FORD MOTOR CO. SEPARATE HOUSING

U-150 (Bronco)
E-100 & E-150
F-100 & F-150

DESCRIPTION

The axle has a banjo-type housing with a removeable carrier. The drive pinion is straddle mounted, and its depth is adjusted by shims. The ring gear and differential case are mounted on the removeable carrier. The pre-load on the side bearings is set by adjusting nuts on which the bearing cups rest. This unit is distinguishable from the Dana/Spicer units by its removeable carrier and lack of a rear cover plate. It is used with semi-floating axles in all applications. Ring gear diameter is 9.0".

AXLE RATIO & IDENTIFICATION

Axle ratio and model identification numbers may be found on the metal tag attached to axle by 1 carrier bolt. Other information included on tag includes date code, ring gear diameter, and assembly plant code. To determine drive axle ratio, refer to Drive Axle Ratio Identification in this Section.

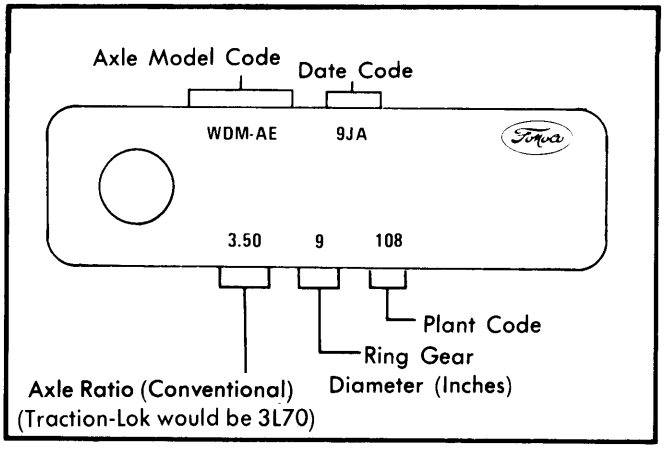

Fig. 1 Drive Axle Identification Tag

REMOVAL & INSTALLATION

AXLE SHAFTS

Models W/Ball Type Bearing – Remove wheel and tire, and brake drum. Working through hole in axle flange, remove four wheel bearing retainer nuts. Using a slide hammer connected to axle, pull out axle and bearing. Install one nut to hold backing plate in place. Replace oil seal using suitable tool (1175-AB or AC) and slide hammer. To install, reverse procedure. Use new bearing retainer gasket. Make sure bearing is firmly seated in axle housing.

Models W/Tapered Roller Bearing – Follow same procedure as outlined for ball bearing removal. Use a slide hammer to remove bearing cup from axle housing. To install, reverse removal procedure. Place bearing cup over tapered bearing before sliding axle into housing.

NOTE – *If axle is removed for service or overhaul, a new oil seal must be installed.*

AXLE BEARINGS & SEALS

Models W/Ball Type Bearing – 1) With axle removed, drill a ¼-½" hole in bearing retainer ring. Drill hole to a depth of ¾ the thickness of retainer ring.

CAUTION – *DO NOT drill through ring into axle shaft.*

2) Place a chisel across drilled hole. Strike with a hammer until ring separates and can be removed.

3) Press or pull bearing from axle shaft after bearing retainer has been removed. Remove axle seal using a suitable adapter and slide hammer. Press a new bearing and retainer onto axle shaft. Drive a new seal into axle housing.

NOTE – *DO NOT attempt to press new bearing and retaining ring onto axle at the same time.*

Models W/Tapered Roller Bearing – 1) With axle removed, drill a ¼-½" hole in bearing retainer ring. Drill hole to a depth of ¾ the thickness of retainer ring.

CAUTION – *DO NOT drill through ring into axle shaft.*

2) Place a chisel across drilled hole. Strike with a hammmer until ring separates and can be removed. Remove bearing cup from housing and place over bearing.

3) Place a suitable removal collet (T75L-1165-A) over bearing. Place axle shaft in press, position over a support plate and press off bearing.

4) Install retainer plate on axle shaft (if removed). Lubricate new seal and bearing. Place seal and bearing on axle making sure cup rib ring is facing axle flange.

5) Press bearing onto axle, making sure it is fully seated. Do not attempt to press bearing retainer on at the same time. Press on a new bearing retainer.

PINION FLANGE & SEAL

Removal – Mark propeller shaft end yoke and pinion flange for reassembly reference, then disconnect propeller shaft and tie out of way. Scribe marks on pinion shaft and pinion flange for reassembly reference, then measure and record pinion bearing preload. Remove pinion nut, washer and flange, then pry pinion oil seal from bore in bearing retainer.

Installation – 1) Press new oil seal into bore in bearing retainer and seal outer edge with oil resistant sealer. Install pinion flange, washer and new nut. Tighten pinion shaft nut slowly while rotating pinion flange to insure proper seating of pinion bearings.

2) Continue tightening nut, taking frequent preload readings. If recorded preload reading was less than specifications, tighten to specification. If recorded reading was more than specification, tighten to original reading. Install drive shaft.

CAUTION – *DO NOT back off pinion nut to lessen preload. If backed off, a new spacer must be installed.*

FORD MOTOR CO. SEPARATE HOUSING (Cont.)

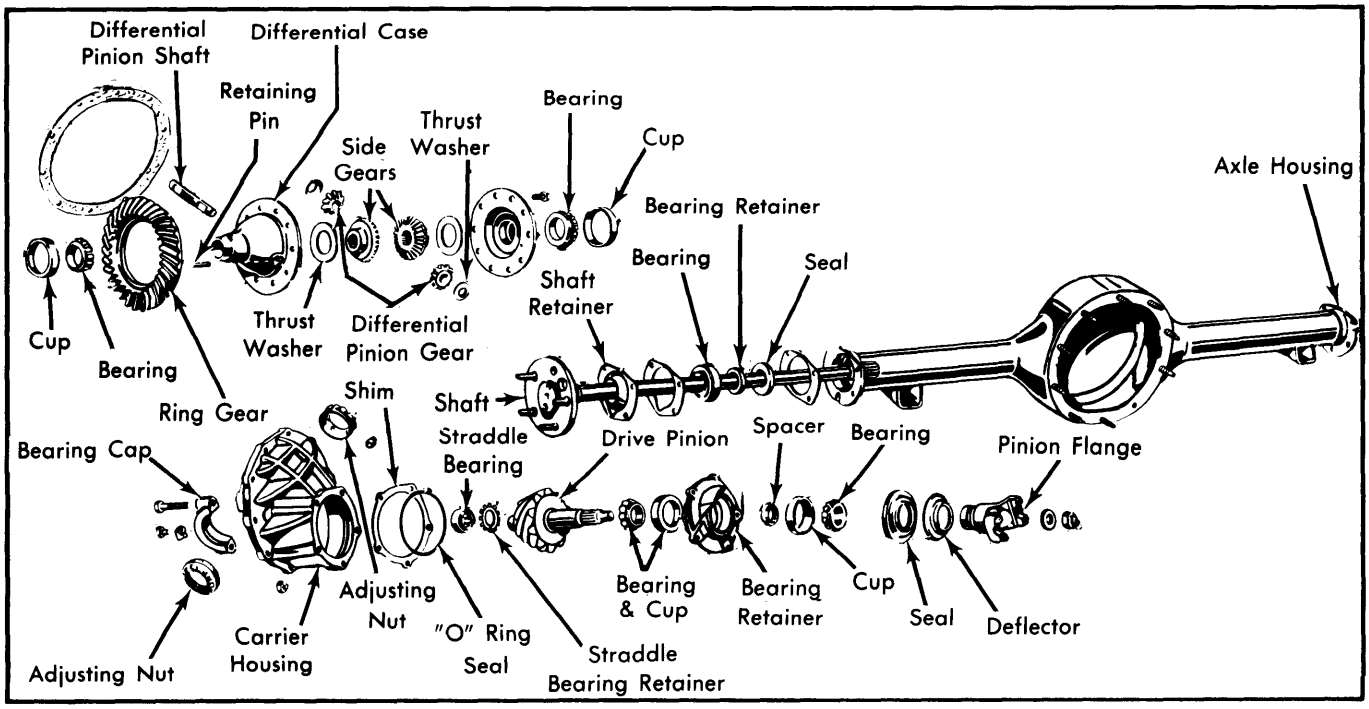

Fig. 2 Exploded View of Ford Motor Co. Separate Housing Drive Axle Assembly

DIFFERENTIAL CARRIER

Remove both axle shafts, then mark propeller shaft end yoke and pinion flange for reassembly reference and remove propeller shaft. Drain rear axle lubricant, then remove carrier attaching bolts and differential carrier. To install, reverse removal procedure.

OVERHAUL

DISASSEMBLY

1) Mark differential bearing caps for reassembly reference, then remove adjusting nut locks, bearing caps and adjusting nuts. Remove differential case from carrier. Remove differential side bearings from case. Remove ring gear attaching bolts and discard. Tap ring gear from case using a soft faced hammer.

2) Drive out differential pinion shaft retaining pin. Mark case halves for reassembly reference and separate case. Using brass drift, drive out pinion shaft. Remove differential side gears, pinion gears and thrust washers from case.

3) Remove pinion shaft nut, washer, pinion flange and seal from carrier. Remove pinion shaft and bearing retainer, noting number and thickness of shims between retainer and carrier. Remove straddle bearing and retainer from carrier using suitable driver and press pinion bearings from pinion shaft. Press bearing cups from bearing retainer.

REASSEMBLY & ADJUSTMENT

NOTE – *Lubricate all parts with hypoid gear lubricant during assembly.*

Differential Case Assembly – Place differential side gear and thrust washer into differential case bore. From outside of case, drive differential pinion shaft into case just far enough to retain pinion thrust washer and pinion gear, then place second pinion thrust washer and gear into position in case. Drive pinion shaft into place, making sure shaft retainer holes are in alignment with holes in case. Install second side gear and thrust washer, assemble case halves and install retainer pin. Install differential side bearings and ring gear and tighten ring gear bolts to specifications.

NOTE – *Ring and pinion gears should not be used if numbers do not match.*

Drive Pinion Depth – 1) Press new pinion bearing cups into pinion retainer housing until fully seated, making sure a .0015" feeler gauge cannot be inserted between bearing cup and bottom of bore.

2) Install new straddle bearing and retainer (with concave side up) in carrier and fully seat bearing and retainer. Press rear pinion bearing onto pinion shaft.

3) Determine pinion shim thickness as follows: If same ring and pinion gears are being reused, install original shim pack. If new ring and pinion gears are being installed, use "nominal" thickness shim and make tooth contact pattern to see if additional shims are required. Check pinion depth using suitable tool (T79P-4020-A or equivalent).

4) Measure clearance using feeler gauge and select correct shim from Shim Chart according to feeler gauge thickness.

Pinion Bearing Preload (W/Collapsible Preload Spacer) – 1) Place NEW preload spacer on drive pinion shaft. Install front pinion bearing and bearing retainer. Press bearing into

FORD MOTOR CO. SEPARATE HOUSING (Cont.)

SHIM CHART

Feeler Gauge Reading	Shim Required	Feeler Gauge Reading	Shim Required
.002"	.038"	.018"	.022"
.003"	.037"	.019"	.021"
.004"	.036"	.020"	.020"
.005"	.035"	.021"	.019"
.006"	.034"	.022"	.018"
.007"	.033"	.023"	.017"
.008"	.032"	.024"	.016"
.009"	.031"	.025"	.015"
.010"	.030"	.026"	.014"
.011"	.029"	.027"	.013"
.012"	.028"	.028"	.012"
.013"	.027"	.029"	.011"
.014"	.026"	.030"	.010"
.015"	.025"	.031"	.009"
.016"	.024"	.032"	.008"
.017"	.023"	.033"	.007"

position being careful not to crush spacer. Install "O" ring in groove in bearing retainer, place selected pinion depth shim on carrier housing, then install pinion assembly and tighten bolts.

2) Install pinion flange, washer and nut. Tighten pinion flange nut to 175 ft. lbs. Check pinion bearing preload. Continue to tighten pinion flange nut until proper preload is obtained.

CAUTION – *DO NOT exceed 175 ft. lbs. at this time. DO NOT back off nut to obtain preload. If torque on pinion shaft is less than 175 ft. lbs. after preload is set, a new collapsible spacer MUST be installed.*

Backlash & Side Bearing Preload – **1)** Place cups on differential side bearings and set differential case in carrier. Slide assembly along bores until a slight amount of backlash is felt between gear teeth. Set adjusting nuts in bores so nuts just contact bearing cups (each nut should be engaging approximately same number of threads). Carefully position bearing caps on carrier, install bearing cap bolts and tighten to 70-80 ft. lbs. Make sure adjusting nuts turn freely as bolts are tightened. If not, remove caps and inspect for damaged threads. Now loosen bolts and retorque to 25 ft. lbs.

2) Loosen right adjusting nut until it is away from cup. Tighten left nut until ring gear is just forced into pinion with no backlash.

3) Make sure right nut is still loose. Tighten right nut 2 notches past point where it first contacts bearing cup.

4) Rotate ring gear several revolutions in each direction. This will seat bearings in cups. This procedure is important for obtaining correct specification.

5) Loosen right nut again to release preload. If any backlash is noted, tighten left nut just enough to remove backlash.

6) Install a dial indicator as shown in illustration. See *Fig. 3*. Tighten right adjuster nut until side bearing preload (case spread) is to specifications.

7) As preload is applied from right-hand side, the correct backlash is usually obtained.

8) Install a dial indicator on carrier so contact tip of indicator bears against face of gear tooth on outer diameter of ring gear.

9) Measure backlash on several locations on ring gear. If backlash measurements vary more than .003", there is excessive runout in gear or mounting.

10) If backlash is not correct, loosen one adjusting nut and tighten opposite nut an equal amount. This will move ring gear into adjustment without changing bearing preload.

NOTE – *When moving adjusting nuts, final movement should always be made in a tightening direction. If nut must be loosened 1 notch, loosen 2 notches and then tighten 1 notch.*

11) When side bearing preload and ring gear backlash are correctly set, tighten side bearing caps to specifications. Make sure gear tooth pattern check (see appropriate article in this Section), and install carrier into axle housing.

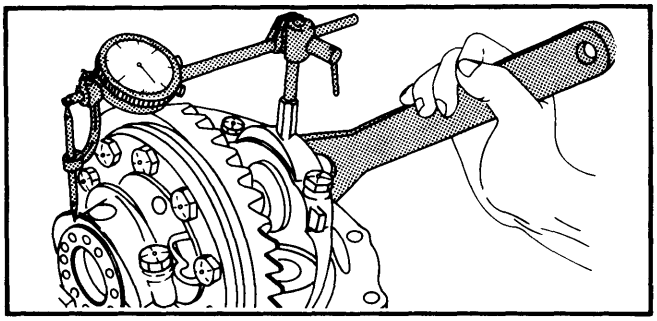

Fig. 3 Using Dial Indicator to Adjust Side Bearing Preload

TIGHTENING SPECIFICATIONS

Application	Torque (Ft. Lbs.)
Side Bearing Cap Bolts	70-85
Ring Gear Bolts	70-85
Pinion Flange Nut	
Collapsible Spacer (Minimum)	175
Pinion Bearing Retainer-to-Carrier	30-45
Carrier-to-Housing	25-40
Adjusting Nut Lock Bolts	12-25
Bearing Retainer Plate Bolt	22-40

AXLE ASSEMBLY SPECIFICATIONS

Application	Specification
Ring Gear Backlash	.008-.012"
Ring Gear Runout (Maximum)	.003"
Backlash Variation (Maximum)	.003"
Side Bearing Preload (Case Spread)	
New Bearings	.008-.012"
Used Bearings	.005-.008"
Pinion Bearing Preload (Rotating Torque)	
Collapsible Spacer	
New Bearings	17-27 INCH Lbs.
Used Bearings	10-14 INCH Lbs.
Side Gear Thrust Washer Thickness	.030-.032"
Pinion Gear Thrust Washer Thickness	.030-.032"
Nominal Pinion Shim Thickness	.015"