

SECTION 25 - FWD FRONT AXLE

Chapter 1 - FWD Front Axle, Supersteer™ and Sensitrack™

CONTENTS

Section	Description	Page
	Specifications	3
	Front to Rear Axle Ratio	3
	Bolt Torque Specifications	6
	Special Tools	6
25 100	Description of Operation - FWD Front Axle	7
	FWD Front Axle	7
	Troubleshooting	8
	Lubrication	10
	Overhaul - Standard FWD Axle	11
	Standard FWD Axle	11
	Removal	11
	Installation	11
25 108	Gear Reduction Drop Box	12
	Disassembly	12
25 102	Front Axle and Differential	15
	Disassembly	15
	Drive Pinion	16
	Disassembly	16
	Front Axle	17
	Inspection	17
	Differential	17
	Inspection	17
	Gear Reduction - Drop Box	17
	Inspection	17
	Drive Pinion	18
	Assembly	18
	Differential Gear	18
	Assembly	18
	Axle and Differential	19
	Assembly	19
	Differential Case Bearing Preload	20
	Check and Adjustment	20
	Ring Gear-to-Pinion Backlash	20
	Check and Adjustment	20
25 108	Gear Reduction Box	23
	Assembly	23

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

Section	Description	Page
	Ring Gear-to-Pinion Backlash	25
	Check and Adjustment	25
	Bevel Gear-to-Pinion Backlash	26
	Check	26
	Description and Operation - Supersteer™/Sensitrack™	27
25 100	Supersteer™	27
	Sensitrack™	28
	Automatic Position (Engaged)	29
	Automatic Position (Disengaged)	30
	Full Time Front Wheel Drive (Locked Down)	30
	Supersteer™ Front Axle	30
	Overhaul - Supersteer™ Axle	33
25 100	Supersteer™ Axle	35
	Removal	35
	Gear Reduction-Drop Box	40
	Disassembly	40
25 102	Front Axle and Differential	42
	Disassembly	42
	Drive Pinion	43
	Disassembly	43
	Front Axle	44
	Inspection	44
	Differential	44
	Inspection	44
	Gear Reduction-Drop Box	44
	Inspection	44
	Drive Pinion	45
	Assembly	45
	Differential Gear	45
	Assembly	45
25 102	Axle and Differential	46
	Assembly	46
	Differential Case Bearing Preload	47
	Check and Adjustment	47
	Ring Gear-to-Pinion Backlash	47
	Check and Adjustment	47
25 108	Gear Reduction Box	50
	Assembly	50
	Bevel Gear-to-Pinion Backlash	52
	Check	52
	Supersteer™ Axle	53
	Installation	53

SPECIFICATIONS

Power Steering Pump Flow @ 2600 rpm, 2WD and FWD gpm (19.4 lpm) Flow @ 2600 rpm, Supersteer gpm (19.4 lpm)	5.13 gpm (19.4 lpm) 5.13 gpm (19.4 lpm)
Power Steering Type	Full Hydraulic
Relief Valve Pressure FWD Supersteer bar)	1450 - 1520 psi (100-105 bar) 2030 - 2100 psi (140-145)
Reservoir Capacity Oil	1.5 US qts. (1.4 L.) Ambra Multi G 134
Maximum Turning Angle FWD Supersteer Axle Articulation Total Turn Angle	54° 54° 21° 75°
Power Steering Hose Fittings Straight Fitting Swivel Fitting	285-325 in.-lb. 220-265 in.-lb.
SUPERSTEER FRONT AXLE	
Front to Rear Axle Ratio	1.660 to 1
Drive Pinion Bearing Preload	36 to 44 lbs. (16.3 to 20 kg.)
Pinion Shims (qty. as required)	.004" (.1 mm) .008" (.2 mm) .020" (.5 mm)
Differential shims (qty. as required)	.004" (.1 mm) .008" (.2 mm) .020" (.5 mm)

FRONT TO REAR AXLE RATIO

TC35A, TC35DA, TC40A, TC40DA, TC45A and TC45DA

IMPORTANT: *On tractors equipped with FWD (Front Wheel Drive) the front to rear axle ratio (1.6605:1, with an acceptable range of 1.63 - 1.69:1), is critical and must be maintained for safe and efficient use of the tractor. This ratio applies to all available tire options. Following is a list of problems that may occur if the front to rear axle ratio is not maintained:*

- Engine will lug down or stall when operating on hard surfaces.
- The front wheel drive lever will not remain in the engaged position, or is difficult to disengage.
- Failure of the driveline gears.
- Failure of the front axle , ring and pinion gears.
- Premature tire wear.

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

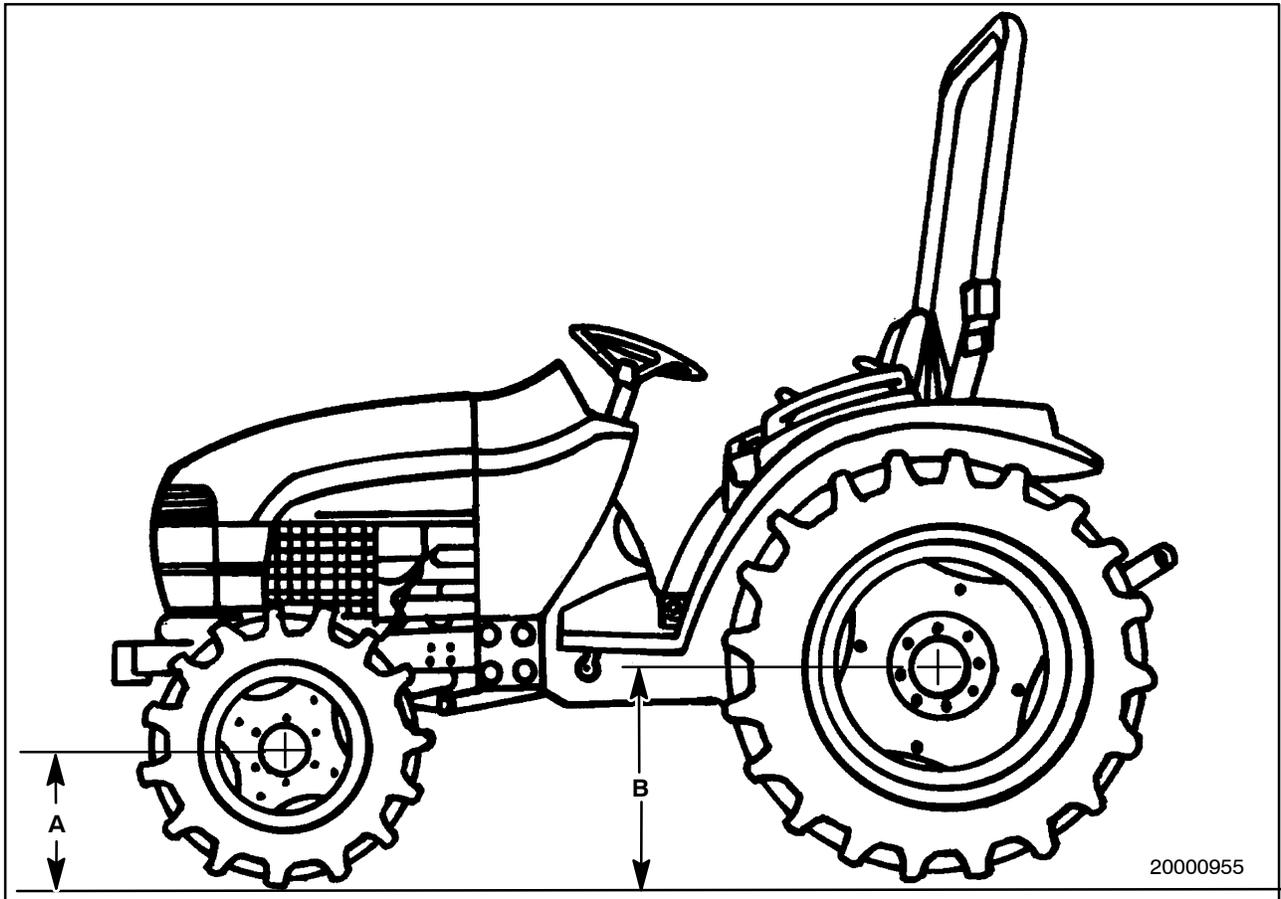
To calculate the front to rear axle ratio, use method 1 or method 2.

Method 1:

1. Obtain a measurement from the center of the front axle to the ground (Distance A), and center of the rear axle to the ground (Distance B).
2. Divide Distance B by Distance A to calculate the front to rear axle ratio. ("B" ÷ "A" = Front to rear ratio.)

3. To change the front to rear ratio, increase or decrease the tire inflation pressure.

NOTE: Do not exceed the tire inflation pressures recommended in the Operators Manual. Consult the Operators Manual for the available tire sizes for a specific tractor.

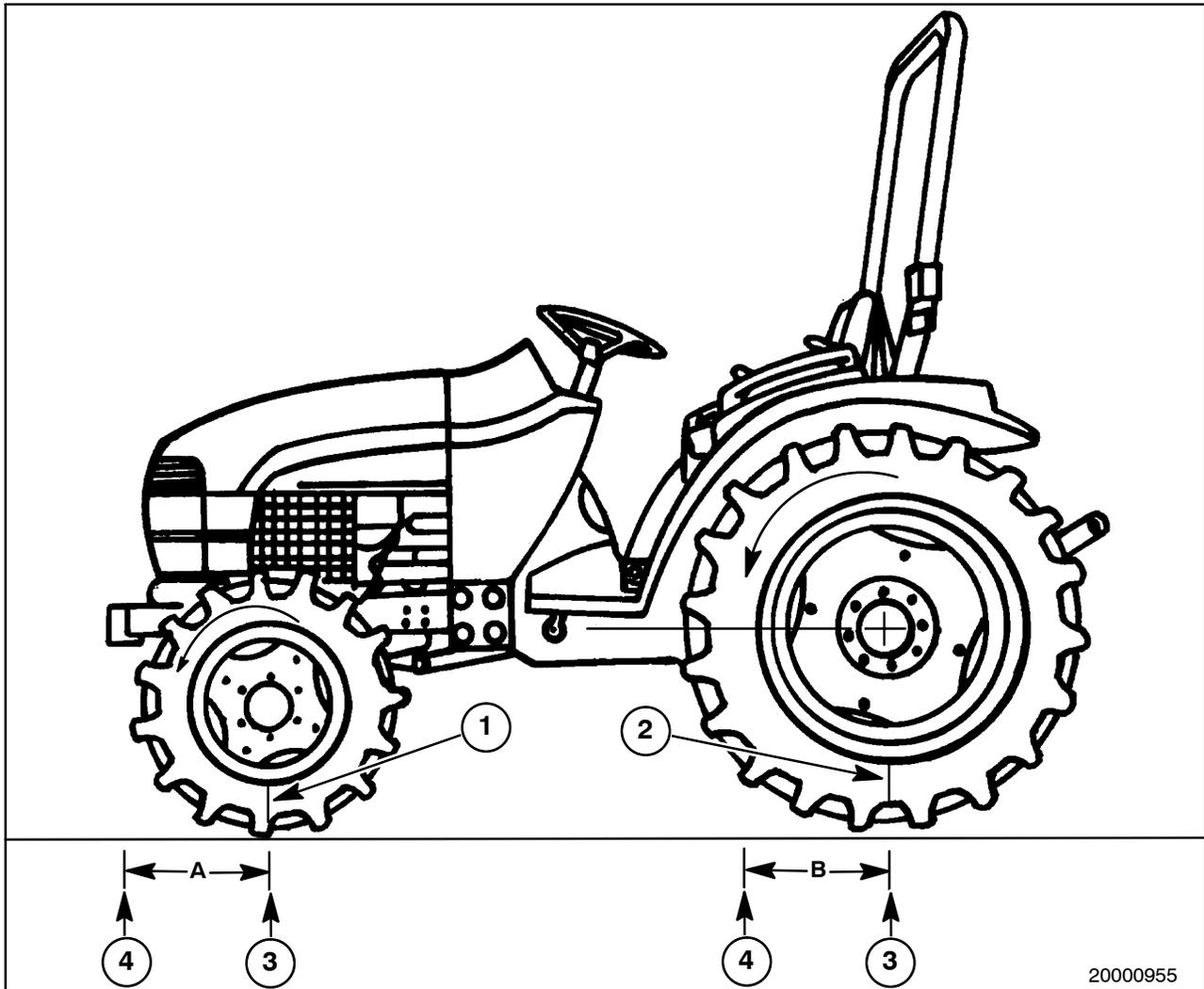


Method 2: Rolling Test

1. Make a mark on the front tire, 1, and the rear tire, 2.
2. Make a corresponding mark, 3, on the ground at each tire.
3. Slowly roll the tractor forward until the marks on the tires, 1 and 2, make one full revolution.
4. Make a second mark, 4, on the ground as in step 2.
5. Measure the distance between the marks on the ground for each tire.

6. Divide the distance B by the distance A to calculate the front to rear ratio.
7. To change the front to rear ratio, increase or decrease the tire inflation pressure, or check the rear counterbalance weights.

NOTE: Do not exceed the tire inflation pressures recommended in the Operators Manual. Consult the Operators Manual for the available tire sizes and inflation pressures for a specific tractor.



BOLT TORQUE SPECIFICATIONS

Bolt Size	Grade No.	Coarse Thread			Fine Thread		
		Pitch (mm)	Foot-Pounds	Newton Meters	Pitch (mm)	Foot-Pounds	Newton-Meters
M6	4T, 4.8	1.0	3.6 - 5.1	4.9 - 6.9	-----	-----	-----
	7T, 8T, 8.8		6.1 - 8.3	8.3 - 11.3			
	10T, 11T		8.6 - 11.6	11.7 - 15.7			
M8	4T, 4.8	1.25	9.4 - 12.3	12.7 - 16.7	1.0	11.2 - 14.9	15.2 - 20.2
	7T, 8T, 8.8		16.7 - 21.0	22.6 - 28.4		19.6 - 25.3	26.5 - 34.3
	10T, 11T		21.0 - 26.8	28.5 - 36.3		22.4 - 29.7	30.4 - 40.2
M10	4T, 4.8	1.5	18.8 - 24.6	25.5 - 33.3	1.25	21.0 - 26.8	28.5 - 36.3
	7T, 8T, 8.8		32.5 - 41.3	44.1 - 55.9		36.2 - 46.3	49.0 - 62.8
	10T, 11T		39.8 - 51.3	54.0 - 69.6		42.7 - 54.2	57.9 - 73.5
M12	4T, 4.8	1.75	27.5 - 34.8	37.3 - 47.1	1.25	31.8 - 40.5	43.1 - 54.9
	7T, 8T, 8.8		48.5 - 61.5	65.7 - 83.3		54.9 - 69.4	74.5 - 94.1
	10T, 11T		68 - 85.6	92 - 116		73.1 - 93.7	99 - 127
M14	4T, 4.8	2.0	46.3 - 59.3	62.8 - 80.4	1.5	51.4 - 64.4	69.7 - 87.3
	7T, 8T, 8.8		76.8 - 97.4	104 - 132		85.6 - 109	116 - 148
	10T, 11T		102.6 - 129	139 - 175		110 - 136	149 - 185
M16	4T, 4.8	2.0	63.5 - 81.2	86 - 110	1.5	67.2 - 84.9	91 - 115
	7T, 8T, 8.8		110 - 136.5	149 - 185		116 - 142	157 - 193
	10T, 11T		151.3 - 188	205 - 255		162 - 199	220 - 270
M18	4T, 4.8	2.0	83.4 - 104	113 - 141	1.5	96.7 - 120	131 - 163
	7T, 8T, 8.8		145 - 174	196 - 236		169 - 206	230 - 280
	10T, 11T		203 - 246	275 - 333		220 - 270	299 - 367
M20	4T, 4.8	2.5	106 - 133	144 - 180	1.5	126 - 155	171 - 211
	7T, 8T, 8.8		177 - 214	240 - 290		203 - 245	275 - 333
	10T, 11T		268 - 252	363 - 341		293 - 358	397 - 485

SPECIAL TOOLS

	Tool No.
Detent Tool	FNH00081
Seal Driver Set	NH00293
Includes:	NH27488 Handle NH27515 Drive Plate NH27530 Drive Plate

DESCRIPTION OF OPERATION - FWD FRONT AXLE

Op. 25 100

FWD FRONT AXLE

The four-wheel drive front axle is a factory installed option on the TC35A, 35DA, 40A, 40DA, 45A, and 45DA tractors.

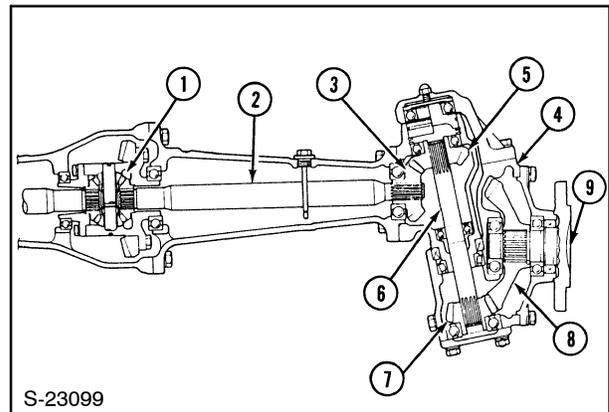
The four-wheel drive system uses the same supporting system as the two-wheel drive models. The front wheel tie rod assembly is adjustable for toe-in adjustments.

Power to the front axle flows from the final drive pinion gear, in the rear differential, through a take off box attached to the underside of the rear axle center housing. The take off box transmits power to the front axle drive pinion through a drive shaft.

Power to the front wheels flows from the front axle differential side gear, 1, and axle shaft, 2, to the front wheel reduction drop box, 4, assembly.

A pinion gear, 3, on the axle shaft, 2, drives an idler pinion, 5, and an idler shaft, 6, in the drop box. A final drive pinion, 7, on the idler shaft, 6, drives a bevel gear, 8, which is splined to the wheel hub and shaft assembly, 9.

The front wheel drive is controlled by a control lever located on the left control pod on TC35DA, 40DA, and 45DA model tractors and by a control lever located to the left of the operators seat on the TC35A, 40A, and 45A model tractors.



TROUBLESHOOTING

Most malfunctions in the steering system can usually be traced to dirt or foreign matter in the system. Dirt can cause such things as stickiness, erratic operation, or hard steering.

Before considering the procedures below, follow these suggested steps:

1. Check the pump for proper relief valve action. See "Pressure Testing," discussed later in this section.

2. Jack the front end of the tractor off the ground and cycle the steering from stop to stop to check for front axle binding.
3. Be sure the hydraulic hoses from the pump-to-motor and from the motor-to-cylinder are hooked up correctly.

CONDITION	POSSIBLE CAUSE	REMEDY
Hard Steering	<ol style="list-style-type: none"> 1. Control valve unit <ul style="list-style-type: none"> Control valve unit not aligned to steering column Spool-and-sleeve combination is seized because of foreign matter. Over tightening of the end cap bolts. 2. Oil pump <ul style="list-style-type: none"> The pump is stuck and will not work. The pump is worn down. Pumping performance inadequate. 3. Relief valve <ul style="list-style-type: none"> The valve is damaged because of internal deterioration. Pressure setting is too low. 	<ul style="list-style-type: none"> Reposition Control valve unit. (If loosening its mounting bolts lightens the handwheel, it means that Control valve unit was in misalignment). Replace. Re-tighten to the specified torque limit. Replace oil pump. Replace oil pump. Test pump performance and, if necessary, remove the pump. Disassemble the pump and inspect the internal seals. Refer to the pump seal kit repair section. Replace control valve assembly. Replace control valve assembly.
Steering wheel will not return to neutral or will turn by itself	<ol style="list-style-type: none"> 1. Control valve unit <ul style="list-style-type: none"> Spool and sleeve combination is stuck and will not rotate. Control valve unit not aligned to steering column. 	<ul style="list-style-type: none"> Replace control valve assembly. Re-align.

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

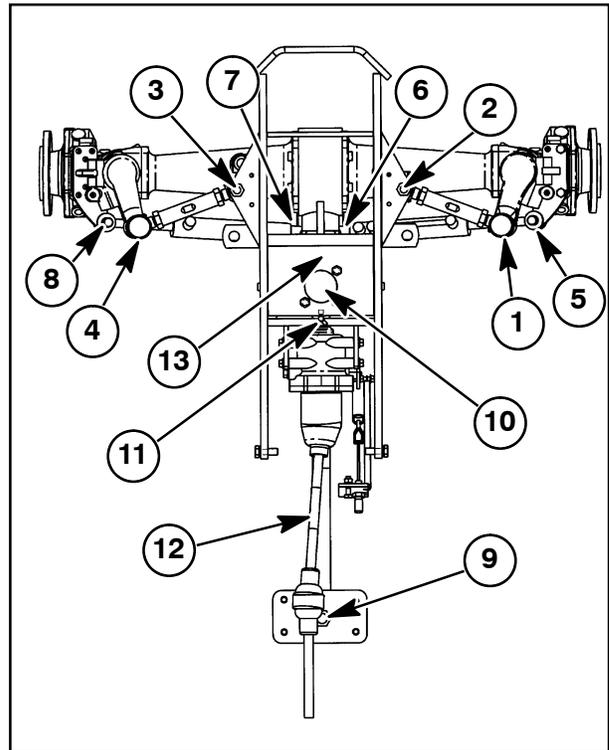
CONDITION	POSSIBLE CAUSE	REMEDY
Cylinder will not follow steering wheel rotation or will respond sluggishly.	<ol style="list-style-type: none"> Control valve unit Control valve unit has been improperly rebuilt, resulting in valve mistiming. Steering cylinder Air is trapped in the cylinder. Internal oil leakage because of damaged piston seal. 	<p>Repair.</p> <p>Bleed air out.</p> <p>Replace the seal.</p>
Steering wheel will "kick back"	<ol style="list-style-type: none"> Control valve unit Control valve unit has been improperly rebuilt, resulting in valve mistiming. Piping Pipes are improperly connected to the four ports of Control valve unit. 	<p>Repair.</p> <p>Correct the pipe connections.</p>
<p>Oil leakage</p> <ol style="list-style-type: none"> From the splined connection of column to spool. From mated face joints (valve body, spacer plate, Control valve unit, end cap). 	<ol style="list-style-type: none"> Leaky oil seal Dirty hydraulic oil. Damaged O-ring 	<p>Replace the seal.</p> <p>Change the oil.</p> <p>Replace.</p>
Front wheel Shimmy	<ol style="list-style-type: none"> Worn pivot shaft and/or bushings Loose tie-rod Loose spindle arm Worn king pin and/or bearing 	<p>Replace pivot shaft and/or bushings</p> <p>Tighten tie-rod</p> <p>Tighten spindle arm</p> <p>Replace king pin and/or bushing</p>
Loose Spindle	<ol style="list-style-type: none"> Worn bushing Worn spindle shaft Worn or damaged thrust bearing 	<p>Replace bushing</p> <p>Replace spindle shaft</p> <p>Replace thrust bearing</p>
Hard steering	<ol style="list-style-type: none"> Faulty power steering system 	<p>Inspect and repair power steering system</p>

LUBRICATION

Lubricate Every 50 Hours - Supersteer™

1. Right tie rod outer ball joint
2. Right tie rod inner ball joint
3. Left tie rod inner ball joint
4. Left tie rod outer ball joint
5. Right steering cylinder outer bushing
6. Right steering cylinder inner bushing
7. Left steering cylinder inner bushing
8. Left steering cylinder outer bushing
9. Stabilizer rear ball joint
10. Stabilizer front ball joint
11. Pivot bearing
12. Rear drive shaft
13. Front drive shaft

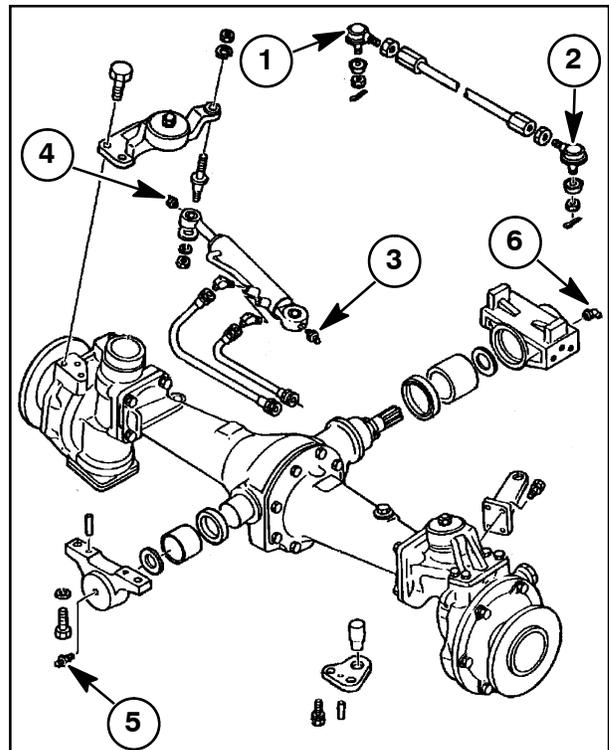
IMPORTANT: The Supersteer™ front axle requires lubrication every 50 hours at various locations.



4

Lubricate Every 50 Hours - Standard FWD

1. Tie rod - right side
2. Tie rod - left side
3. Steering cylinder - barrel end
4. Steering cylinder - rod end
5. Front bearing holder
6. Rear bearing holder



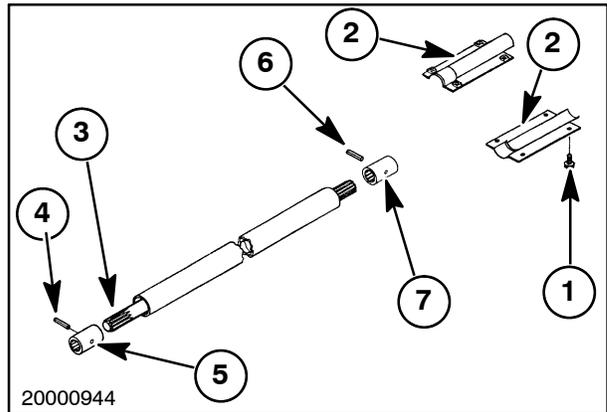
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OVERHAUL - STANDARD FWD AXLE

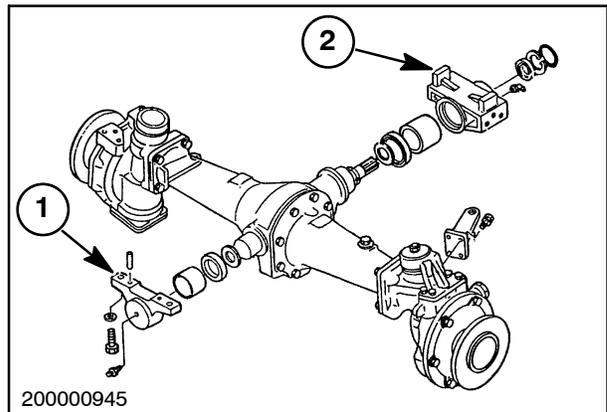
STANDARD FWD AXLE

Removal

1. Drain the power steering reservoir and remove the power steering hoses from the steering cylinder.
2. Loosen and remove the retaining bolts, 1, and the covers, 2, from the drive shaft, 3.
3. Drive out the roll pin, 4, from the coupler, 5. Drive out the roll pin, 6, from the coupler, 7.
4. Remove the couplers, 5 and 7, and the drive-shaft, 3, from the tractor.
5. Raise the tractor with a floor jack and support the frame with jack stands.
6. Remove the front pivot bearing holder, 1, and the rear pivot bearing holder, 2, from the tractor frame.
7. Carefully roll the front axle assembly forward, out from under the tractor.



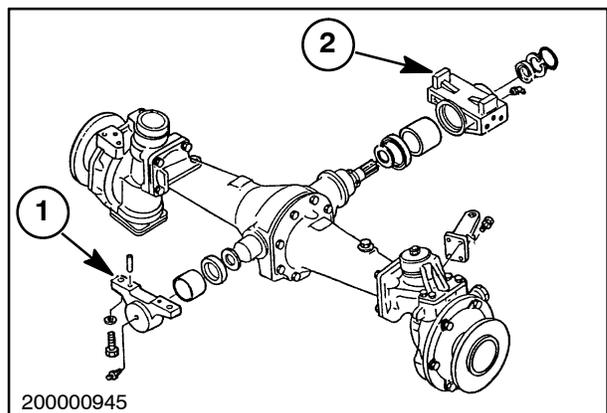
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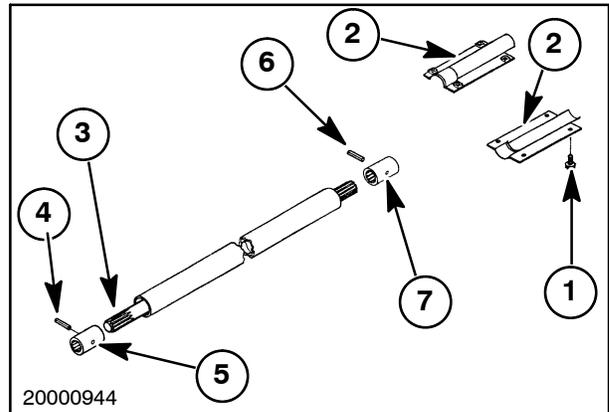
Installation

1. With the tractor supported on jack stands, carefully roll the front axle under the tractor.
2. Install the rear pivot bearing holder, 2, and the front pivot bearing holder, 1, onto the axle and the frame of the tractor.
3. Raise the tractor using a floor jack, and remove the jack stands. Lower the tractor and remove the floor jack.



8

4. Install the coupler, 7, onto the drive shaft, 3, using the roll pin, 6.
5. Install the coupler, 5, onto the drive shaft, 3. Do not install the roll pin, 4, at this time.
6. Install the drive shaft assembly onto the tractor.
7. Install the roll pin, 4, into the coupler, 5 at this time.
8. Install the covers, 2, onto the drive shaft, 3, and secure with the retaining bolts, 1.



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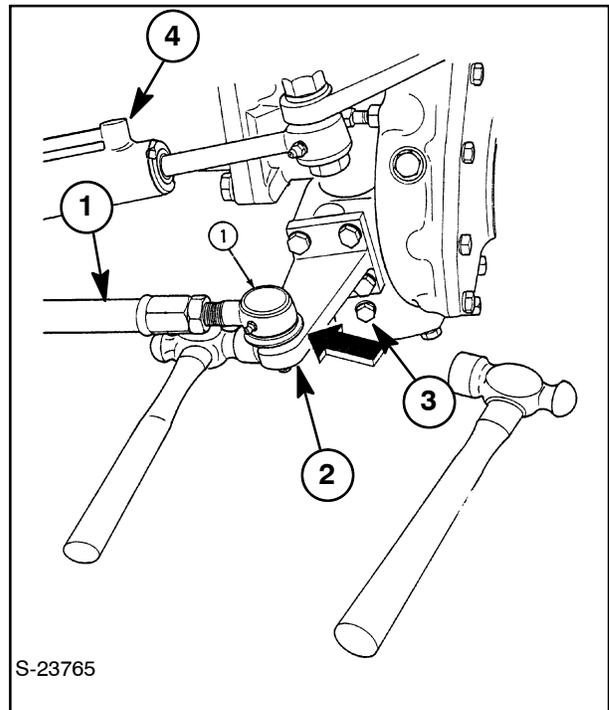
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GEAR REDUCTION DROP BOX

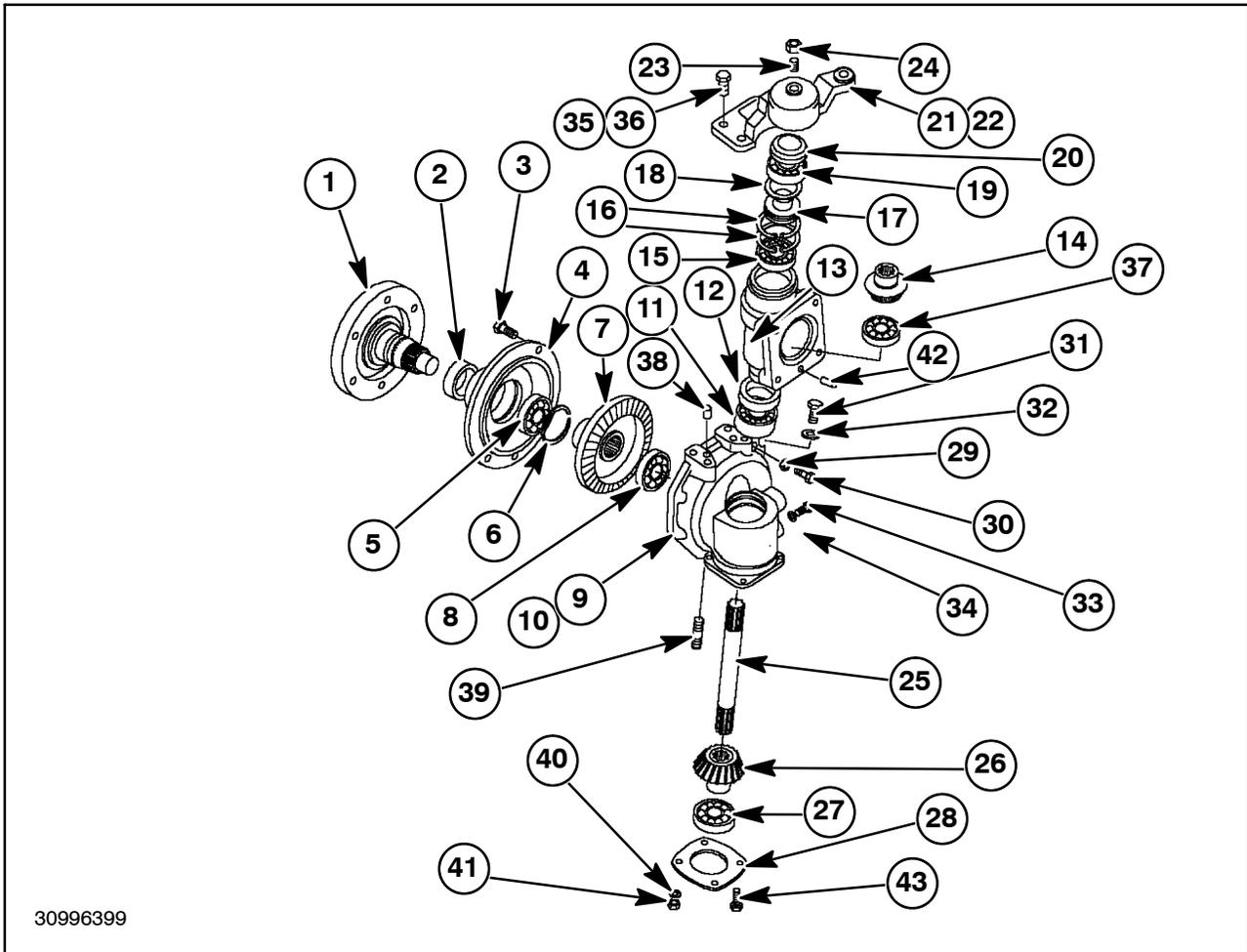
Disassembly

NOTE: These procedures apply to both the right and left front axle component assemblies. Repeat the procedure for the opposite side component to be disassembled or repaired.

1. Remove the front-wheel hub bolts and remove the front wheels.
2. Remove the tie rod, 1, from the steering arm, 2. Tap the ball joint with a hammer to loosen the ball joint.
3. Remove the drain plug, 3, from the drop box case, and drain the oil into a clean suitable container.
4. Remove the steering cylinder, 4, from the steering arm, and the front axle.



10



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- | | |
|-----------------------------------|-----------------------------|
| 1. Wheel Hub and Shaft | 23. Adjuster Screw |
| 2. Oil Seal | 24. Nut Cap |
| 3. Bolt | 25. Idler Shaft |
| 4. Case Cover | 26. Final Drive Pinion Gear |
| 5. Ball Bearing | 27. Ball Bearing |
| 6. Clip | 28. Cover |
| 7. Final Drive Bevel Gear | 29. Nut |
| 8. Ball Bearing | 30. Bolt |
| 9. L.H. Drop Box Casing Assembly | 31. Plug |
| 10. R.H. Drop Box Casing Assembly | 32. Seal Washer |
| 11. Tapered Roller Bearing | 33. Drain Bolt |
| 12. Oil Seal | 34. Seal Washer |
| 13. Idler Casing Assembly | 35. Left Side Bolt |
| 14. Idler Pinion Gear | 36. Right Side Bolt |
| 15. Ball Bearing | 37. Ball Bearing |
| 16. Snap Ring | 38. Dowel Pin |
| 17. Kingpin | 39. Stud Bolt |
| 18. O ring | 40. Spring Washer |
| 19. Ball Bearing | 41. Nut |
| 20. Spacer | 42. Dowel Pin |
| 21. L.H. Steering Arm | 43. Bolt |
| 22. R.H. Steering Arm | |

5. Remove the case cover bolts, 3, and remove the wheel hub, 1, cover, 4, and final bevel gear, 7, as an assembly.



The drop box, 9 or 10, is free to disengage and fall away from the idler gear case, 13, when the steering arm, 21 or 22, bolts, 35 and 36, are removed. Use care to avoid accidental disengagement of the components. Uncontrolled dropping of the components may cause personal injury.

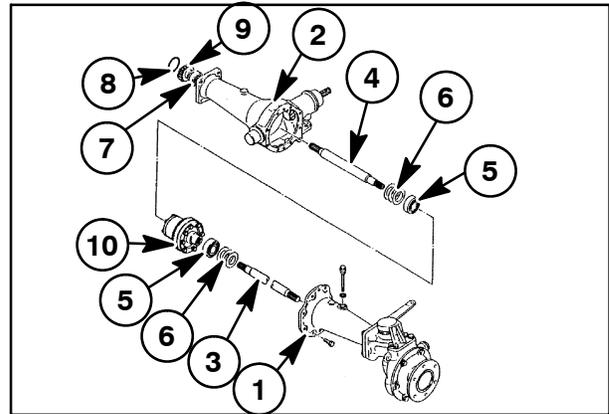
6. Remove the four retaining bolts, 35 and 36, from the steering arms, 21 or 22.
7. Remove the drop box case, 9 or 10, the final drive pinion gear, 26, and the idler shaft, 25, as an assembly from the idler case, 13.
8. Remove the four bolts, 43, from the final drive pinion cover, 28. Remove the final drive pinion gear, 26, the bearing, 27, the cover, 28, and the shaft, 25, as an assembly from the drop box, 9 or 10.
9. Remove the idler case, 13, from the front axle.
10. Remove the oil seal, 12, and the tapered roller bearing, 11, from the drop box, 9 or 10.
11. Remove the wheel hub shaft inner bearing, 8, from the wheel hub shaft, 1, and remove the final drive bevel gear, 7.
12. Remove the split ring, 6, and gently drive the wheel hub shaft assembly, 1, from the cover, 4.
13. Remove the bearing, 5, and the oil seal, 2, from the cover, 4.
14. Remove the idler pinion gear, 14, and the bearings, 15 and 37, from inside the idler case, 13.
15. Remove the axle drive pinion gear and O ring seal from the front axle housing.
16. Remove the spacer, 20, the bearing, 19, the kingpin, 17, the O ring, 18, and the snap rings, 16, from the idler case, 13.

Op. 25 102

FRONT AXLE AND DIFFERENTIAL

Disassembly

1. Remove the left axle housing retaining bolts, 1, and remove the axle housing, 2, and the axle shaft, 3, as an assembly.
2. Remove the differential assembly, 4, and differential carrier bearings, 5, from the axle housing, 2.
3. Remove the O ring, 6, the axle outer pinion gear, 8, and bearing, 7, from each end, and gently drive the axle shaft, 3 and 9, inward to remove from the housing.

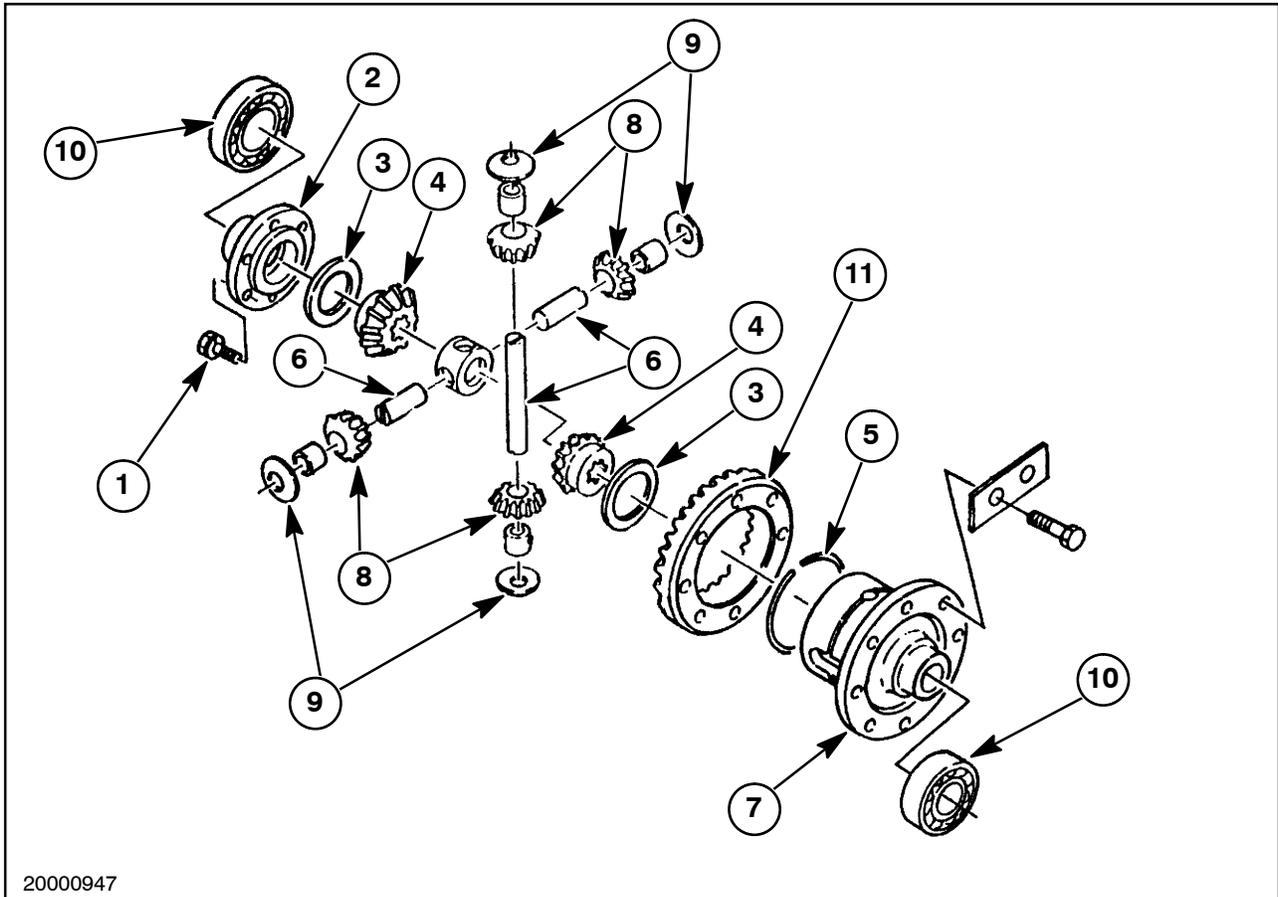


12

NOTE: Observe the quantity and the size of the shims, 6, between the axle shaft inner bearing and the axle housing. Shim sizes are 0.1 mm (0.004"), 0.2 mm (0.008"), and 0.5 mm (0.020").

4. Check the differential side gear to pinion backlash. Replace the gears if backlash exceeds 0.3 mm (0.012").

5. Remove the bolts, 1, from the differential case cover, 2.
6. Remove the differential side gear, 4, and the thrust washer, 3.
7. Remove the pinion gear shaft retaining ring, 5, and slide the pinion shaft, 6, out of the case, 7.
8. Remove the four pinion gears, 8, and thrust washers, 9.
9. Remove the support bearings, 10 and the ring gear, 11, from the case, 7.



13

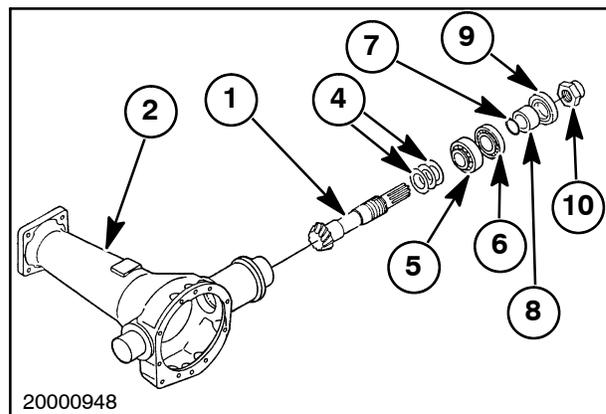
DRIVE PINION

Disassembly

1. Remove the drive pinion locknut, 10.
2. Remove the collar, 8, the O ring, 7, the oil seal, 9, and the bearing, 6.
3. Gently drive the pinion shaft, 1, inward, and remove the pinion assembly with the bearing, 5 and the shims, 4, from the case, 2.

NOTE: Observe the quantity and the size of the shims used on the pinion shaft. Shim sizes are 0.1 mm (0.004"), 0.2 mm (0.008"), and 0.5 mm (0.020").

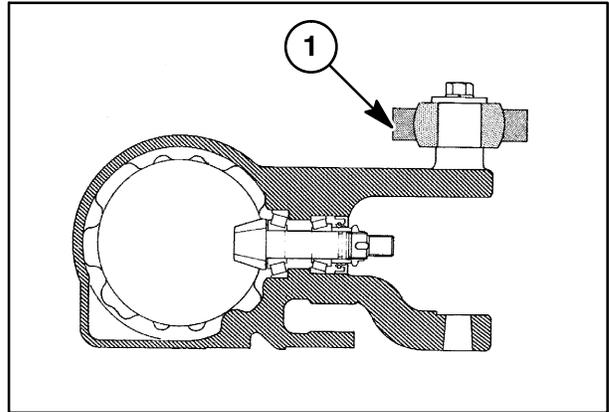
4. Remove the bearing, 5, and the shims, 4, from the pinion shaft, 1.



14

FRONT AXLE**Inspection**

1. Wash all parts in a suitable solvent and air dry.
2. Inspect the axle pivot bearing retainer for cracks, excessive pitting, wear, or distortion. Replace if found to be defective.



15

DIFFERENTIAL**Inspection**

1. Wash all parts in a suitable solvent and air dry.
2. Using a telescoping gauge and micrometer, measure the pinion gear bore and the pinion shaft to determine the bore to shaft clearance. Replace the gear and/or shaft if the clearance exceeds 0.1 mm (0.004").
3. Measure the differential to side gear thrust washer thickness. Replace the thrust washers if the thickness is less than 1.2 mm (0.047").

NOTE: If the thrust washers are replaced, recheck the side gear to pinion gear backlash during assembly. Refer to backlash check made during disassembly.

4. Inspect all gear teeth for excess wear or damage. Replace gears if teeth are damaged or wear is excessive.

GEAR REDUCTION—DROP BOX**Inspection**

1. Wash all parts in a suitable solvent and air dry.
2. Inspect the gears for excess wear or damage. Replace gears that show excessive wear or damage. See "Assembly", for gear backlash checks.
3. Inspect the splines on the pinion gears, idler shaft, and axle shaft for excess wear or damage.
4. Check the bearings for wear or roughness. Rotate the bearings by hand and replace as required.
5. On assembly, check the bevel gear and pinion backlash. See "Gear Reduction—Drop Box Assembly", discussed later in this section.

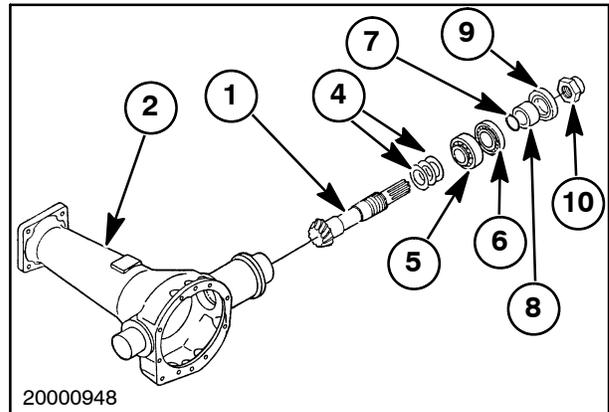
DRIVE PINION

Assembly

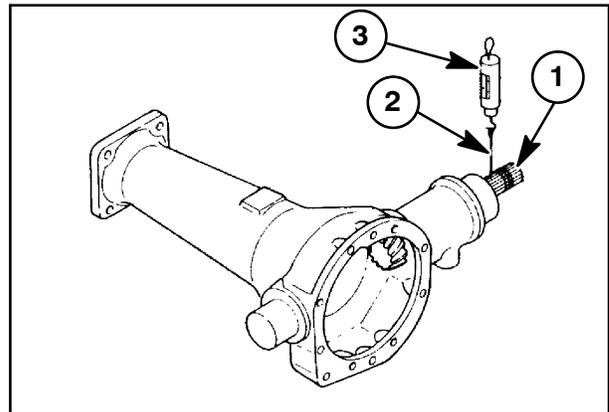
1. Install the shims, 4, and the front pinion bearing, 5, on the drive pinion, 1.

NOTE: Observe the quantity and the size of the shims used on the pinion shaft. Shim sizes are 0.1 mm (0.004 "), 0.2 mm (0.008 "), and 0.5 mm (0.020 ").

2. Insert the drive pinion, 1, in place in the differential housing, 2.
3. Install the outer bearing, 6, on the pinion shaft, 1, in the differential housing, 2.
4. Using a suitable driver, install the oil seal, 9, the O ring, 7, and the collar, 8, on the pinion shaft, 1.
5. Install the pinion locknut, 10, and tighten to obtain the correct bearing preload as follows:
 - Wrap a strong cord, 2, around the pinion shaft, 1. Using a pull scale, 3, measure the pounds of pull required to rotate the pinion shaft.
 - Tighten or loosen the locknut as necessary to obtain a preload of 16.3 - 20 kg (36 - 44 lbs.) pull.



16

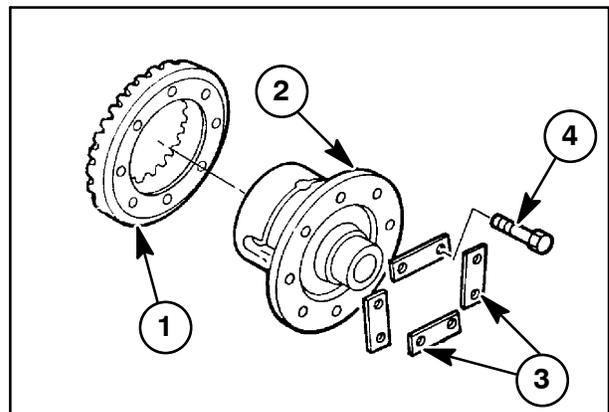


17

DIFFERENTIAL GEAR

Assembly

1. Install the differential ring gear, 1, to the case, 2, and align the mounting bolt holes.
2. Install new locking plates, 3.
3. Install and tighten bolts, 4, to the specified torque. See "Bolt Torque Specifications", discussed earlier in this section.



18

AXLE AND DIFFERENTIAL**Assembly**

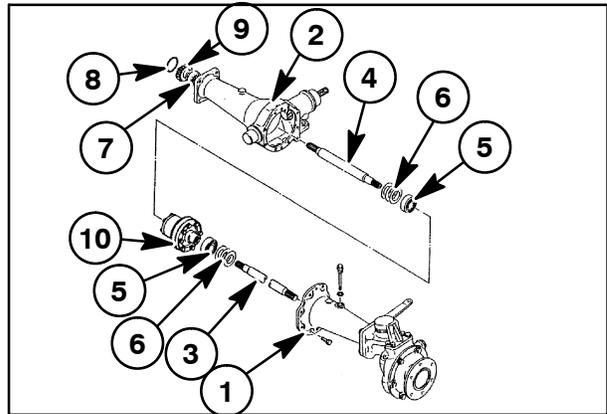
If any of the following components are not being replaced, assemble the front axle using the original components.

Differential assembly, 10

Differential case carrier bearings, 5

Axle housing, 1 and 2

Axle shaft, 3 and 4



19

1. Install the shim pack, 6, and carrier bearing, 5, in the differential axle housing, 2.

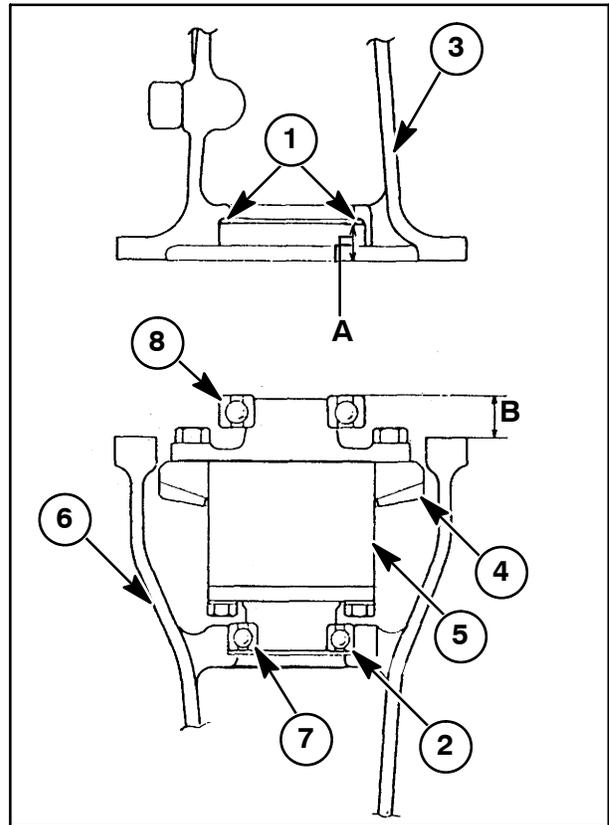
NOTE: Observe the quantity and the size of the shims used on the pinion shaft. Shim sizes are 0.1 mm (0.004 "), 0.2 mm (0.008 "), and 0.5 mm (0.020 ").

2. Install the axle shaft, 4, in the housing from the outer end through the shim pack, 6.
3. Install the axle shaft outer bearing, 7.
4. Position the differential assembly, 10, in the housing, inserting the differential outer cover end inside the bearing, 5, previously positioned in the axle housing, 2.
5. Assemble the left axle shaft and housing in the same manner described in steps 1 through 4.
6. Apply liquid gasket to the left axle housing mating surface and align the right and left axle housings together.
7. Install the axle retaining bolts and tighten to the specified torque. See "Bolt Torque Specifications", discussed earlier in this section.

NOTE: The differential carrier bearing preload and ring gear backlash must be checked and adjusted if the differential case bearings, axle shaft inner bearings, or axle shaft have been replaced.

DIFFERENTIAL CASE BEARING PRELOAD**Check and Adjustment**

1. Position the differential carrier bearing, 7, and the shim pack, 1, in place in the right differential axle housing.
2. Place the differential assembly, 5, in the housing, being sure the differential case is fully seated inside the bearing, 7.
3. Position the left differential case bearing, 8, on the differential assembly, 5, being sure it is fully seated.
4. Measure the distance "A" and measure the distance "B". Add or subtract shims, 1 or 2, from the shim pack so that the measurements "A" - "B" = 0.15 mm (0.006").



20

RING GEAR-TO-PINION BACKLASH**Check and Adjustment**

Ring gear-to-pinion backlash must be checked and adjusted whenever new components are used or if the shim requirements are unknown.

NOTE: This is a continuation of the carrier bearing preload adjustment.

1. Position the assembled axle housing assembly in a vertical position, supported by the housing and not the shaft.

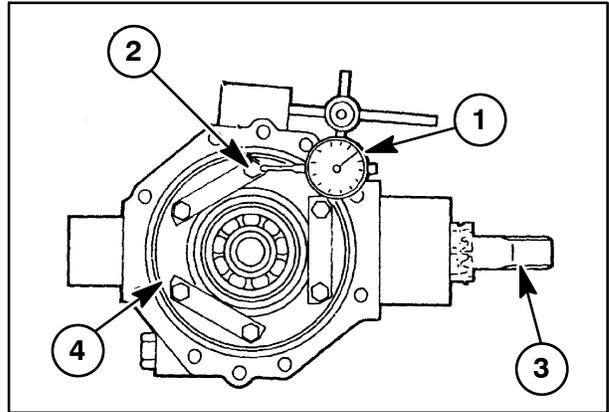
NOTE: For personal safety, be sure the assembly is properly supported to prevent falling.

2. Position the differential assembly in the housing, being sure the differential case is fully seated in the bearing and axle housing counterbore.

NOTE: Be sure there is clearance between the ring gear and the pinion gear. There must not be any interference.

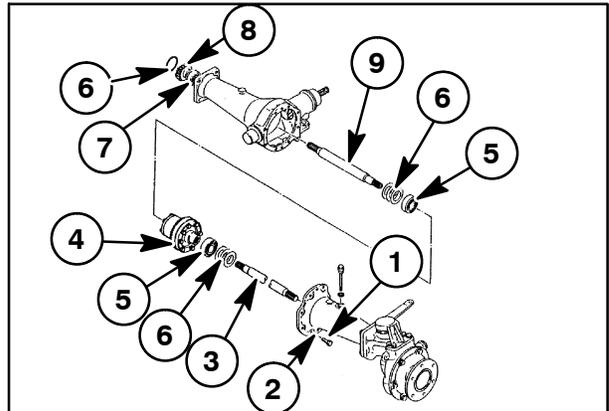
SECTION 25 - FWD FRONT AXLE - CHAPTER 1

3. Place a dial indicator, 1, on the axle housing so that it rests upon a casing bolt, 2. Rock the ring gear, 4, back and forth by turning the pinion shaft, 3, to obtain the ring gear free-play clearance on the dial indicator.



21

4. If the reading is not within the range of 0.10 - 0.15 mm (0.004 - 0.006"), adjust the shims, 6, between the left and right axles to obtain the correct free-play clearance.

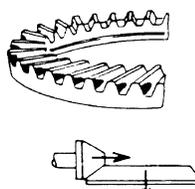


22

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

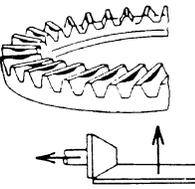
5. Apply Prussian blue to the pinion shaft gear teeth.
6. Rotate the pinion until the ring gear has rotated one complete revolution.
7. Inspect the gear tooth markings. If the markings are incorrect, adjust the pinion gear assembly as required to obtain the correct pattern as shown.

HEEL CONTACT:



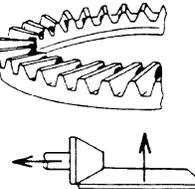
Select the shims so that the drive pinion is out nearer to the ring gear.

FACE CONTACT:



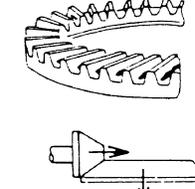
Select the shims so that the ring gear is put nearer to the drive pinion.

TOE CONTACT:

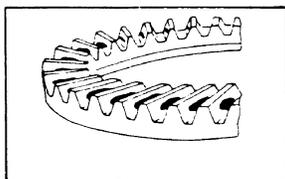


Select the shims so that the ring gear is put farther from the drive pinion.

FLANK CONTACT:



Select the shims so that the drive pinion is put farther from the ring gear.



Correct pinion gear to ring gear tooth contact.

Ring Gear To Pinion Adjustment

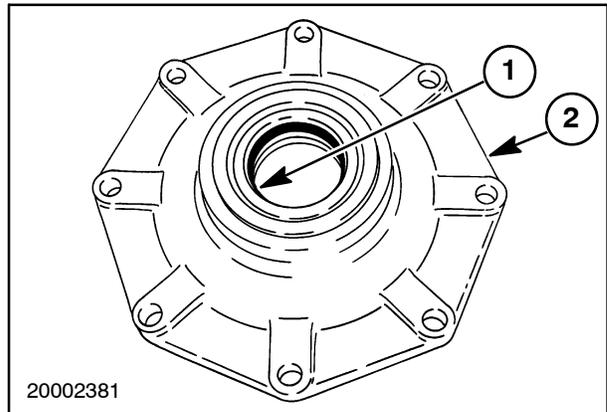
Op. 25 108

GEAR REDUCTION BOX

Assembly

IMPORTANT: The oil seal, 1, is a cassette type seal and must be installed in the hub cover, 2, using the proper tools. If the proper tools are not used the seal may fail prematurely.

NOTE: Install seal with metal side facing away from the oil (towards outside of housing).



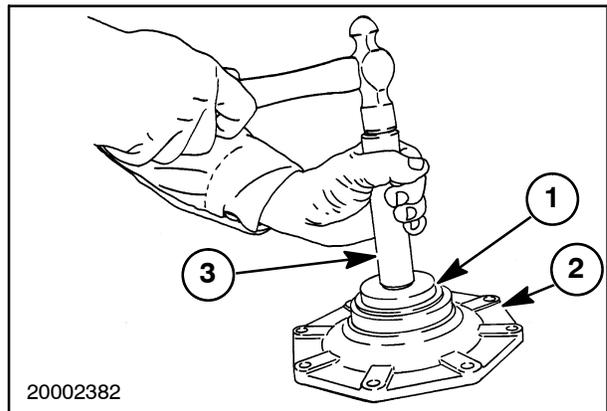
24

1. Lightly lubricate a new seal, 1, and install into the hub cover, 2, using the special tool, 3, No. NH00293.

NOTE: Seal driver set No. NH00293 includes different sizes of drive plates. For this application use the following:

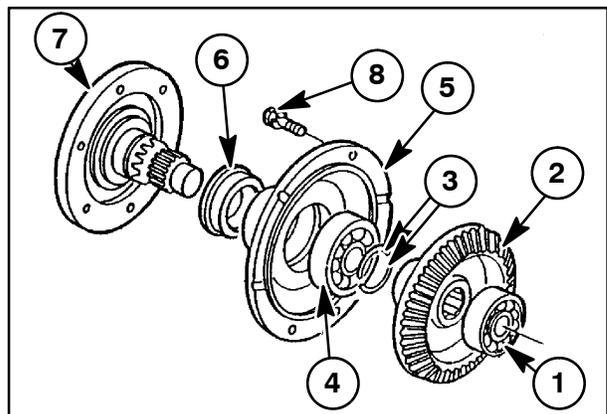
- NH27515 Drive Plate
- NH27530 Drive Plate
- NH27488 Handle

This procedure is the same for the Supersteer as well as the standard FWD axle.



25

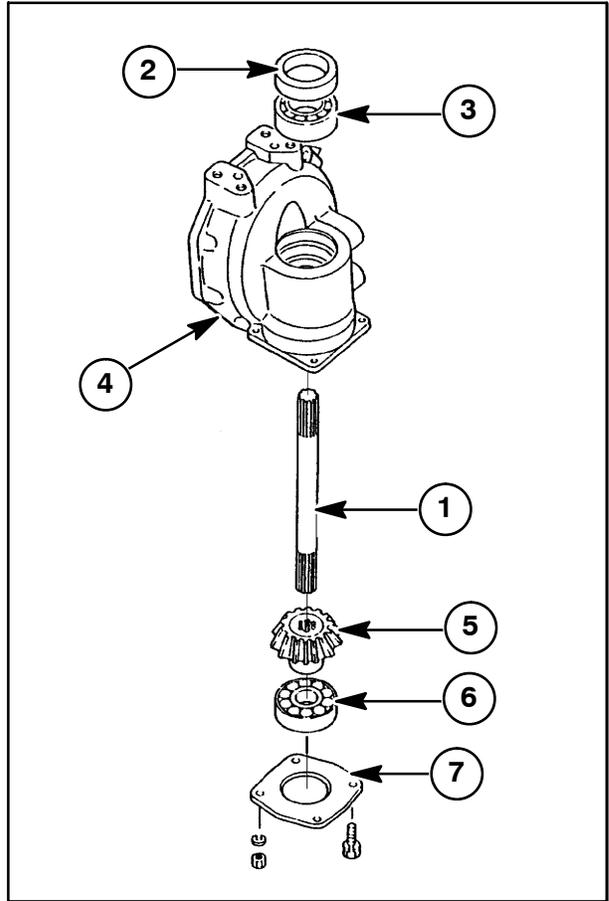
2. Position the wheel shaft outer bearing, 4, in the cover, 5.
3. Install the seal, 6, and the hub and shaft assembly, 7, in the cover, 5.
4. Position the two-piece locking ring, 3, in the shaft groove.
5. Install the bevel gear, 2, on the shaft, making certain that the bevel gear counterbore hub fits down fully over the locking ring, 3
6. Install the inner bearing, 1, on the shaft.



26

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

7. Install the idler gear bearing, 3, and seal, 2, in the drop box case, 4.
8. Install the final drive pinion gear, 5, bearing, 6, and cover, 7, in the bottom of the drop box case, 4.
9. Install the idler shaft, 1, from the top.



RING GEAR-TO-PINION BACKLASH

Check and Adjustment

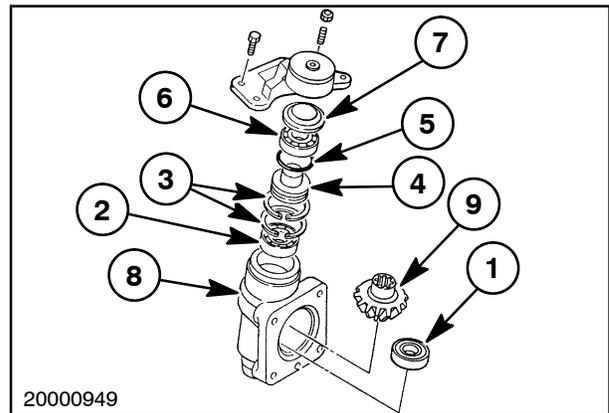
Ring gear-to-pinion backlash must be checked and adjusted whenever new components are used or if the shim requirements are unknown.

NOTE: This is a continuation of the carrier bearing preload adjustment.

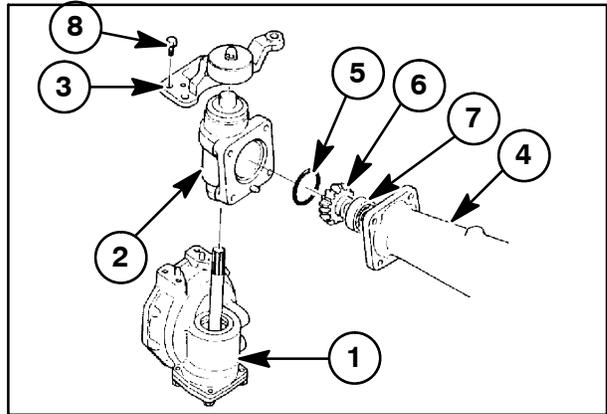
1. Position the assembled axle housing assembly in a vertical position, supported by the housing and not the shaft.

NOTE: For personal safety, be sure the assembly is properly supported to prevent falling.

2. Position the differential assembly in the housing, being sure the differential case is fully seated in the bearing and axle housing counterbore.
3. Install the bearings, 1 and 2, snap rings, 3, king-pin, 4, O ring, 5, bearing, 6, and spacer, 7, into the idler case, 8.
4. Position the idler gear, 9, inside the idler case, 8.



5. Position the idler gear case, 2, onto the drop box case, 1.
6. Install the steering arm assembly, 3, onto the idler gear case, 2.
7. Install the retaining bolts, 8, and tighten to the specified torque. See "Bolt Torque Specifications", discussed later in this section.
8. Install the pinion gear, 6, and bearing, 7, on the axle shaft. Apply liquid gasket to the mating surface of the axle housing, 4, and the idler gear case, 2.
9. Lightly grease and position, the O ring, 5, in place on the axle housing, 4, and install the drop box assembly, 1, 2, and 3, to the axle housing, 4.
10. Install the drop box to axle housing retaining bolts and tighten to the specified torque. See "Bolt Torque Specifications", discussed later in this section.
11. Apply liquid gasket to the drop box cover mating surface and install the cover and hub assembly to the drop box case, 1.
12. Install the retaining bolts and tighten to the specified torque. See "Bolt Torque Specifications", discussed later in this section.



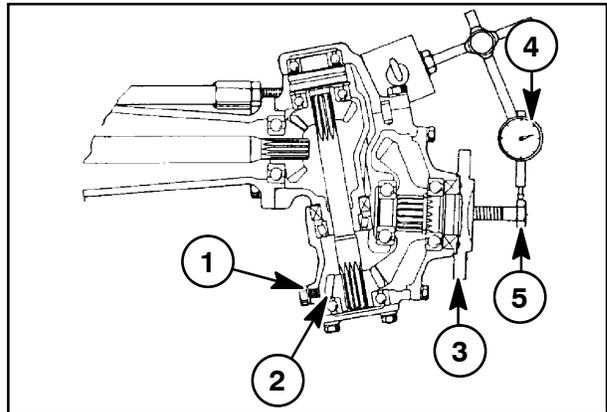
29

BEVEL GEAR-TO-PINION BACKLASH

Check

With the front wheels removed and the front end of the tractor supported, use the following steps to determine the bevel gear-to-pinion gear backlash.

1. Remove the oil drain plug from the drop box case and drain the oil into a suitable container.
2. Install a long bolt, 1, into the drain plug hole, until it makes contact with the pinion gear, 2, and prevents it from rotating.
3. Install a bolt, 5, in the wheel hub flange, 3, and attach a dial indicator, 4.
4. Rotate the hub back and forth and observe the dial indicator reading. Replace the bearings and/or gears if the backlash exceeds 0.5 mm (0.020").



30

Op. 25 100

DESCRIPTION OF OPERATION - SUPERSTEER™/SENSITRACK™

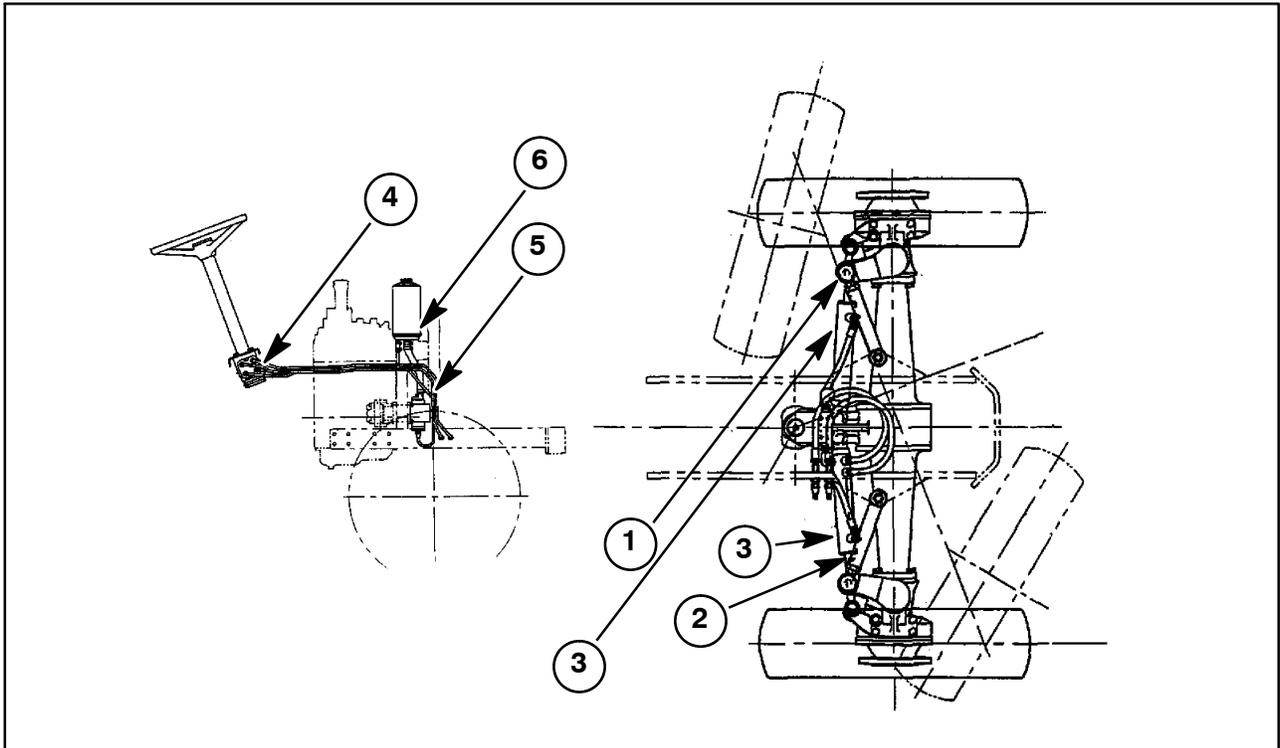
SUPERSTEER™

The Supersteer™ system described in this section is optional equipment for the Model TC35DA, TC40DA, and TC45DA tractors. The Supersteer™ system is a fully hydraulic system consisting of a power steering control motor, 4, a pump, 5, a reservoir, 6, two power steering cylinder assemblies, 3, and tubing.

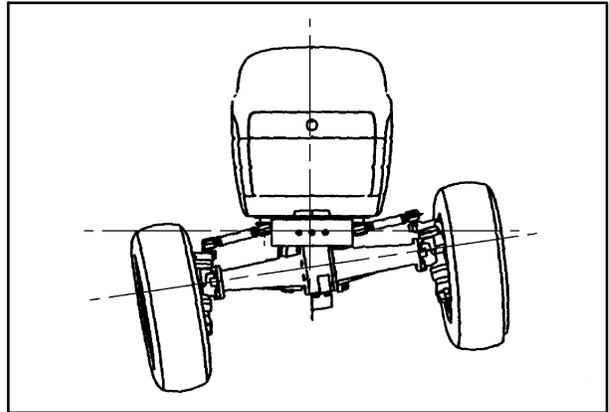
The important part of this design is that the spindle arms, 1, are connected to the tractor frame with the

tie rods, 2, which make the tractor chassis a link in the system.

The steering action occurs when the steering cylinders, 3, apply force to the outer spindle arms as the turn is started. The tie rods, 2, which connect the spindle arms to the tractor front frame cause the axle to move under the frame. This action causes the entire axle assembly to pivot underneath the tractor on the front axle pivot point.



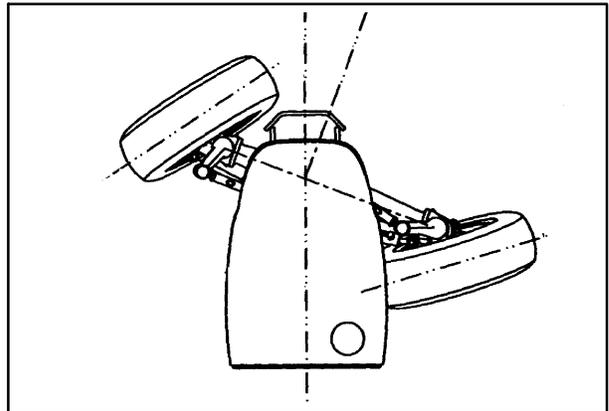
The pivoting front axle design also permits the axle to rotate 8 degrees in either direction relative to the tractor centerline, maintaining the tractor chassis in a level position and ensuring stable operation on irregular ground.



32

The design of the pivoting front axle mount linkage and the steering linkage permit articulation of up to 21 degrees relative to the centerline of the tractor frame.

Axle and wheel steering occur simultaneously. When steering, the cylinder on the same side as the direction of the turn will shorten, causing the spindle and the wheel to rotate into the turn. Simultaneously, the action of the cylinder causes the tie rod to push the chassis away from the direction of the turn.



33

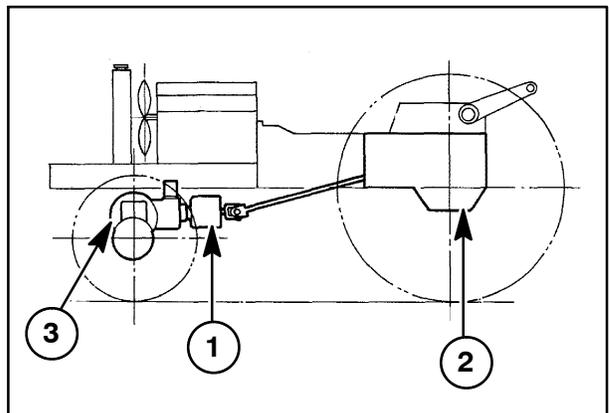
Depending on the speed and rate of turn, the tractor chassis could initially travel in a straight line while the wheels turn and the axle swings out from its center position.

The movement of the chassis relative to the turning wheels gives greater tire-to-tractor clearances allowing for much tighter turns.

The Supersteer™ FWD steering cylinder displacement is approximately 31% greater than the standard steer axles, which increases the lock-to-lock turns by nearly one turn while providing a much shorter turn around diameter.

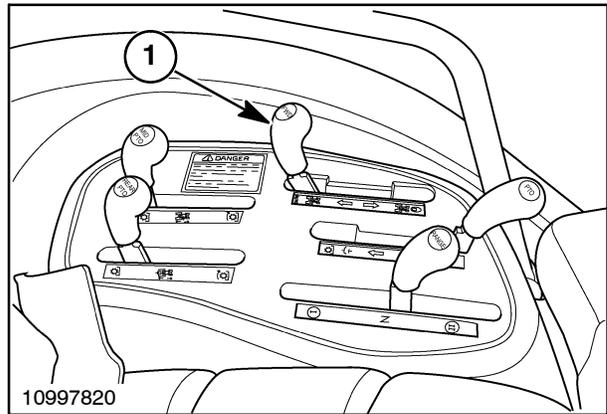
SENSITRACK™

Front wheel drive is standard equipment with the Supersteer™ system. The system also utilizes a Sensitrack™ feature, 1, in the drive train which receives the main transmission, 2, drive shaft input and provides either full time front wheel drive or automatic front wheel drive, 3, dependent upon control lever position.



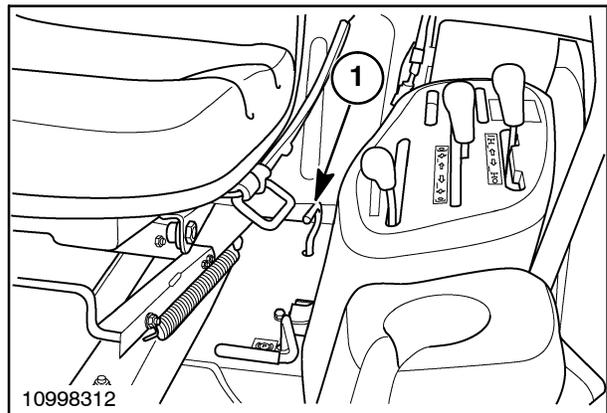
34

The front wheel drive option is operator controlled by a lever, 1, located on the left-hand control pod. Normal operation of the front wheel drive option, is in the automatic mode, with the control lever in the rear position. Full time front wheel drive is engaged by moving the control lever to the forward position.



35

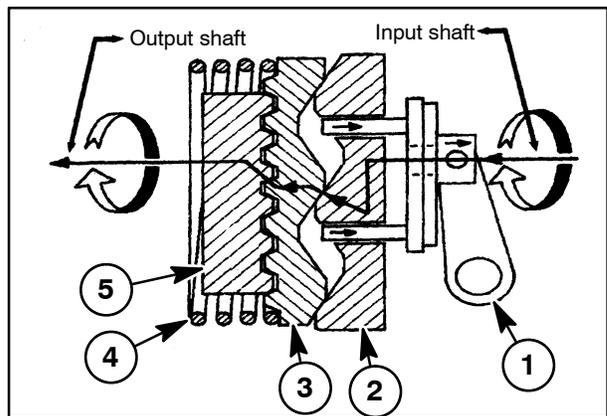
The front-wheel drive system can be locked out completely, allowing the tractor to be operated in full-time two wheel drive. The full-time 2WD lever, located to the left of the seat on tractors equipped with Supersteer™ front axles, controls engagement of the FWD shaft. Pulling up on the lever engages the FWD sliding gear with the FWD shaft in the transmission housing. Pushing down on the lever disengages the FWD sliding gear and the FWD shaft, allowing the tractor to be operated in full-time 2WD.



36

Automatic Position (Engaged)

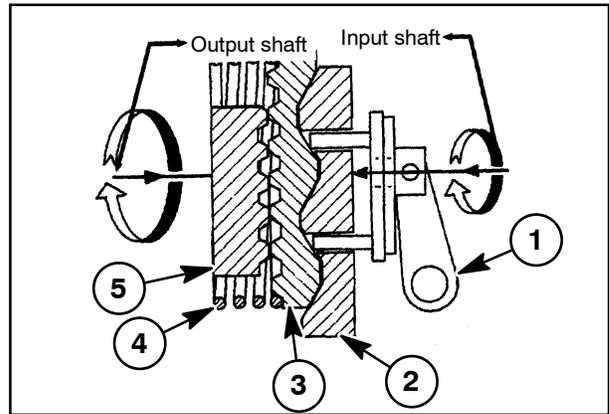
In the automatic mode, the Sensitrack™ clutch engages (providing FWD) whenever the speed of the input shaft is equal to or greater than the speed of the output shaft. In such a case, the input shaft rotation causes the drive cam, 2, to shift. As it does, it rides up on the center cam, 3, thereby pushing it outward. The center cam movement causes it to mesh with the driven cam, 5, overcoming the compression spring, 4, restoring power to the output shaft. Notice that the shifter fork, 1, does not engage any of the cams.



37

Automatic Position (Disengaged)

In the automatic position, the Sensitrack™ has a disconnect feature which disengages front wheel drive when drive line wrap-up is sensed on straight-aways, down-grades, or when making sharp turns. This disconnect happens when the front wheels are turning faster than the rear wheels. When this happens, the drive cam, 2, aligns with the center cam, 3, and the compression spring, 4, pushes the center cam disengaging it from the driven cam, 5. When front wheel drive disengages, it automatically re-engages when the rear drive input is equal to or greater than the front output shaft rotation. The shifter fork, 1, is always in the same position in the automatic mode.

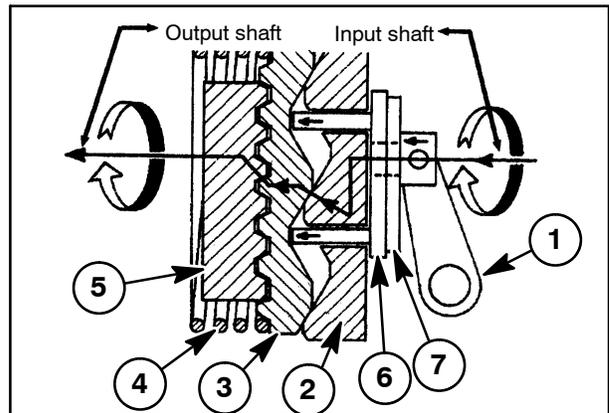


38

Full Time Front Wheel Drive (Locked Down)

In the full time front wheel drive position the shifter fork, 1, is continuously engaged pushing on the thrust washer, 7, and sleeve, 6, which engages the center cam, 3, with the driven cam, 5, and overcomes the compression spring, 4, pressure. This permits the drive cam, 2, rotation to be continuously transmitted through the center cam and the driven cam.

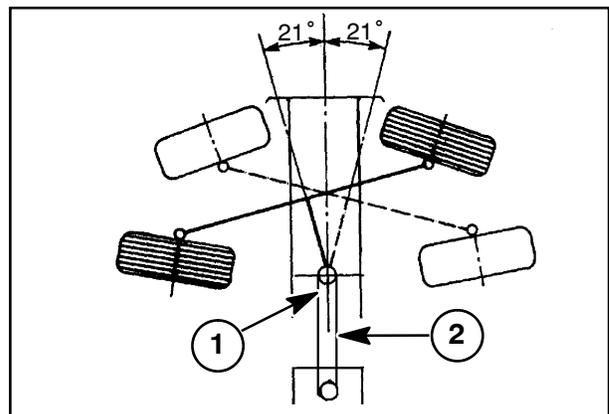
NOTE: When disengaging full-time FWD, it may be necessary to move in reverse to unlock the Sensitrack™ clutch.



39

SUPERSTEER™ FRONT AXLE

The Supersteer™ front axle is mounted to the tractor frame with a spherical bearing and a bearing retainer, 1. A stabilizer bar, 2, is mounted at the pivot point and at the clutch housing to keep the front axle anchored to the tractor. The tie rods are connected to the front of the frame. This allows the entire front axle assembly to articulate 21° relative to the center line of the tractor frame.



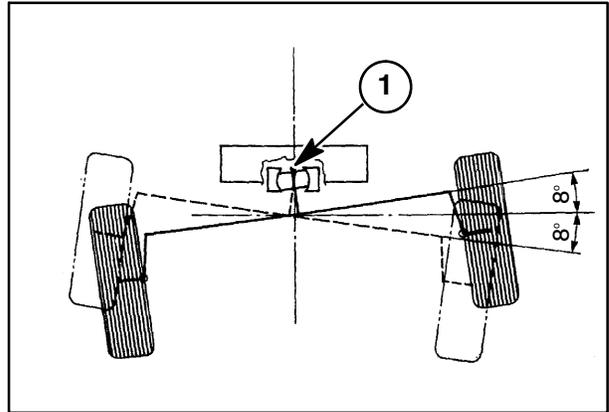
40

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

The axle can also oscillate 8° on the spherical bearing, 1, maintaining the tractor chassis in a level position ensuring stable operation while on irregular ground.

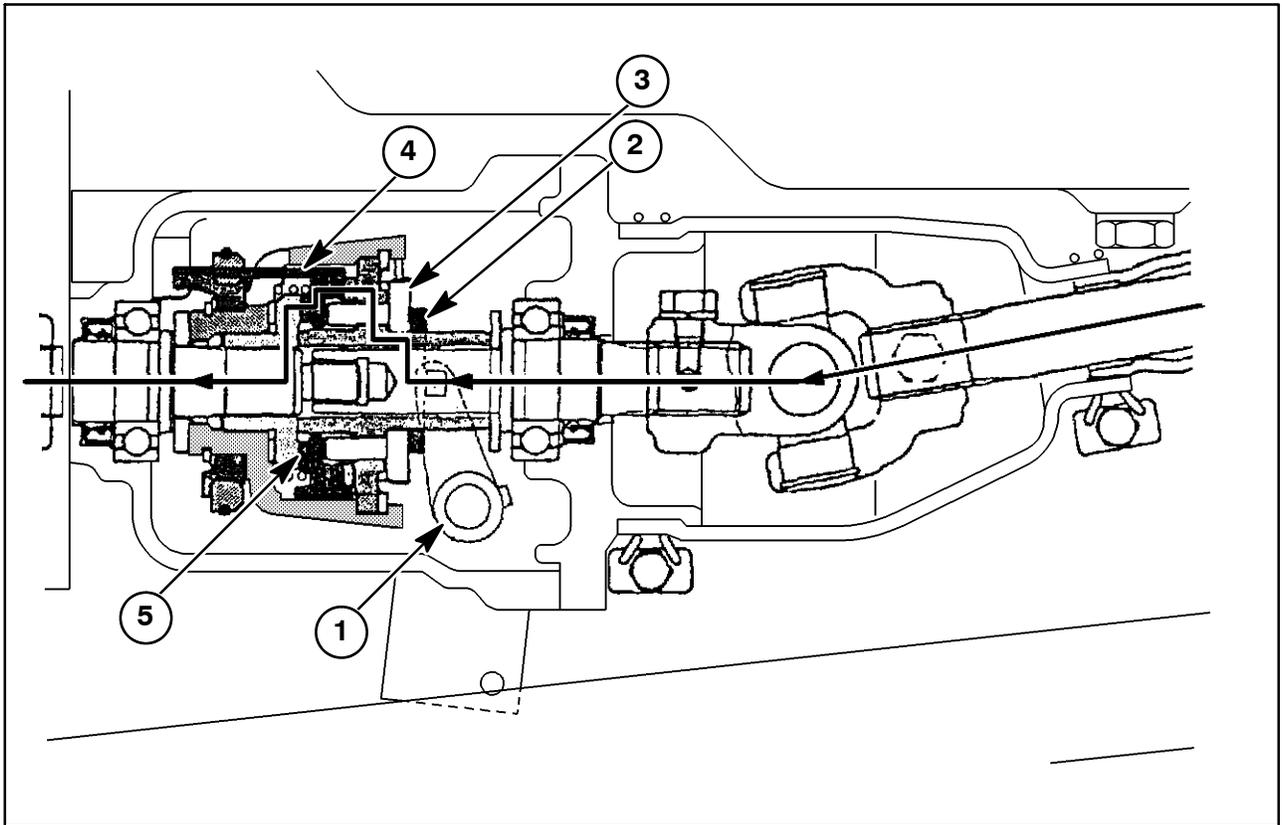
The front wheel drive front axle is not adjustable and the front wheels are not to be reversed.

The front wheel tie rod assembly is adjustable for toe-in adjustments. The power steering cylinders are located between the front axle and the steering arm.



41

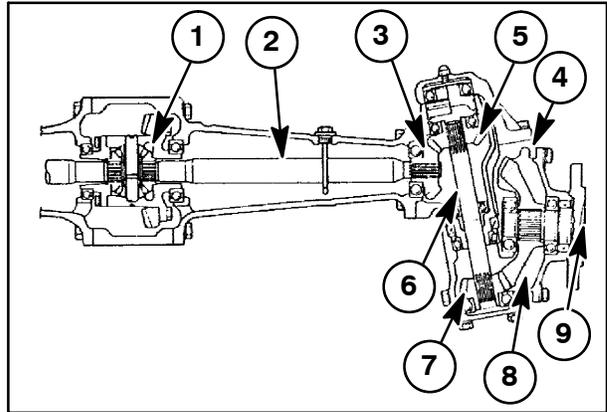
Power flows from the main transmission through the rear drive shaft to the Sensitrack™. When engaged, the shifter fork, 1, pushes on the thrust washer, 2, and the sleeve, 3, and causes the center cam, 4, to mate with the driven cam, 5. This in turn causes the Sensitrack™ output shaft and connecting shaft to the front axle differential assembly to rotate.



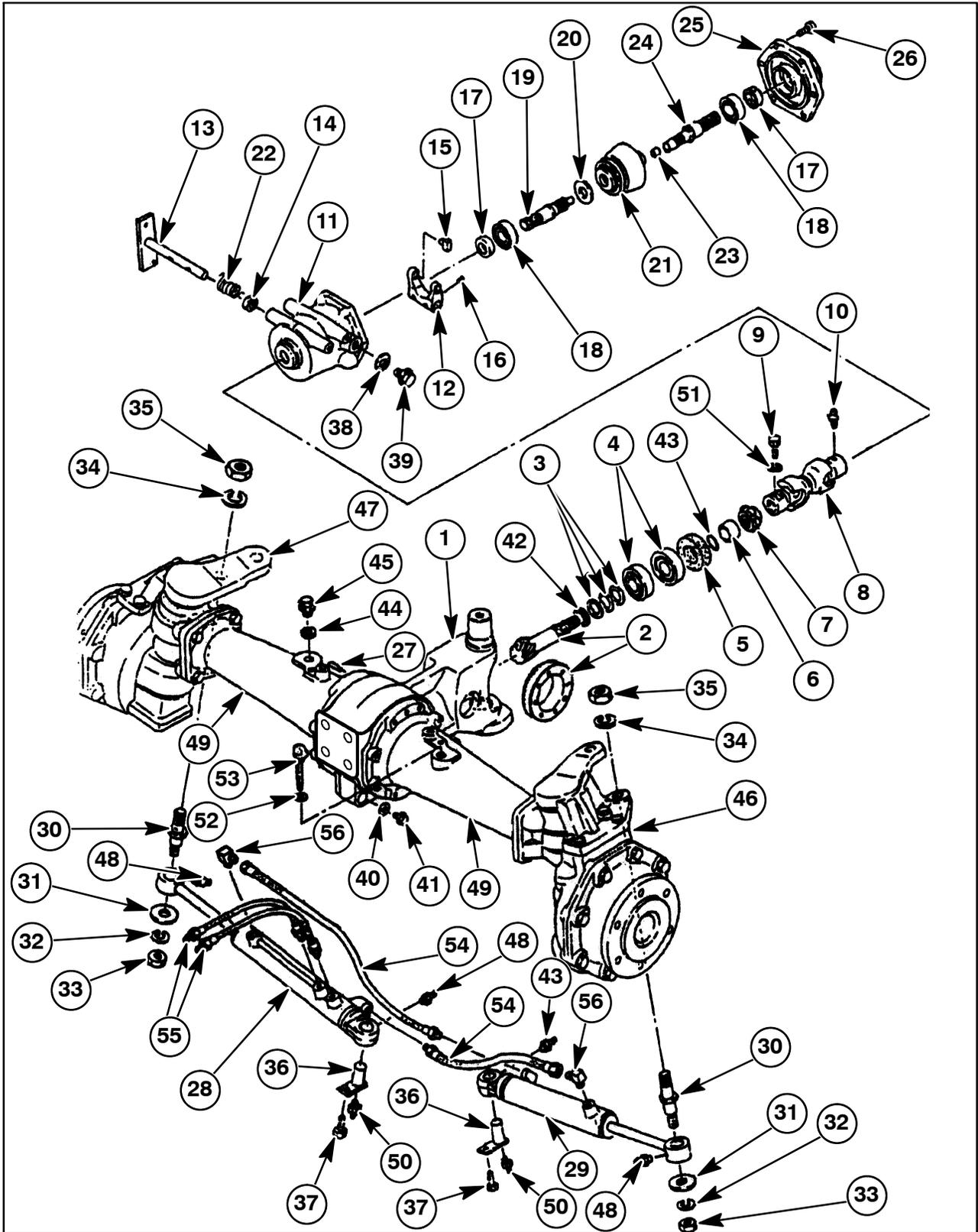
42

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

Power then flows to the front wheels from the front axle differential side gear, 1, and axle shaft, 2, to the reduction gearbox assembly. A pinion gear, 3, on the axle shaft, drives an idler pinion, 5, and an idler shaft, 6, in the drop box, 4. final drive pinion, 7, on the idler shaft drives the bevel gear, 8, which is splined to the wheel hub and shaft assembly.



OVERHAUL - SUPERSTEER™ AXLE



SECTION 25 - FWD FRONT AXLE - CHAPTER 1

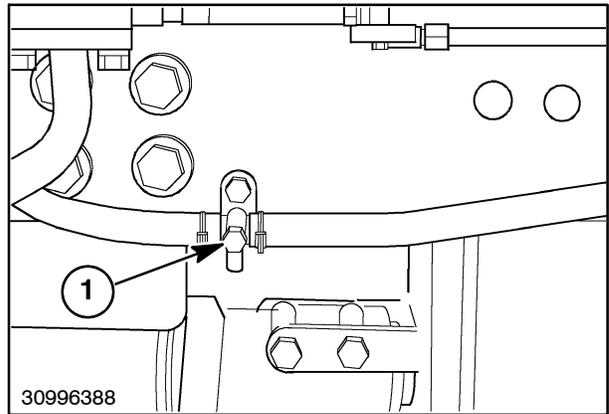
1. Casing Assembly
2. Drive Pinion Assembly
3. Shims
4. Tapered Roller Bearing
5. Oil Seal
6. Collar
7. Nut
8. Joint
9. Bolt
10. Grease Nipple
11. Casing
12. Shifter Fork
13. Shift Arm
14. Oil Seal
15. Block
16. Bolt
17. Oil Seal
18. Ball Bearing
19. Drive Shaft
20. Thrust Washer
21. Clutch Assembly
22. Spring
23. Bushing
24. Drive Shaft
25. Seal Cover
26. Bolt
27. Dowel Pin
28. R.H. Cylinder Assembly
29. L.H. Cylinder Assembly
30. Pin
31. Spacer
32. Spring Washer
33. Nut
34. Spring Washer
35. Nut
36. Pin
37. Bolt
38. Spring Washer
39. Plug
40. Seal Washer
41. Bolt
42. Thrust Washer
43. O-ring
44. Seal Washer
45. Plug
46. L.H. Arm
47. R.H. Arm
48. Grease Nipple
49. Shaft Housing
50. Grease Nipple
51. Spring Washer
52. Seal Washer
53. Dipstick
54. Hose
55. Hose
56. Adapter

Op. 25 100

SUPERSTEER AXLE

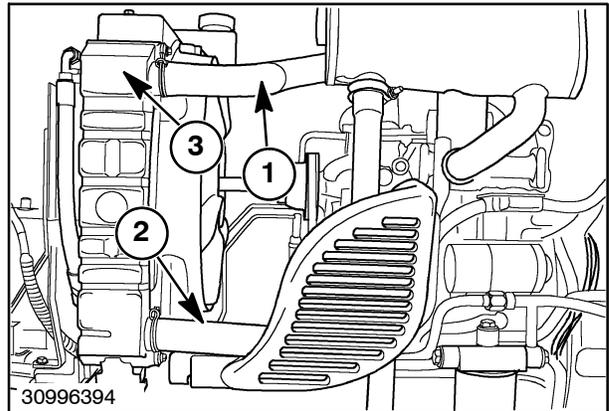
Removal

1. Loosen the coolant drain bolt, 1, and drain the coolant into a clean suitable container.



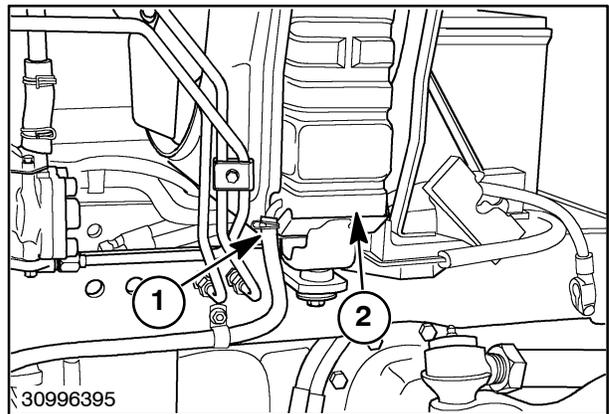
45

2. Remove the upper and lower radiator hoses, 1 and 2, from the radiator, 3.



46

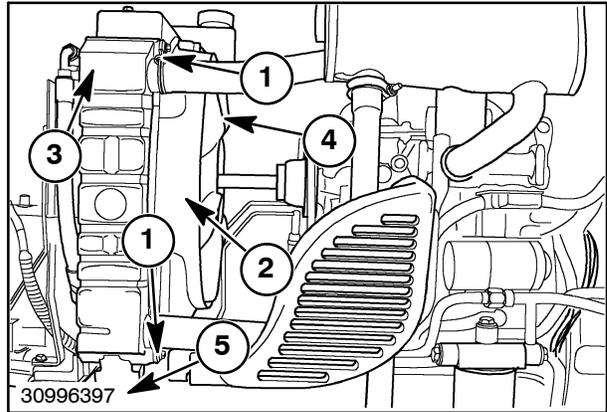
3. Remove the drain petcock hose, 1, from the radiator, 2.



47

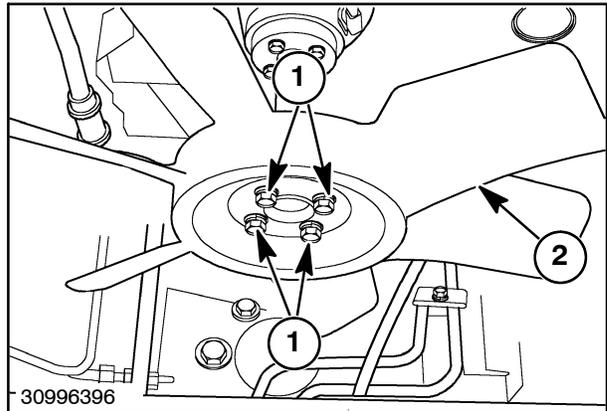
SECTION 25 - FWD FRONT AXLE - CHAPTER 1

4. Loosen and remove the four radiator fan shroud retaining bolts, 1.
5. Remove the radiator fan shroud, 2, from the radiator, 3, to ease the removal of the radiator fan, 4.
6. Loosen and remove the two radiator mounting bolts, 5.
7. Carefully remove the radiator, 3, from the tractor.



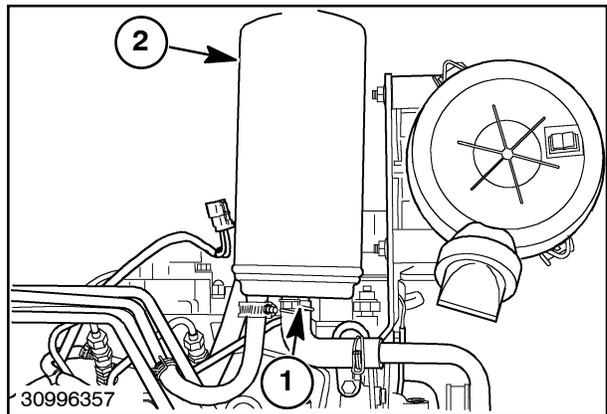
48

8. Loosen and remove the four fan retaining bolts, 1, and remove the fan, 2, from the engine.



49

9. Loosen and remove the drain bolt, 1, and drain the fluid from the power steering reservoir, 2, into a suitable container.



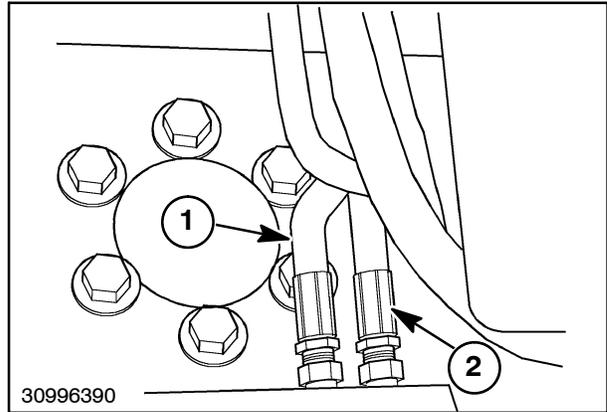
50

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

10. Remove the power steering hoses, 1 and 2. Cap and plug all fittings.
11. Using a floor jack, raise the tractor until the front wheels are just off the ground, and place jack stands under the tractor frame for support.

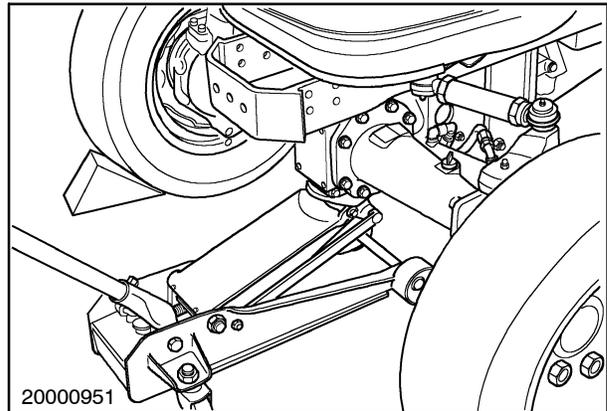


Make certain that the tractor frame, and the axle, are supported properly, or damage to the tractor could result when the following steps are performed.



51

12. Place a jack under the front differential housing to support the axle when performing steps 14 through 20.

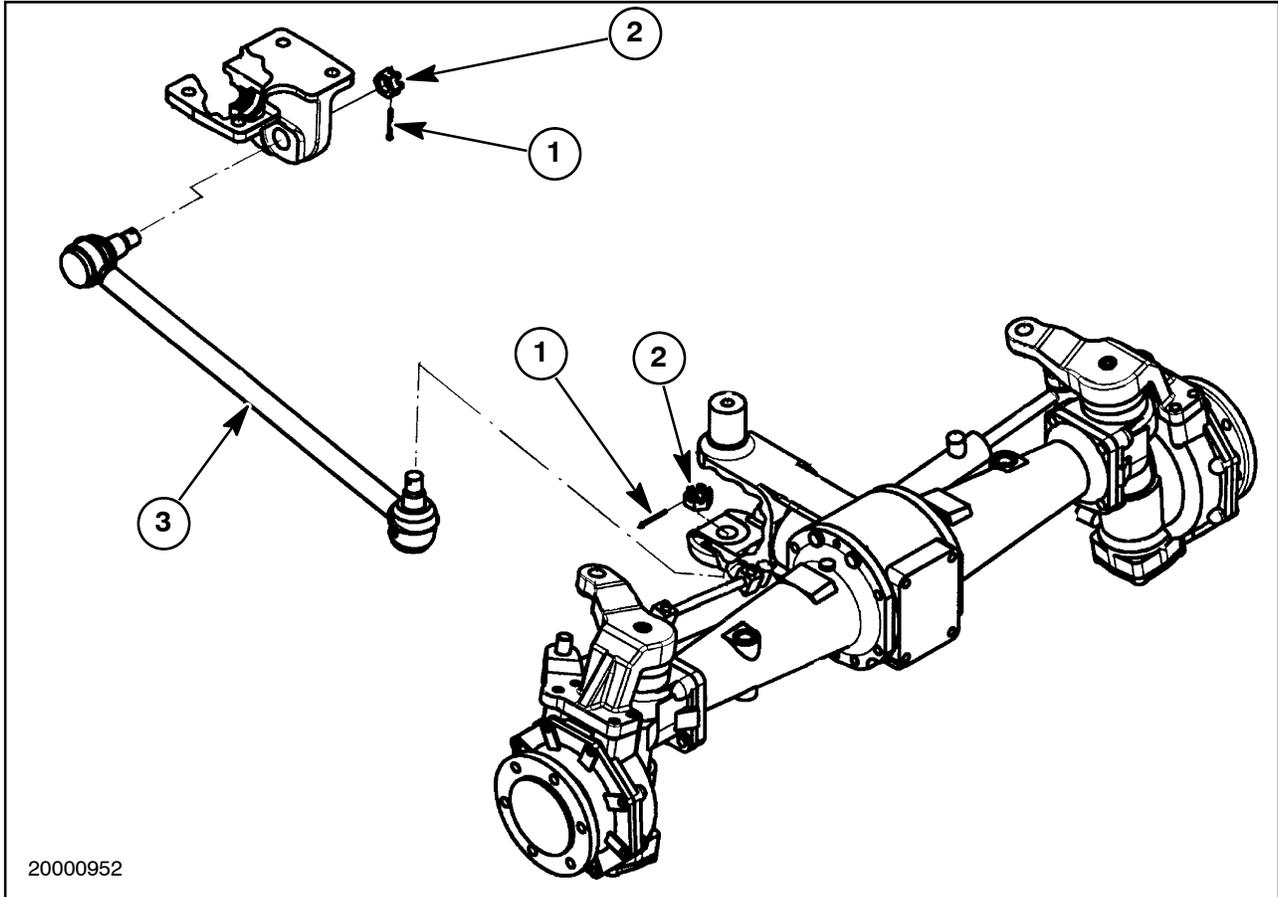


52

NOTE: The axle may have to be raised slightly to release the stress on the stabilizer bar when removing the bar from the differential housing.

13. Remove the cotter pins, 1 and the castle nuts, 2, from the stabilizer bar, 3, and remove the bar from the tractor.

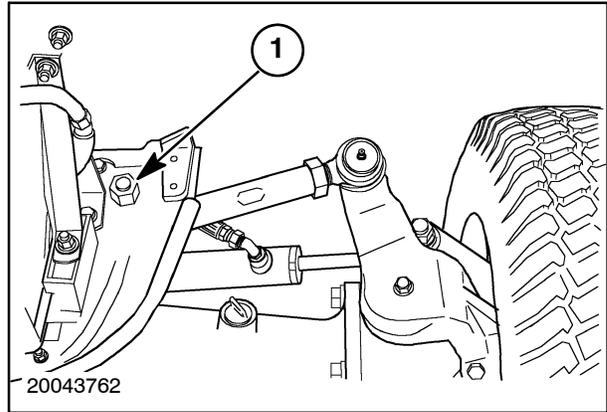
14. Remove the Sensitrack™ assembly. Refer to "SENSITRACK™ REMOVAL" as discussed earlier in this section.



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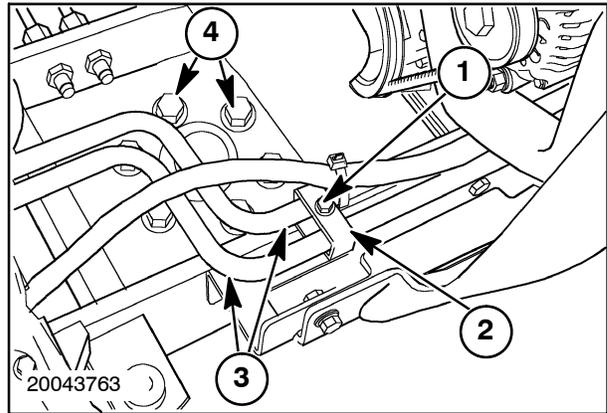
SECTION 25 - FWD FRONT AXLE - CHAPTER 1

15. With the tractor frame supported by the jack stands, loosen and remove the castle nuts, 1, on the left side and right side tie rod ends, at the frame. Use a brass drift and a hammer to remove the tie rod ends from the frame.



54

16. Loosen and remove the clamp bolt, 1, and the clamp, 2, to allow the transmission oil cooler lines, 3, to be moved to gain access to the axle pivot retaining bolts, 4.
17. Loosen and remove the axle pivot retaining bolts and lock washers, 4.
18. Using a floor jack or a chain hoist to properly support the axle, carefully remove the axle from under the tractor.



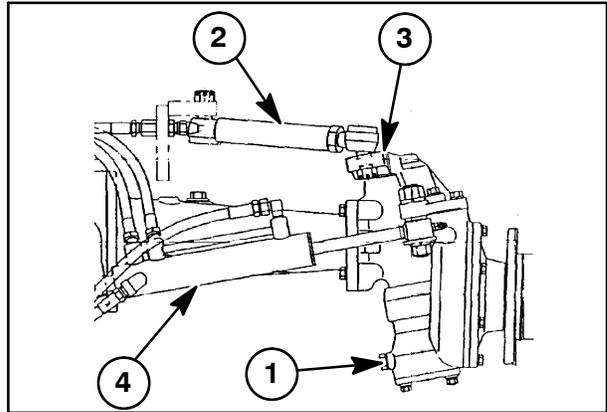
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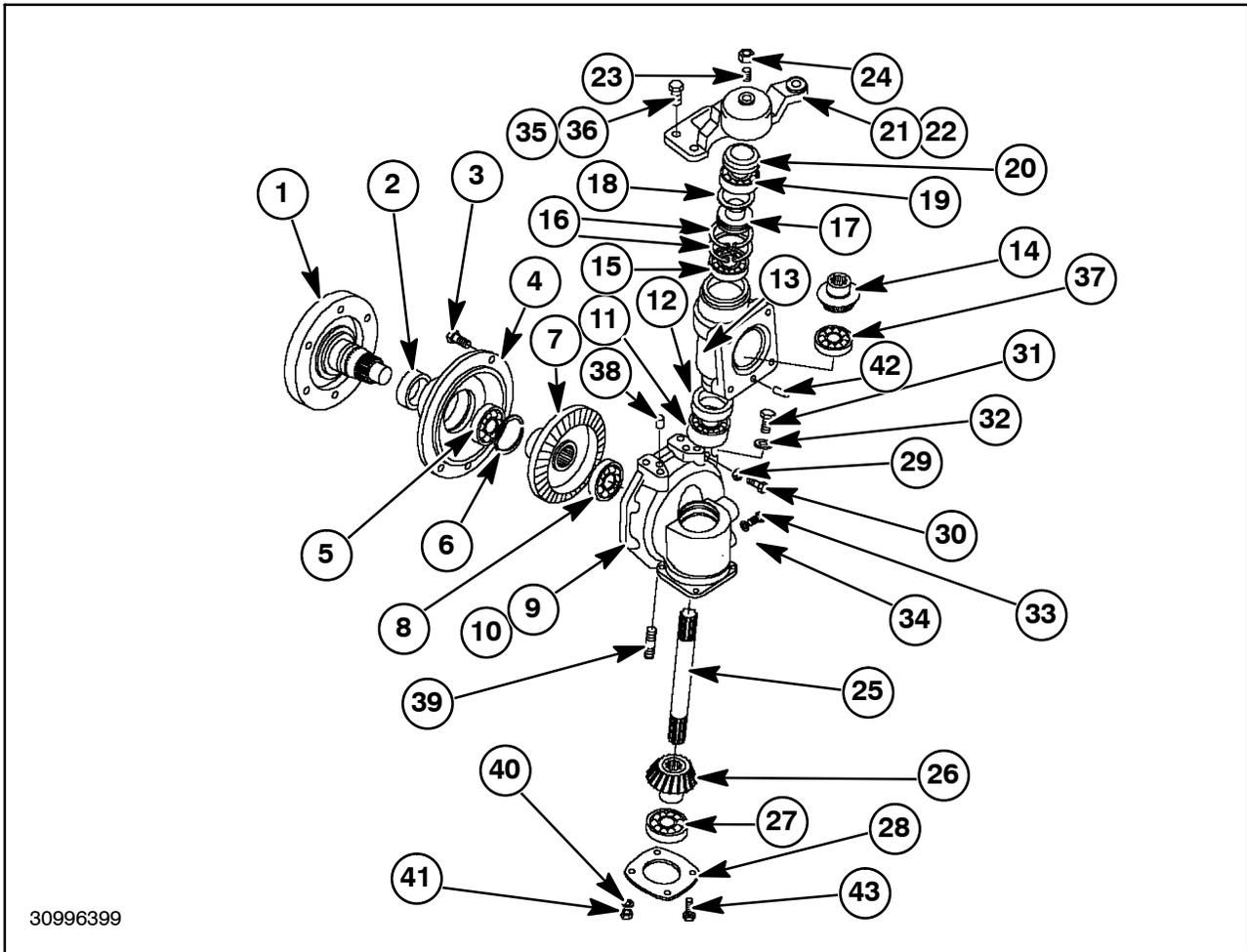
GEAR REDUCTION-DROP BOX

Disassembly

NOTE: These procedures apply to both the right and left front axle component assemblies. Repeat the procedure for the opposite side component to be disassembled or repaired.

1. Remove the front-wheel hub bolts and remove the front wheels.
2. Remove the tie rod, 2, from the steering arm, 3. Tap the ball joint pin with a brass drift and a hammer to loosen the pin.
3. Remove the drain plug, 1, from the drop box case, and drain the oil into a clean suitable container.
4. Remove the power steering cylinder, 4, from the steering arm, and the front axle.





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- | | |
|-----------------------------------|-----------------------------|
| 1. Wheel Hub and Shaft | 23. Adjuster Screw |
| 2. Oil Seal | 24. Nut Cap |
| 3. Bolt | 25. Idler Shaft |
| 4. Case Cover | 26. Final Drive Pinion Gear |
| 5. Ball Bearing | 27. Ball Bearing |
| 6. Clip | 28. Cover |
| 7. Final Drive Bevel Gear | 29. Nut |
| 8. Ball Bearing | 30. Bolt |
| 9. L.H. Drop Box Casing Assembly | 31. Plug |
| 10. R.H. Drop Box Casing Assembly | 32. Seal Washer |
| 11. Tapered Roller Bearing | 33. Drain Bolt |
| 12. Oil Seal | 34. Seal Washer |
| 13. Idler Casing Assembly | 35. Left Side Bolt |
| 14. Idler Pinion Gear | 36. Right Side Bolt |
| 15. Ball Bearing | 37. Ball Bearing |
| 16. Snap Ring | 38. Dowel Pin |
| 17. Kingpin | 39. Stud Bolt |
| 18. O ring | 40. Spring Washer |
| 19. Ball Bearing | 41. Nut |
| 20. Spacer | 42. Dowel Pin |
| 21. L.H. Steering Arm | 43. Bolt |
| 22. R.H. Steering Arm | |

- Remove the case cover bolts, 3, and remove the wheel hub, 1, cover, 4, and final bevel gear, 7, as an assembly.



The drop box, 9 or 10, is free to disengage and fall away from the idler gear case, 13, when the steering arm, 21 or 22, bolts, 35 and 36, are removed. Use care to avoid accidental disengagement of the components. Uncontrolled dropping of the components may cause personal injury.

- Remove the four retaining bolts, 35 and 36, from the steering arms, 21 or 22.
- Remove the drop box case, 9 or 10, the final drive pinion gear, 26, and the final drive shaft, 25, as an assembly from the idler case, 13.
- Remove the four bolts, 43, from the final drive pinion cover, 28. Remove the final drive pinion gear, 26, the bearing, 27, the cover, 28, and the shaft, 25, as an assembly from the drop box, 9 or 10.

- Remove the idler case, 13, from the front axle.
- Remove the oil seal, 12, and the tapered roller bearing, 11, from the drop box, 9 or 10.
- Remove the wheel hub shaft inner bearing, 8, from the wheel hub shaft, 1, and remove the final drive bevel gear, 7.
- Remove the clip, 6, and gently drive the wheel hub shaft assembly, 1, from the cover, 4.
- Remove the bearing, 5, and the oil seal, 2, from the cover, 4.
- Remove the idler pinion gear, 14, and the bearings, 15 and 37, from inside the idler case, 13.
- Remove the axle drive pinion gear and O ring seal from the front axle housing.
- Remove the spacer, 20, the bearing, 19, the king-pin, 17, the O ring, 18, and the snap rings, 16, from the idler case, 13.

Op. 25 102

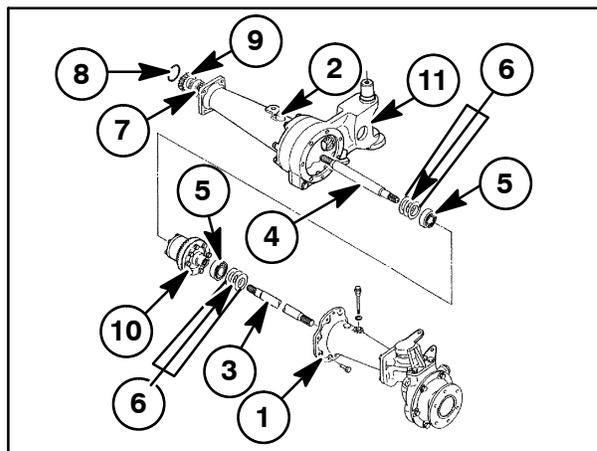
FRONT AXLE AND DIFFERENTIAL

Disassembly

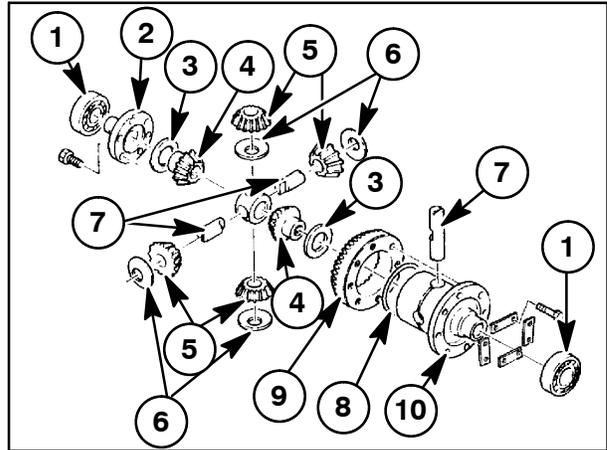
- Remove the left axle housing, retaining bolts, and remove the axle housing, 1, and axle shaft, 3, as an assembly.
- Remove the differential assembly, 10, and differential carrier bearings, 5, from the axle housing, 2.
- Remove the O ring, 8, the axle outer pinion gear, 9, and bearing, 7, from each end and gently drive the axle shaft, 3 and 4, inward to remove from the housing.

NOTE: Observe the quantity and the size of the shims, 6, between the axle shaft inner bearing and the axle housing. Shim sizes are 0.1 mm (0.004"), 0.2 mm (0.008"), and 0.5 mm (0.020").

- Check the differential side gear to pinion backlash. Replace the gears if backlash exceeds 0.3 mm (0.012").



5. Remove the bolts from the differential case cover, 2.
6. Remove the differential side gear, 4, and the thrust washer, 3.
7. Remove the pinion gear shaft retaining ring, 8, and slide the pinion shaft, 7, out of the case, 10.
8. Remove the four pinion gears, 5, and thrust washers, 6.
9. Remove the support bearings, 1 and the ring gear, 9, from the case, 10.



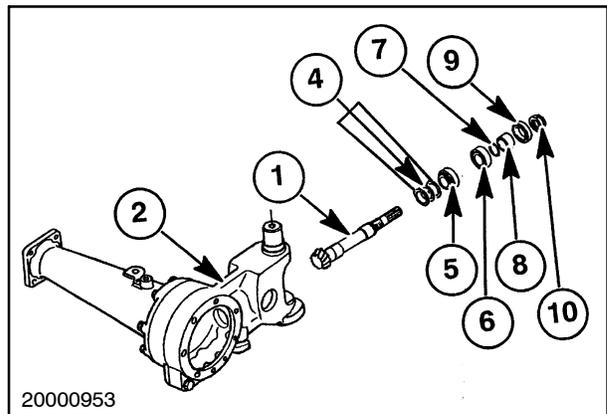
59

DRIVE PINION

Disassembly

1. Remove the drive pinion locknut, 10.
2. Remove the collar, 8, the O ring, 7, the oil seal, 9, and the bearing, 6.
3. Gently drive the pinion shaft, 1, inward and remove the pinion assembly with the bearing, 5, the thrust washer, 3, and the shims, 4, from the case.

NOTE: Observe the quantity and the size of the shims used on the pinion shaft. Shim sizes are 0.1 mm (0.004"), 0.2 mm (0.008"), and 0.5 mm (0.020").



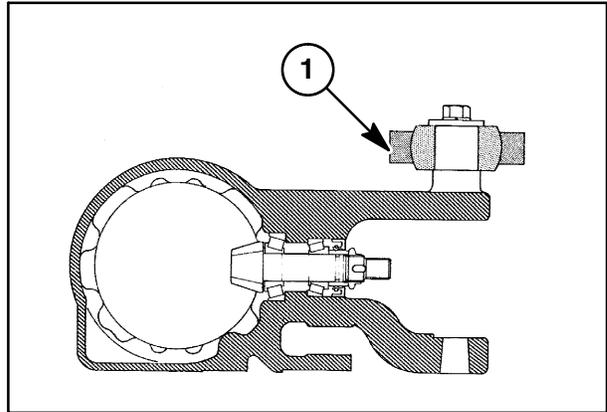
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60

4. Remove the bearing, 5, and the shims, 4, from the pinion shaft, 1.

FRONT AXLE**Inspection**

1. Wash all parts in a suitable solvent and air dry.
2. Inspect the axle pivot spherical bearing and bearing retainer, 1, for cracks, excessive pitting, wear, or distortion. Replace if found to be defective.
3. Check the axle pivot for wear or cracks. Repair or replace as necessary.



61

DIFFERENTIAL**Inspection**

1. Wash all parts in a suitable solvent and air dry.
2. Using a telescoping gauge and micrometer, measure the pinion gear bore and the pinion shaft to determine the bore to shaft clearance. Replace the gear and/or shaft if the clearance exceeds 0.1 mm (0.004").
3. Measure the differential to side gear thrust washer thickness. Replace the thrust washers if the thickness is less than 1.2 mm (0.047").

NOTE: If the thrust washers are replaced, recheck the side gear to pinion gear backlash during assembly. Refer to backlash check made during disassembly.

4. Inspect all gear teeth for excess wear or damage. Replace gears if teeth are damaged or wear is excessive.

GEAR REDUCTION-DROP BOX**Inspection**

1. Wash all parts in a suitable solvent and air dry.
2. Inspect the gears for excess wear or damage. Replace gears that show excessive wear or damage. See "Assembly", for gear backlash checks.
3. Inspect the splines on the pinion gears, idler shaft, and axle shaft for excess wear or damage.
4. Check the bearings for wear or roughness. Rotate the bearings by hand and replace as required.
5. On assembly, check the bevel gear and pinion backlash. See "Gear Reduction—Drop Box Assembly", discussed later in this section.

DRIVE PINION

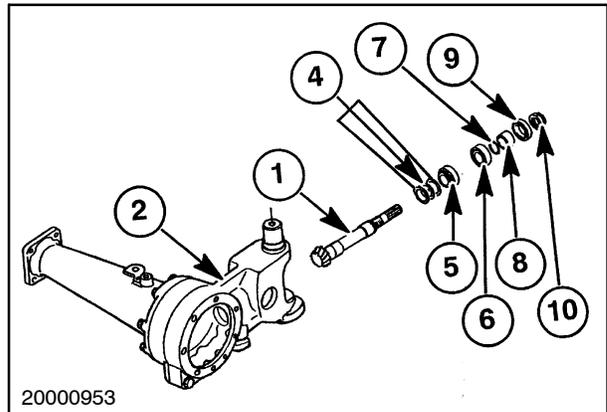
Assembly

1. Install the shims, 4, and front pinion bearing, 5, on the drive pinion, 1.

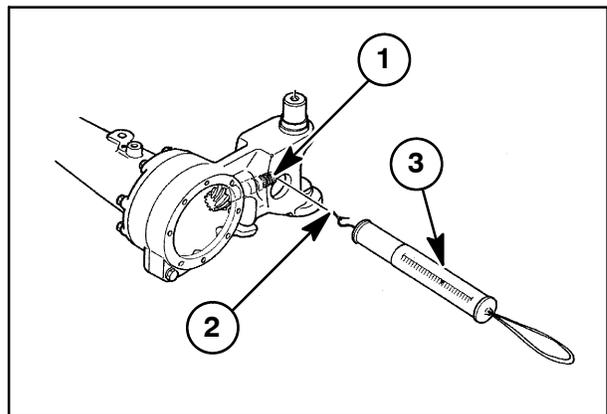
NOTE: Observe the quantity and the size of the shims used on the pinion shaft. Shim sizes are 0.1 mm (0.004"), 0.2 mm (0.008"), and 0.5 mm (0.020").

2. Insert the drive pinion, 1, in place in the differential housing, 2.
3. Install the outer bearing, 6, on the pinion shaft, 1, in the differential housing, 2.
4. Using a suitable driver, install the oil seal, 9, the O ring, 7, and the collar, 8, on the pinion shaft, 1.
5. Install the pinion locknut, 10, and tighten to obtain the correct bearing preload as follows:

- Wrap a strong cord, 2, around the pinion shaft, 1. Using a pull scale, 3, measure the pounds of pull required to rotate the pinion shaft.
- Tighten or loosen the locknut as necessary to obtain a preload of 16.3 - 20 kg (36 - 44 lbs.) pull.



62

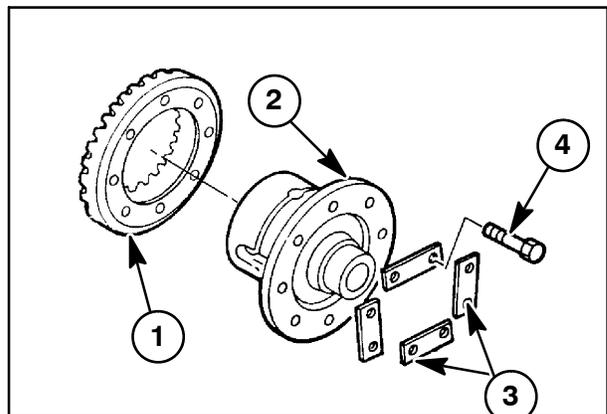


63

DIFFERENTIAL GEAR

Assembly

1. Install the differential ring gear, 1, to the case, 2, and align the mounting bolt holes.
2. Install new locking plates, 3.
3. Install and tighten bolts, 4, to the specified torque. See "Bolt Torque Specifications", discussed earlier in this section.



64

Op. 25 102

AXLE AND DIFFERENTIAL**Assembly**

If any of the following components are not being replaced, assemble the front axle using the original components.

Differential assembly, 10

Differential case carrier bearings, 5

Axle housing, 1 and 2

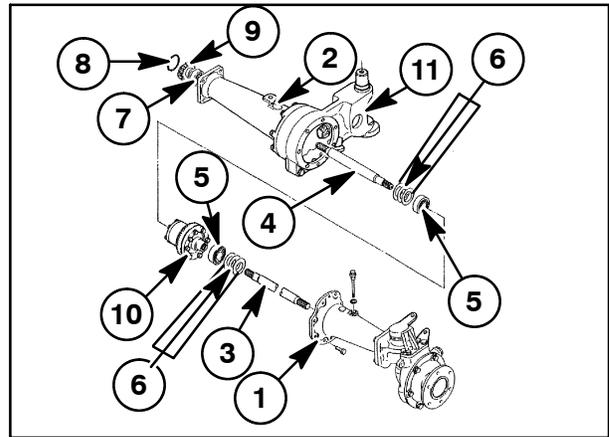
Axle shaft, 3 and 4

1. Install the shim pack, 6, and carrier bearing, 5, in the differential axle housing, 2.

NOTE: Observe the quantity and the size of the shims used on the pinion shaft. Shim sizes are 0.1 mm (0.004"), 0.2 mm (0.008"), and 0.5 mm (0.020").

2. Install the axle shaft, 4, in the housing from the outer end through the shim pack, 6.
3. Install the axle shaft outer bearing, 7.
4. Position the differential assembly, 10, in the housing, inserting the differential outer cover end inside the bearing, 5, previously positioned in the bearing, 5, in the axle housing, 2.
5. Assemble the left axle shaft and housing in the same manner described in steps 1 through 4.
6. Apply liquid gasket to the left axle housing mating surface and align the right and left axle housings together.
7. Install the axle retaining bolts and tighten to the specified torque. See "Bolt Torque Specifications", discussed later in this section.

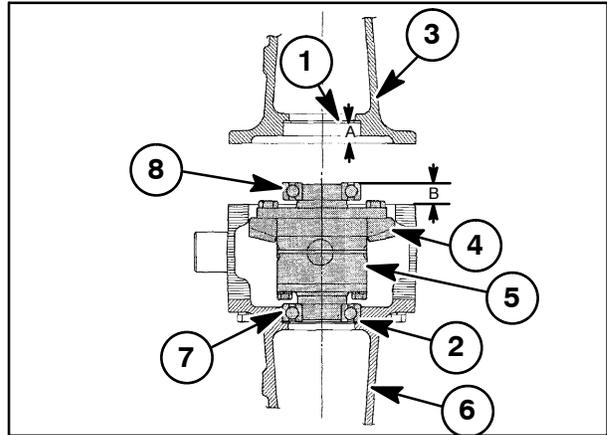
NOTE: The differential carrier bearing preload and ring gear backlash must be checked and adjusted if the differential case bearings, axle shaft inner bearings, or axle shaft have been replaced.



65

DIFFERENTIAL CASE BEARING PRELOAD**Check and Adjustment**

1. Position the differential carrier bearing, 7, and the shim pack, 1, in place in the right differential axle housing.
2. Place the differential assembly, 5, in the housing, being sure the differential case is fully seated inside the bearing, 7.
3. Position the left differential case bearing, 8, on the differential assembly, 5, being sure it is fully seated.
4. Measure the distance "A" and measure the distance "B". Add or subtract shims, 1 or 2, from the shim pack so that the measurements "A" - "B" = 0.15 mm (0.006").



66

RING GEAR-TO-PINION BACKLASH**Check and Adjustment**

Ring gear-to-pinion backlash must be checked and adjusted whenever new components are used or if the shim requirements are unknown.

NOTE: This is a continuation of the carrier bearing preload adjustment.

1. Assemble the differential axle housing complete with axle shaft, bearing and drive pinion following the disassembly procedure in reverse.
2. Position the assembled axle housing assembly in a vertical position, supported by the housing and not the shaft.

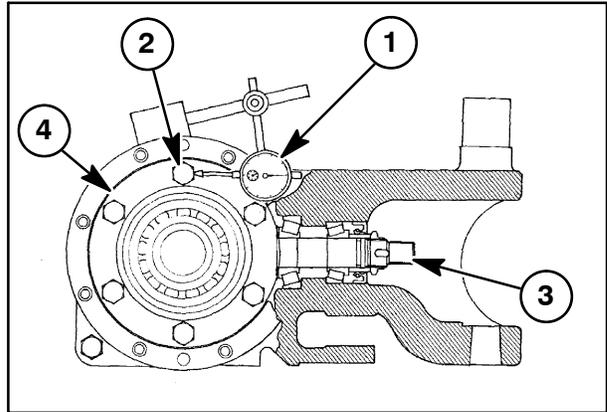
NOTE: For personal safety, be sure the assembly is properly supported to prevent falling.

3. Position the differential assembly in the housing, being sure the differential case is fully seated in the bearing and axle housing counterbore.

NOTE: Be sure there is clearance between the ring gear and the pinion gear. There must not be any interference.

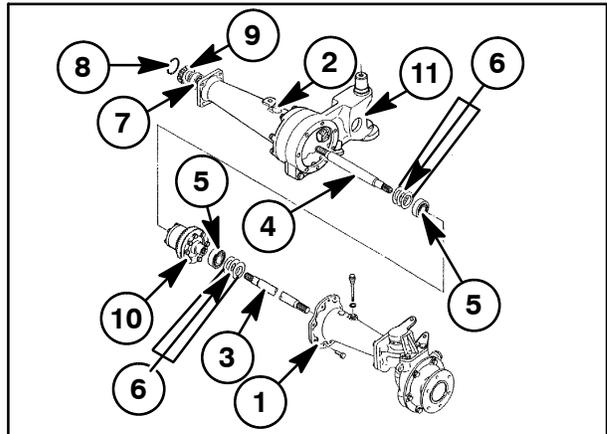
SECTION 25 - FWD FRONT AXLE - CHAPTER 1

4. Place a dial indicator, 1, on the axle housing so that it rests upon a casing bolt, 2. Rock the ring gear, 4, back and forth by turning the pinion shaft, 3, to obtain the ring gear free-play clearance on the dial indicator.



67

5. If the reading is not within the range of 0.10 - 0.15 mm (0.004 - 0.006"), adjust the shims, 6, between the left and right axles to obtain the correct free-play clearance.

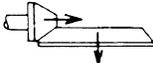
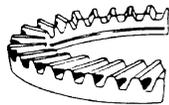


68

SECTION 25 - FWD FRONT AXLE - CHAPTER 1

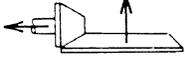
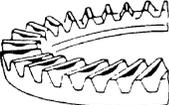
6. Apply Prussian blue to the pinion shaft gear teeth.
7. Rotate the pinion until the ring gear has rotated one complete revolution.
8. Inspect the gear tooth markings. If the markings are incorrect, adjust the pinion gear assembly as required to obtain the correct pattern as shown.

HEEL CONTACT:



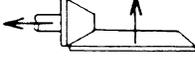
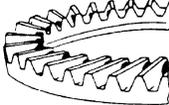
Select the shims so that the drive pinion is out nearer to the ring gear.

FACE CONTACT:



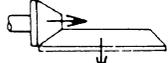
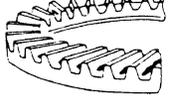
Select the shims so that the ring gear is put nearer to the drive pinion.

TOE CONTACT:

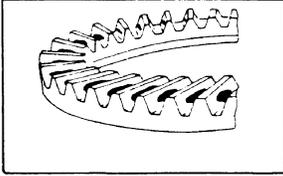


Select the shims so that the ring gear is put farther from the drive pinion.

FLANK CONTACT:



Select the shims so that the drive pinion is put farther from the ring gear.



Correct pinion gear to ring gear tooth contact.

Ring Gear To Pinion Adjustment

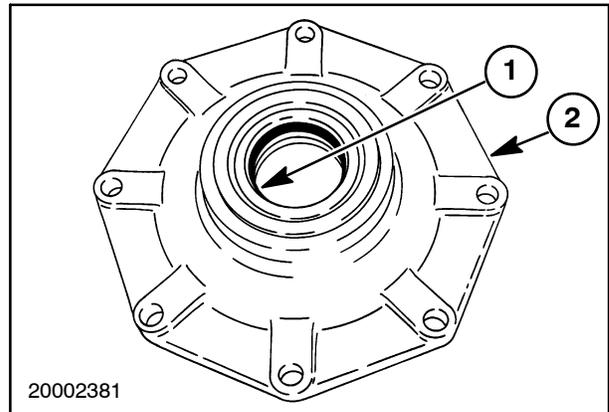
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GEAR REDUCTION BOX

Assembly

IMPORTANT: The oil seal, 1, is a cassette type seal and must be installed in the hub cover, 2, using the proper tools. If the proper tools are not used the seal may fail prematurely.

NOTE: Install seal with metal side facing away from the oil (towards outside of housing).



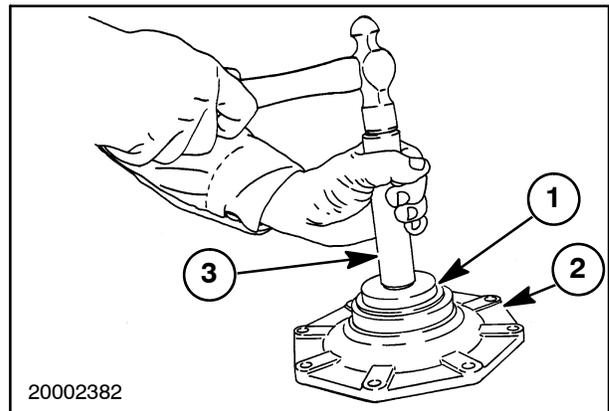
70

1. Lightly lubricate a new seal, 1, and install into the hub cover, 2, using the special tool, 3, No. NH00293.

NOTE: Seal driver set No. NH00293 includes different sizes of drive plates. For this application use the following:

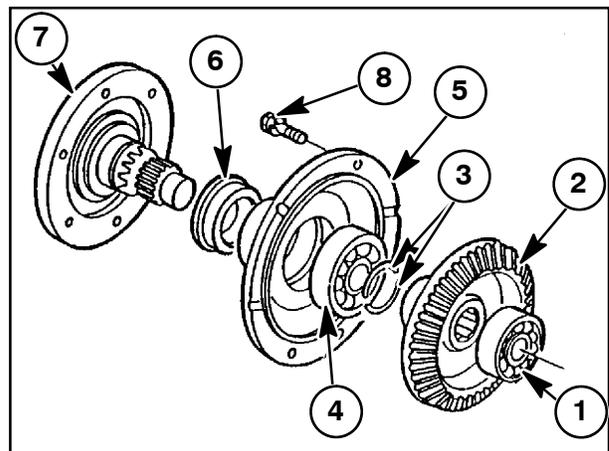
- NH27515 Drive Plate
- NH27530 Drive Plate
- NH27488 Handle

This procedure is the same for the Supersteer as well as the standard FWD axle.



71

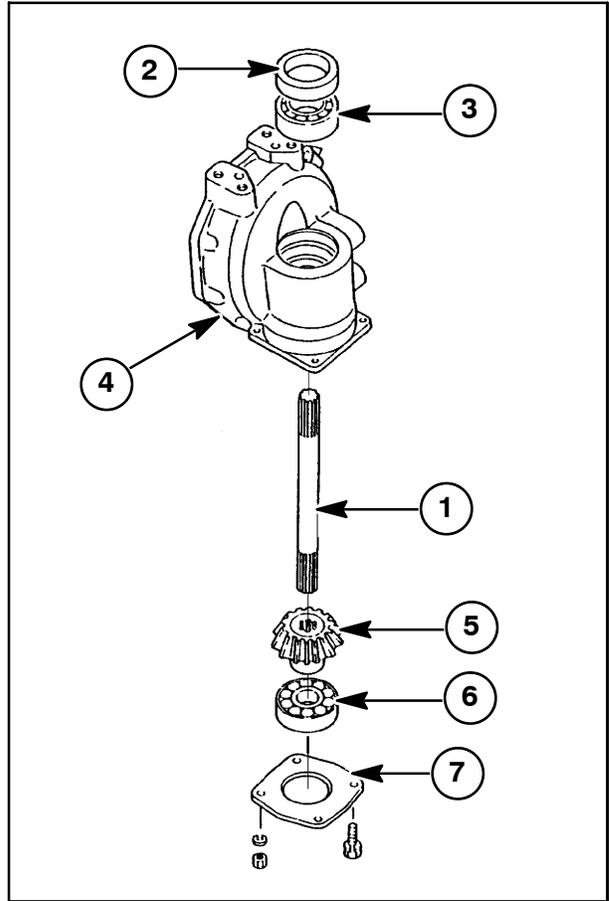
2. Position the wheel shaft outer bearing, 4, in the cover, 5.
3. Install the seal, 6, hub and shaft assembly, 7, in the cover, 5.
4. Position the two-piece locking ring, 3, in the shaft groove.
5. Install the bevel gear, 2, on the shaft, making certain that the bevel gear counterbore hub fits down fully over the locking ring, 3
6. Install the inner bearing, 1, on the shaft.



72

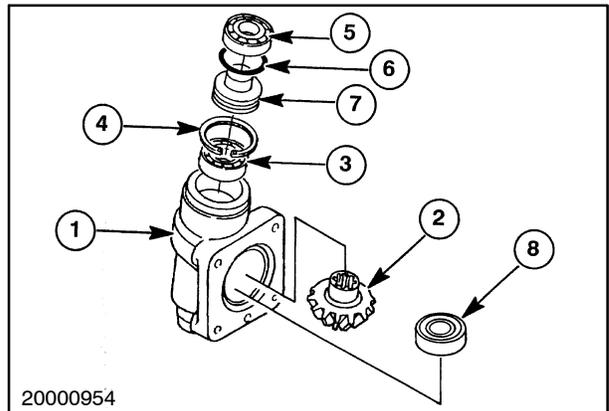
SECTION 25 - FWD FRONT AXLE - CHAPTER 1

7. Install the idler gear bearing, 3, and seal, 2, in the drop box case, 4.
8. Install the final drive pinion gear, 5, bearing, 6, and cover, 7, in the bottom of the drop box case, 4.
9. Install the idler shaft, 1, from the top.



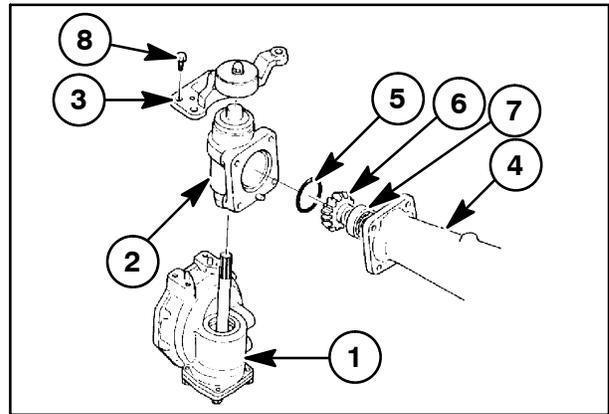
73

10. Install the idler bearings, 3 and 8, the snap ring, 4, the kingpin, 7, a new O ring, 6, and the bearing, 5, into the idler case, 1.
11. Position the idler gear, 2, inside the idler case, 1.



74

12. Position the idler gear case, 2, onto the drop box case, 1.
13. Install the steering arm assembly, 3, onto the idler gear case, 2.
14. Install the retaining bolts, 8, and tighten to the specified torque. See "Bolt Torque Specifications", discussed earlier in this section.
15. Install the pinion gear, 6, and bearing, 7, on the axle shaft. Apply liquid gasket to the mating surface of the axle housing, 4, and the idler gear case, 2.
16. Lightly grease and position, the O ring, 5, in place on the axle housing, 4, and install the drop box assembly, 1, 2, and 3, to the axle housing, 4.
17. Install the drop box to axle housing retaining bolts and tighten to the specified torque. See "Bolt Torque Specifications", discussed earlier in this section.
18. Apply liquid gasket to the drop box cover mating surface and install the cover and hub assembly to the drop box case, 1.
19. Install the retaining bolts and tighten to the specified torque. See "Bolt Torque Specifications", discussed earlier in this section.



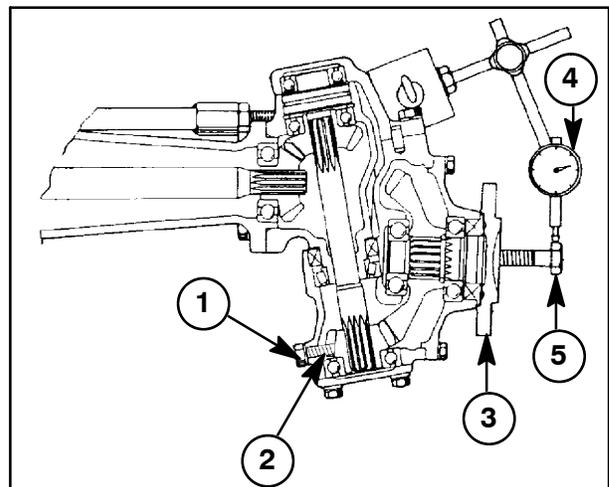
75

BEVEL GEAR-TO-PINION BACKLASH

Check

With the front wheels removed and the front end of the tractor supported, use the following steps to determine the bevel gear-to-pinion gear backlash.

1. Remove the oil drain plug from the drop box case and drain the oil into a suitable container.
2. Install a long bolt, 1, into the drain plug hole, until it makes contact with the pinion gear, 2, and prevents it from rotating.
3. Install a bolt, 5, in the wheel hub flange, 3, and attach a dial indicator, 4.
4. Rotate the hub back and forth and observe the dial indicator reading. Replace the bearings and/or gears if the backlash exceeds 0.5 mm (0.020").



76

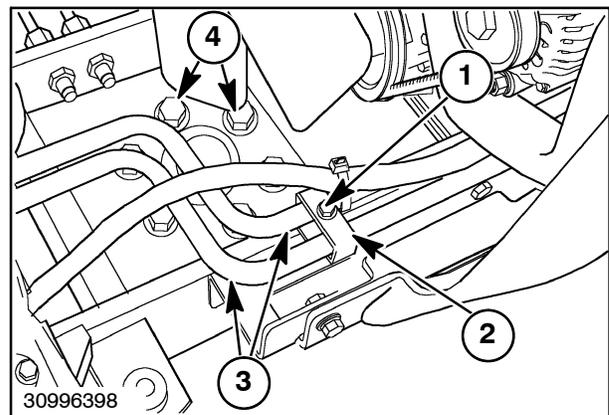
SUPERSTEER AXLE

Installation

1. With the axle properly supported by a floor jack or a chain hoist, and the tractor supported by jackstands, carefully roll the axle under the tractor and into position.
2. Raise the axle slowly, aligning the axle pivot bolt holes in the tractor frame with the bolt holes in the axle pivot bearing collar.

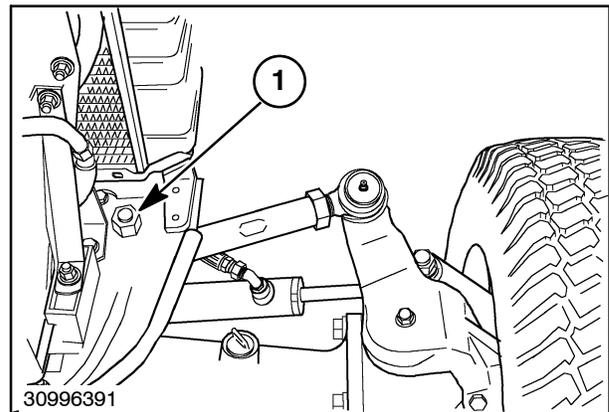
NOTE: It may be necessary to raise or lower the jack/hoist to properly align the axle pivot bolt holes

3. Install the axle pivot bolts through the frame and into the axle pivot bearing collar.
4. Tighten the axle pivot bearing bolts, 4. See "Bolt Torque Specifications" discussed earlier in this section.
5. Install and tighten the clamp, 2, and bolt, 1, on the transmission oil cooler lines, 3.



77

6. Install the left and right side tie rod ends into the frame and secure with the castle nuts, 1. Tighten the castle nuts, 1, to 95-115 N·m (70-85 ft.-lbs.).
7. Install the Sensitrack™ assembly. Refer to SENSITRACK INSTALLATION, discussed earlier in this section.

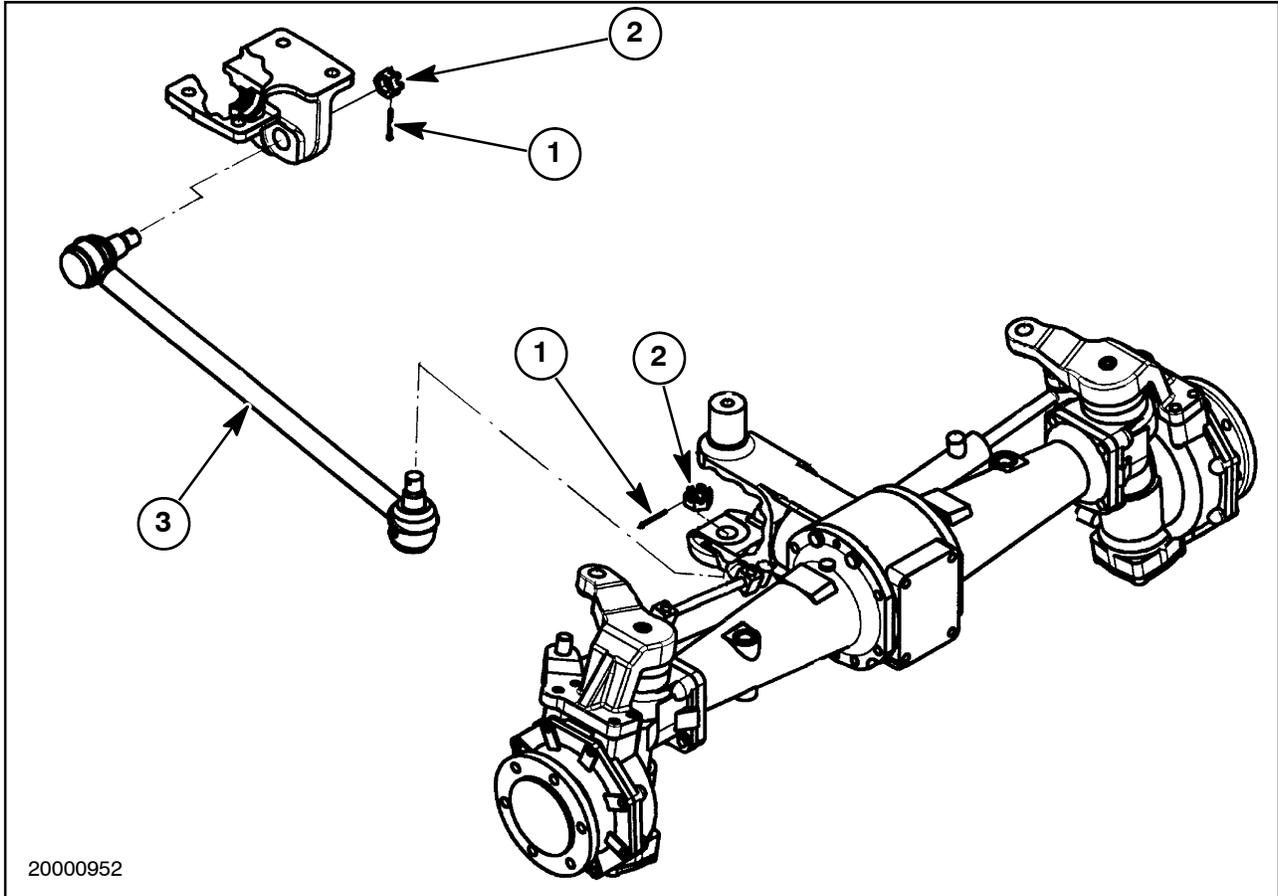


78

NOTE: The axle may have to be raised or lowered slightly to align the stabilizer bar with the mounting hole in the differential housing.

tion housing. Secure with castle nuts, 2, and cotter pins, 1. Torque the castle nuts to 135.6-169.5 N·m (100-125 ft.-lbs.).

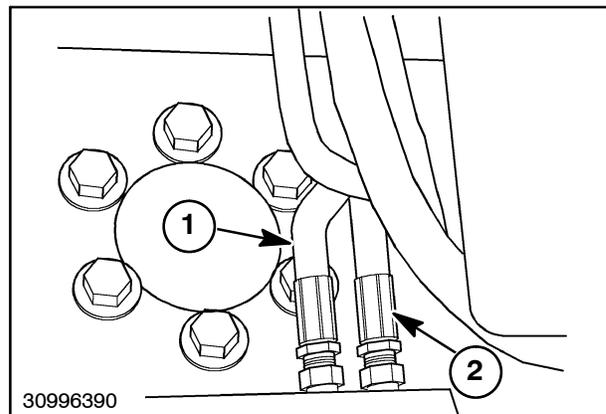
8. Install the stabilizer bar, 3, to the differential housing and to the bracket under the transmis-



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79

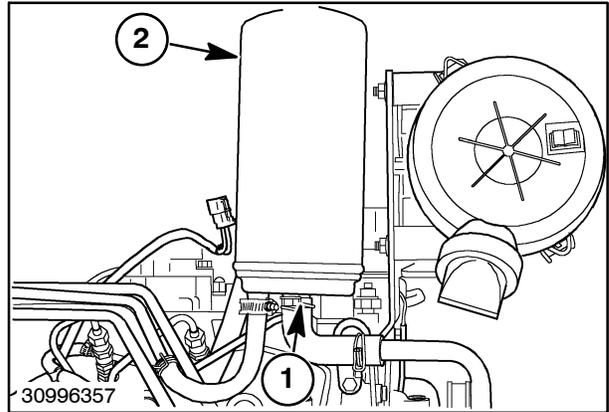
9. Remove all caps and plugs from the power steering hoses and fittings. Connect the power steering hoses, 1 and 2, to the fittings.



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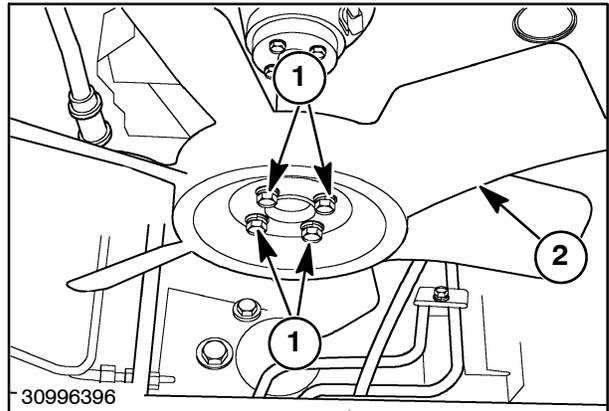
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10. Install the drain bolt, 1, and fill the power steering reservoir, 2, with clean fluid.



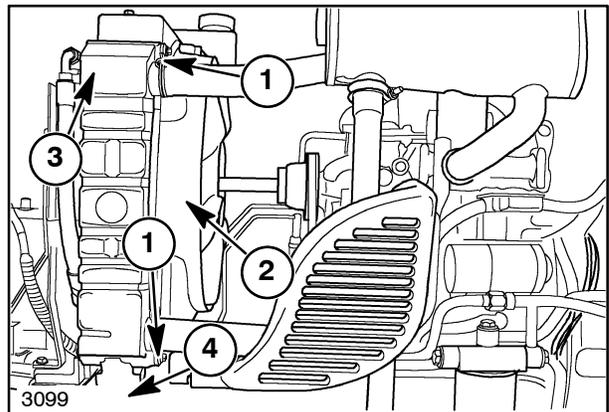
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11. Install the fan, 2, and secure with the four fan retaining bolts, 1.



82

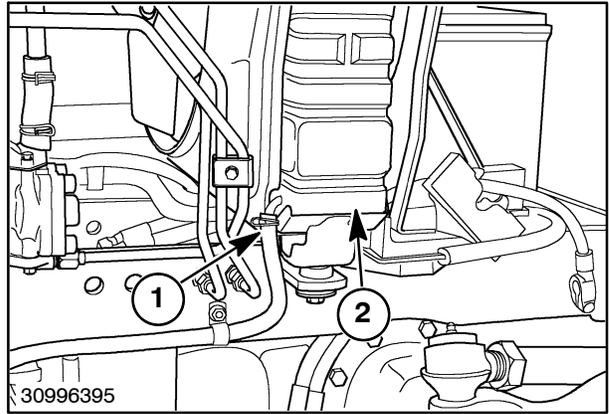
12. Carefully install the radiator, 3, onto the tractor.
13. Install and tighten the two radiator mounting bolts, 4. Tighten and torque to 34 N·m (25 ft.-lbs.).
14. Install the radiator fan shroud, 2, onto the radiator, 3. Tighten the four shroud retaining bolts, 1.



83

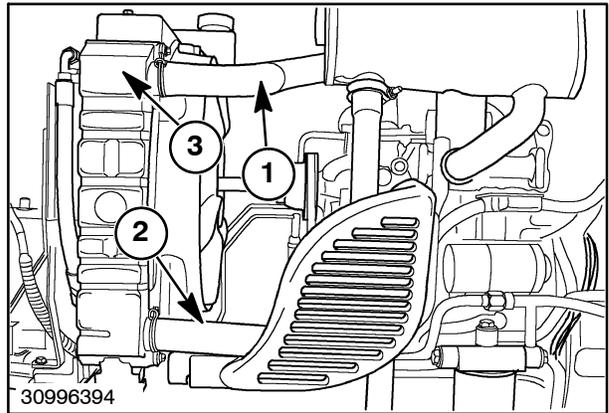
SECTION 25 - FWD FRONT AXLE - CHAPTER 1

15. Connect the drain petcock hose, 1, to the radiator, 2.



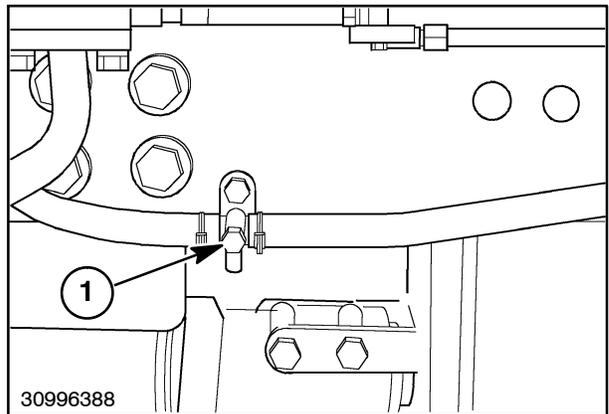
84

16. Connect the upper and lower radiator hoses, 1 and 2, to the radiator, 3.



85

17. Close the coolant drain bolt, 1, and refill the cooling system with clean coolant.



86