1433V / 1440V
TRACTORS SERVICE MANUAL
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FRONT AXLE (4WD)

GENERAL DESCRIPTION

FIG. 6B-01: The 4WD front axle is a center-pivot, reverse Eliot type. The front wheel drive mechanism is incorporated as part of the axle.

The front wheel drive power is taken off the rear transmission and transmitted to the differential in the front axle where the power is divided into right and left and to the respective final cases.

In the final cases, the transmitted revolution is reduced by the bevel gears to drive the front wheel. The 4WD mechanism with bevel gears provides wider steering angles and greater durability.

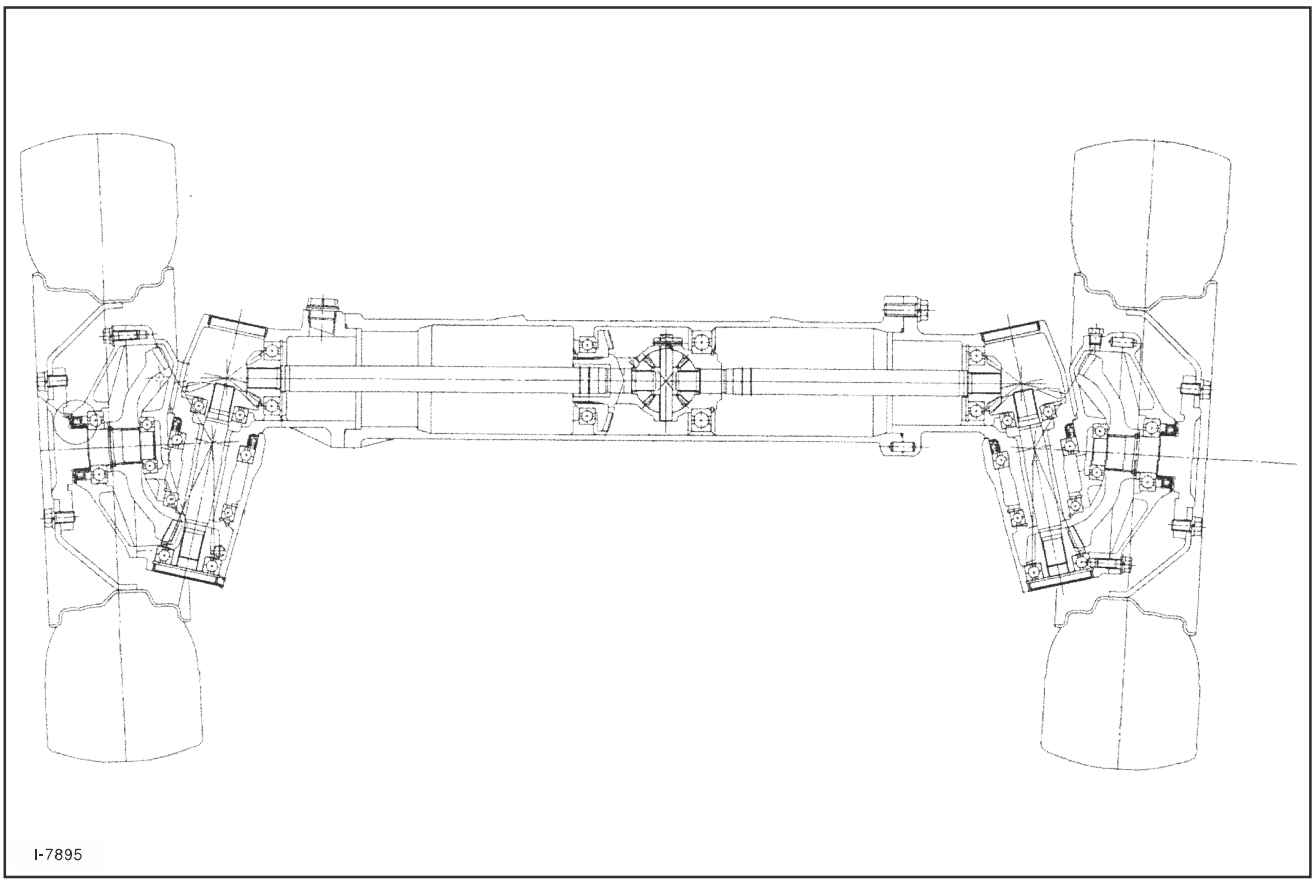

FIG. 6A-01

FRONT WHEEL DRIVE SHAFT (4WD)

FIG. 6B-02: Front Drive Shaft Component List

1. 4WD Shaft
2. Snap Ring
3. Coupling
4. Tube Assembly
5. 4WD Pipe Assembly
6. O-ring
7. O-ring
8. Clamp
9. Bolt
10. Nut
11. Washer

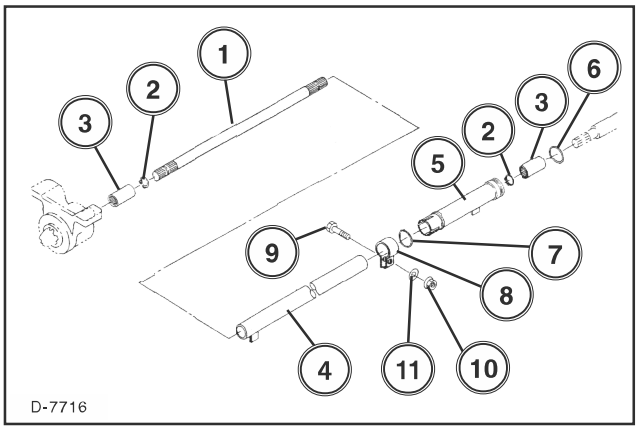

FIG. 6A-02

Removal and Installation

FIG. 6A-03: Loosen clamp bolt, 9, holding telescoping drive tubes.

Slide tubes, 4 and 5, together to expose couplers, 3, and snap rings, 2.

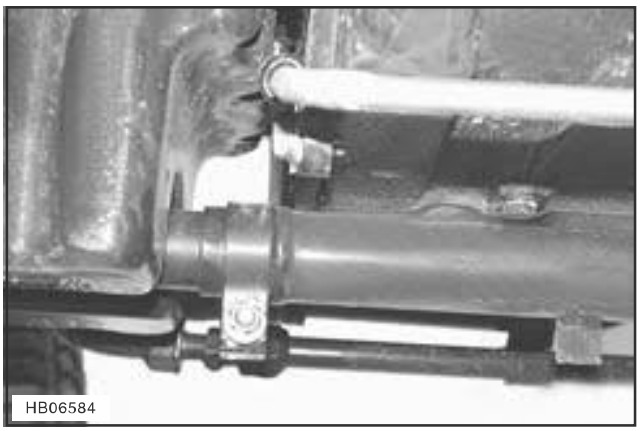

FIG. 6A-03

FIG. 6A-04: Move snap rings, 2, toward center of shaft.

Slide couplers, 3, towards each other shaft and remove shaft.

Reverse procedures to install drive shaft, making certain snap rings are located in groove.

FIG. 6A-04

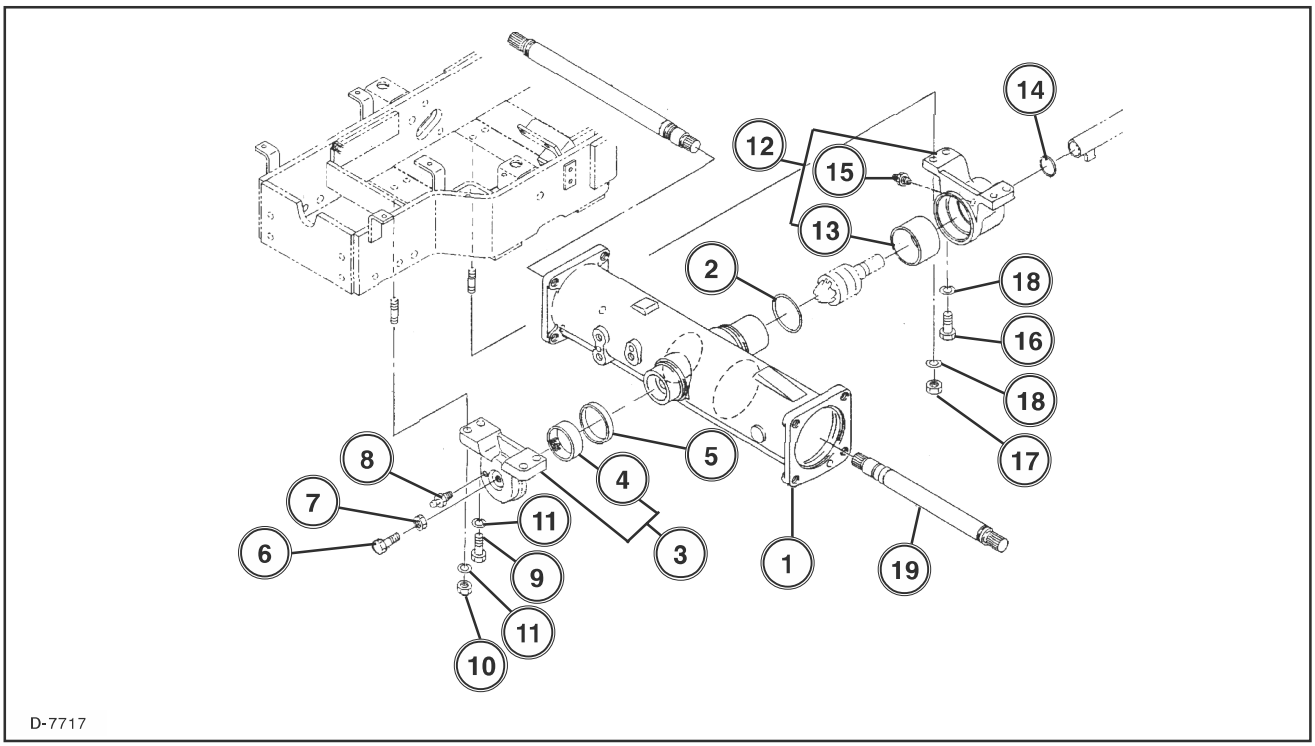

FIG. 6A-05

FIG. 6A-05: Front Axle Component List

1. Axle Housing
2. O-ring
3. Front Pivot Support Assembly
4. Bushing (62x67x20)
5. Oil seal
6. Bolt (M12x35)
7. Nut (M12)
8. Grease Nipple
9. Bolt (M12x53)
10. Nut (M12)
11. Lock Washer (M12)
12. Rear Pivot Support Assembly
13. Bushing (65x70x44)
14. O-Ring
15. Grease Nipple
16. Bolt (M12x35)
17. Nut (M12)
18. Lock Washer (M12)
19. Shaft
20. Shaft

PIVOT SUPPORTS

Removal and Installation Disassembly

Remove front axle as outlined in "SPLITTING FRONT AXLE" in Chapter 1B.

Inspection

Front Axle Bushing Bore Diameter

FIG. 6A-06: Measure the bore diameter of the bushing in the pivot support. If the measured value exceeds the usable limit, replace the bushing.

Standard values as assembled	62 (2.44)
Usable limit	62.2 (2.45)

Worn or damaged oil seals, O-rings, bushings, etc. should be replaced.

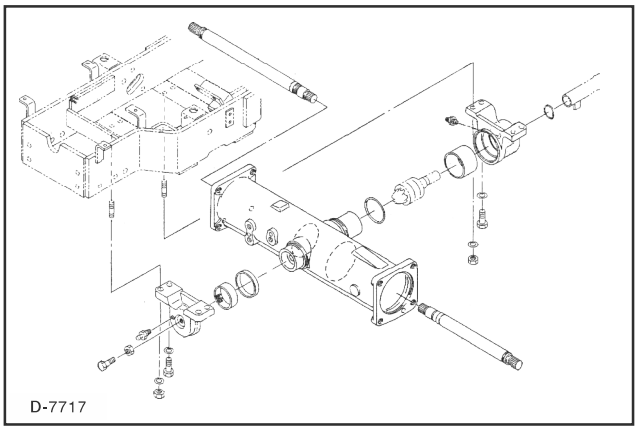

FIG. 6A-06

Reassembly

Reassemble the parts in reverse order of disassembly, following these instructions.

Lips of the oil seals, bushing contact surfaces, and O-rings should be coated with grease in advance.

When installing the bushings, abide by the following precautions.

Use an installer and press in the bushings on a press.

The bore surface should be coated with grease in advance.

The seam of the bushing should be in a position which is free from any load.

NOTE: Slanted or forced installation of the bushing should be avoided, and the bore surface of the bushing, should not be damaged.

Set axle end float.

NOTE: After correcting the pivot bracket end play, tighten the lock nut of the adjusting bolt to a torque of 117 - 136 Nm (87 - 101 ft-lbs).

The reassembled front axle should rock smoothly while pivoting.

Perform road tests and confirm that there are no loose parts or other abnormalities.

TOE-IN ADJUSTMENT

FIG. 6A-07: Correct "toe-in" dimension of front wheels (A minus B) is 2 - 6 mm (0.08 - 24 in.).

To adjust, loosen lock nuts, 1, and adjust tie rod length by turning turnbuckles, 2. Adjust each side evenly. Ball joints must move freely after lock nuts are tightened.

NOTE: Measure toe-in from tire center to tire center at a point halfway up on face of each tire.

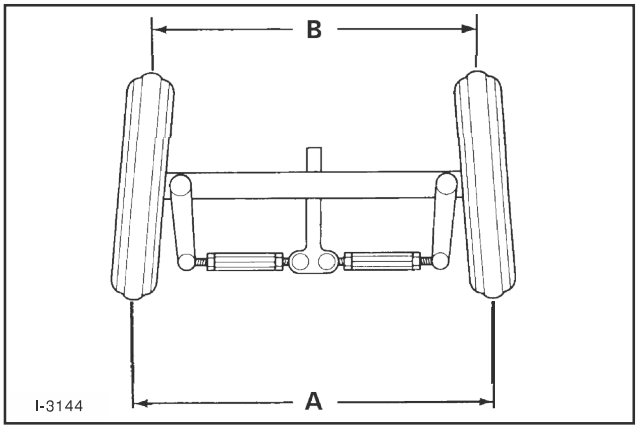

FIG. 6A-07

FRONT DIFFERENTIAL

FIG. 6A-08: Front Differential Component List

1. Gear Set
2. Bearing Assembly
3. Collar (48x52x17)
4. Nut (M25)
5. Shim/C
6. Shim/D
7. Oil Seal
8. Snap Ring
9. Differential Case
10. Differential Pinion Shaft
11. Bevel Gear
12. Pin (14x91)
13. Spring Pin (5x32)
14. Wire
15. Bearing
16. Bearing
17. Snap Ring
18. Snap Ring

NOTE: Shim C is 0.2mm (.008in) thick. Shim D is 0.1mm (.004 in) thick.

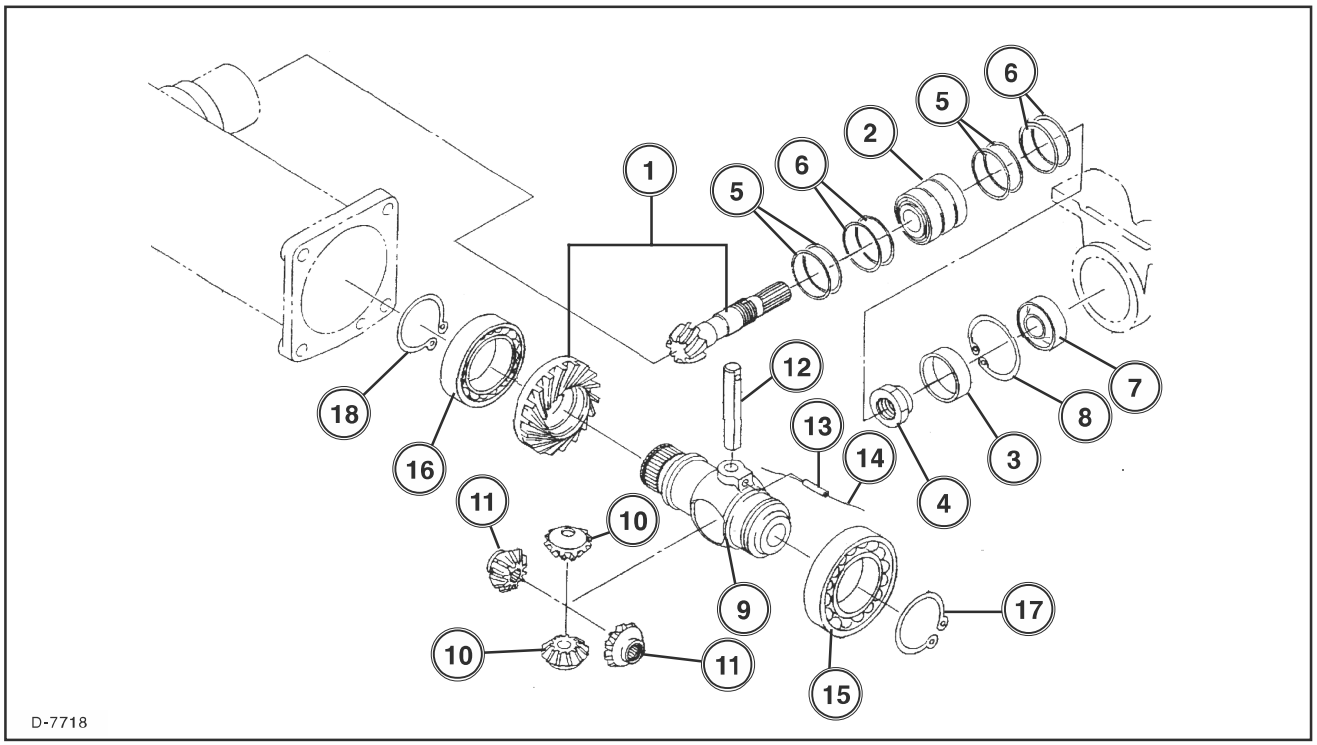

FIG. 6A-08

Disassembly

Remove both wheels.

Remove the drain plug from the final case on both sides and drain oil from the final case.

Remove front axle as outlined in "SPLITTING FRONT AXLE" unless only the front case assembly or its components need to be serviced.

FIG. 6A-09: Remove pinion shaft oil seal. Remove snap ring from pinion shaft.

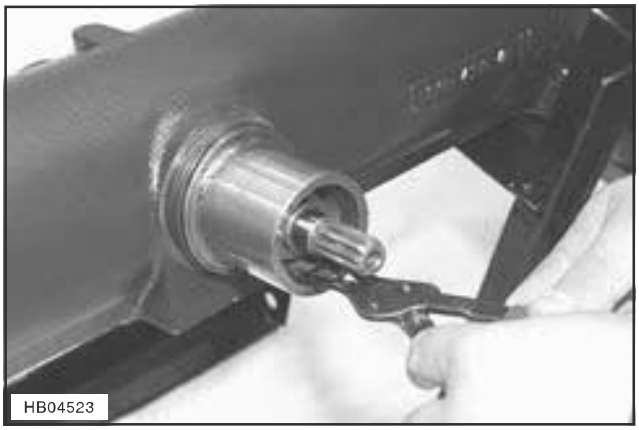

FIG. 6A-09

FIG. 6A-10: Remove pinion shaft assembly, 1, collar, 2, rear shims, 3, and front shims, 4. Remove staked nut, 5, and use a hydraulic press to remove pinion shaft bearings, 6.

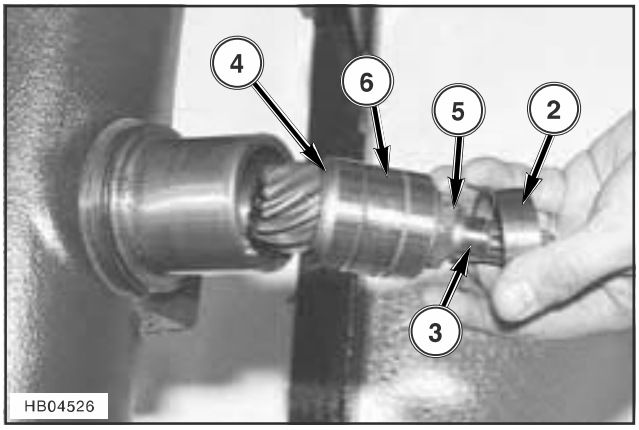

FIG. 6A-10

FIG. 6A-11: Remove left and right hand final case assemblies. Inspect the o-ring, 1, on the axle housing.

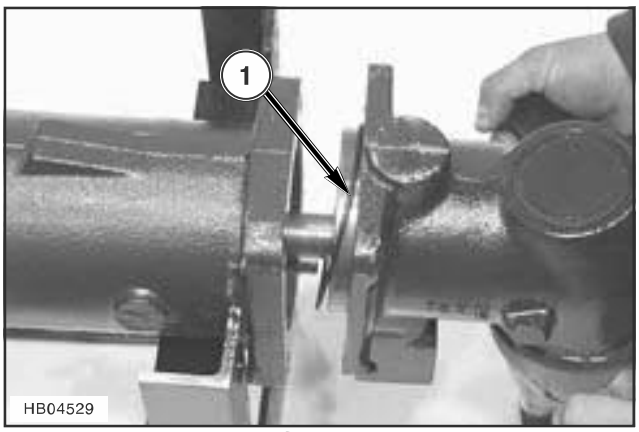

FIG. 6A-11

FIG. 6A-12: Remove left and right hand axle shafts.

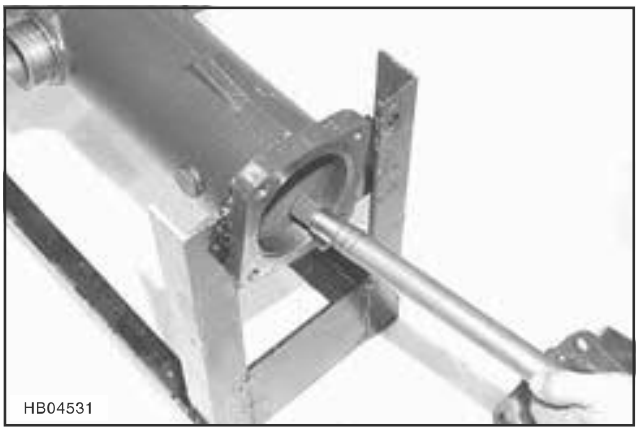

FIG. 6A-12

FIG. 6A-13: Remove differential assembly through the left hand end of the axle housing.

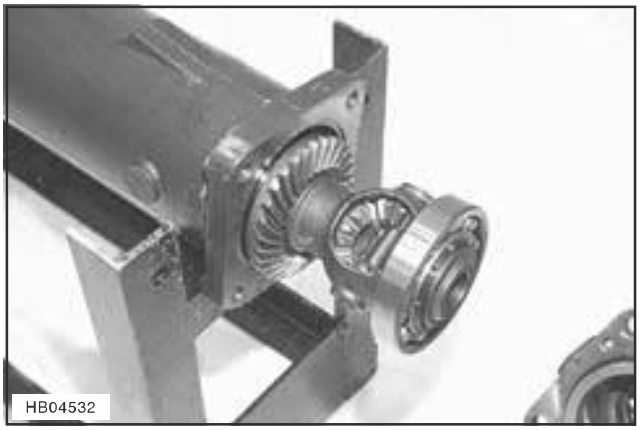

FIG. 6A-13

FRONT DIFFERENTIAL

Overhaul

Remove differential.

NOTE: The thrust play of the bevel pinions should be inspected before disassembly. If the play exceeds the specified value, correct it by shimming.

Specified value	0.2 mm (.008 in.) or less
Available shims mm (in.)	Shim A: 0.2 (0.008) Shim B: 0.1 (0.004)

FIG. 6A-14: When removing bearings from bevel pinion, 3, release stake on lock nut, 1, then remove nut and remove bearings.

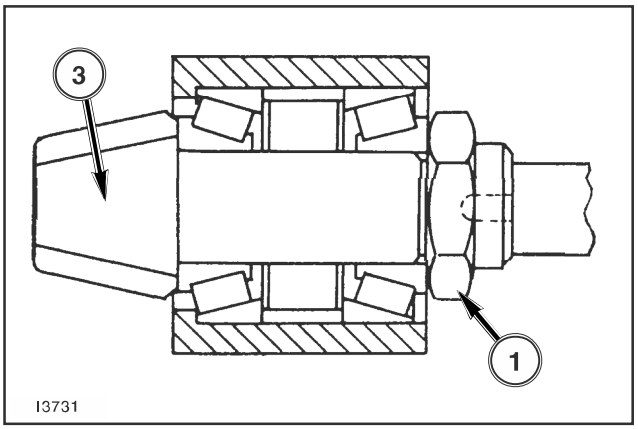

FIG. 6A-14

NOTE: The lock nut should be staked at a point completely away from the threads. Staking near the threads may damage the threads of the bevel pinion.

Inspection

Visually check the bearing surfaces of the bevel pinion and ring gear teeth.

NOTE: The bevel pinion and the ring gear should be replaced as a pair.

Seriously worn or damaged parts should be replaced.

Reassembly

Reassemble the parts in reverse order of disassembly, following these instructions.

Each friction surface should be coated with grease in advance.

The bevel pinion, 3, and the ring gear are a matched set, after a mesh adjustment performed at the factory. Consequently, when reassembling, be sure to match parts with the same reference number.

Leave the seal out until adjustments have been completed.

The front wheel drive pinion has two adjustments related to its support housing.

Pre-Load On Bearings

This is adjusted with nut on rear end of shaft. Specified starting torque - 5 - 7 kgf-cm (4.3 - 6 in.-lbs.).

End Play Of Complete Assembly Inside Housing

This is adjustable with shims. Specified end play - mm (in.) 0 - 0.2 (.008).

PROCEED AS FOLLOWS:

FIG. 6A-15 & 16: Install bearing cone, 1, on pinion shaft, making certain it is seated at pinion.

Install cups, 2, and spacer, 3.

Install cone, 4.

Install nut, 5, and tighten until all end play is removed between bearing cups, 2, and cones, 1, and 4.

Cups, 2, and spacer, 3, should still roll easily on cones, 1, and 4.

Install assembly in axle housing and install spacer, 6, and snap ring, 7.

Measure end play between snap ring, 7, and spacer, 6.

Remove snap ring and pinion assembly.

Install shims, evenly spaced, between spacer, 6, and cone, 2, at front, and bearing cone and housing, 8, to reduce end play to 0 - 0.2 mm (.000 - .008) with snap ring installed.

FIG. 6A-17: Check starting torque as shown with front seal removed. It should be 5 - 7 kfg-cm (4.3 - 6 in.-lbs.). This is equivalent to 5 – 7 kg (11 – 15.4 lbs.) force when measured using a pull-scale and string.

If starting torque is not correct it will be necessary to remove snap ring and pinion and readjust nut until correct starting torque is obtained.

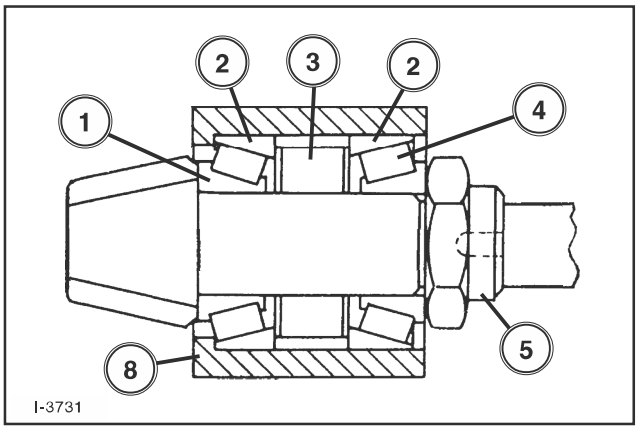

FIG. 6A-15

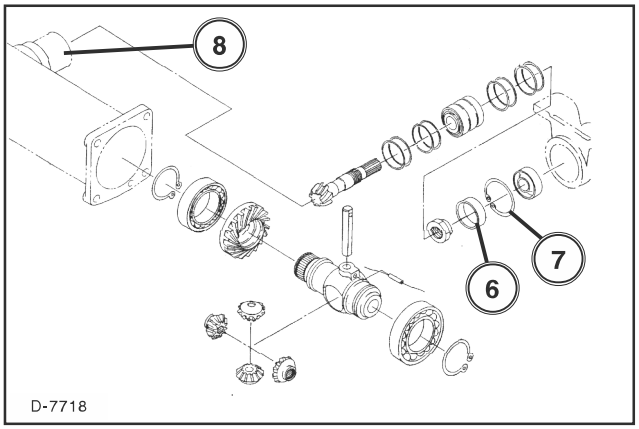

FIG. 6A-16

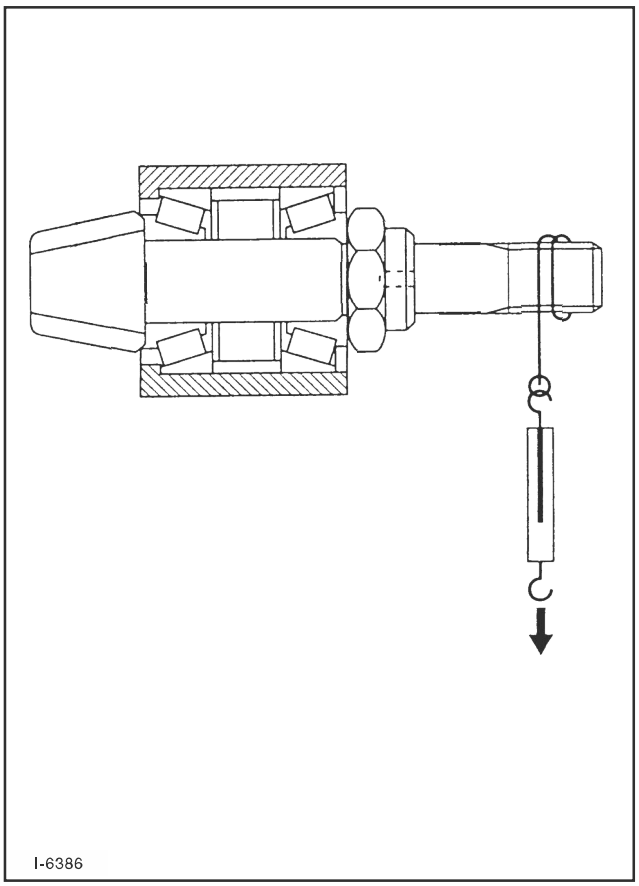

FIG. 6A-17

FIG. 6A-18: When correct starting torque is obtained, remove pinion assembly and stake nut, 1.

NOTE: Do not stake nut near threads on pinion shaft, because it could damage the pinion.

Reinstall pinion, with shims, spacer, and snap ring and make certain end play is within limits.

Lubricate lip on seal, 2, and install up to surface, 3. Be careful not to damage lip on seal.

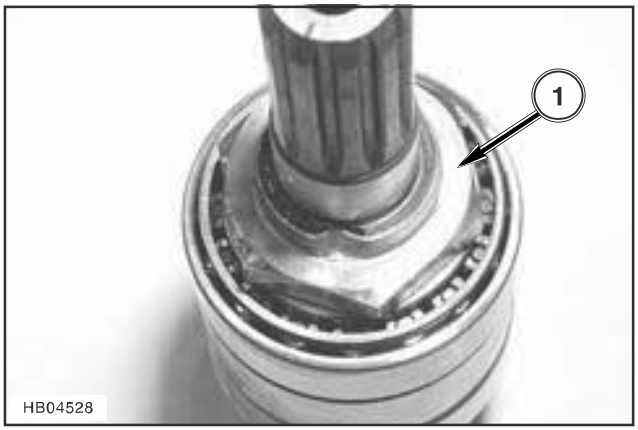

FIG. 6A-18

FIG. 6A-19: When replacing the ring gear and input shaft with new ones, backlash adjustment is impossible because of design, so make sure that they turn smoothly by turning the shaft between the differential and the final case. When they are excessively heavy to turn, add the shims at T2, 1, and remove shims at T1, 2, or vice versa if they are to easily turned. After T2 shimming, add shims at T1, 2, until the snap ring, 3, has no play against the collar, 4.

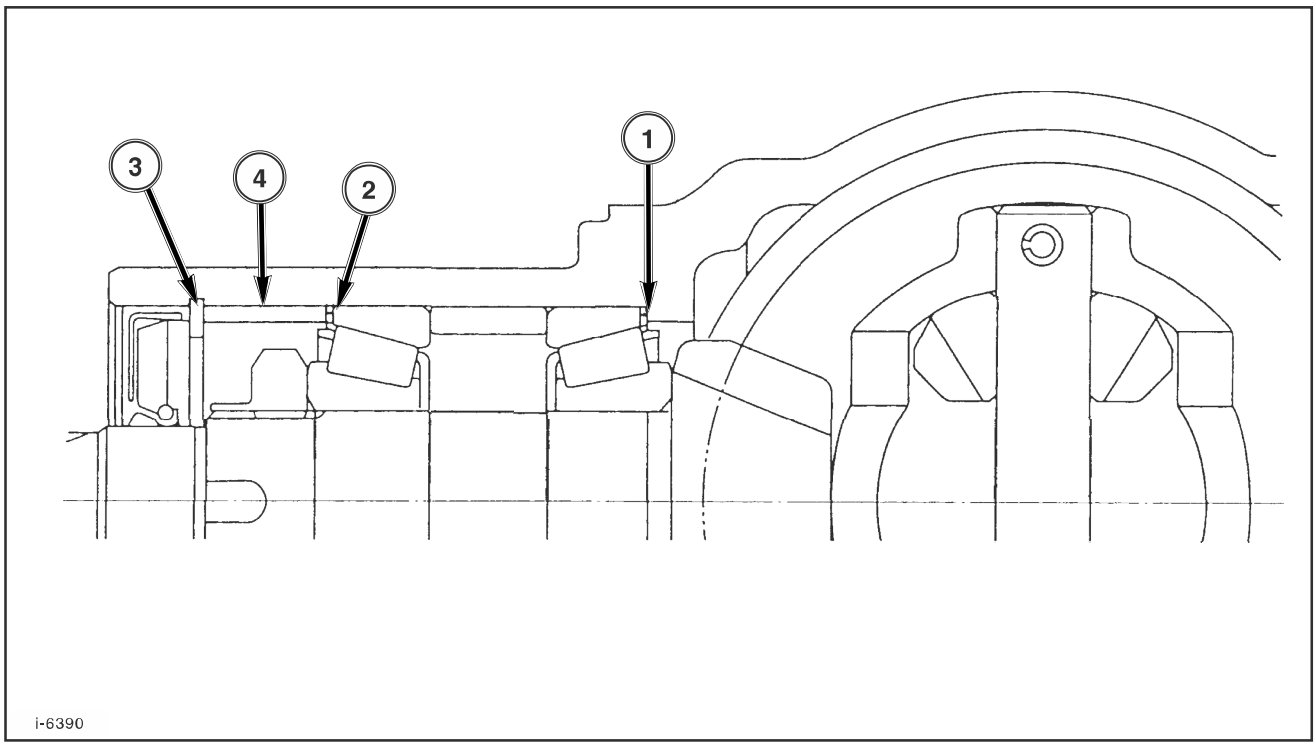

FIG. 6A-19

FIG. 6A-20: To disassemble the differential, proceed as follows:

Remove bearings, 1.

Remove ring gear, 2.

Remove roll pin and wire, 3.

Remove pin, 4.

Remove bevel gears, 5, and side gears, 6.

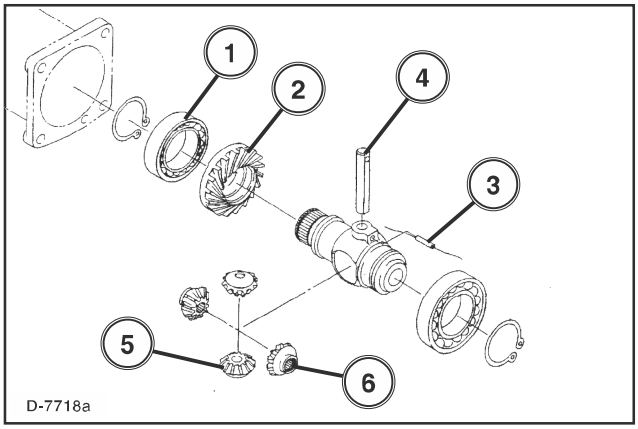

FIG. 6A-20

Inspection

Inspect ring gear for wear or damage.

Inspect bearings for wear or roughness.

Replace parts if necessary.

NOTE: Ring Gear and pinion are matched sets, if ring gear is damaged both ring gear and pinion must be changed.

Reassembly

Reverse procedures to assemble differential with the following additional information.

Friction surfaces should be coated with grease.

NOTE: There is no shimming procedure for the ring gear or differential.

FIG. 6A-21: When sub-assembling the differential, insert the spring pin, 1, so the seam is installed in the direction of external force applied. After inserting the spring pin, retain it with wire.

NOTE: Seam of roll pin should face in direction which load is applied.

After installing the front axle on the axle bracket, adjust the fore-and-aft play of the front axle to the specified value.

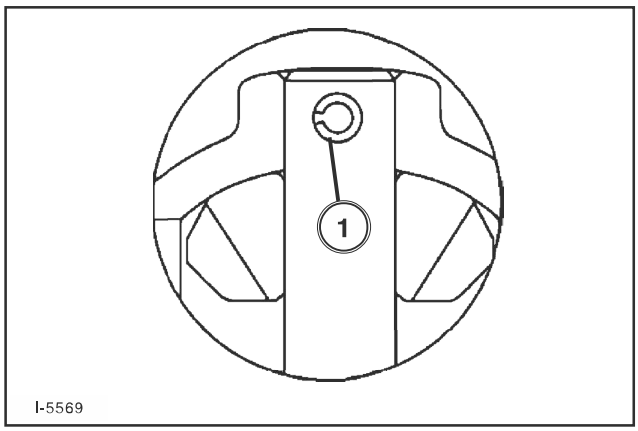

FIG. 6A-21

FIG. 6A-22: Torque final drive mounting bolts (4 per side), 1, to 146 N.m (108 ft.lbs.).

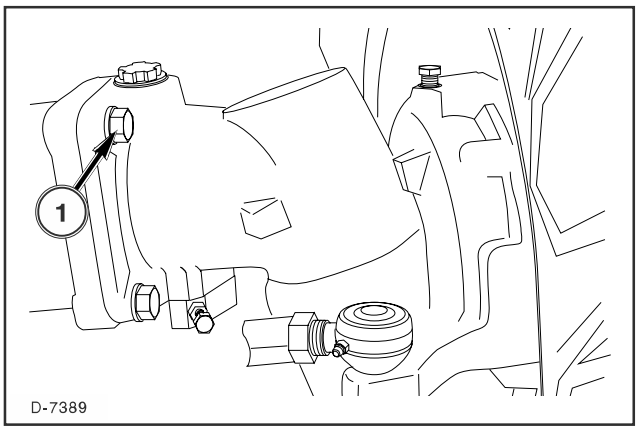

FIG. 6A-22

FINAL DRIVE

FIG. 6A-23: Final Drive

1. Final Case A - Left
2. Blank Cap (M12)
3. Seal Plug (65)
4. O-ring
5. Bolt (M14x40)
6. Lock Washer (M14)
7. Pin (10x24)
8. Final Case A - Right
9. Blank Cap (M12)
10. Seal Plug (65)
11. O-ring
12. Oil Cap Assembly
13. Gasket
14. Bolt (M14x40)
15. Lock Washer (14)
16. Pin (10x24)
17. Bevel Gear (17)
18. Bearing
19. Snap Ring
20. Bevel Gear (17)
21. Ball Bearing
22. Oil Seal
23. Bearing
24. Bearing
25. Snap Ring
26. Snap Ring
27. Final Case B - Left
28. Seal Plug (72x08)
29. Snap Ring
30. Screw Seal Plug
31. Final Case B - Right
32. Seal Plug (72x08)
33. Snap Ring
34. Screw Seal Plug
35. Shaft
36. Bevel Gear (11)
37. Bearing
38. Wheel Shaft
39. Bevel Gear (46)
40. Collar
41. Oil Seal
42. Bearing
43. Bearing
44. Ring
45. Wheel Cover
46. Pin (10x24)
47. Bolt/SP (M10x30)

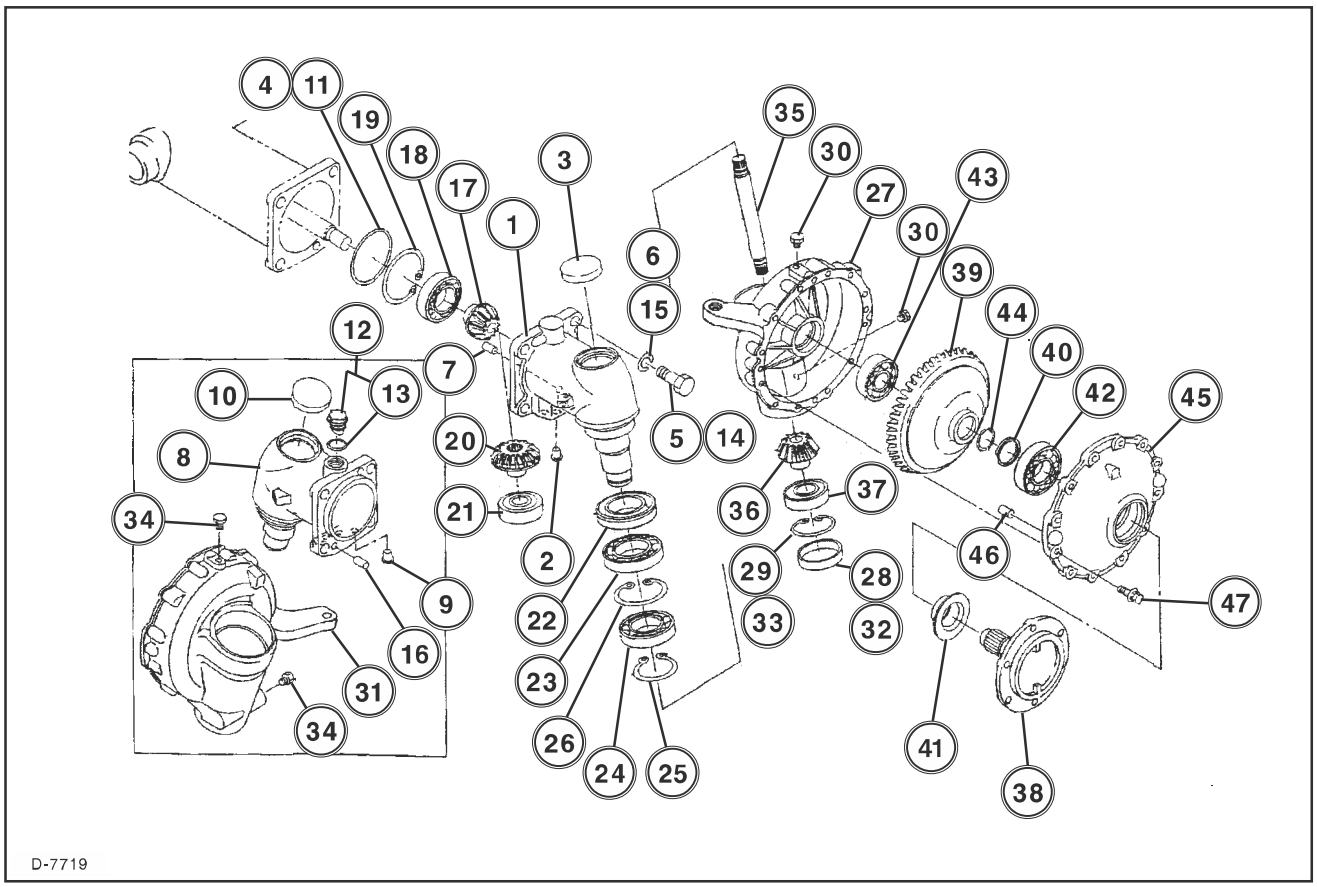

FIG. 6A-23

WHEEL SHAFT SEAL OR COVER (ONE)

Removal and Installation

FIG. 6A-24: To remove wheel shaft cover assembly, proceed as follows:

Block front axle up on side where cover will be removed.

Remove wheel and tire.

Position an oil pan under housing and remove drain plug, to drain oil.

Remove cover bolts, and remove stub axle with cover gear and bearings.

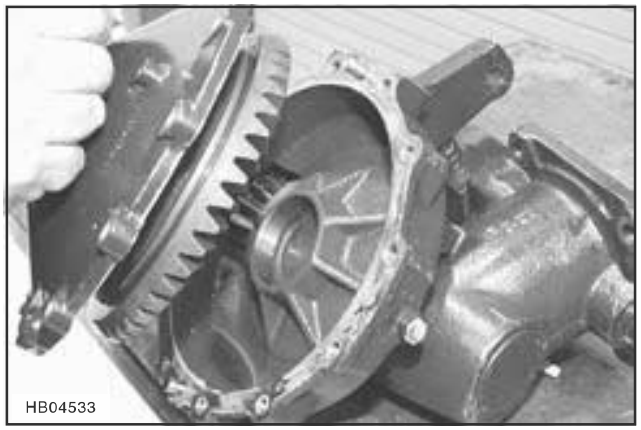

FIG. 6A-24

FIG. 6A-25: Use a suitable puller to remove bearing and bevel gear.

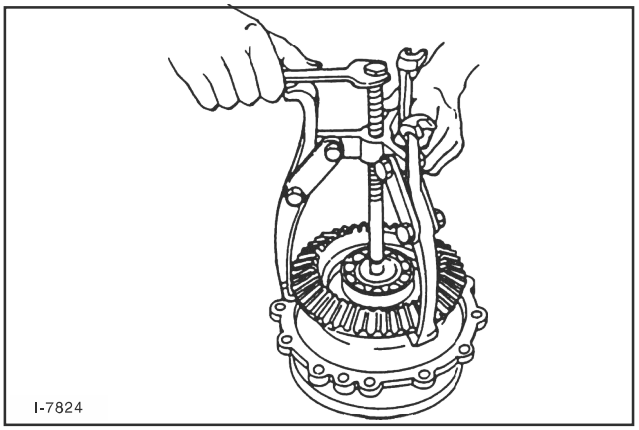

FIG. 6A-25

FIGS. 6A-26 & 27: Remove retaining clips and spacer washer, 2. At this point, use a plastic hammer and drive the wheel shaft out of the housing. The front wheel seal can be replaced at this point.

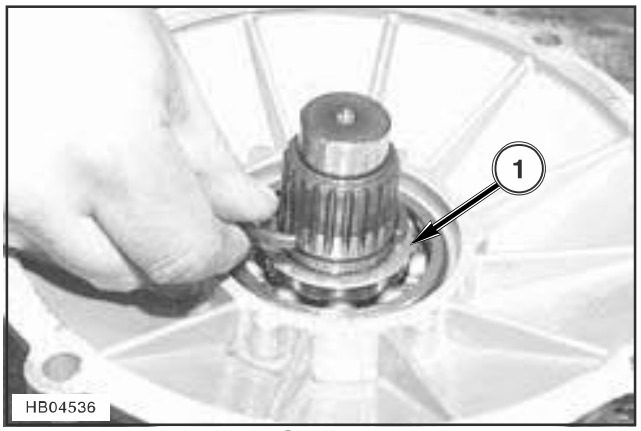

FIG. 6A-26

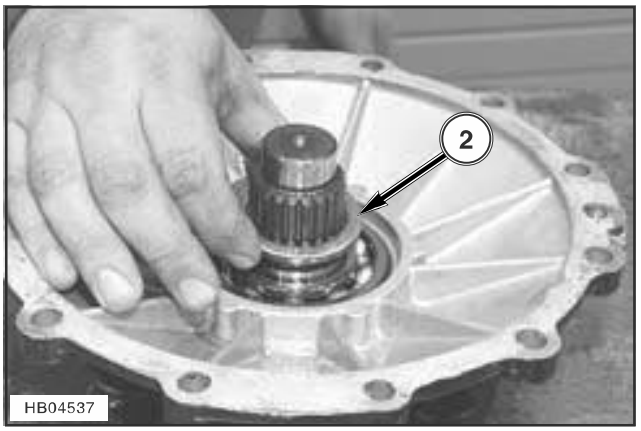

FIG. 6A-27

FIG. 6A-28: Check inner and outer bearings, 1, and replace, if they have excessive play or are rough.

Install sealant on outside of seal housing, and install seal, 2. Check surface where seal seats on hub, 1.

If surface is damaged, hub will have to be replaced.

Grease inside of seal and install cover, 2, with bearing, 3, and seal, 4. Install spacer, 5, snap ring, 6, bevel gear, 7, and bearing, 8. Apply Form-a-Gasket sealant to housing, and install cover, 2, carefully on dowel pins, 10.

Install bolts, 11, and torque to 18-29 Nm (14-22 ft-lbs).

NOTE: Retaining ring, 6, is a two piece ring.

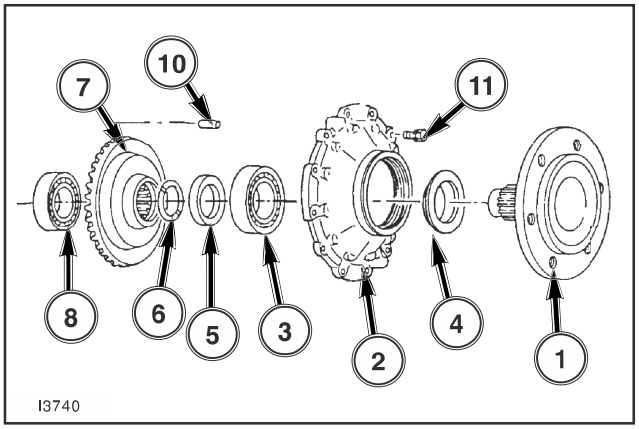

FIG. 6A-28

FIG. 6A-29: When replacing the shaft seals on the rotation parts of the final drive case and wheel shaft, never hit the flange surface of the sleeve. Damaged flange surfaces will cause oil leaks.

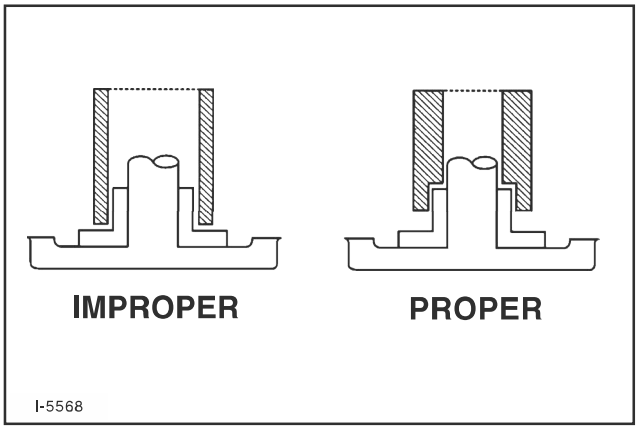

FIG. 6A-29

FIG. 6A-30: Install drain plug, 3.

Install wheel with tire and torque wheel bolts to 88-108 Nm (65-80 ft-lbs).

Lower tractor to level the front axle.

Remove level plug, 1, and fill plug, 2.

Add oil to bring oil level up to level plug, 1.

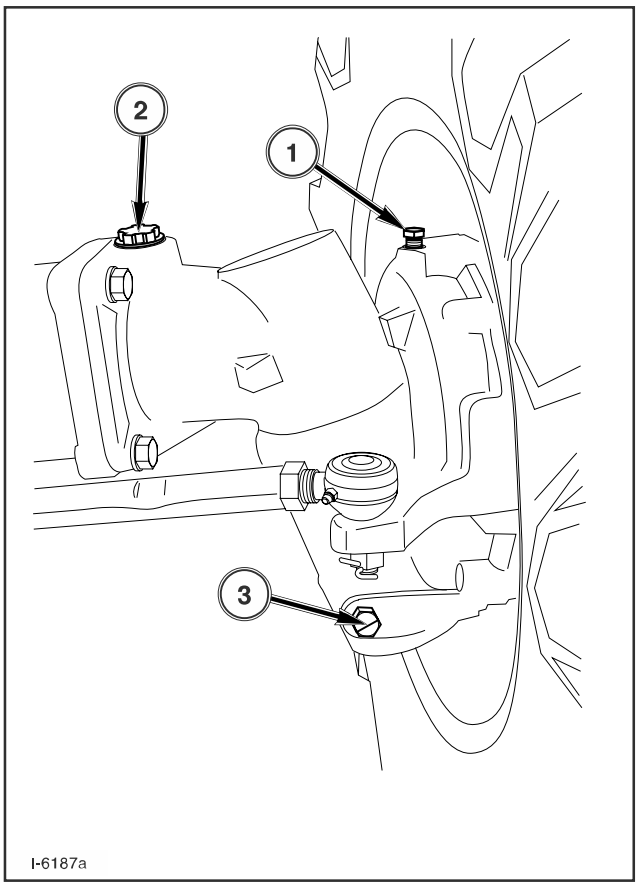

FIG. 6A-30

Front Axle End-Float

FIG. 6A-31: Fore and aft play of front drive axle, 1, in its supports should be 0.004-0.012" (0.1-0.3 mm). End-float is measured with axle raised off ground.

Loosen lock nut, 2, and turn adjusting bolt, 3, as needed to achieve correct measurement. Tighten lock nut.

NOTE: Excessive end-float will cause noise. This noise will be more pronounced when using 4-WD.

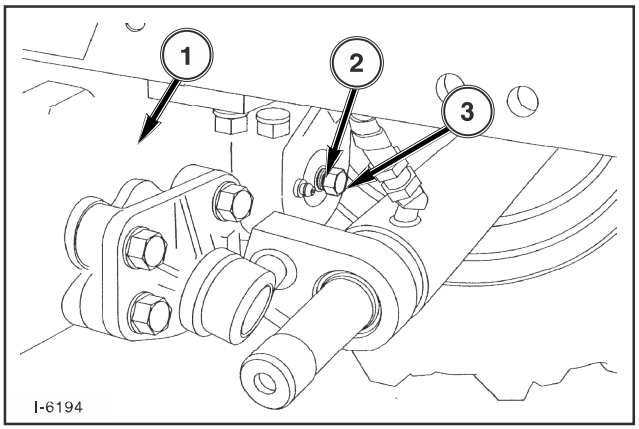

FIG. 6A-31

Steering Wheel Free-Play

FIG. 6A-32: Steering should be checked for excessive looseness, as indicated by steering wheel free- play. Maximum free-play is approximately 1-1/4" (30 mm) when measured at outside of steering wheel rim.

Excessive free-play can be caused by:

- Loose or worn ball joints
- Worn or damaged steering column shaft/universal joints
- Worn or damaged power steering unit

CAUTION: Excessive steering free-play must be corrected before use. Contact your Massey Ferguson Dealer.

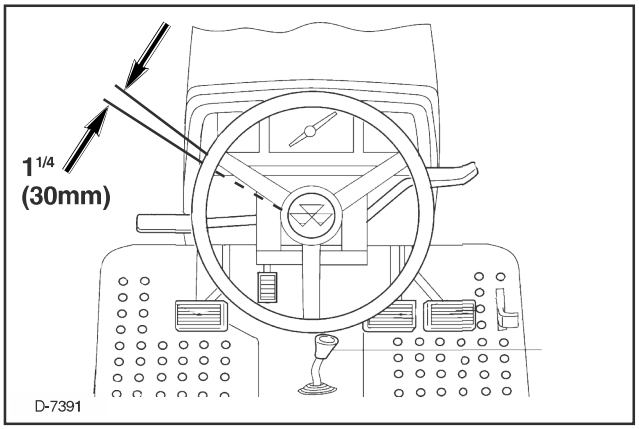

FIG. 6A-32

Steering Stop Bolt

FIG. 6A-33: Whenever front tread is changed, front wheels must be checked for turning clearance. ON some narrow settings, front tires/wheels may contact tractor chassis.

To check clearance, jack Tractor front and securely block. Turn steering wheel full right to full left. When clearance is less than 10mm, stop bolts, 1, should be installed in the front axle housing. Adjust stop bolts, 1, to limit steering angles as necessary.

Securely tighten all lock nuts and recheck adjustment.

NOTE: Clearance must be checked at full turn positions, with and without the axle tilted.

CAUTION: Securely block beneath Tractor when checking/making adjustments.

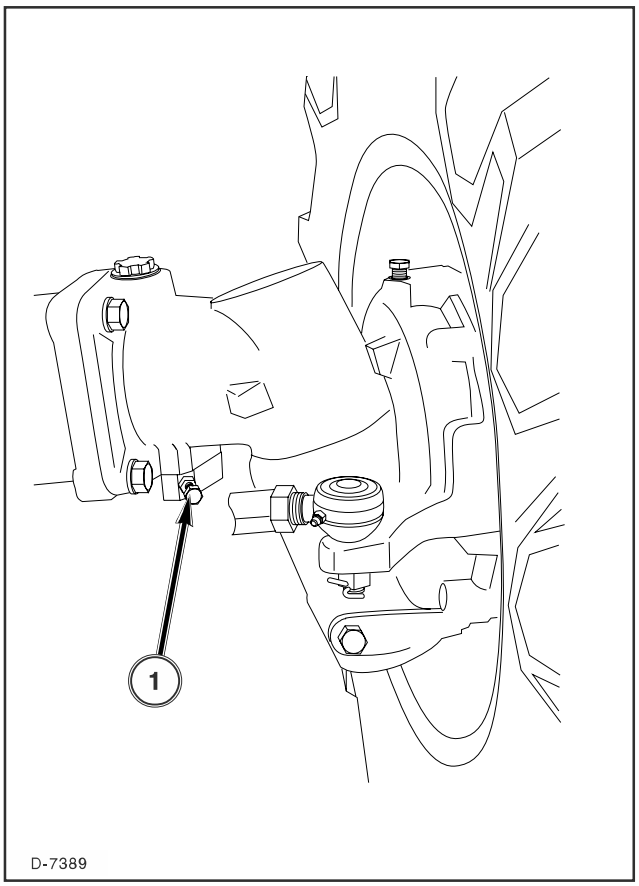

FIG. 6A-33

FINAL DRIVE CASE

Disassembly, Inspection, and Reassembly

FIG. 6A-34: Drain oil. Remove the tire on the side of which final case is to be disassembled.

NOTE: Support the tractor front with a suitable jack stand.

CAUTION: Take care not to damage the O-ring. Never attempt to insert the blade of a screwdriver between the contact surfaces of the final case and axle end.

FIG. 6A-34

FIG. 6A-35: Remove the final case from the axle end.

Separate the wheel cover from the final case.

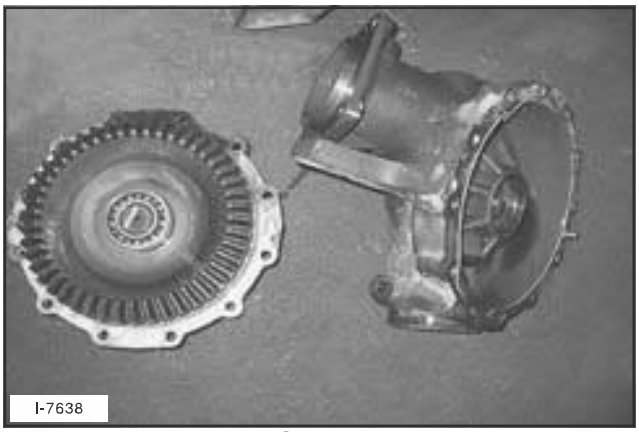

FIG. 6A-35

FIG. 6A-36: Remove dust cover.

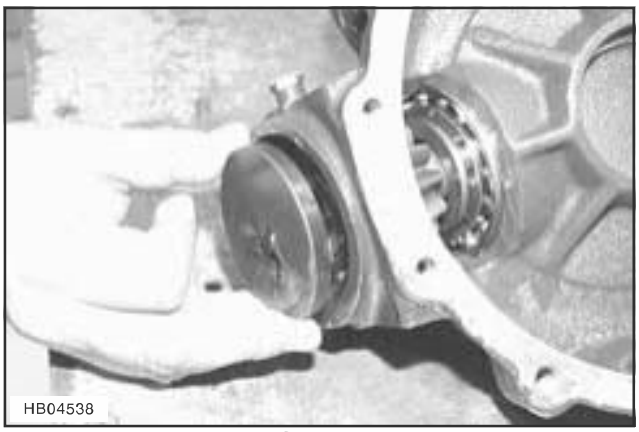

FIG. 6A-36

FIG. 6A-37: Remove the snap ring.

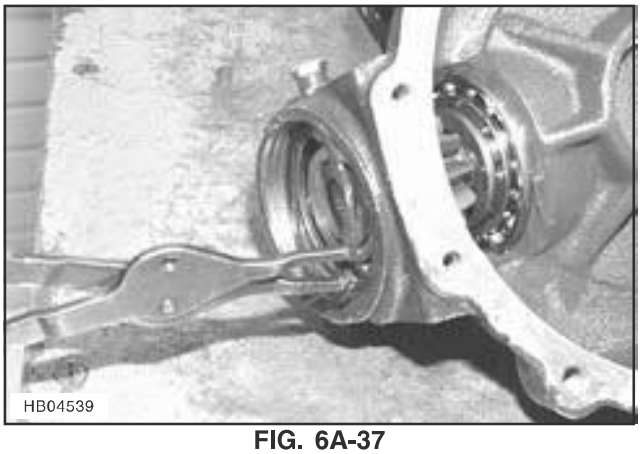

FIG. 6A-37

FIG. 6A-38: Remove bearing, bevel gear (11T) and shaft.

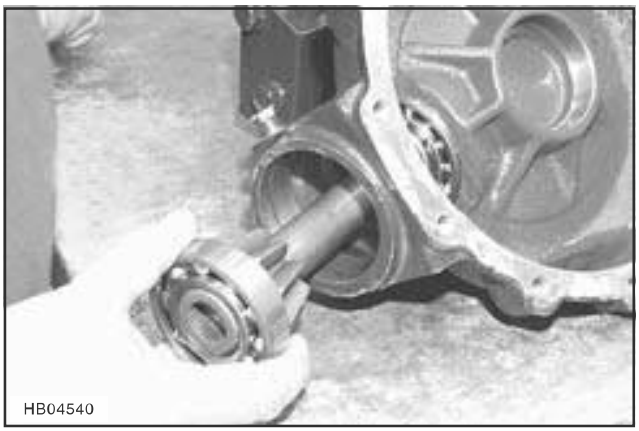

FIG. 6A-38

FIG. 6A-39: Remove snap ring, bearing and bevel gear (17T).

FIG. 6A-39

FIG. 6A-40: Remove bevel gear (17T) and bearing.

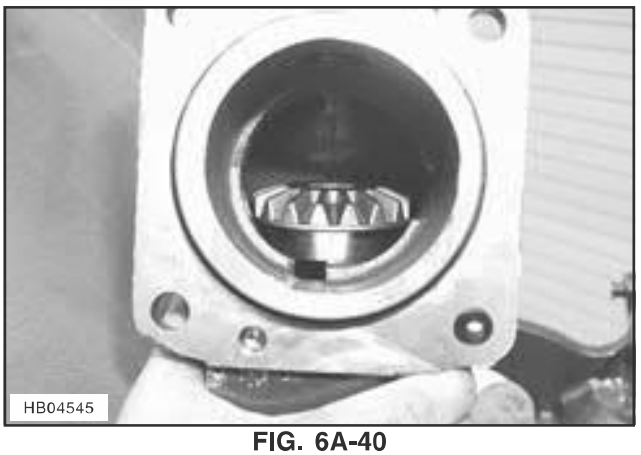

FIG. 6A-40

FIG. 6A-41: Divide final case into final case A, 1, and final case B, 2. The final case pivot seal can be accessed at this point.

NOTE: Seal should be discarded and replaced when reassembled.

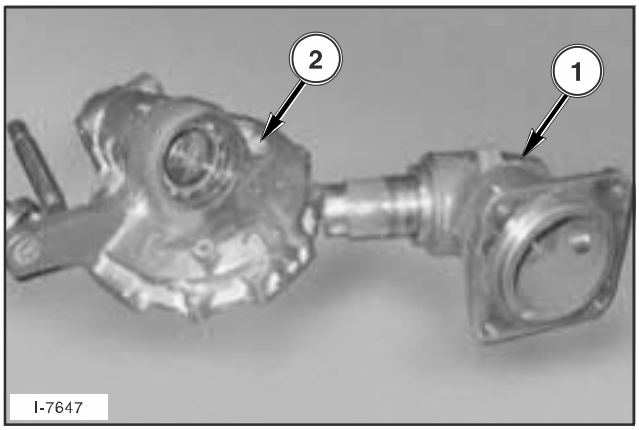

FIG. 6A-41

Inspection

Inspect seals, dust covers, o-rings, snap rings and bearings. Replace all seals and o-rings prior to reassembly. Replace damaged dust covers, damaged snap rings and rough bearings.

Reassembly

Reassemble the parts in reverse order of disassembly, following these instructions.

Apply a silicone sealant to the following parts:

Contact surfaces between the final case B and wheel shaft cover.

Contact surfaces between the final case A and bearing cover.

Contact surfaces between the final case A and front axle housing.

When installing expansion plug into bottom of final drive apply a sealant to outer circumference of expansion plug.

FIG. 6A-42: When installing unitized seals on the wheel shaft cover and the rotating part between the final drive housing, apply force only to the outer circumference of the seal as shown at, 1.

Do not deform seal retainer at position, 2.

The installed wheel shaft should turn smoothly.

The oil seals should be coated with grease in advance. Install them carefully, assuring that their lips are not turned over.

The reassembled final drive housing should turn smoothly until it makes contact with the stop.

When the wheel (tire) is reinstalled, turn it by hand to make sure that all the mechanism turns smoothly with out making any noise.

Wheel clamping torque	9-11 Kgfm (65 - 80 ft-lbs)

After adjustment of the toe-in, perform road tests. There should be no abnormalities such as vibration, abnormal noises, deflected steering wheel operation, etc.

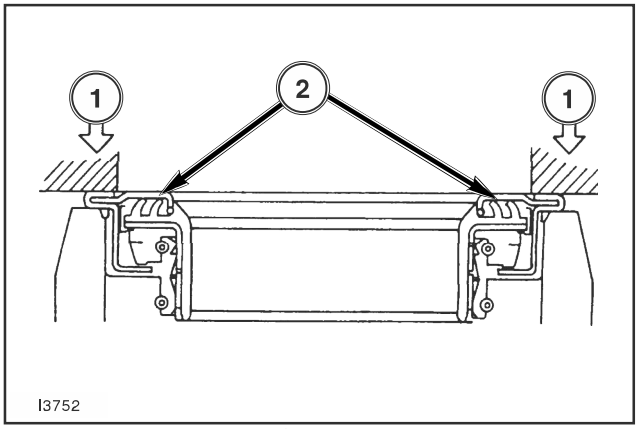

FIG. 6A-42

FIG. 6A-43: Summary 4WD Front Axle Assembly

1. Set end float 0.1 - 0.3 mm (.004 - .012)
2. Apply adhesive
3. Grease and install seal as shown using seal driver
4. Fore/Aft play of axle 0 - 0.2 mm (0 - 0.008)
5. Apply grease
6. Apply grease on assembly
7. Tightening torque 146 Nm (108 ft-lbs)
8. Starting torque 5 - 7 kg-cm (4.3 - 6 in-lbs)
9. Be sure to install snap ring
10. Properly install roll pin and retain with wire

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