19589-A lubricant or equivalent. This spline is sealed so that the transmission fluid does not wash away the spline lubricant. Remove the tool from the extension housing. Install the yoke on the transmission output shaft. Do not allow the yoke assembly to bottom on the output shaft with excessive force.

Install the drive shaft so index marks or the yellow mark (if visible) on the yoke (light side) is in line with the yellow mark on the companion flange. This prevents vibration, which occurs when the shaft and the axle pinion flange become out of balance. If a vibration exists, the drive shaft should be disconnected from the axle, rotated 180 degrees and reinstalled.

3. Install the U-bolts and nuts that attach the U-joint to the drive pinion flange. Torque the U-bolt nuts to 8-15 ft-lbs.

DISASSEMBLY AND ASSEMBLY

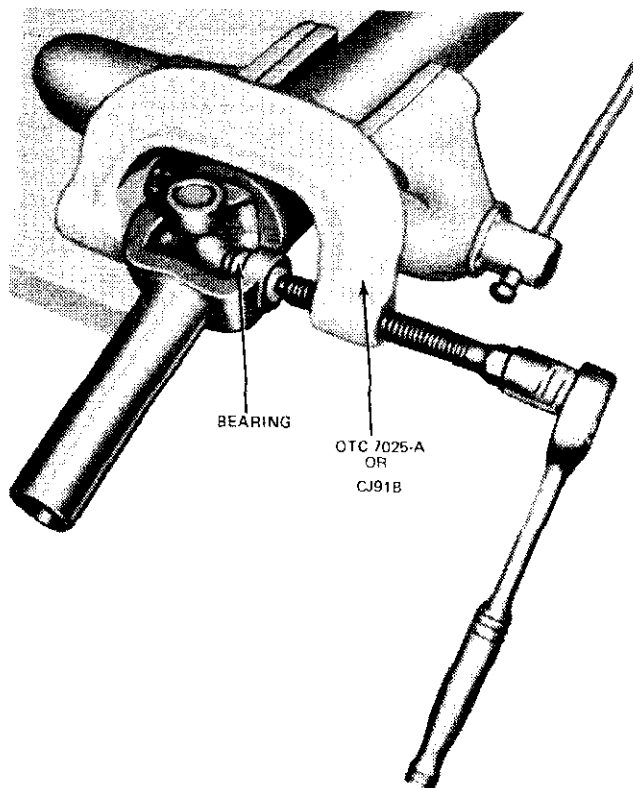
DISASSEMBLY

1. Place the drive shaft in a vise being careful not to damage it.
2. Remove the snap rings that retain the bearings in the slip yoke and in the drive shaft.
3. Position the tool shown in Fig. 6 on the shaft and press the bearing out of the slip yoke. If the bearing cannot be pressed all the way out of the yoke, remove it with vise grip or channel lock pliers.
4. Reposition the tool to press on the spider and remove the bearing from the opposite side of the yoke.
5. Remove the yoke from the spider.
6. Remove the bearings and spider from the drive shaft in the same manner.
7. Clean all foreign matter from the yoke area at each end of the drive shaft.

ASSEMBLY

1. Start a new bearing into the yoke at the rear of the drive shaft.
2. Position the spider in the rear yoke and press the bearing 1/4 inch below the surface (Fig. 7).
3. Remove the tool and install a new snap ring.
4. Start a new bearing into the opposite side of the yoke.
5. Install the tool and press on the bearing until the opposite bearing contacts the snap ring.
6. Remove the tool and install a new snap ring. It may be necessary to grind the facing surface of the snap ring to permit easier entry.

7. Reposition the drive shaft and install the new spider and two new bearings in the same manner as the rear yoke.



E2097-1C

FIG. 6 Removing Universal Joint Bearing

8. Position the slip yoke on the spider and install two new bearings and snap rings.
9. Check the joint for freedom of movement. If bind has resulted from misalignment during the foregoing procedures, a sharp rap on the yokes with a brass hammer will seat the bearing needles and usually provide freedom of movement. Take care to support the shaft end during this operation, and do not strike the bearings themselves. Be sure the universal joints are free to move easily without binding before installing the drive shaft.

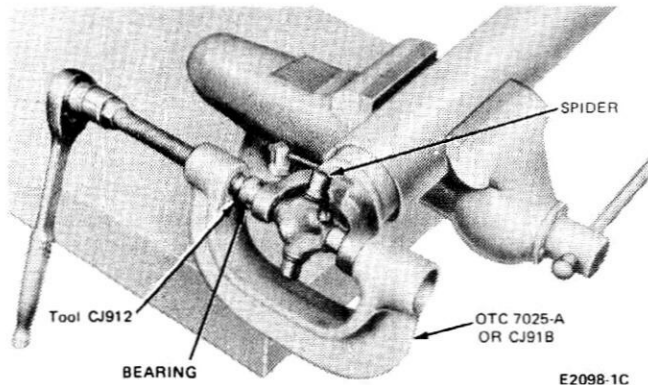


FIG. 7 Installing Universal Joint Bearing

Drive Shaft — Double Cardan Type U-Joints

**PART
15-66**

Applies To Lincoln Continental and Versailles

SUBJECT	PAGE	SUBJECT	PAGE
DESCRIPTION	66-1	TESTING	
DISASSEMBLY AND ASSEMBLY		Drive Line Angle Check	66-2
Double Cardan Joint — Versailles	66-3	Drive Line Balance Check	66-2
Double Cardan Joint — Lincoln Continental ...	66-3	Drive Shaft Runout Check	66-2
REMOVAL AND INSTALLATION	66-2		

CF2521-2B

DESCRIPTION

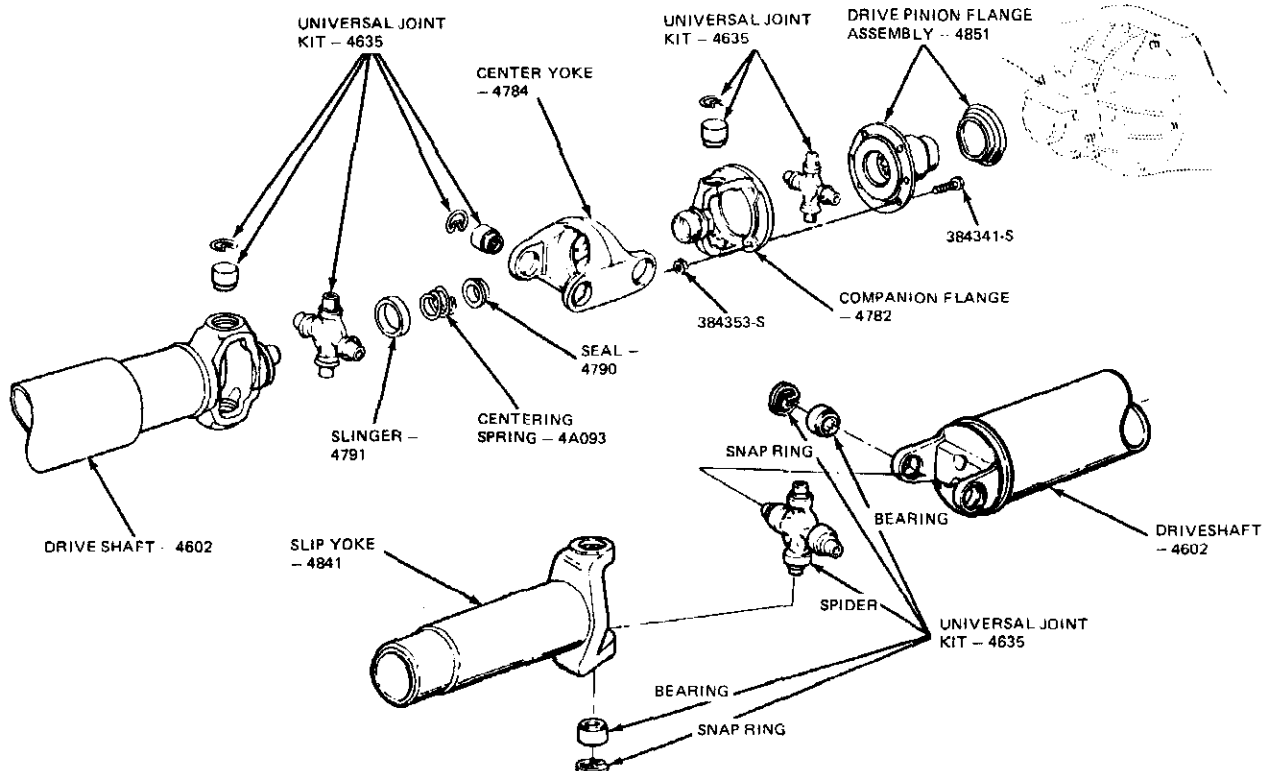
The drive shaft is the means of transferring power from the transmission to the differential in the rear axle.

The Versailles drive shaft incorporates one Cardan-type universal joint and a slip yoke in front and a double Cardan-type universal joint and a circular flange in the rear. (Fig. 1.)

The Lincoln Continental drive shaft is equipped with double Cardan-type universal joints at both the front and the rear of the drive shaft.

Information on repairing the Versailles front universal joint is contained in Part 15-60.

The double Cardan type universal joint used at the rear of the Versailles drive shaft is of a different design and manufacture from the double Cardan joints used at both ends of the Lincoln Continental drive shaft.



F2543-2A

FIG. 1 Driveshaft and Universal Joints—Disassembled—Versailles

TESTING

DRIVE LINE BALANCE CHECK

If detailed parts of the drive shaft are replaced and shaft vibration is encountered after installation, disconnect the shaft at the slip yoke. Rotate the slip yoke 180 degrees; then, reconnect the shaft to the slip yoke. If the vibration persists, disconnect the shaft at the rear axle companion flange. Rotate the companion flange 180 degrees and reconnect the shaft to the flange.

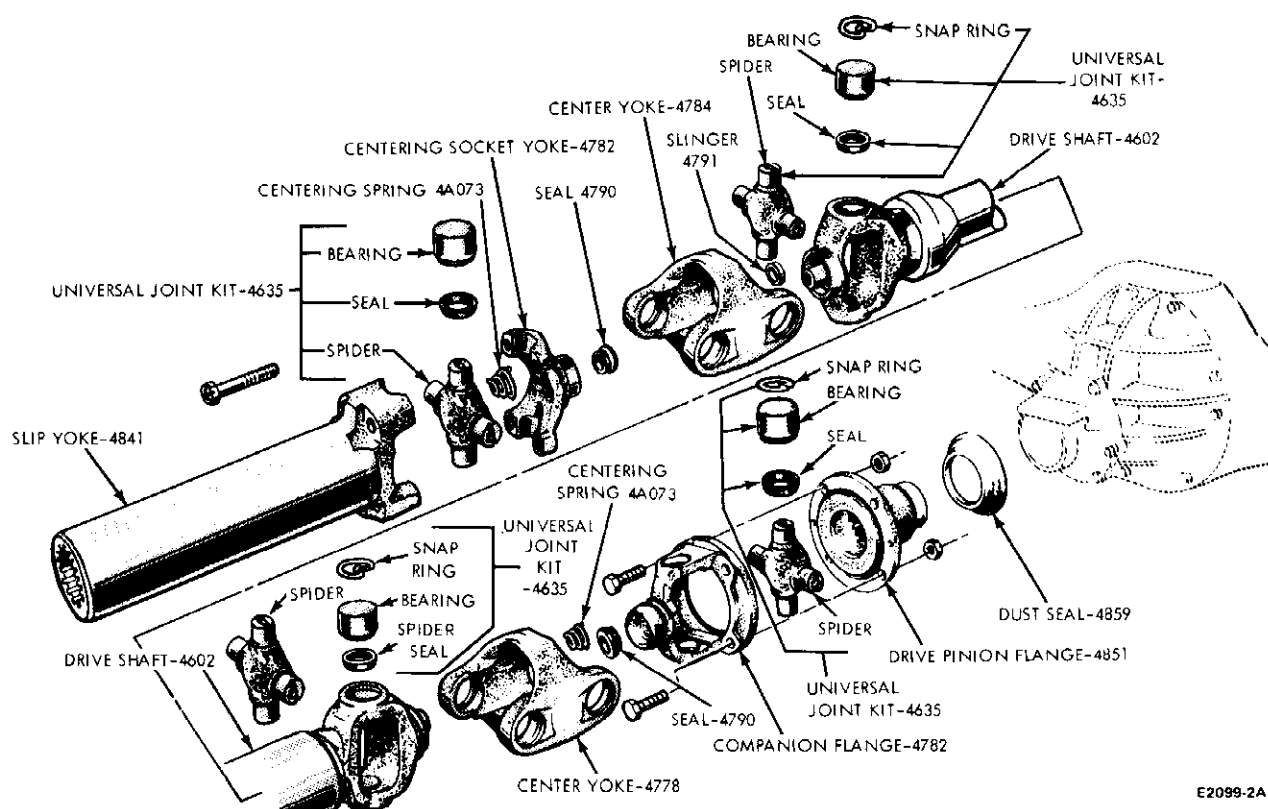
DRIVE LINE ANGLE CHECK

Vibration or shudder which is noticeable either on fast acceleration or when coasting, using the engine for

a brake, may be caused by the rear axle housing being loose on the rear springs or by improper pinion angle. Refer to Part 14-01 for pinion angle checking procedures.

DRIVE SHAFT RUNOUT CHECK

Using a dial indicator, check the runout at each end and in the middle of the drive shaft. The rear check should be made on the small tube section of the shaft between the balance weights and the yoke welds. Drive shaft runout should not exceed 0.335 inch at any one point.



E2099-2A

FIG. 2 Drive Shaft and Universal Joints Disassembled—Lincoln Continental

REMOVAL AND INSTALLATION

Removal

1. To maintain drive line balance, mark the rear drive shaft yoke and the drive pinion flange of the axle (if the alignment marks are not visible), in relation to the shaft, so that they may be installed in their original positions.
2. Disconnect the drive shaft from the circular companion flange. Pull the drive shaft toward the rear of the vehicle until the slip yoke clears the transmission extension housing and the seal. Install the appropriate tool in the extension housing to prevent lubricant leakage.

Installation

1. If either the rubber seal on the output shaft or the seal in the end of the transmission extension

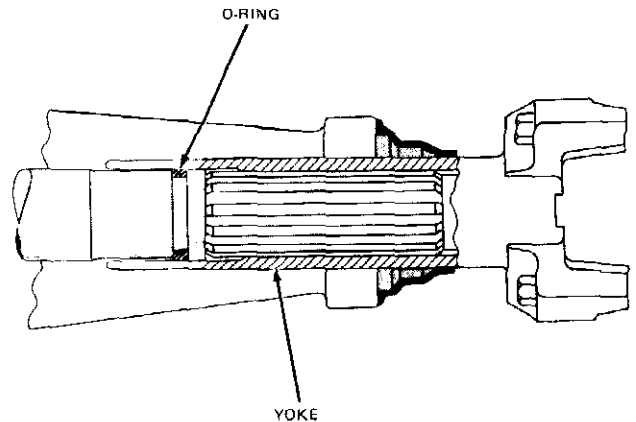
housing is damaged, replace the seal or seals as required.

2. Lubricate the yoke spline with B8A-19589-A lubricant. This spline is sealed so that the transmission fluid does not wash away the spline lubricant. Remove the tool from the extension housing. Install the yoke on the transmission output shaft. Do not allow the yoke assembly to bottom on the output shaft with excessive force.

Install the drive shaft so index marks or the yellow mark (if visible) on the yoke (light side) is in line with the yellow mark on the companion flange. This prevents vibration, which occurs when the shaft and the axle pinion flange become out of balance. If a vibration exists, the drive shaft should be

disconnected from the axle, rotated 180 degrees and reinstalled.

3. Install the bolts and nuts that attach the yoke to the drive pinion flange. Torque the nuts to 70 to 90 ft-lbs.



E2101 1B

FIG. 3 Output Shaft Spline Seal

DISASSEMBLY AND ASSEMBLY

DOUBLE CARDAN JOINT—VERSAILLES

VERSAILLES REAR

Disassembly

1. Working at the rear axle end of the shaft, mark the position of the spiders, the center yoke, and the centering socket yoke as related to the companion flange. The spiders must be assembled with the bosses in their original position to provide proper clearances.
2. Position Tool CJ91B as shown in Fig. 4. Thread the tool clockwise until the bearing protrudes approximately 3/8 inch out of the yoke.
3. Remove the driveshaft from the vise.
4. Tighten the bearing in the vise and tap on the yoke to free the bearing from the center yoke. Do not tap on the drive shaft tube.
5. Reposition Tool CJ91B on the yoke and force the opposite bearing outward and remove it.
6. Position the tool on one of the remaining bearings and force it outward approximately 3/8 inch.
7. Grip the bearing in the vise and tap on the weld yoke to free the bearing from the center yoke. **Do not tap on the driveshaft tube.**
8. Reposition the tool on the yoke to press out the remaining bearing.
9. Remove the spider from the center yoke.
10. Remove the bearings from the driveshaft yoke as outlined above and remove the spider from the yoke.
11. Insert a screwdriver into the centering ball socket located in the companion flange and pry out the rubber seal. Remove the retainer, three piece ball seat, washer and spring from the ball socket.

Assembly

1. Inspect the centering ball socket assembly for worn or damaged parts. If any damage is evident replace the entire assembly.
2. Insert the spring, washer, three piece ball seat and retainer into the ball socket.

3. Using a suitable tool, install the centering ball socket seal.
4. Position the spider in the driveshaft yoke. Make sure the spider bosses are in the same position as originally installed. Press in the bearing cups with Tool CJ91B. Install the internal snap rings provided in the repair kit.
5. Position the center yoke over the spider ends and press in the bearing cups. Install the snap rings.
6. Install the spider in the companion flange yoke. Make sure the spider bosses are in the position as originally installed. Press on the bearing cups and install the snap rings.
7. Position the center yoke over the spider ends and press on the bearing cups. Install the snap rings.

LINCOLN CONTINENTAL DOUBLE CARDAN JOINTS

UNIVERSAL JOINT

Disassembly

1. Mark the position of all the yokes before disassembly so that they can be reassembled in their original relationship to retain driveshaft balance (Fig. 5).
2. Support the driveshaft in a horizontal position in a vise. Never clamp the driveshaft tubing in a vise, always clamp on one of the yokes. Position the tool as shown in (Fig. 6), and tighten the tool clockwise until the plastic retaining the bearing is sheared, and the bearing protrudes approximately 3/8" out of the yoke.
3. Remove the driveshaft from the vise.
4. Grip the bearing in the vise, and drive on the center yoke as shown in (Fig. 7) to remove the bearing.
5. Reposition the tool on the yoke, and move the remaining bearing in the opposite direction so that it protrudes approximately 3/8" out of the yoke.
6. Grip the bearing in a vise. Drive on the center yoke to free it from the bearing (Fig. 7).