

Section II. FRONT AND REAR AXLES MAINTENANCE

6-2. FRONT AND REAR AXLES MAINTENANCE INDEX.

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6-3. FRONT AXLE ASSEMBLY REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Equipment Condition

- Truck raised and frame supported on jack stands.
- Front wheels removed.
(See TM 9-2320-289-20)
- Calipers removed and tied out of way.
(See TM 9-2320-289-20)
- Front propeller shaft disconnected from front axle differential. (See TM 9-2320-289-20)
- Connecting rod disconnected from steering arm. (See TM 9-2320-289-20)
- Front shock absorbers disconnected from axle. (See TM 9-2320-289-20)

Tools/Test Equipment

- Torque wrench

Personnel Required

- MOS 63W (2)

General Safety Instructions

- Front axle assembly is heavy. Use extreme caution, provide support, and use assistance during removal and installation.
-

1. Slide clamp up front axle vent hose (7) and disconnect front axle vent hose from front axle differential (8).
2. Place a suitable jack under front axle differential (8).

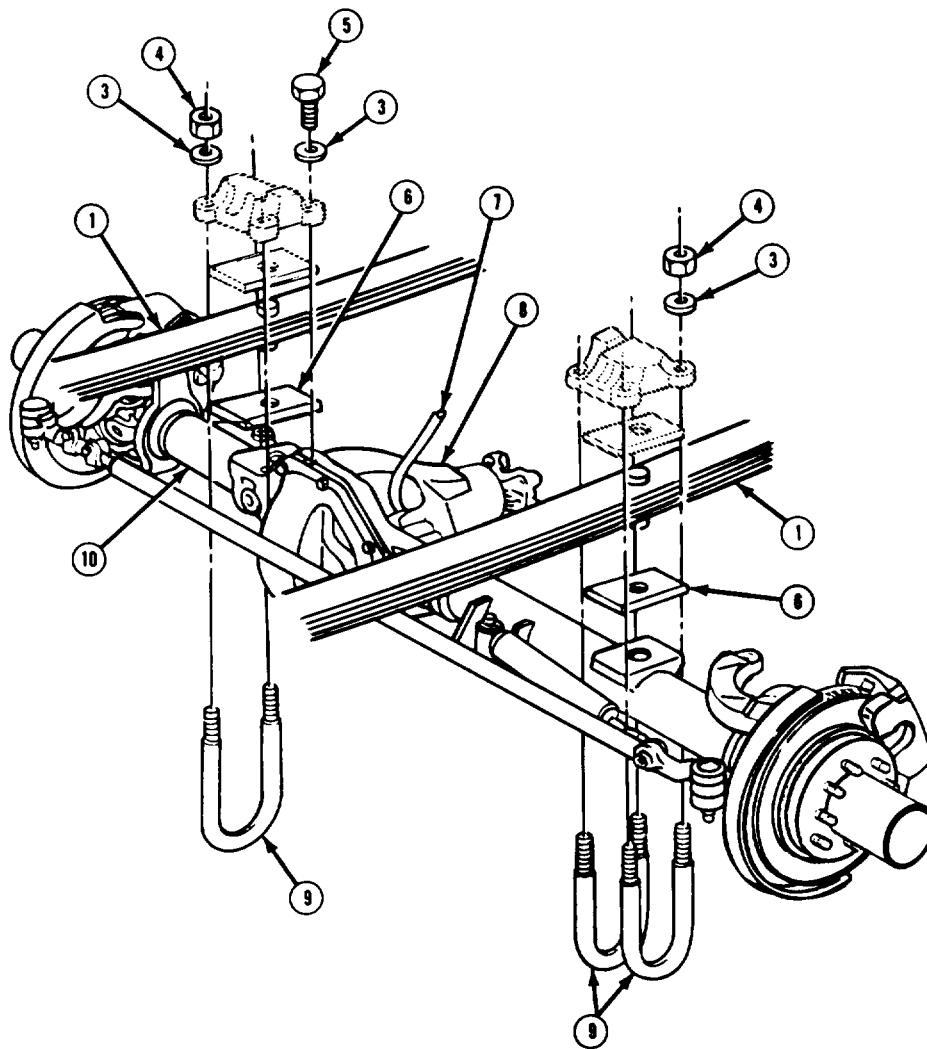
WARNING

Front axle assembly (10) is heavy, Use extreme caution, provide support, and use assistance during removal, Failure to follow this warning may result in serious injury to personnel or damage to front axle assembly,

NOTE

- . All except M1009 front axle assembly (10) removal is given.
 - . M1009 front axle assembly (10) is secured to spring assembly (1) using 2 "U" bolts (9) on each side.
3. Remove 6 nuts (4), 2 bolts (5), 8 washers (3), and 3 "U" bolts (9), Lower front axle assembly (10) and remove, Remove 2 spacers (6) from axle housing.

6-3. FRONT AXLE ASSEMBLY REPLACEMENT (Con't).



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6-3. FRONT AXLE ASSEMBLY REPLACEMENT (Con't).

b. INSTALLATION

WARNING

Front axle assembly (10) is heavy, Use extreme caution, provide support, and use assistance during installation. Failure to follow this warning may result In serious injury to personnel or damage to front axle assembly.

NOTE

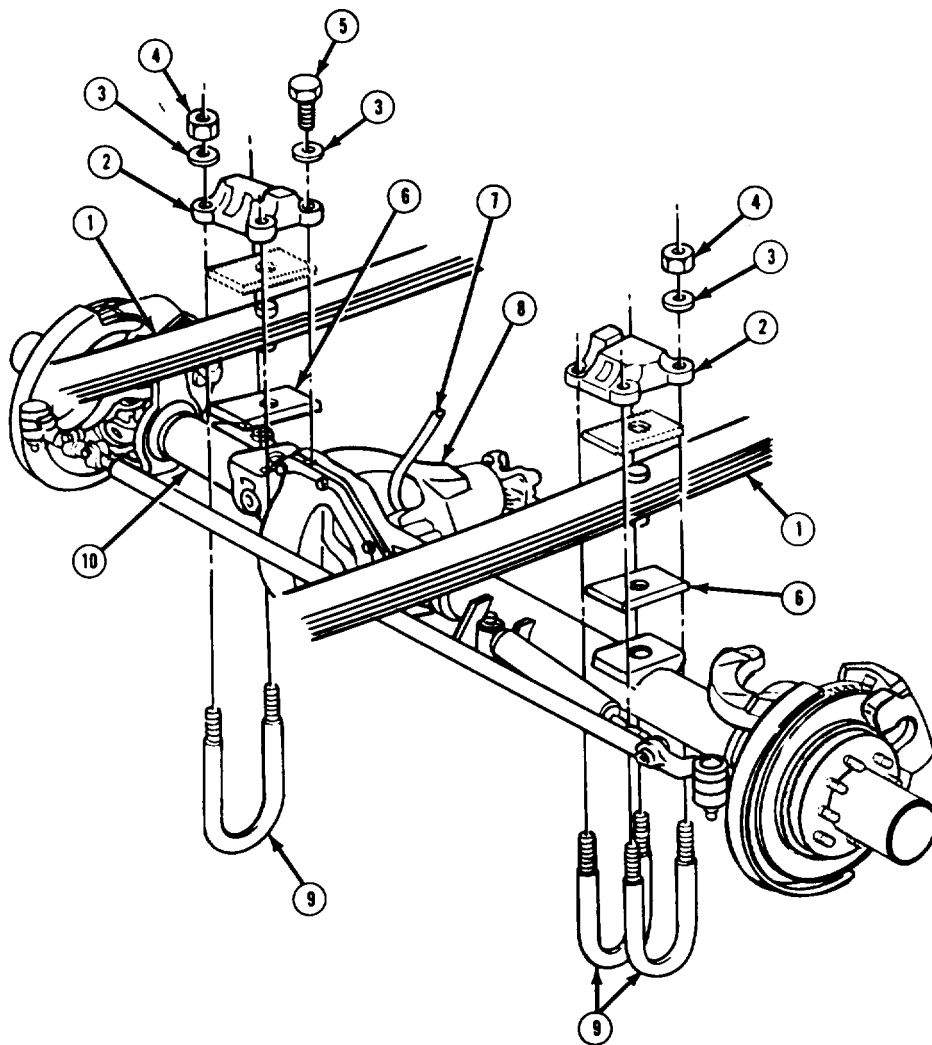
- All except M1009 front axle assembly (10) installation Is given.
 - M1009 front axle assembly (10) is secured to spring assembly (1) using 2 "U" bolts (9) on each side.
1. Pisutuib fribt axle assembly (10) on suitable jack and raise into position. Install 2 spacers (6) on axle housing, alining holes in spacers with holes in axle housing and spring assembly (1) center bolts. Loosely install 3 "U" bolts (9) with 8 washers (3), 6 nuts (4), and 2 bolts (5). Install all nuts and bolts to uniform engagement on "U" bolts to retain and position anchor plate (2).

NOTE

All nuts (4) and bolts (5) must be tightened evenly to ensure that spring assemblies (1) seat properly.

2. Tighten all nuts (4) and bolts (5) in diagonal sequence to 25 lb.-ft. (34 N.m). Using same diagonal sequence, fully tighten all nuts and bolts to 150 lb.-ft, (203 N.m).
3. Remove jack from front axle differential (8).
4. Connect front axle vent hose (7) to front axle differential (8) and tighten clamp.

6-3. FRONT AXLE ASSEMBLY REPLACEMENT (Con't).



FOLLOW-ON TASKS:

- Connect front shock absorbers to axle. (See TM 9-2320-289-20)
- Connect connecting rod to steering arm. (See TM 9-2320-289-20)
- Connect front propeller shaft to front axle differential. (See TM 9-2320-289-20)
- Install calipers. (See TM 9-2320-289-20)
- Install front wheels, (See TM 9-2320-289-20)
- Remove jack stands and lower truck.
- Road test truck and check torque of "U" bolt fasteners.

TA50512

6-4. FRONT AXLE SHAFT MAINTENANCE.

This task covers: a. Removal c . Installation
 b. Cleaning and Inspection

INITIAL SETUP:

Equipment Condition

- Front axle spindle removed.
(See TM 9-2320-289-20)

Materials/Parts

- One universal joint repair kit
- One axle shaft seal
- One spindle seal
- Dry cleaning solvent
(Item 23, Appendix B)
- Grease (Item 36, Appendix B)

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
-

a. REMOVAL

1. Remove front axle shaft assembly (1 and 7).
2. If not already removed, remove spindle seal (6), axle shaft seal (5), and bronze spacer (8) from outer axle shaft (7). Discard seals.
3. Remove deflector (4).
4. Place front axle shaft assembly (1 and 7) over wooden blocks. Remove 4 retainer clips (10). Press out 4 bearing cups (2) and remove universal joint (3). Separate outer axle shaft (7) from inner axle shaft (1). Discard retainer clips, bearing cups (2), and universal joint (3).

b. CLEANING AND INSPECTION

WARNING

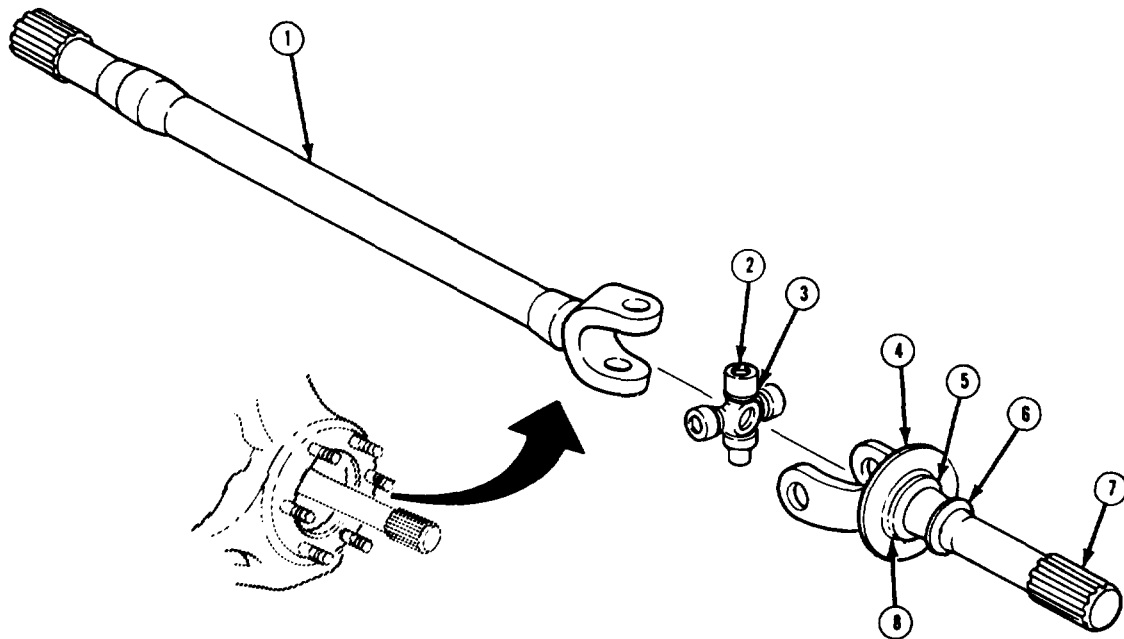
Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.

1. Clean inner and outer axle shafts with dry cleaning solvent.
2. Inspect inner and outer axle shafts for cracks, bends, or damaged splines. Replace if cracked, bent, or if splines are damaged.

c. INSTALLATION

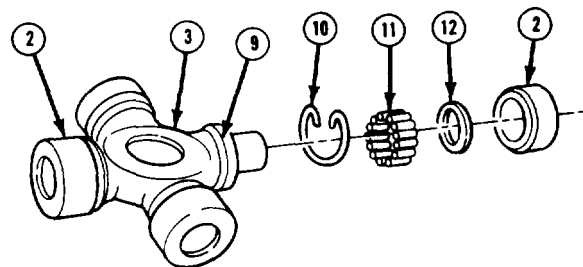
1. Position new universal joint (3) in outer axle shaft (7) yoke.

6-4. FRONT AXLE SHAFT MAINTENANCE (Con't).



CAUTION

- Ensure that seal (9) and washer (12) are properly positioned and that needle bearings (11) are properly aligned in bearing cups (2),
- Ensure that bearing cups (2) are aligned with universal joint (3) trunnion. Failure to follow this caution may result in damage to universal joint and bearing cups.



2. Position 2 bearing cups (2) at outside of outer axle shaft (7) yoke and press in bearing cups far enough to install 2 retainer clips (10).

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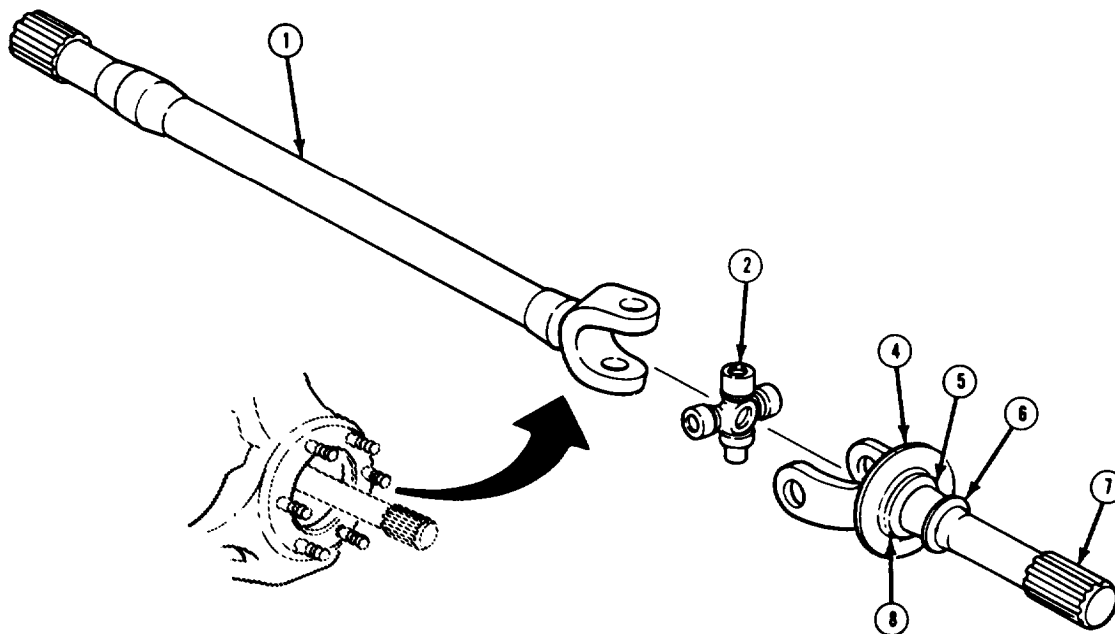
6-4. FRONT AXLE SHAFT MAINTENANCE (Con't).

3. Repeat step 2 to install other 2 bearing cups (2) into inner axle shaft (1) yoke.

NOTE

Ensure that bronze spacer (8) is fully seated against shoulder of outer axle shaft (7).

4. Install deflector (4) and bronze spacer (8) to outer axle shaft (7). Install new axle shaft seal (5) on outer axle shaft with lip facing outward. Pack area around thrust face area of outer axle shaft and axle shaft seal with grease.
5. Install new spindle seal (6) on outer axle shaft (7) with lip facing inward.
6. Install front axle shaft assembly (1 and 7),



FOLLOW-ON TASKS:

- Install front axle spindle, (See TM 9-2320-289-20)
- Check front axle differential lubricating oil level. (See LO 9-2320-289-12)

6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009).

This task covers: a. Removal c. Installation
 b. Cleaning and Inspection

INITIAL SETUP:*Equipment Condition*

- Front or rear axle shafts removed. (See paragraph 6-4 or 6-14)
- Steering tie-rod removed (if replacing front axle differential). (See TM 9-2320-289-20)

Tools/Test Equipment

- Bearing preload gage and strap, J-22779
- Dial indicator
- Micrometer
- Torque wrench

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

Materials/Parts

- One differential cover gasket
- Shim sets
- Prussian blue dye (Item 24, Appendix B)
- Gear lubricating oil (Item 44, Appendix B)

Personnel Required

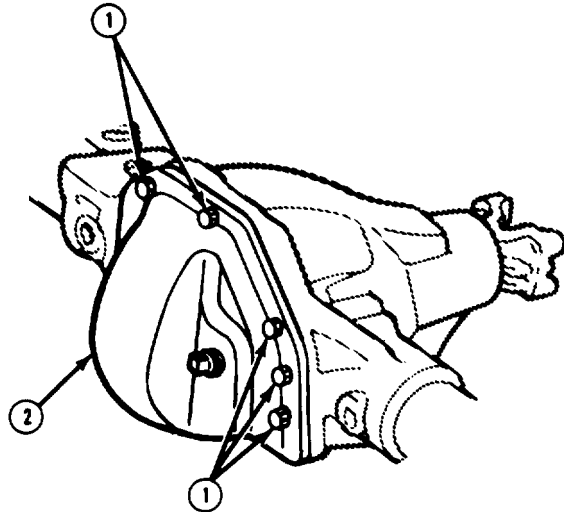
- MOS 63W (2)

Manual References

- TM 9-214

a. REMOVAL

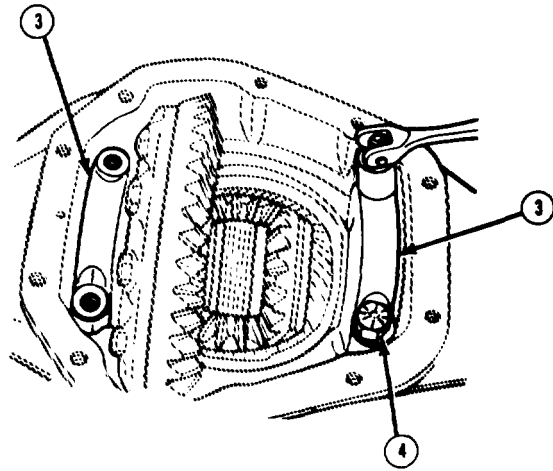
1. If working on front axle differential, place a suitable container under housing. Remove 10 bolts (1) and cover (2). Allow all lubricating oil to drain. Remove cover gasket and discard.



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6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

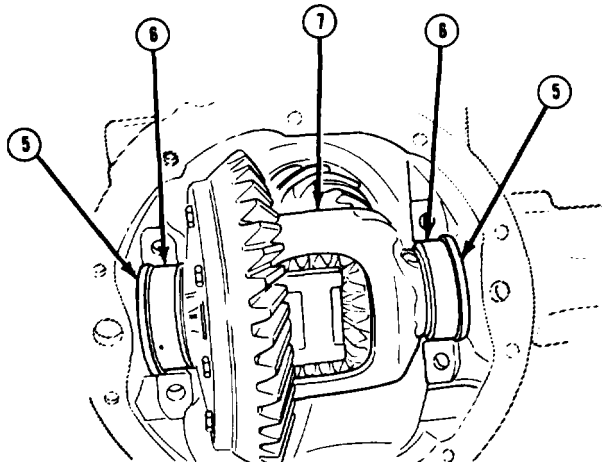
2. Mark 2 bearing caps (3) and housing for installation alignment. Remove 4 bolts (4) and bearing caps.



NOTE

- Front axle differential has shims (5) and spacers at side bearing assemblies. Rear axle differential has only shims.
- When removing differential case (7) assembly from housing, bearing cups (6), shims (5), and spacers may fall out. Ensure that bearing cups, shims, and spacers are tagged, indicating from which side they were removed.

3. Work differential case (7) assembly loose. Remove differential case assembly, bearing cups (6), shims (5), and spacers if present.



6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.

1. Clean differential cover and magnet, interior of housing, bearing cups, and shims with dry cleaning solvent. Clean all gasket material from differential cover and housing.
2. Inspect shims and spacers for damage. Replace if damaged.
3. Inspect condition of differential side bearings and bearing cups in accordance with TM 9-214. Inspect cup seats in housing and bearing caps to ensure that they are free of nicks, burrs, and foreign material. Remove any nicks, burrs, or foreign material found.
4. If present, remove excess casting material near machined surfaces to provide for installation of shims and bearing preload gage. Remove all traces of filing dust.

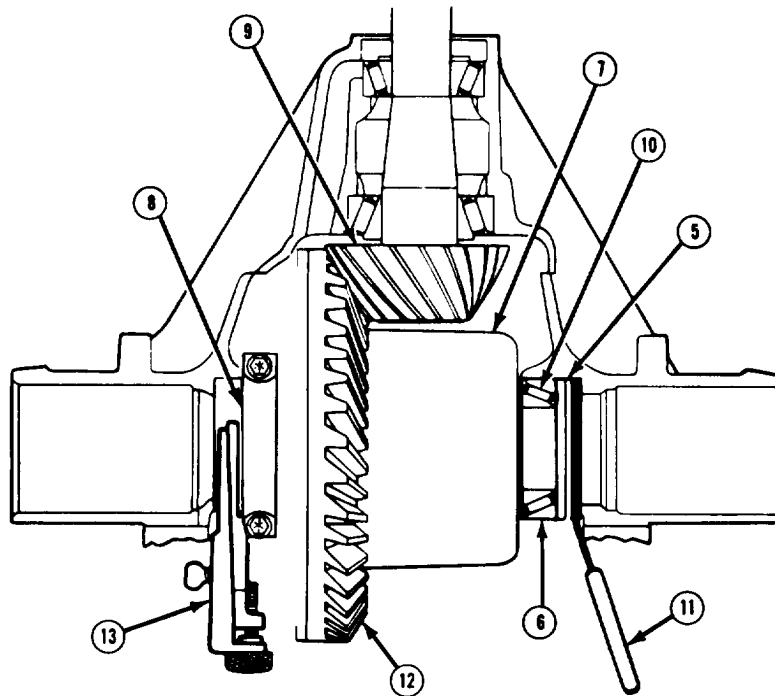
NOTE

- Ensure that position of axle shaft inner seals is noted for installation.
 - There are no axle shaft seals on rear axle assembly.
5. Inspect 2 axle shaft inner seals in housing side bores. Remove and discard if damaged.

6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

c. INSTALLATION

1. If removed, install 2 new axle shaft inner seals in housing side bores,
2. Install 2 bearing cups (6) as tagged, over side bearings (10), Install differential case (7) assembly inside housing.
3. Install bearing strap tool (8) over left side bearing cup (6) with 2 bolts.
4. With ring gear (12) tight against drive pinion (9), insert bearing preload gage (13) between left bearing cup (6) and housing.
5. While moving bearing preload gage (13), turn adjusting nut clockwise until a noticeable drag is felt. Tighten lockbolt on side of tool,
6. Between right bearing cup (6) and housing, install spacer if removed, and a shim (5) thinner than what was originally installed. Install a feeler gage (11) between shim and housing. Feeler gage must be of sufficient thickness to produce a slight drag when moved between shim and housing,



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6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

7. Remove bearing preload gage (13), spacer if installed, shim (5), and feeler gage (11).
8. Measure thickness of bearing preload gage (13) in 3 places and average these readings. Record the result.
9. Measure combined thickness of spacer if present, shim (5), and feeler gage (11).
10. Using example given in Table 6-1, determine proper thickness of each shim pack,

Table 6-1. Determining Side Bearing Shim Requirements

RING GEAR SIDE			OPPOSITE SIDE		
inches	millimeters		inches	millimeters	
0.250 in.	6.350 mm	Thickness of bearing preload tool required to force ring gear into contact with drive pinion. TO MAINTAIN PROPER BACKLASH (0.005 in. - 0.008 in.) (0.127 mm - 0.2032 mm), ring gear is moved away from pinion by subtracting 0.010 in. (0.254 mm) shims from ring gear side and adding 0.010 in. (0.254 mm) shims to the opposite side.	Combined total of spacer, service shim, and feeler gage.	0.265 in.	6.731 mm
-0.010 in.	-0.254 mm			+ 0.010 in.	+ 0.254 mm
0.240 in.	6.096 mm	TO OBTAIN PROPER PRELOAD on side bearings, add 0.004 in. (0.102 mm) to each side.	1	0.275 in.	6.985 mm
+0.004 in.	+ 0.102 mm			+ 0.004 in.	+0.102 mm
0.244 in.	6.198 mm	Shim dimension required for ring gear side,	Shim dimension required for opposite side.	0.279 in.	7.087 mm

11. If present, install 2 spacers as tagged, between bearing cups (6) and housing.

NOTE

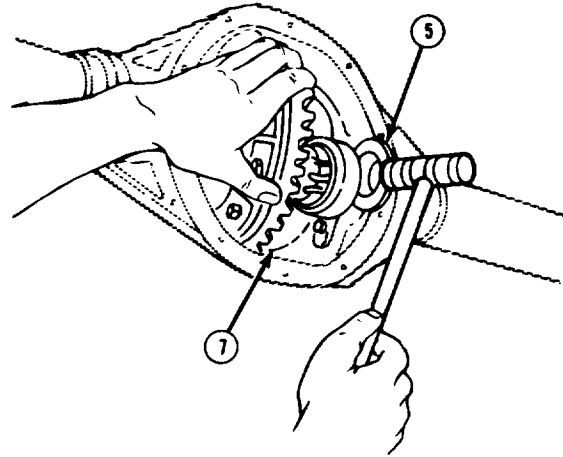
- Production preloading of the differential side bearings (10) is accomplished by use of cast iron preload shims. These cannot be reused when rebuilding the housing as they may break when tapped into place. Service shims may be reused if not damaged.
- Chamfered side of shim (5) should face outward. Shim should have sufficient chamfer or lead around outside diameter to allow for easy installation. Additional chamfer on shim should be filed or ground as required.

6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

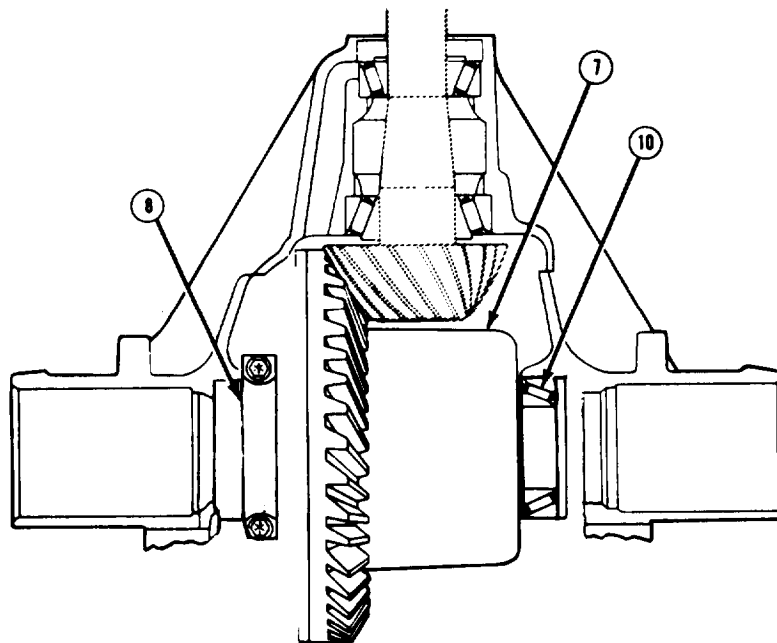
NOTE

If shim (5) is difficult to install, differential case (7) assembly may be partially removed, then shim and differential case assembly slid into position at same time.

12. Install left shim (5) first, between spacer, if present, and housing. Install right shim. Using soft-faced hammer, tap shims into place while rotating differential case (7) assembly.



13. Remove 2 bolts and bearing strap tool (8).



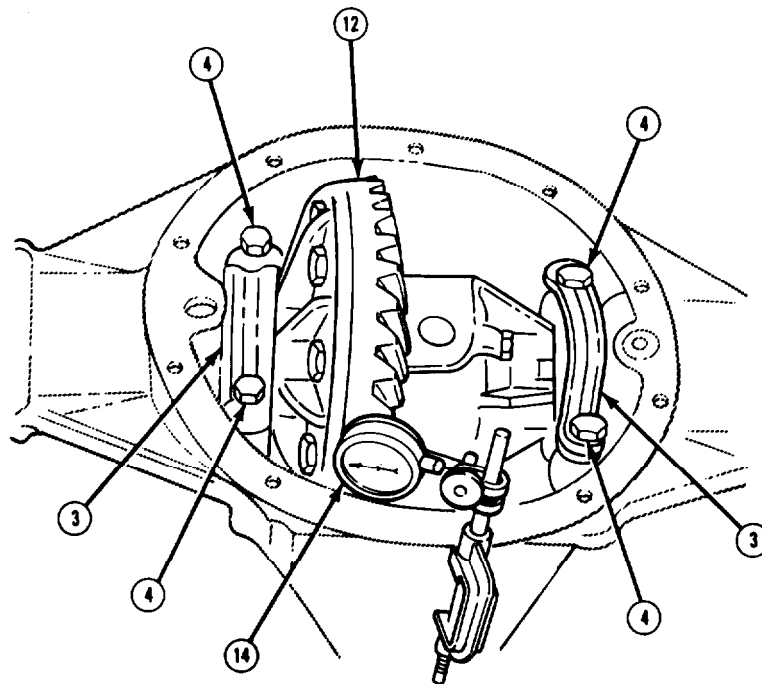
6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

14. Install 2 bearing caps (3) in their original positions and install 4 bolts (4). Tighten bolts to 55 lb.-ft. (75 N.m).

NOTE

Differential side bearings (10) are now properly preloaded. If any adjustments are required in later procedures, ensure that preload established in step 12 remains the same. If backlash is changed in later steps, the total thickness of 2 shim packs does NOT change.

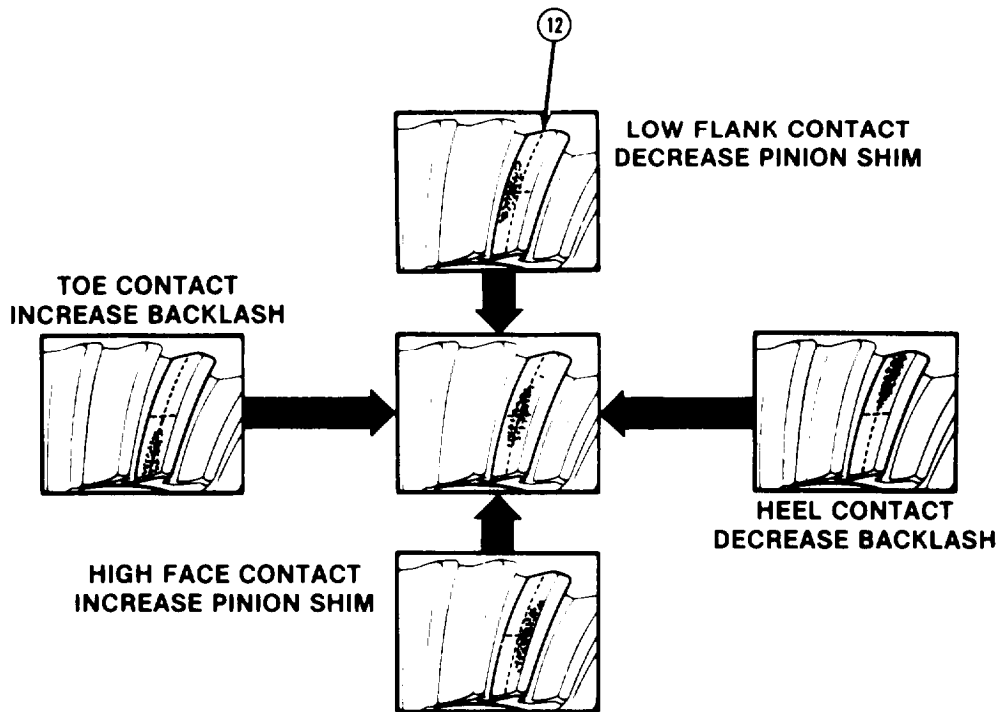
15. Mount dial indicator (14) on housing with indicator button perpendicular to tooth angle and in line with ring gear (12) rotation. Check backlash between ring gear and drive pinion. Backlash should be within range of 0.005-0.008 in. (0.13-0.20 mm). Check backlash at 4 different equally spaced positions around ring gear. Variation in the 4 readings should not exceed 0.001 in. (0.025 mm).
16. If variation in backlash readings exceeds 0.002 in. (0.051 mm), reposition dial indicator (14) on housing so that indicator button contacts back of ring gear (12) and measure ring gear and housing runout. Gear runout should not exceed 0.003 in. (0.076 mm). If runout exceeds this limit, inspect ring gear and housing for deformation or foreign matter between housing and ring gear.



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6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

17. If backlash is not within limits, decrease shim thickness on one side and increase shim thickness on other side by an equal amount:
 - (a) If backlash exceeds .008 in. (0.20 mm), increase shim thickness on ring gear (12) side and decrease thickness on opposite side by an equal amount.
 - (b) If backlash is less than 0.005 in. (0.13 mm), decrease shim thickness on ring gear (12) side and increase thickness on opposite side by an equal amount.



NOTE

If drive pinion and ring gear (12) were replaced, perform steps 20-23 to check for proper gear tooth contact pattern.

18. Wipe any lubricant from housing and clean each tooth of ring gear (12).
19. Apply prussian blue dye sparingly to all ring gear (12) teeth using medium stiff brush, Area of tooth contact should be clearly visible after load is applied to gears.

NOTE

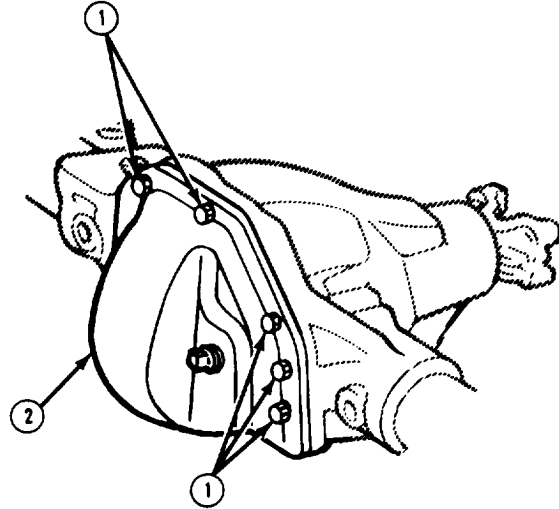
Excessive turning of ring gear (12) is not recommended. Ring gear should only be turned enough to provide tooth contact pattern.

20. Apply load until it takes a torque of 40-50 lb.-ft. (54-68 N.m) to turn drive pinion. Turn companion flange so that ring gear (12) turns 1 full revolution, then reverse so that ring gear turns 1 full revolution in opposite direction.

TA50520

6-5. FRONT AND REAR AXLE DIFFERENTIAL REPLACEMENT (M1009) (Con't).

21. Contact pattern should be centrally located up and down on the face of the ring gear (12) teeth. Compare tooth contact pattern on ring gear with examples shown and make adjustments as indicated.
22. If working on front axle differential, install new cover gasket and cover (2) with 10 bolts (1). Tighten bolts to 35 lb.-ft. (47 N.m).

**FOLLOW-ON TASKS:**

- Install steering tie-rod if removed. (See TM 9-2320-289-20)
- Install front or rear axle shafts, (See paragraph 6-4 or 6-14)
- Fill front or rear axle differential with lubricating oil. (See LO 9-2320-289-12)

6-6. FRONT AXLE DIFFERENTIAL REPAIR (M1009).

This task covers:

- a. Disassembly
- b. Cleaning and Inspection
- c. Assembly

INITIAL SETUP:

Equipment condition

- Front axle differential removed.
(See paragraph 6-5)

Materials/Parts

- Dry cleaning solvent
(Item 23, Appendix B)
- Gear lubricating oil
(Item 44, Appendix B)
- Wiping rags (Item 53, Appendix B)

Tools/Test Equipment

- Puller kit
- Torque wrench

Manual References

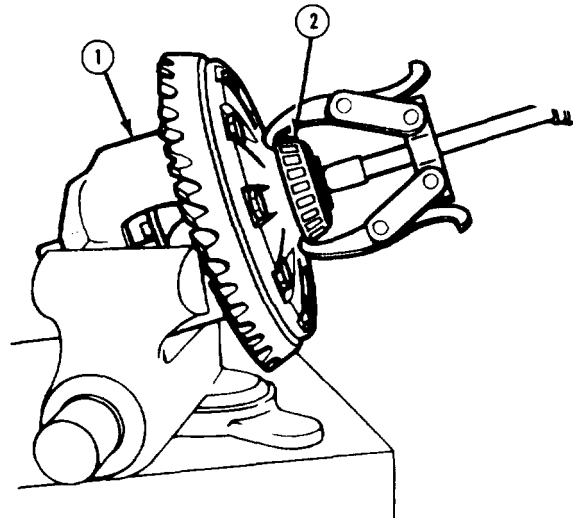
- TM 9-214

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).
-

a . DISASSEMBLY

- 1 . Place differential case (1) assembly in vise.
- 2 . Remove 2 side bearings (2) and tag for assembly.



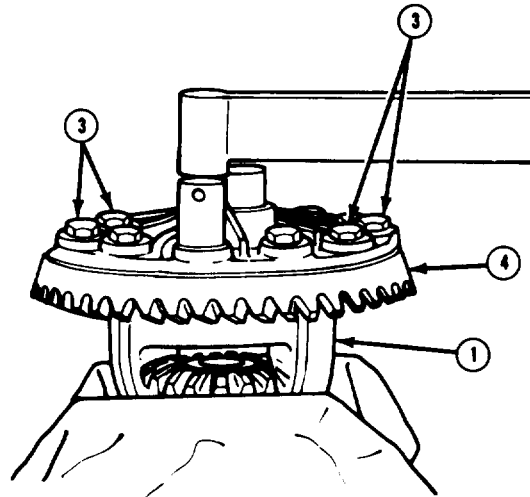
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6-6. FRONT AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

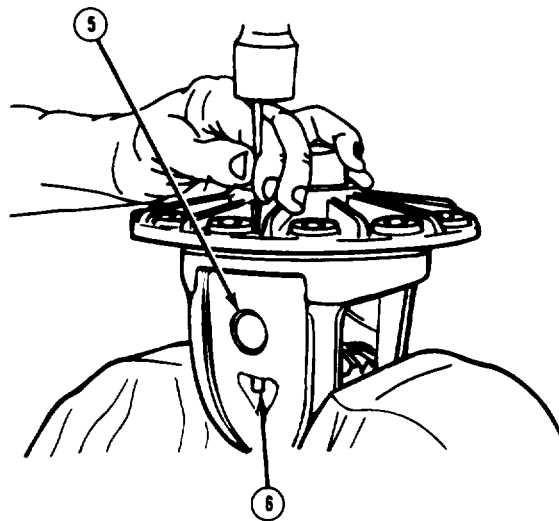
NOTE

Shop rags placed around vise will help protect ring gear (4) teeth from damage should ring gear fall during disassembly.

3. Scribe a line on differential case (1) assembly and ring gear (4) to ensure assembly in same position. Remove 10 bolts (3). Using a soft-faced hammer, tap ring gear loose from differential case assembly. Remove differential case assembly from vise and remove ring gear.



4. Drive out lockpin (6) and remove pinion shaft (5).

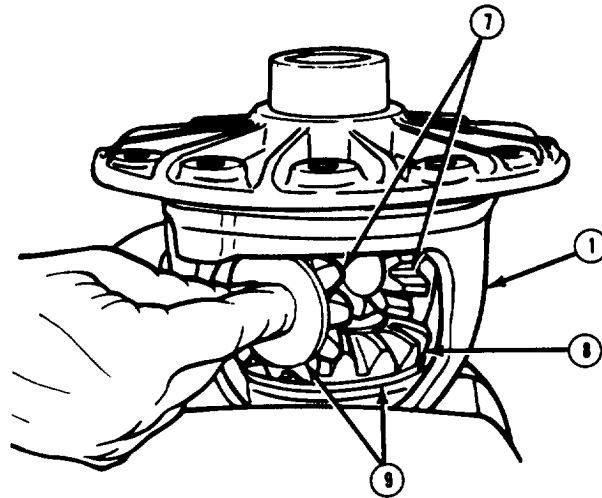
**TA50523**

6-6. FRONT AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

NOTE

Ensure that pinion gears (7), side gears (8), and thrust washers (9) are marked for assembly,

5. Rotate 2 side gears (8). Remove 2 pinion gears (7) and thrust washers (9). Remove 2 side gears and thrust washers,



b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help, if solvent contacts eyes, immediately wash your eyes with water and get medical aid.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.
1. Clean all removed components with dry cleaning solvent and dry with compressed air.
 2. Clean and inspect differential side bearings in accordance with TM 9-214. If one side bearing is damaged, replace both side bearings.

TA50624

6-6. FRONT AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

3. Inspect differential case for cracks, scoring, or signs of damage to machined surfaces. Remove any nicks or burrs found. Replace differential case if cracked or damaged.

NOTE

If ring gear is damaged, ring gear bolts and drive pinion must also be replaced. (See paragraph 6-7)

4. Inspect ring gear for damage. Replace if damaged.
5. Inspect thrust washers, pinion gears, and side gears for damage. If a pinion or side gear is damaged, replace both as a set.

c. ASSEMBLY

NOTE

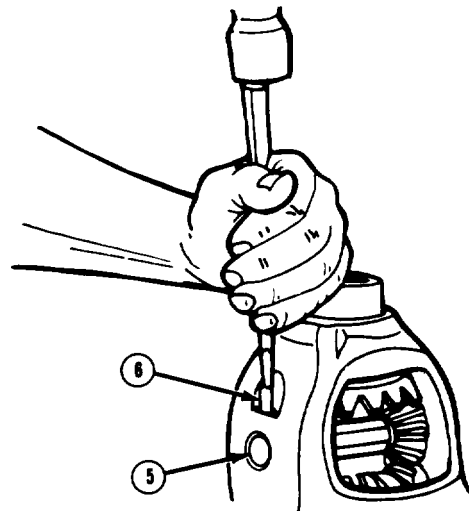
Ensure that all components are lubricated with lubricating oil as they are assembled.

1. Place differential case (1) in vise.
2. Install 2 side gears (8) and thrust washers (9) inside differential case (1). If side gears and thrust washers are original, install as marked.

NOTE

Ensure that holes in pinion gears (7) are aligned with holes in differential case (1) assembly.

3. Assemble 2 pinion gears (7) and thrust washers (9) and roll into position inside differential case (1) assembly. If pinion gears and thrust washers are original, install as marked.
4. Install pinion shaft (5) and retain with lockpin (6).



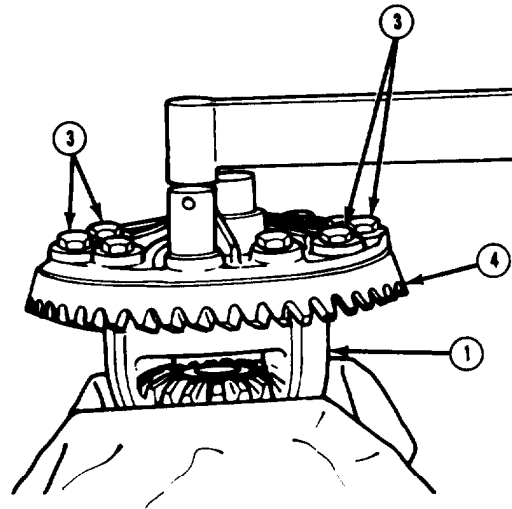
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6-6. FRONT AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

NOTE

Shop rags placed around vise will help protect ring gear (4) teeth mfrom dt ri should ring gear fall during assembly.

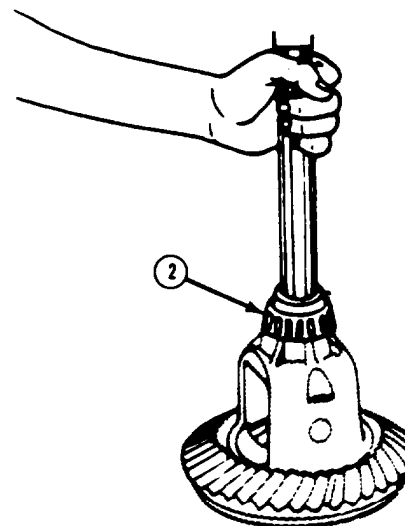
5. Remove differential case (1) assembly from vise. Assemble ring gear (4) to differential case assembly alining marks made during disassembly, if original ring gear is used. Place differential case assembly in vise.
6. Install 10 bolts (3) and tighten alternately to 80 lb.-ft. (108 N.m).



NOTE

Side bearings (2) should rotate freely once installed.

7. Install 2 side bearings (2) as tagged.



6-6. FRONT AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

FOLLOW-ON TASKS:

- Install front axle differential. (See paragraph 6-5)

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009).

This task covers:

- a. Removal
- b. Cleaning and Inspection
- c. Installation

INITIAL SETUP:

Equipment Condition

- Front or rear axle differential removed. (See paragraph 6-5)
- Front or rear propeller shaft disconnected from pinion flange. (See TM 9-2320-289-20)

Materials/Parts

- One flange nut
- One pinion oil seal
- One spacer
- Dry cleaning solvent (Item 23, Appendix B)
- Molybdenum grease (Item 37, Appendix B)
- Gear lubricating oil (Item 44, Appendix B)

Tools/Test Equipment

- Pinion setting gage, J-21777-500
- Flange holder and remover
- Micrometer
- Puller kit
- Torque wrench

Manual References

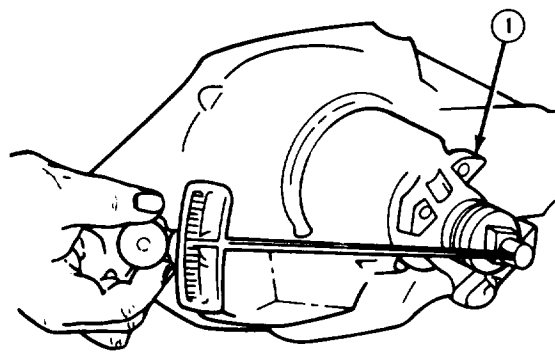
- TM 9-214

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use Only in a well-ventilated area.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).
-

a REMOVAL

1. At flange (1), measure torque required to rotate drive pinion and record for later reference. If there is no preload reading, check for looseness of pinion assembly by pushing and pulling on flange. Looseness indicates need for bearing replacement.



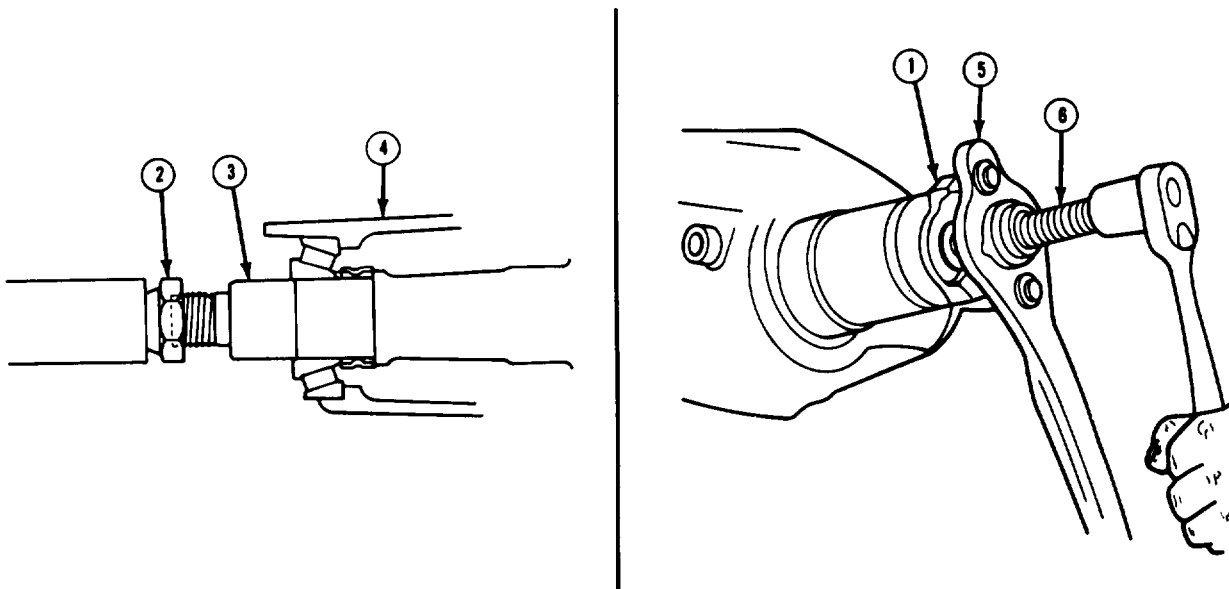
TA50527

 6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

NOTE

Flange nut (2) should be saved for use during drive pinion (3) installation. When drive pinion is fully seated and ready to receive final torque, a new flange nut must be used.

2. Using flange holder (5), remove flange nut (2) and washer from flange (1).
3. Install flange remover bolt into small outside diameter end of flange remover (6). Turn flange remover 1/8 turn to a locked position. Turn flange remover while holding flange holder (5) stationary. Remove flange (1).
4. Install flange nut (2), removed in step 2, halfway on drive pinion (3) threads. Tap on nut with soft-faced hammer to loosen drive pinion. Remove flange nut from drive pinion. Remove drive pinion from housing (4).



TA60628

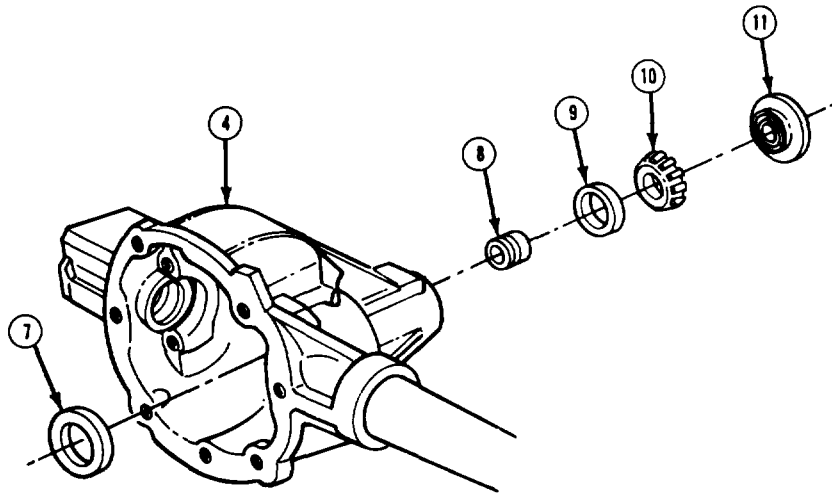
6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

5. Remove oil seal (11) and front bearing (10). Remove spacer (8) from drive pinion (3) shaft. Discard oil seal and spacer.

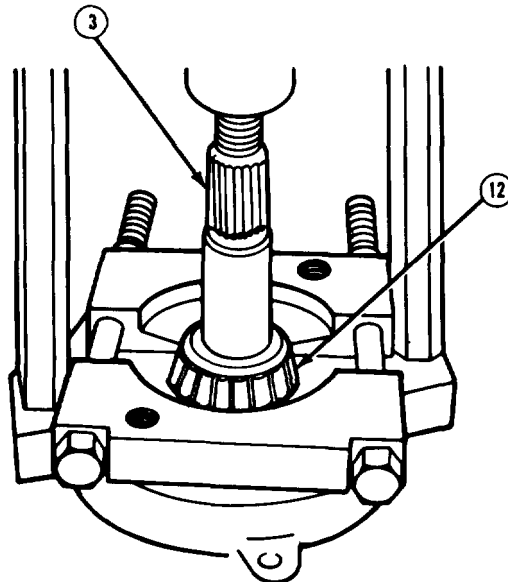
CAUTION

Care should be taken when removing bearing cups (7 and 9). Opposite ends of bearing cups should be alternately tapped to avoid their becoming cocked in housing (4). Failure to follow this caution may result in damage to bearing cups and to housing bore.

6. Remove front bearing cup (9) and rear bearing cup (7) from housing (4).



7. Using puller kit and press, remove rear bearing (12) from drive pinion (3) shaft.
8. Remove shim(s) located between rear bearing (12) and head of drive pinion (3).



TA50529

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent P-D-680 is toxic and flammable, Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.
1. Clean and inspect front and rear bearing assemblies in accordance with TM 9-214.
 2. Clean drive pinion, shim(s), and flange with dry cleaning solvent and dry with compressed air.
 3. Clean bearing bores in housing with dry cleaning solvent to ensure that they are free of dirt or other contamination, Remove any nicks or burrs found.
 4. Clean pinion setting gage tool parts with dry cleaning solvent to ensure that pinion depth measurements will be accurate.

NOTE

If drive pinion is replaced, differential ring gear and ring gear bolts must also be replaced. (See paragraph 6-6 or 6-16)

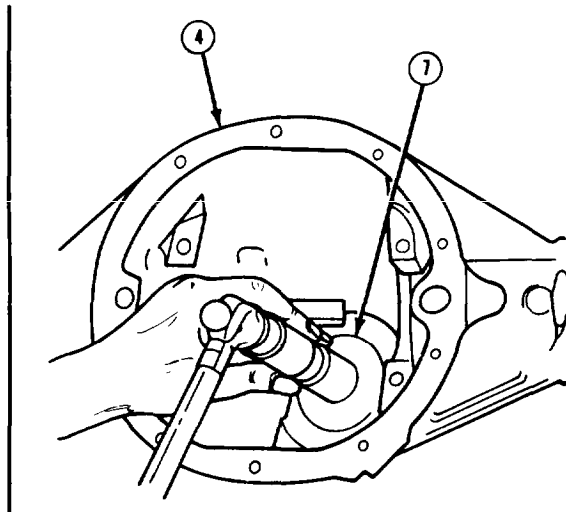
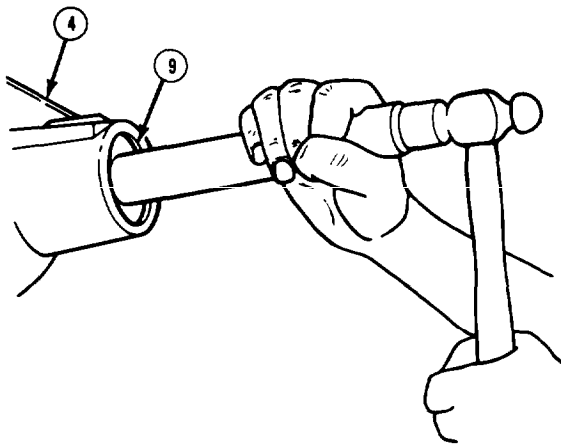
5. Inspect drive pinion, flange, and shim(s) for damage. Replace if damaged. If shim (s) is undamaged, measure and save for installation.

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

c . INSTALLATION

NOTE

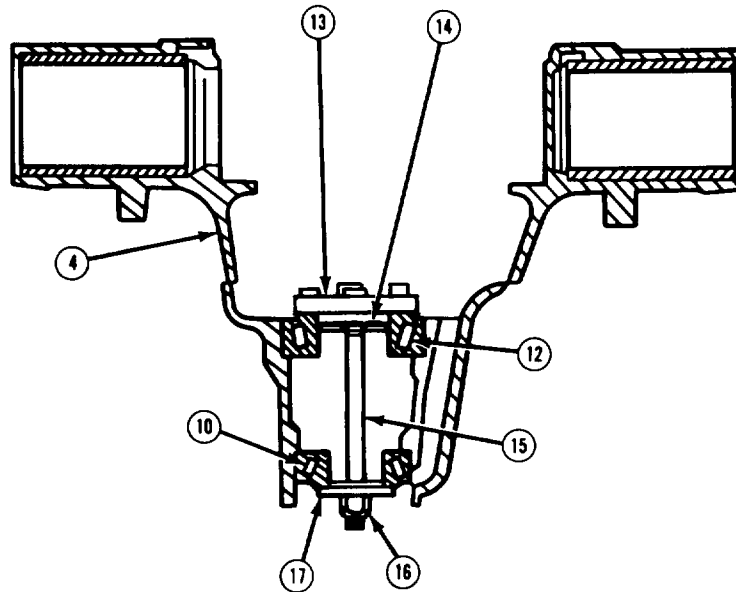
- Ensure that all components are lubricated with lubricating oil as they are installed.
 - If original drive pinion and rear bearing (12) are being reused, perform steps 1 and 11 through 17. Original shim thickness is used,
 - If a new drive pinion or rear bearing (12) are being installed, perform steps 1-17.
1. Install front bearing cup (9) and rear bearing cup (7) in housing (4) with wider, open ends facing outward. Check both bores to ensure that bearing cups are fully seated.



TA50530

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

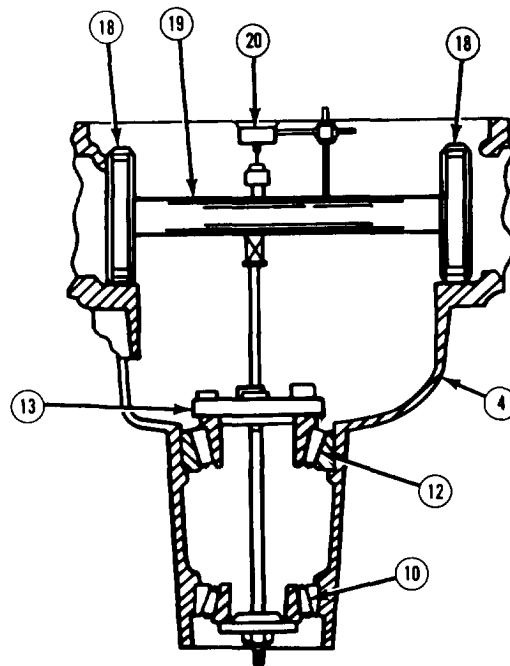
2. Install front bearing (10) in bearing cup (9), and rear bearing (12) in bearing cup (7), with cloverleaf gage plate (13) and rear pilot washer (14) mounted on preload stud (15) and installed in bearing bore in housing (4).
3. Install front pilot washer (17) and hex nut (16) until snug, and rotate front and rear bearings (10 and 12) to ensure that they are properly seated, Hold preload stud (15) stationary and tighten hex nut until it takes 20 lb.-in. (2 N.m) to rotate front and rear bearing assembly,



TA50531

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

4. Mount 2 side bearing discs (18) on ends of arbor (19) using step of disc that fits bores of housing (4). Place arbor and plunger in housing, Ensure that side bearing discs are properly seated in bores. Install 2 bearing caps over side bearing discs and tighten 4 bearing cap bolts until snug.
5. Place dial indicator (20) on mounting post of arbor. Contact button should rest on top surface of plunger. "O" the dial indicator with probe on high point of gaging surface.
6. Rotate gage plate (13) until plunger rests directly upon 8 1/2 in. button. Rock plunger rod slowly back and forth across button until dial indicator (20) reads greatest deflection. Set dial indicator to "O."
7. Ensure that all tools are properly and securely installed inside housing (4).



NOTE

It is important to use dial indicator (20) correctly when determining pinion depth requirement. Number indicated by indicator needle should be recorded. DO NOT record amount of needle travel.

8. Repeat rocking action of plunger several times to verify dial indicator (20) setting, Once final setting is obtained, swing plunger off gaging plate button. Dial indicator will now show required drive pinion shim thickness for "nominal" or "O" pinion. Record reading.

TA50532

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

- 9. Remove dial indicator (20), 2 bearing caps, depth gaging tools, and front and rear bearings (1 O and 12) from housing (4).
- 10. Check rear face of drive pinion, or painted marking on drive pinion shaft being installed, for pinion code number. Calculate drive pinion shim thickness to be used.

Table 6-2. Determining Drive Pinion Shim Requirements

Code Number On Service Pinion	Code Number On Original Pinion				
	+ 2	+ 1	0	- 1	- 2
+ 2	-	Add 0.001	Add 0.002	Add 0.003	Add 0.004
+ 1	Subtract 0.001	-	Add 0.001	Add 0.002	Add 0.003
0	Subtract 0.002	Subtract 0.001	-	Add 0.001	Add 0.002
- 1	Subtract 0.003	Subtract 0.002	Subtract 0.001	-	Add 0.001
- 2	Subtract 0.004	Subtract 0.003	Subtract 0.002	Subtract 0.001	-

- (a) If drive pinion has no plus (+) or minus (-), use exact shim thickness as recorded in step 8.
- (b) If drive pinion is stamped or painted with a plus (+) number, add that many thousandths to thickness recorded in step 8.

EXAMPLE: If reading from step 8 was 0.019 in. (0.483 mm) and drive pinion was stamped "+2," correct shim thickness is:

$$0.019 \text{ in.} + 0.002 \text{ in.} = 0.021 \text{ in.}$$

$$(0.483 \text{ mm} + 0.057 \text{ mm} = 0.534 \text{ mm})$$

- (c) If drive pinion is stamped or painted with a minus (-) number, subtract that many thousandths from thickness recorded in step 9.

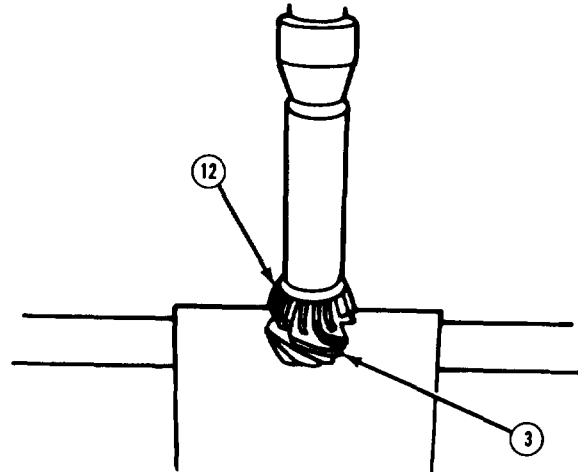
EXAMPLE: If reading from step 8 was 0,031 in, (0.787 mm), and drive pinion was stamped "-3, " correct shim thickness is:

$$0.031 \text{ in.} - 0.003 \text{ in.} = 0.028 \text{ in.}$$

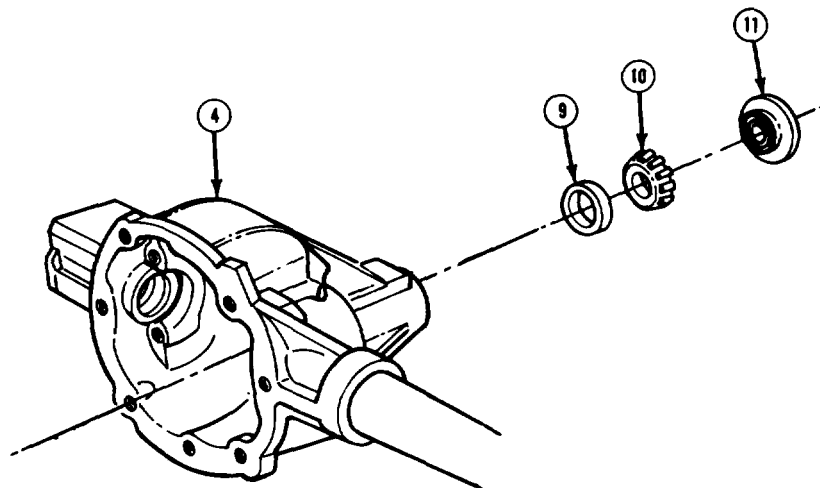
$$(0.787 \text{ mm} - 0.076 \text{ mm} = 0.711 \text{ mm})$$

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

11. Place shim of correct thickness as determined in step 10, or original shim if drive pinion (3) was not replaced, on drive pinion shaft against head. Install rear bearing (12) on drive pinion shaft.



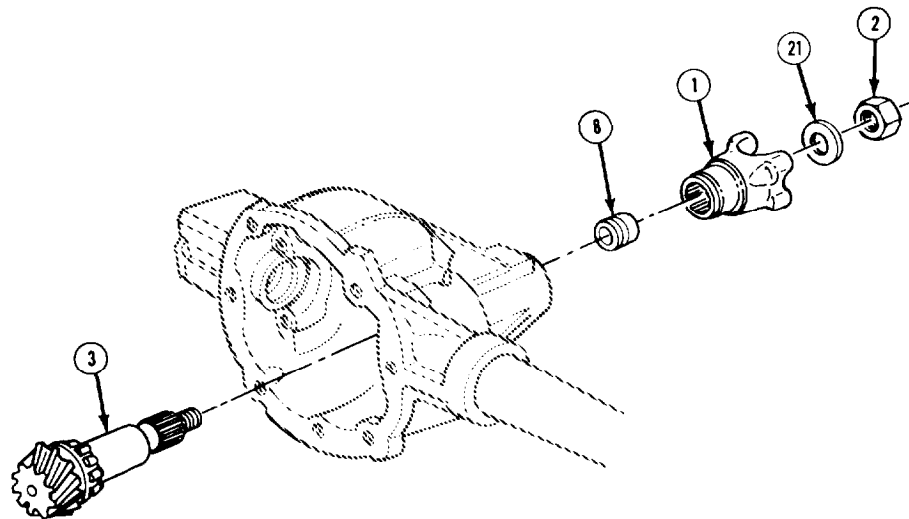
12. Install front bearing (10) in bearing cup (9) in housing (4) bore.
13. Coat lips of new pinion oil seal (11) with molybdenum grease and install squarely into housing (4) bore until flush with housing.



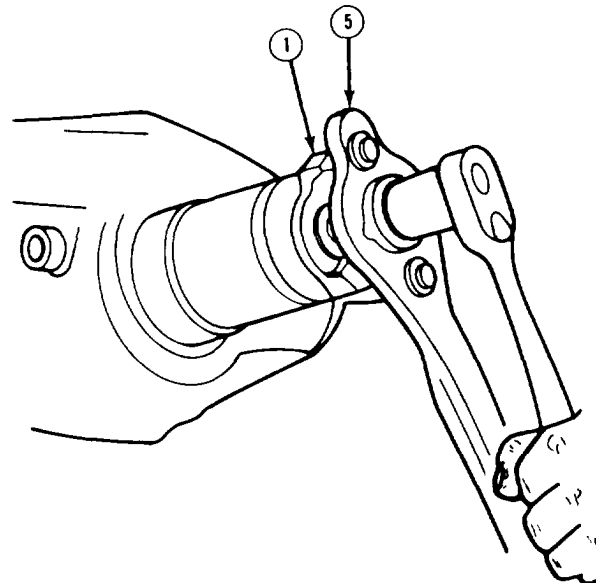
TA50533

6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

14. Install new spacer (8) on drive pinion (3) shaft, Place drive pinion into position. Mount a suitably sized thick washer over threaded stem of drive pinion and install original flange nut (2). Tighten flange nut enough to draw drive pinion through front bearing (10) so that threads are exposed when flange is placed into position. Remove flange nut and washer. Discard flange nut.



15. Install flange (1), original washer (21), and new flange nut (2). Using flange holder (5), tighten flange nut until all end play is removed from drive pinion (3). Remove flange holder. At this point, bearing preload specifications are being neared.

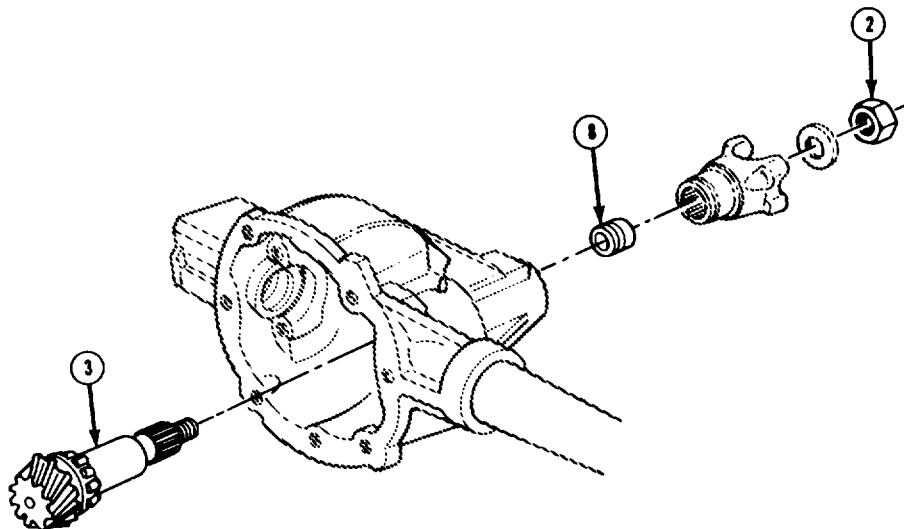


6-7. FRONT AND REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1009) (Con't).

CAUTION

Tightening flange nut (2) as little as 1/8 turn can add up to 5 additional pound-inches of drag. Flange nut should be tightened only a little at a time. Exceeding torque specifications may compress spacer (8) on drive pinion shaft too far and require replacement of spacer.

16. Measure rotating torque, it should be 20-25 lb.-in. (2-3 N.m) on new bearings, or 10-15 lb.-in. (1-2 N.m) on reused bearings. If rotating torque specifications have not been reached, tighten flange nut (2). Check rotating torque after each slight amount of tightening.
17. Rotate drive pinion (3) several times to ensure that bearings are seated. Check preload drag again. If drag has been reduced, reset preload to specifications.



FOLLOW-ON TASKS:

- Connect front or rear propeller shaft to pinion flange. (See TM 9-2320-289-20)
- Install front or rear axle differential. (See paragraph 6-5)

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009).

This task covers:	a. Removal b. Disassembly c. Cleaning and Inspection	d. Assembly e. Preload and Adjustment f. Installation
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INITIAL SETUP:

Equipment Condition

- Front axle assembly removed and mounted on stand. (See paragraph 6-3)
- Steering tie-rod removed. (See TM 9-2320-289-20)
- Front axle shafts removed, (See paragraph 6-4)

Materials/Parts

- One differential cover gasket
- Dry cleaning solvent (Item 23, Appendix B)
- Prussian blue dye (Item 24, Appendix B)
- Gear lubricating oil (Item 44, Appendix B)
- Wiping rags (Item 53, Appendix B)
- Masking tape (Item 68, Appendix B)

Tools/Test Equipment

- Clutch compressor, J-34502
- Axle housing spreader
- Dial indicator
- Puller kit
- Torque wrench

Manual References

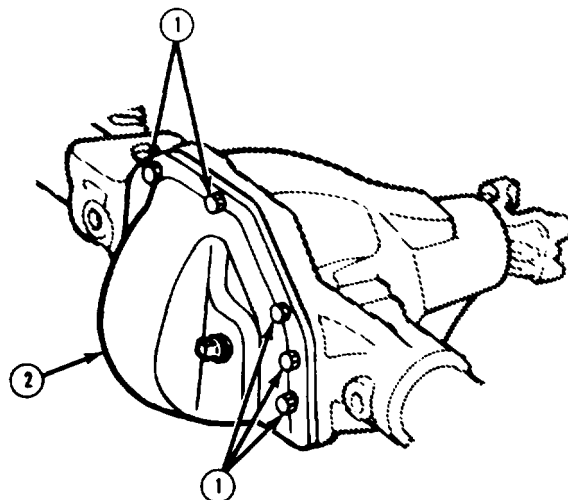
- TM 9-214

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area,
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

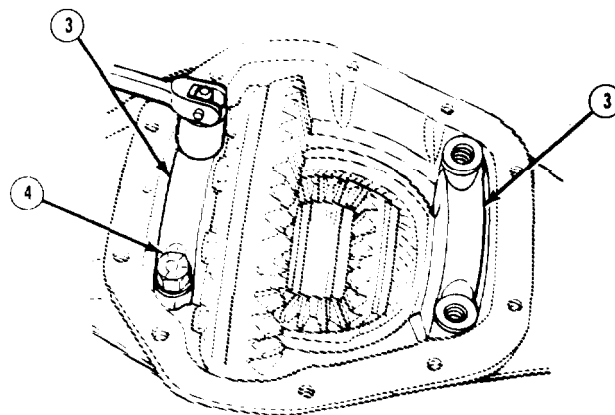
1. Place a suitable container under housing. Remove 10 bolts (1) and differential cover (2) and allow all lubricating oil to drain. Remove differential cover gasket-and discard.



TA50536

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't),

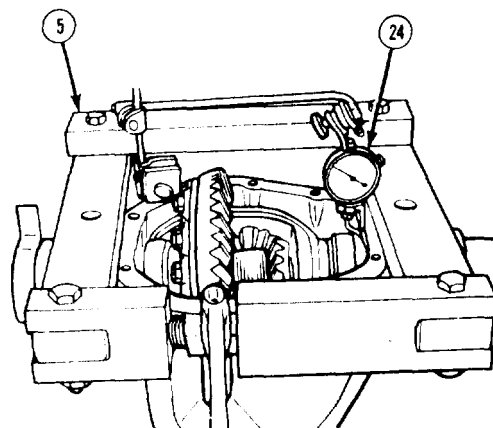
2. Mark 2 side bearing caps (3) and housing for installation alinement. Remove 4 bolts (4) and 2 side bearing caps.



3. Position axle housing spreader (5) with tool dowels fitted into recesses in housing. Install dial indicator (24) from dowel pin bar to dowel pin bar. Ensure that dial indicator is preloaded. Set dial indicator to "0,"

CAUTION

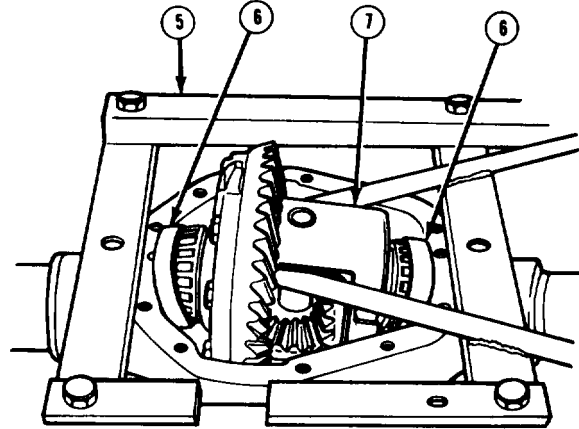
Housing should not be spread more than 0.015 in. (0.381 mm). Failure to follow this caution may cause housing to become damaged and permanently distorted.



4. Spread housing to 0.015 in. (0.381 mm). Remove dial indicator (24).

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

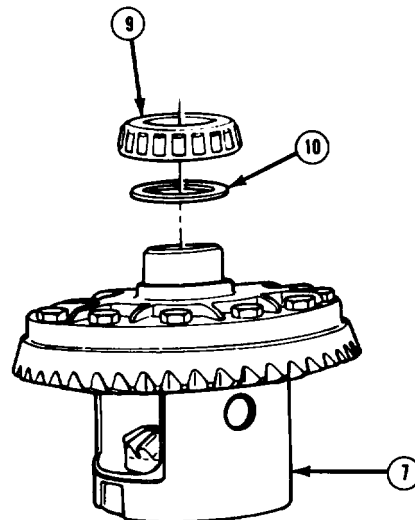
5. Remove differential case (7) assembly from housing. Remove and tag 2 side bearing cups (6) for installation. Relieve tension on axle housing spreader (5) and remove from housing.



b. DISASSEMBLY

NOTE

- M1008 and M1010 front axle differentials have thrust washers at side gears. M1028, M1028A1, and M1031 have clutch packs.
 - If disassembling M1008 or M1010 front axle differential, perform steps 1-6.
 - If disassembling M1028A1, or M1031 front axle differential, perform steps 1-5 and steps 7-10.
1. Place differential case (7) assembly in vise,
 2. Remove 2 side bearings (9) and side bearing shims (10). Tag side bearings and side bearing shims for installation.



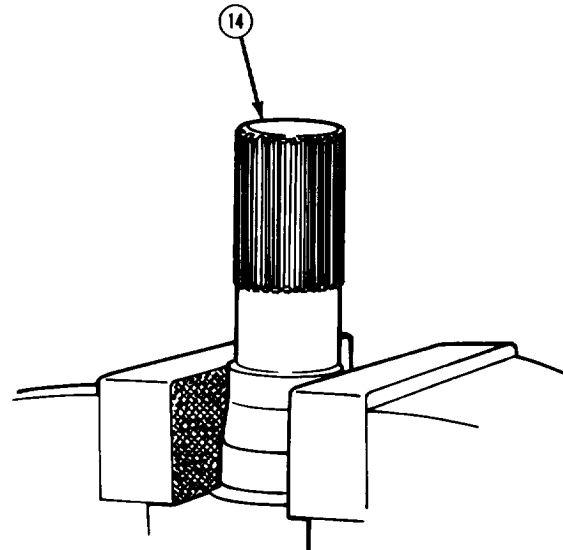
TA50538

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

Axle shaft (14) serves as a tool to help align pinion gears (15) and side gears (16).

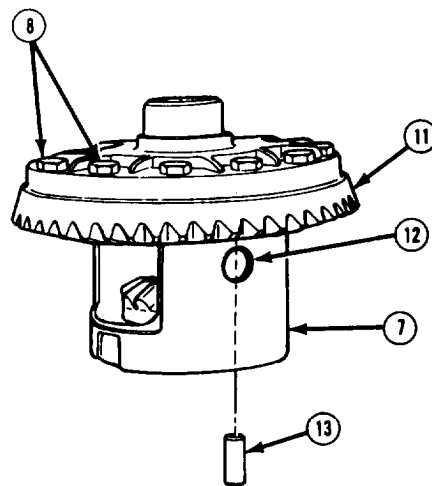
3. Remove differential case (7) assembly from vise. Place axle shaft (14) in vise with no more than 3 in. (76 mm) above top of vise. Place differential case assembly on axle shaft.



NOTE

Shop rags placed around vise will help protect ring gear (11) teeth from damage should ring gear fall during disassembly.

4. Remove lockpin (13). Remove 12 ring gear bolts (8). Tap on ring gear (11) with a soft-faced hammer to separate ring gear from differential case (7) assembly. Remove differential case assembly from axle shaft and remove ring gear.
5. Place differential case (7) assembly on axle shaft in vise. Remove pinion shaft (12).

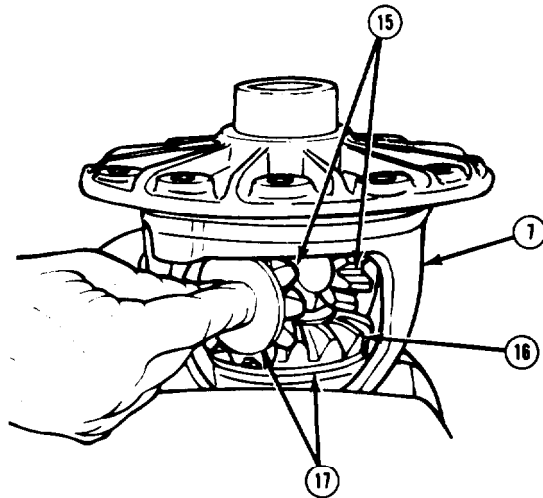


6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

Perform step 6 only if working on M1008 or M1010.

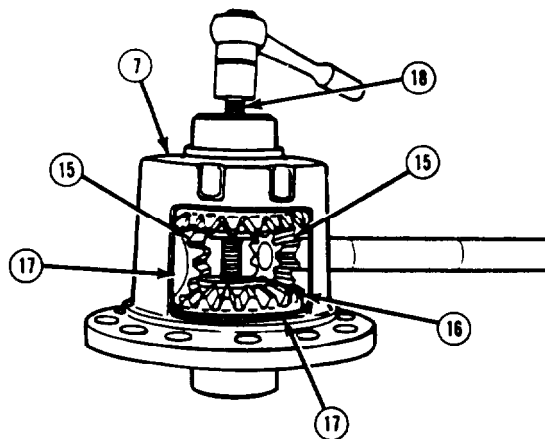
6. Rotate side gears (16) until pinion gears (15) turn to opening in differential case (7) assembly. Remove 2 pinion gears and thrust washers (17) behind gears. Remove 2 side gears and thrust washers.



NOTE

Perform steps 7-10 only if working on M1028, M1028A1, or M1031.

- 7 . Install clutch compressor (18) and remove tension from clutch packs. Remove 2 thrust washers (17) from behind pinion gears (15). Rotate differential case (7) assembly and remove 2 pinion gears.
- 8 . Hold top clutch pack and side gear (16) in place and remove clutch compressor (18).

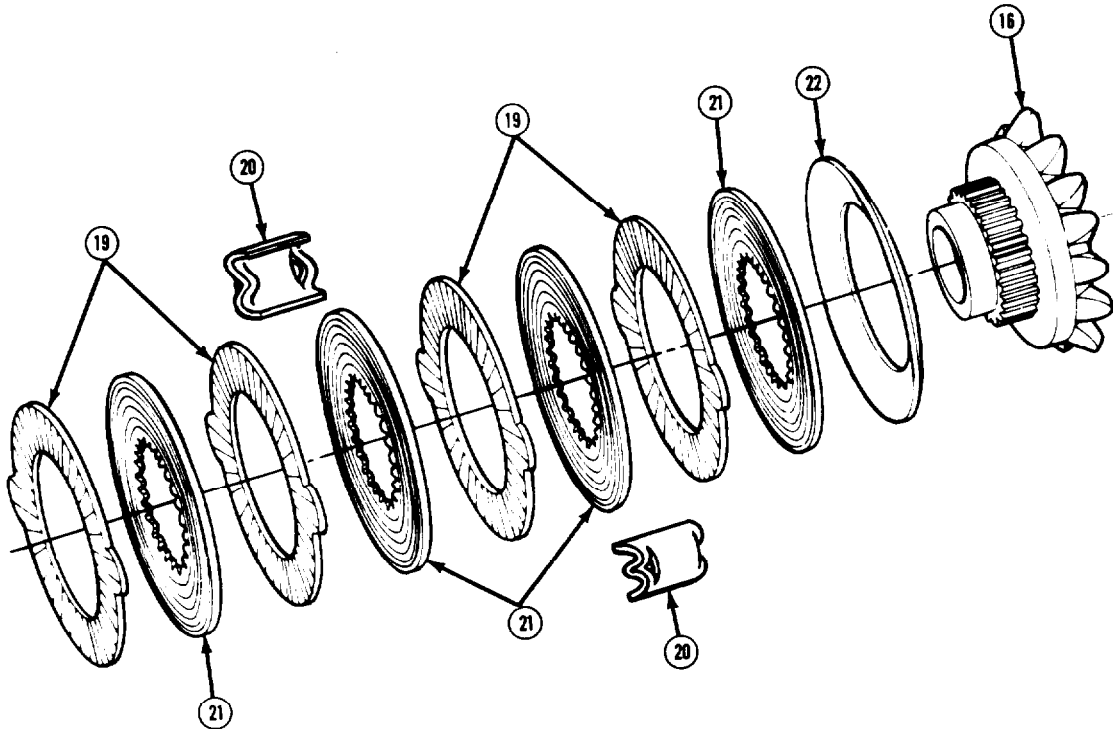


6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

Ensure that clutch packs are kept intact as they are removed.

9. Remove 2 clutch packs and side gears (16).
10. Remove 2 retainer clips (20) from each clutch pack and separate 4 clutch plates (19) and 4 discs (21), Remove dished spacer (22) from each side gear (16).



c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.

TA50541

 6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

 W A R N I N G

Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.

1. Clean and inspect side bearings in accordance with TM 9-214.
2. Clean all removed components with dry cleaning solvent and dry with compressed air.
3. Inspect differential case for cracks, scoring or signs of damage to machined surfaces. Remove any nicks or burrs found. Replace if cracked or scored, or if nicks or burrs cannot be removed.
4. Inspect side bearing shims. Obtain replacement shims of same thickness if damaged.
5. Inspect teeth of pinion and side gears for damage. If one gear is damaged, replace all 4 gears and thrust washers.

NOTE

If ring gear is replaced, ring gear bolts, and drive pinion must also be replaced. (See paragraph 6-9)

6. Inspect ring gear for damage. Replace if damaged.
7. Inspect clutch pack plates, retainer clips, and discs for wear, cracks, or scoring. If one member of either clutch pack is worn, cracked, or scored, replace both clutch packs.
8. Inspect 2 axle shaft seals in housing side bores. Remove and discard if damaged.

d. ASSEMBLY

NOTE

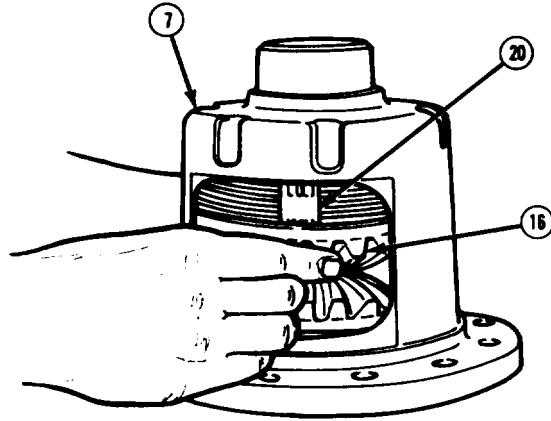
- Ensure that all differential components are lubricated with lubricating oil as they are assembled.
 - If assembling M1008 or M1010 front axle differential, perform steps 5, 6, 8, and 9.
 - If assembling M1028, M1028A1, or M1031 front axle differential, perform steps 1-4 and steps 6-9.
1. Install dished spacer (22) on each side gear (16). Starting with a disc (21) and alternating, install 4 clutch plates (19) and discs, Install 2 retainer clips (20) to each clutch pack.

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

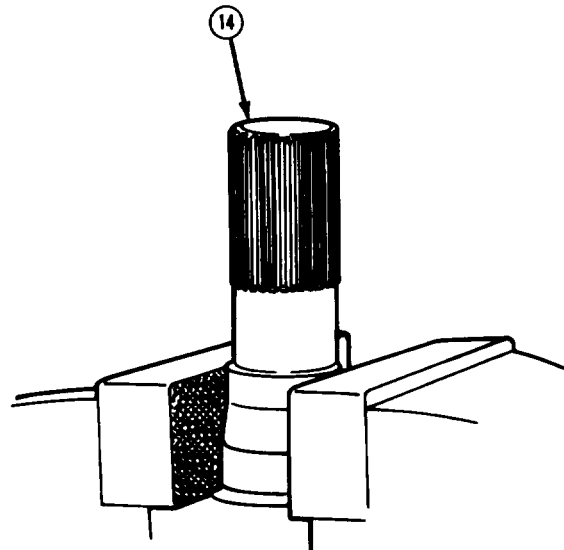
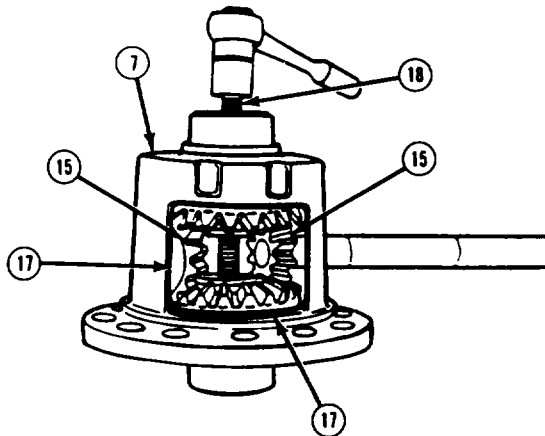
NOTE

Ensure that clutch pack stays assembled to side gear (16) splines and that retainer clips (20) are completely seated into differential case (7) pockets.

2. Install 2 clutch packs and side gears (16) into differential case (7).



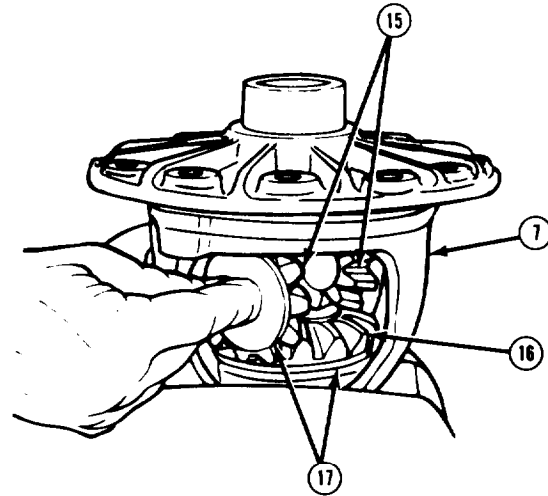
3. Install clutch compressor (18) to differential case (7) assembly and install differential case assembly to axle shaft (14) in vise.



TA50642

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

4. Loosen tension from clutch compressor (18) and install 2 pinion gears (15) by rotating differential case (7) assembly, Tighten clutch compressor and install 2 thrust washers (17) between pinion gears and differential case assembly. Remove clutch compressor.
5. Install differential case (7) assembly on axle shaft (14) in vise. Install 2 side gears (16) and thrust washers (17). Rotate side gears to install 2 pinion gears (15) and thrust washers.

**NOTE**

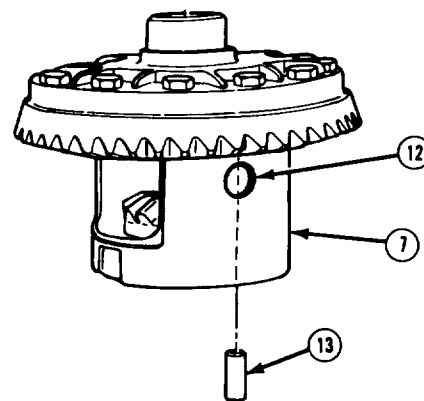
Ensure that pinion gear (15) and thrust washer (17) holes are aligned with differential case (7) assembly holes.

6. Install pinion shaft (12) with lockpin (13) hole on shaft aligned with differential case (7) assembly lockpin hole.

NOTE

- Perform step 7 only if working on M1028, M1028A1, or M1031.
- Tape used in step 7 indicates depth required to install lockpin (13).

7. Place a piece of tape 1 3/4 in. (4.61 5 mm) from end of punch.
8. Install lockpin (13) through differential case (7) assembly into pinion shaft (12).



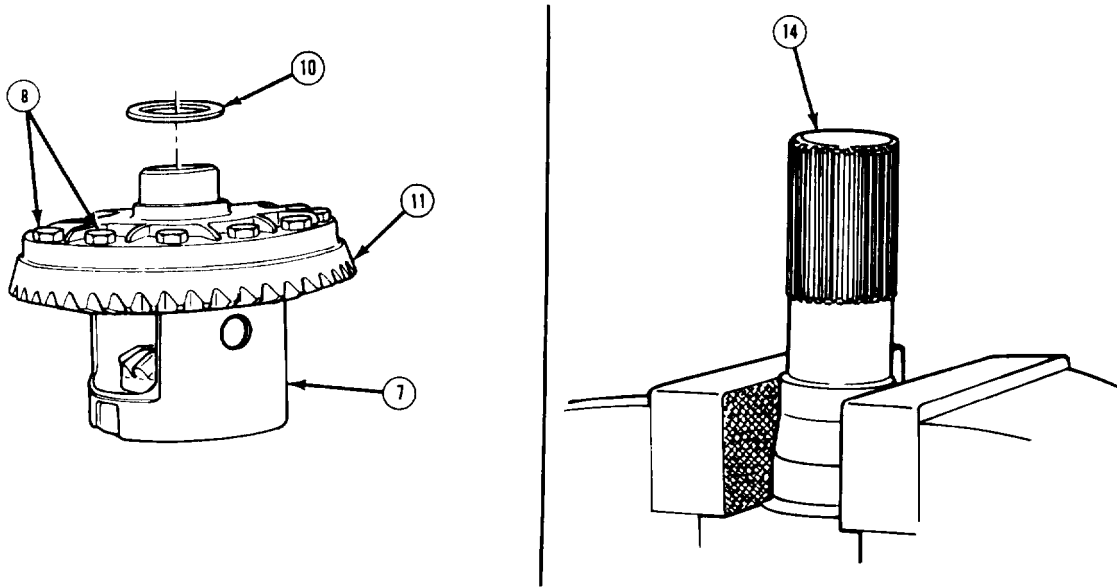
TA50543

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

Shop rags placed around vise will help help protect ring gear (11) teeth from damage should ring gear fall during assembly.

9. Remove differential case (7) assembly from axle shaft (14). Loosely install ring gear (11) with 12 ring gear bolts (8), Install assembly back on vise and tighten bolts alternately to 110 lb.-ft. (149 N.m).



e. PRELOAD AND ADJUSTMENT

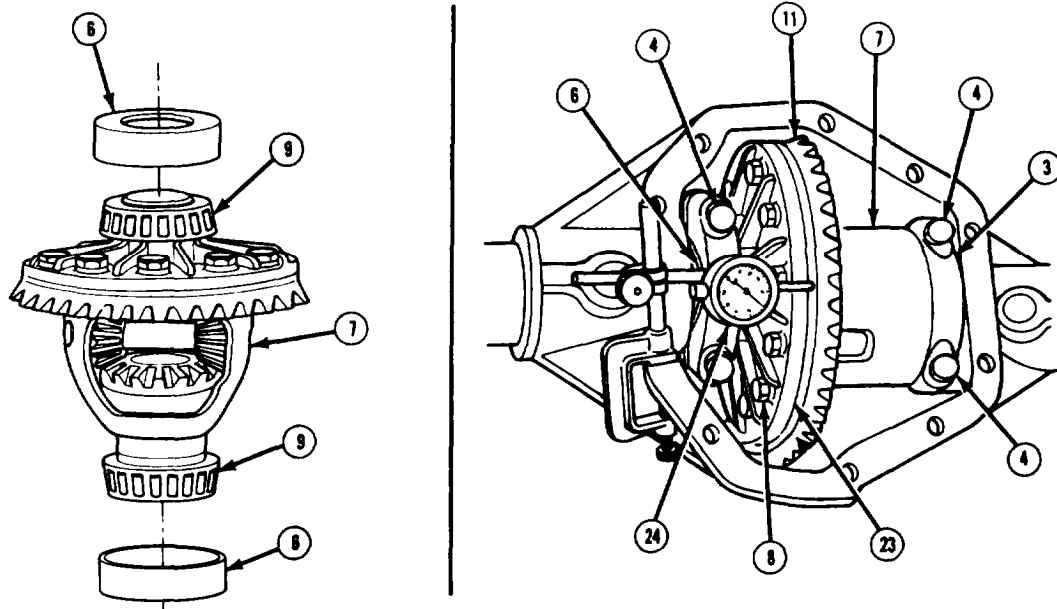
NOTE

- Side bearing shims (10) should not be installed at this time.
- Side bearings (9) should rotate freely once installed.

1. Install 2 side bearings (11) and bearing cups (6) to differential case (7) assembly as tagged,
2. If not already removed, remove front axle drive pinion, (See paragraph 6-9)
3. Place differential case (7) assembly in housing and install 2 side bearing caps (3) as marked. Remove play in side bearings (9) and bearing cups (6). Tighten 4 bearing cap bolts (4) just enough to hold bearing caps in place.

TA50544

 6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT MI 009) (Con't).

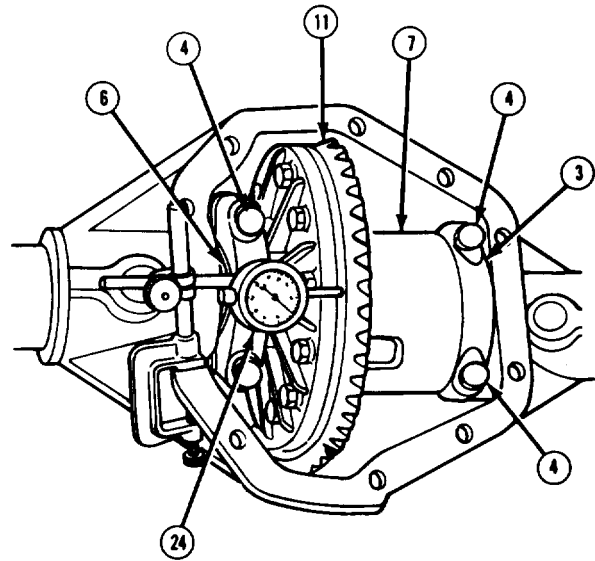


4. Install dial indicator (24) on housing with indicator button contacting back of ring gear (11). Rotate differential case (7) assembly and check for runout. If runout is greater than 0.002 in. (0.051 mm), remove differential case assembly from housing, and remove ring gear. Assemble differential case assembly without ring gear and install in housing,
5. Check runout at ring gear mounting flange (23). If runout on flange exceeds 0.002 in. (0.051 mm), problem is probably in side bearings (9) or differential case (7) and must be corrected before proceeding. If runout is within specifications, problem is with ring gear (11). Install ring gear, ensuring that ring gear bolts (8) are tightened evenly and ring gear mounting flange is free from dirt or chips, etc. Recheck runout with dial indicator (24) contacting back of ring gear. If runout is still greater than 0.002 in. (0.051 mm), replace ring gear, ring gear bolts, and drive pinion as a set.
6. Using 2 screwdrivers wedged between bearing cup (6) and housing on opposite side of ring gear (11) (away from dial indicator (24) side), force differential case (7) assembly as far as possible toward dial indicator. Rock ring gear to set bearings, With force still applied, set dial indicator to "0, "
7. Reposition 2 screwdrivers between bearing cup (6) and housing on ring gear (11) side. Force differential case (7) assembly as far as possible in opposite direction. Repeat several times until the same reading is obtained. Record reading. This reading is the total thickness of shim (s) needed, less preload, for setting backlash and preload during assembly.
8. Remove 4 bearing cap bolts (4) and 2 side bearing caps (3). Remove differential case (7) assembly from housing,

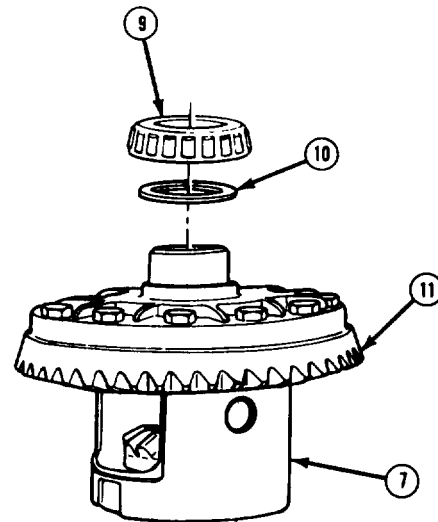
TA50545

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

9. Install and adjust front axle drive pinion and bearings. (See paragraph 6-9)
10. Install differential case (7) assembly into housing and install 2 side bearing caps (3) in their original position. Tighten 4 bearing cap bolts (4) just enough to hold side bearing caps in place.
11. Install dial indicator (24) on housing with indicator button contacting back of ring gear (11).
12. Place 2 screwdrivers between bearing cup (6) and housing on ring gear (11) side and force ring gear into mesh with drive pinion as far as it will go. Rock ring gear for bearings to seat and gears to fully mesh. With force still applied, set dial indicator (24) to "0."



13. Reposition screwdrivers on opposite side of ring gear (11) and force ring gear as far as it will go. Repeat until same reading is obtained. Record reading. This reading is the thickness of shim(s) (10) needed between differential case (7) assembly and side bearing (9) on ring gear side.
14. Remove 4 bearing cap bolts (4) and 2 side bearing caps (3), Remove differential case (7) assembly from housing, Remove side bearing (9) from ring gear (11) side and install proper thickness of shim(s) (10). Install side bearing,



6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

15. Remove side bearing (9) from opposite side of ring gear (11). Subtract size of shim pack just installed on ring gear side from reading obtained in step 7. To this figure, add .015 in. (0.301 mm) to compensate for preload and to provide correct backlash.

EXAMPLE: If reading in step 7 was 0.085 in. (2.159 mm) and shim (s) (10) installed on ring gear side were 0.055 in. (1.3971 mm), correct thickness of shim(s) will be:

$$0.085 - 0.055 + 0.015 = 0.045 \text{ in.}$$

$$(2.159 - 0.055 + 0.381 = 1.143 \text{ mm})$$

16. Install proper thickness of shim(s) (10) as determined in step 15 on side opposite ring gear (11). Install side bearing (9).

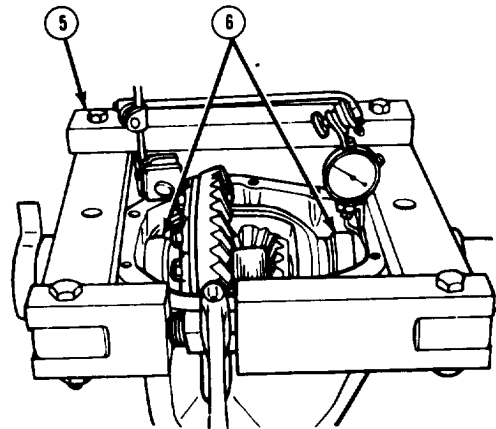
f. INSTALLATION

1. If removed, install 2 new front axle shaft seals inside housing side bores.

CAUTION

Housing should not be spread more than 0.015 in. (0.381 mm). Failure to follow this caution may cause housing to become damaged and permanently distorted.

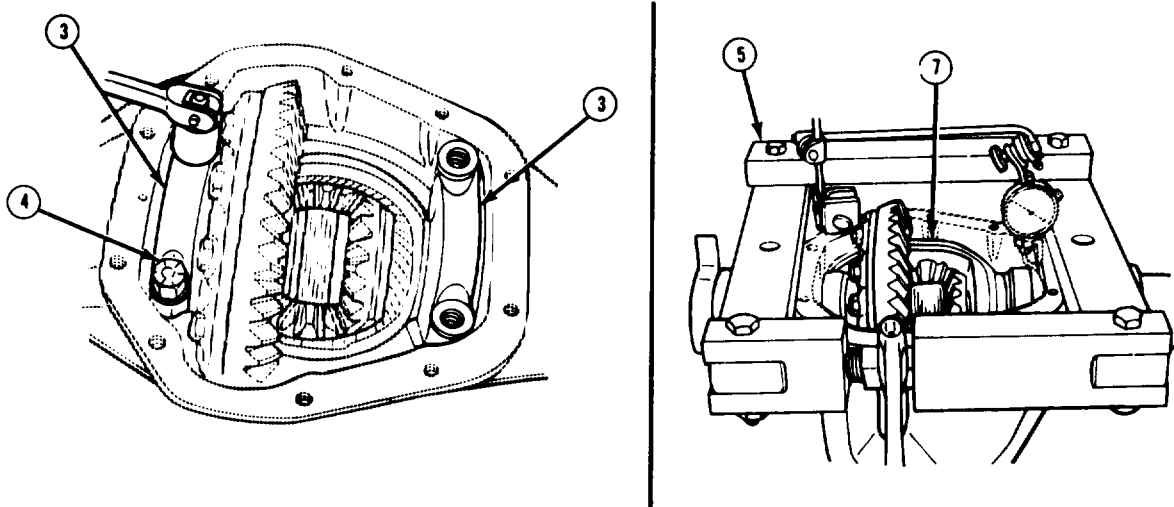
2. Use axle housing spreader (5) to spread housing to 0.015 in. (0.381 mm). Install 2 bearing cups (6) as tagged and install differential case (7) assembly inside housing.



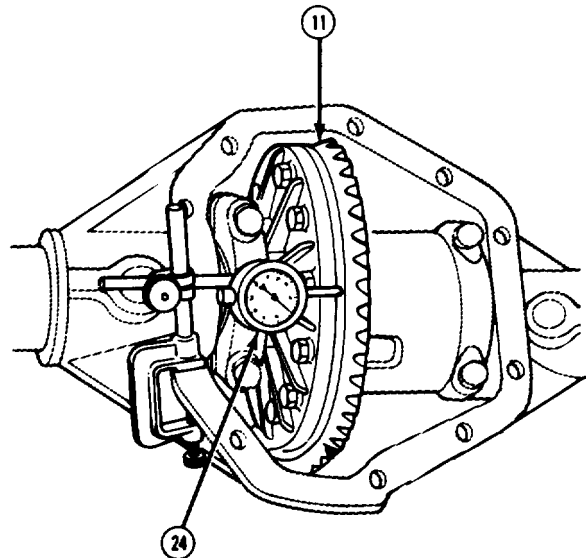
TA50547

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

3. Install 2 bearing caps (3) in their original position and tighten 4 bearing cap bolts (4) finger tight. Rotate differential case (7) assembly and tap it with a soft-faced hammer to ensure that differential case assembly is properly seated in housing. Remove axle housing spreader (5) and tighten bearing cap bolts to 85 lb.-ft. (115 Nom).



4. Install dial indicator (24) and check ring gear (11) backlash at 4 equally spaced points around ring gear. Backlash must 0.004-0.009 in. (0.102-.229 mm) and must not vary more than 0.002 in. (0.051 mm) between 4 points checked.



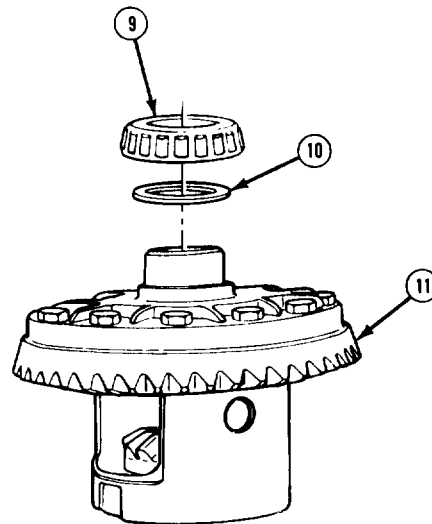
TA50548

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't),

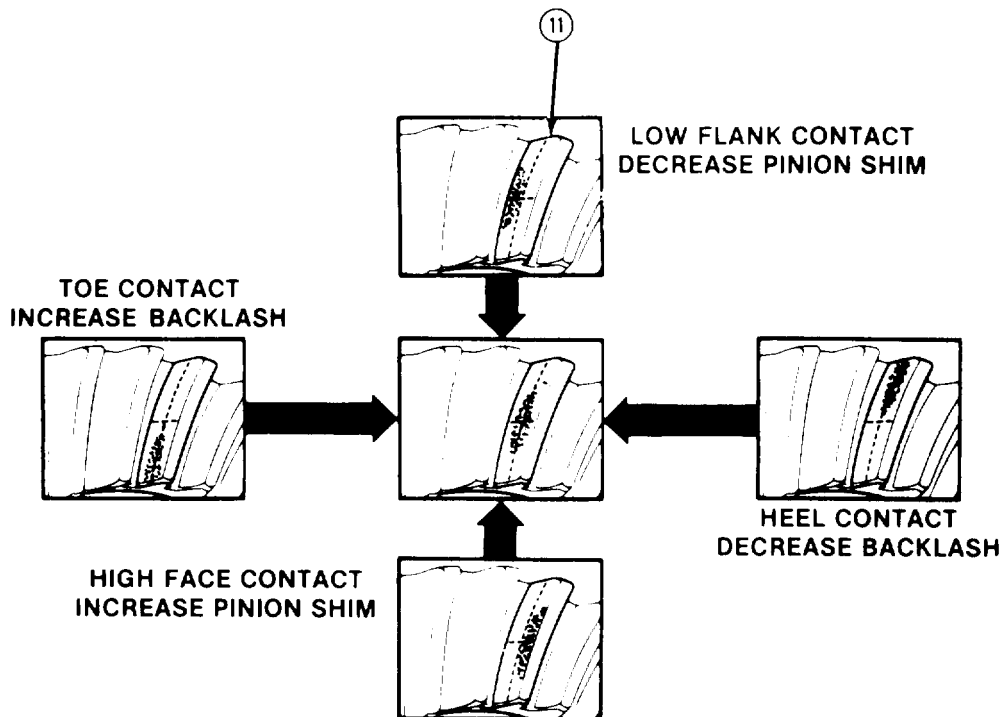
5. If backlash is not within specification, correct by adjusting thickness of side bearing (9) shim pack, To increase backlash, increase right shim (10) and decrease left shim an equal amount. To decrease backlash, decrease right shim and increase left shim an equal amount,

NOTE

If ring gear (11) and drive pinion were replaced, perform steps 6-9 to check for proper gear tooth contact pattern.



6. Wipe any lubricant from housing and clean each tooth of ring gear (11).
7. Using medium stiff brush, sparingly apply prussian blue dye to all ring gear (11) teeth. Area of drive pinion tooth contact should be visible when drive pinion is turned by hand.



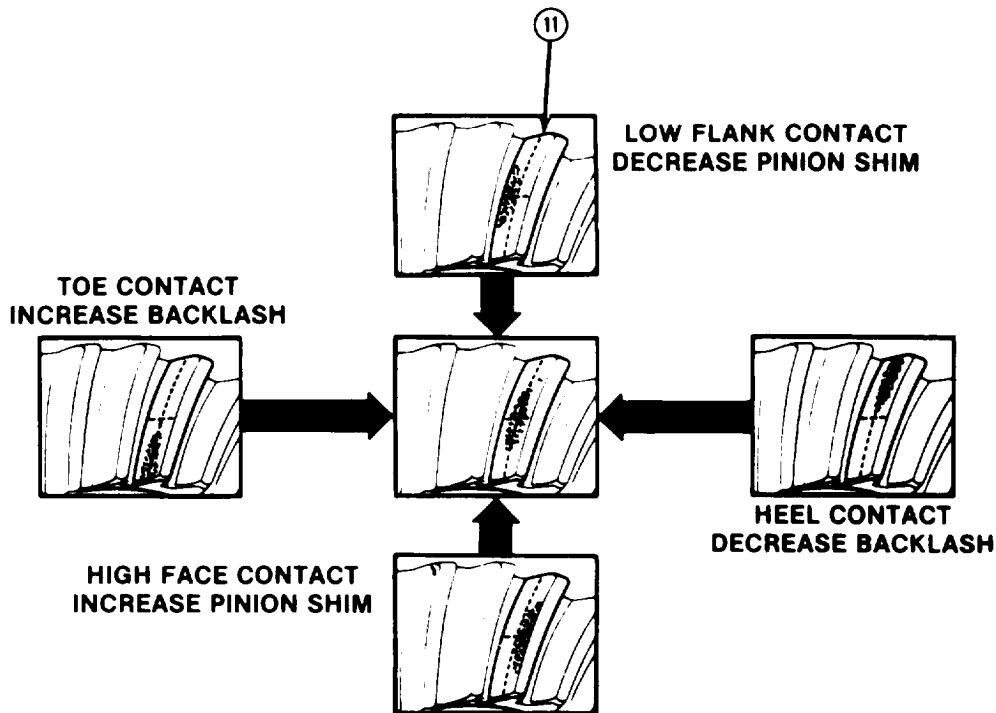
TA50549

6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

Excessive turning of ring gear (11) is not recommended. Ring gear should be turned only enough to provide tooth contact pattern.

8. Apply load until it takes a torque of 40-50 lb.-ft. (54-68 N.m) to turn drive pinion. Turn companion flange so that ring gear (11) turns 1 full revolution, then reverse so that ring gear turns 1 full revolution in opposite direction,
9. Contact pattern should be centrally located up and down on the face of the ring gear (11) teeth. Compare tooth contact pattern on ring gear with examples shown and make adjustments as indicated.

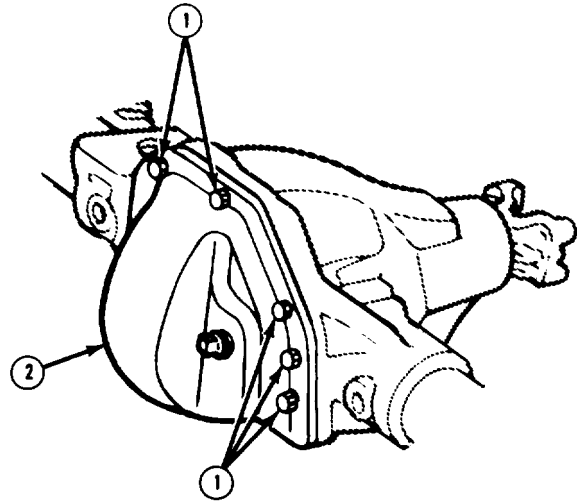


6-8. FRONT AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

Ensure that differential cover (2) and magnet are clean.

10. Install new differential cover gasket and differential cover (2) with 10 bolts (1). Tighten bolts to 35 lb.-ft. (47 N.m).

**FOLLOW-ON TASKS:**

- Install front axle shafts. (See paragraph 6-4)
- Install steering tie-rod. (See TM 9-2320-289-20)
- Install front axle assembly. (See paragraph 6-3)
- Fill front axle differential with lubricating oil. (See LO 9-2320-289-12)

6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009).

This task covers: a. Removal c. Installation
b. Cleaning and Inspection

INITIAL SETUP:

Equipment Condition

- Front axle differential removed.
(See paragraph 6-8)

Tools/Test Equipment

- I Flange holder and remover
- Micrometer
- Torque wrench

Manual References

- TM 9-214

Materials/Parts

- One flange nut
- One pinion oil seal
- Two shim packs
- Two slingers
- Dry cleaning solvent
(Item 23, Appendix B)
- Molybdenum grease
(Item 37, Appendix B)
- Gear lubricating oil
(Item 44, Appendix B)

General Safety Instructions

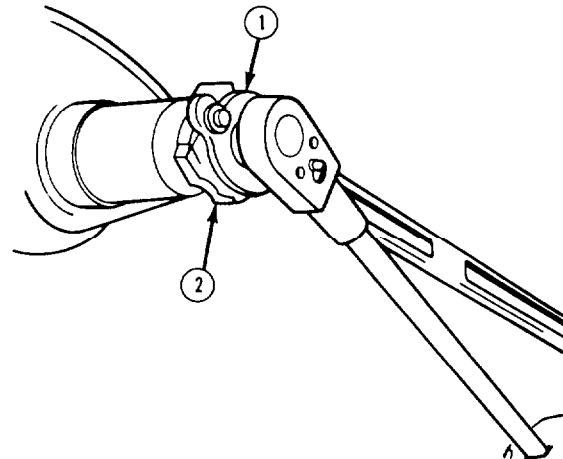
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
 - Compressed air used for cleaning purposes should ever exceed 30 psi (207 kPa).
-

a. REMOVAL

NOTE

- Ensure that shims and slingers are tagged as they are removed and saved for measurement.
- Ensure that flange nut (4) is saved for use during drive pinion (5) installation. When drive pinion is fully seated and ready to receive final torque, a new flange nut must be used.

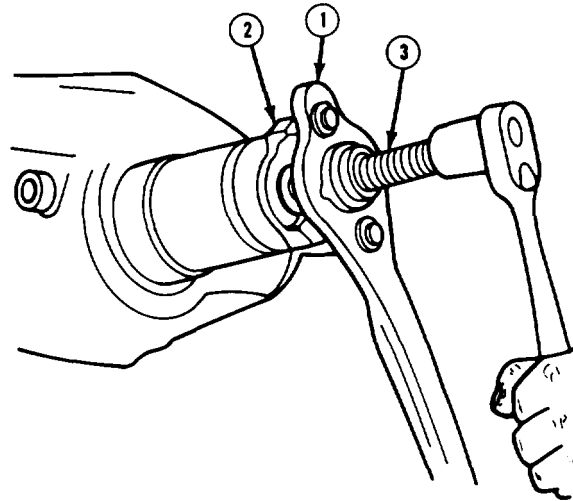
1. Using flange holder (1), remove flange nut (4) and washer from flange (2).



TA50552

 6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

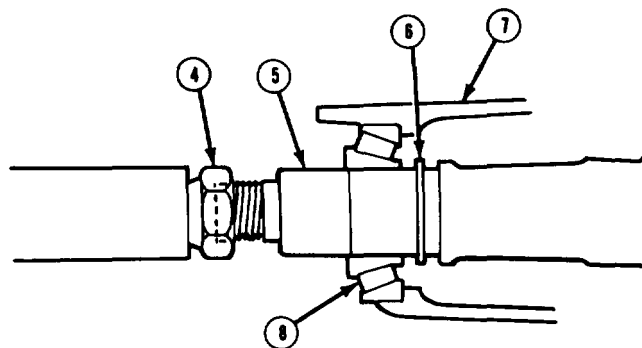
2. Thread flange remover bolt into small outside diameter end of flange remover (3). Turn flange remover 1/8 turn to a locked position. Turn flange remover while holding flange holder (1) stationary. Remove flange (2). Remove deflector from flange if damaged.



NOTE

Shim (6) may be on drive pinion (5) shaft or inside housing (7).

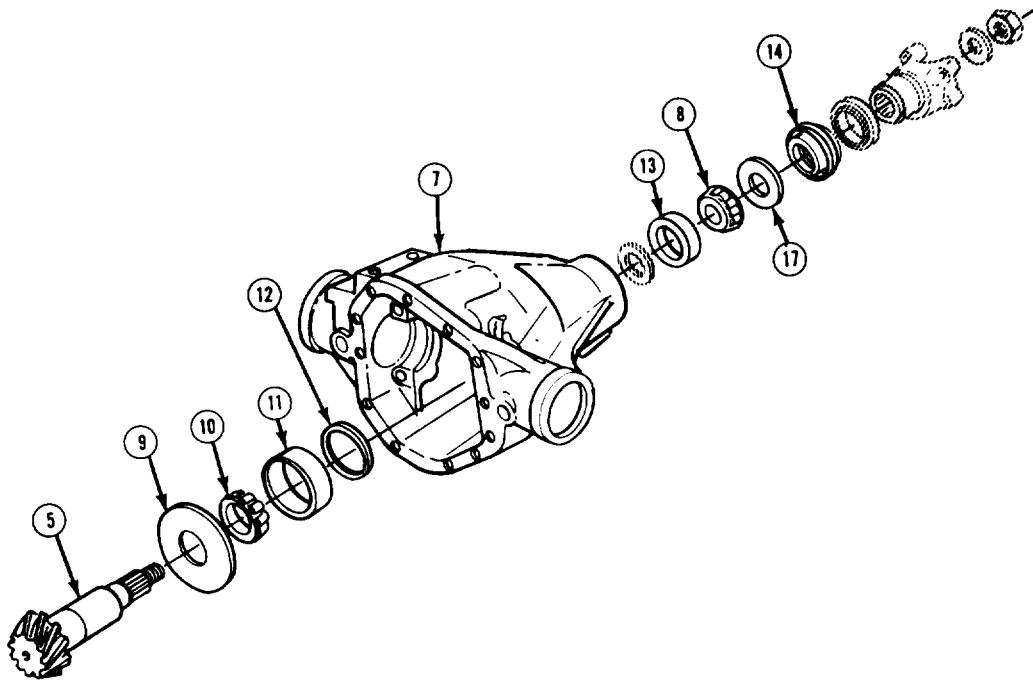
3. Install flange nut (4) halfway onto drive pinion (5) threads. Tap on flange nut with soft-faced hammer to loosen drive pinion in front pinion bearing (8). Remove flange nut from drive pinion. Remove drive pinion from housing (7). Remove shim (6).



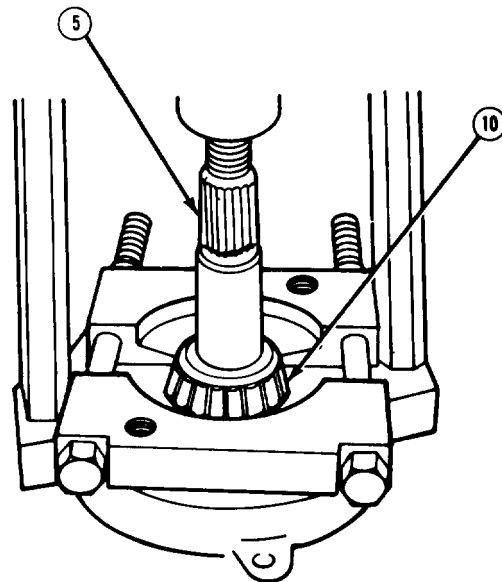
TA50553

6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

4. Tap on inner race of front pinion bearing (8) to remove pinion oil seal (14), slinger (17), front bearing cup (13) and front pinion bearing. Discard pinion oil seal.



5. Remove rear bearing cup (11) from housing (7). Remove shim (12). Press rear pinion bearing (10) from drive pinion (5) shaft. Remove slinger (9).



TA50554

6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.
1. Clean drive pinion, shims, slingers, flange, and deflector with dry cleaning solvent and dry with compressed air.
 2. Clean drive pinion bearing bores in housing to ensure that they are free of dirt or other contamination. Remove any nicks found.
 3. Clean and inspect front and rear bearing assemblies in accordance with TM 9-214.

NOTE

If drive pinion is replaced, differential ring gear and ring gear bolts must also be replaced. (See paragraph 6-8)

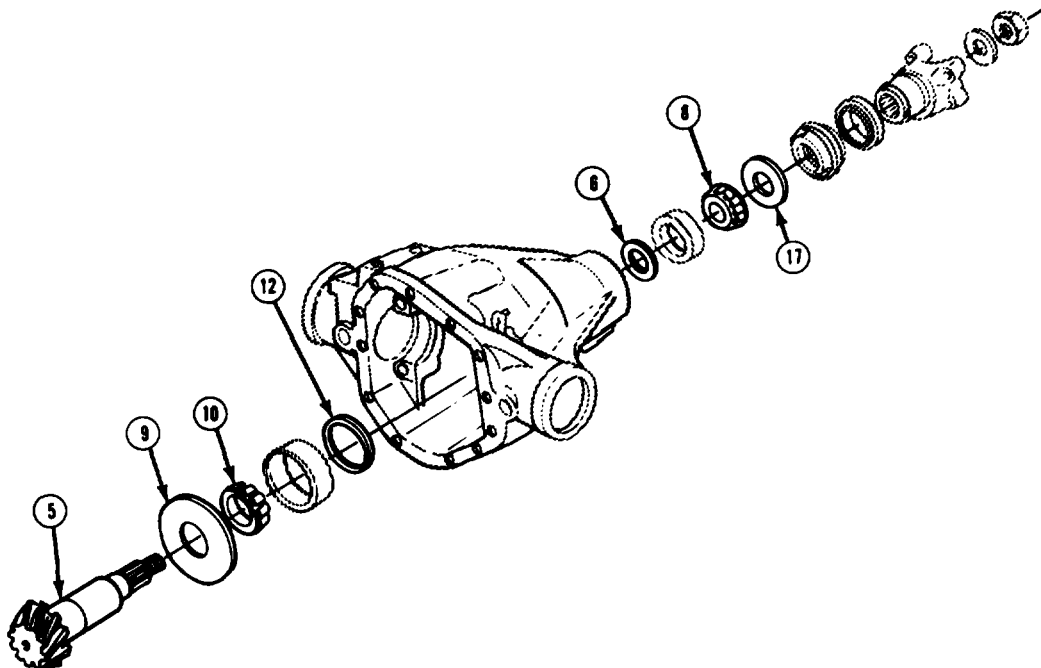
4. Inspect drive pinion for damage. Replace if damaged.
5. Inspect flange for evidence of wear at point of oil seal contact. Replace if worn.

6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

c. INSTALLATION

NOTE

- Ensure that all components are lubricated with lubricating oil as they are installed.
 - If original drive pinion (5) is reused, new shim pack must be built equal in thickness to original one.
 - Slings (9 and 17) are considered part of shim pack.
 - If new drive pinion (5) is installed, adjustments in new shim packs' thickness will be required unless the number etched on gear end of replacement drive pinion is the same as original drive pinion.
1. Measure thickness of shim (12) and slinger (9) to determine thickness of original buildup at rear pinion bearing (10). Measure thickness of shim (6) and slinger (17) to determine thickness of original buildup at front pinion bearing (8). Record measurements. Discard shims and slingers.



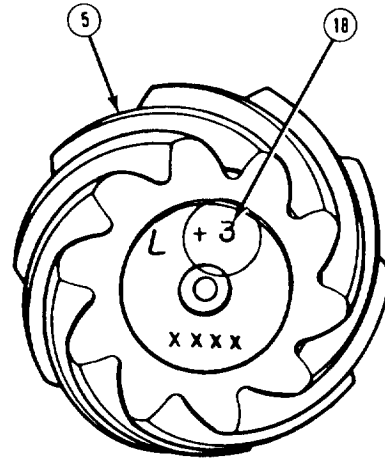
TA50555

 6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

Perform steps 2 and 3 only if new drive pinion (5) is being installed.

2. Determine proper rear shim pack (9 and 12) for setting pinion depth as follows :
 - (a) Check number (18) etched on gear end of old drive pinion (5) and locate it in "Old *Pinion Marking*" column of Table 6-3.
 - (b) Check number (18) etched on gear end of new drive pinion (5) and locate it in "New *Pinion Marking*" column of Table 6-3,
 - (c) Find point where 2 columns intersect to determine adjustment number for new rear shim pack (9 and 12).



NOTE

A "+" means add that amount; a "-" means subtract that amount; and "O" means no change.

3. Add or subtract adjustment number found on Table 6-3 to old rear shim pack (9 and 12) to determine new rear shim pack.

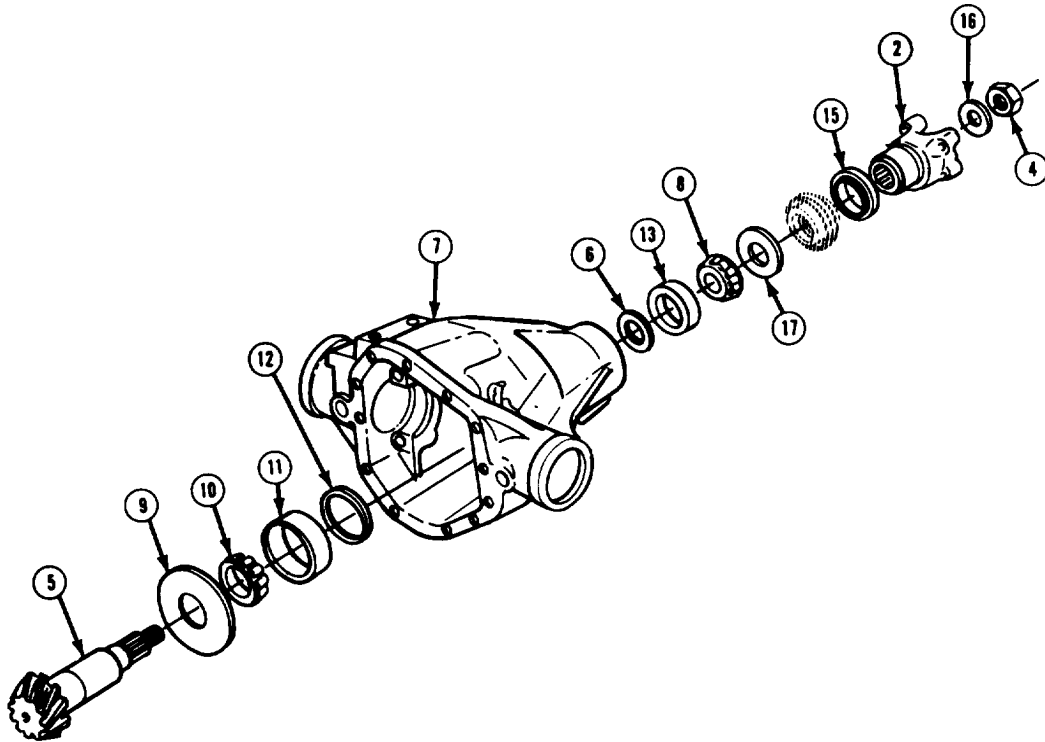
6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

Table 6-3. Pinion Setting Charts.

English U.S. Standard Chart									
Old Pinion Marking	New Pinion Marking								
	- 4	- 3	- 2	- 1	0	+1	+2	+3	+4
+4	+ 0.008	+ 0.007	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0
+3	+ 0.007	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	-0.001
+2	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	-0.001	-0.002
+1	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	-0.001	-0.002	-0.003
0	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	-0.001	-0.002	-0.003	-0.004
- 1	+ 0.003	+ 0.002	+ 0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
- 2	+ 0.002	+ 0.001	0	- 0.001	-0.002	-0.003	-0.004	-0.005	-0.006
- 3	+ 0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
- 4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008
Metric Chart									
Old Pinion Marking	New Pinion Marking								
	- 10	- 8	- 5	- 3	0	+3	+5	+8	+ 10
+ 10	+ 0.20	+ 0.18	+ 0.15	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0
+ 8	+ 0.18	+ 0.15	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	-0.03
+ 5	+ 0.15	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	-0.03	-0.05
+ 3	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	-0.03	-0.05	-0.08
0	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	-0.03	-0.05	-0.08	-0.10
- 3	+ 0.08	+ 0.05	+ 0.03	0	-0.03	-0.05	-0.08	-0.10	-0.13
- 5	+ 0.05	+ 0.03	0	-0.03	-0.05	-0.08	-0.10	-0.13	-0.15
- 8	+ 0.03	0	-0.03	-0.05	-0.08	-0.10	-0.13	-0.15	-0.18
-10	0	-0.03	-0.05	-0.08	-0.10	-0.13	-0.15	-0.18	-0.20

4. Install new shim (12) inside rear bearing cup (11) bore, Install rear bearing cup in housing (7).
5. To front shim pack (6 and 17), add or subtract an amount equal to what was added or subtracted to rear shim pack (9 and 12).
6. Install front bearing cup (13) into housing (7) bore.
7. Install new slinger (9) and rear pinion bearing (10) onto drive pinion (5) shaft. Install drive pinion and bearing assembly in housing (7).

6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).



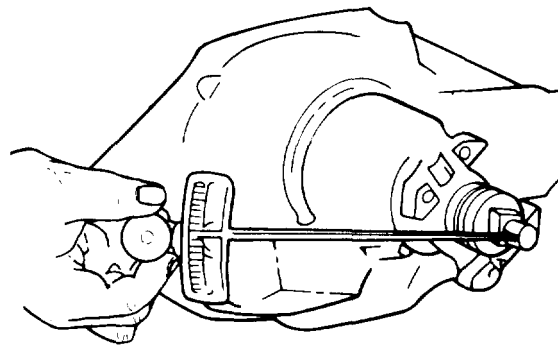
8. Install new shim (6), front pinion bearing (8), and new slinger (17) on drive pinion (5) shaft.
9. If removed, install new deflector (15) to flange (2). Install flange, washer (16), and flange nut (4). Using flange holder and flange remover, tighten flange nut to pull flange onto drive pinion (5) and to fully seat front pinion bearing (8). Tighten flange nut to 255 lb.-ft, (346 N.m). Remove flange holder and flange remover.

TA50557

6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

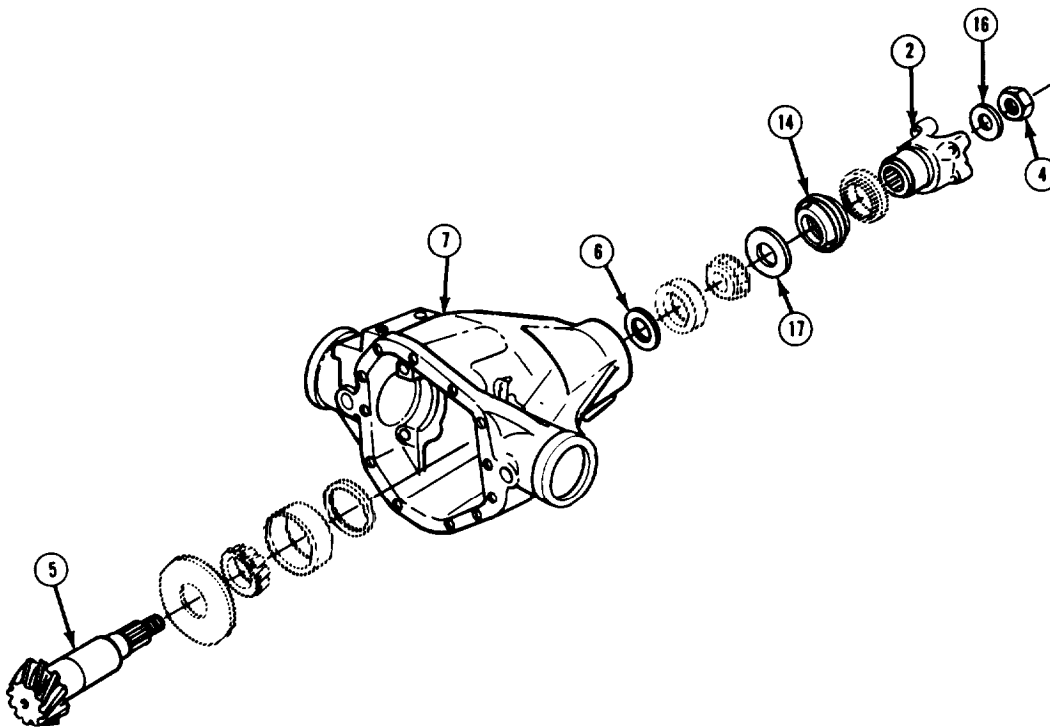
- When measuring rotating torque, torque reading needed to start drive pinion (5) shaft-turning should be disregarded.
 - Front shim pack (6 and 17) should be increased to reduce rotating torque. Front shim pack should be decreased to increase rotating torque.
10. Measure rotating torque at flange nut (4). Rotating torque should be 20-40 lb.-in. (2-5 N.m) for new bearings, or 10-20 lb.-in. (1-2 N.m) for reused bearings. Adjust front shim pack (6 and 17) by repeating steps 8 and 9 if specifications are not met.



11. Remove flange nut (4), washer (16), and flange (2) from drive pinion (5) shaft. Discard flange nut.
12. Coat lips of new pinion oil seal (14) with molybdenum grease and install squarely into housing (7) bore until flush with housing, Install flange (2), washer (16), and new flange nut (4). Tighten flange nut to 255 lb.-ft. (346 N.m).

TA50558

6-9. FRONT AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).



FOLLOW-ON TASKS:

- Install front axle differential. (See paragraph 6-8)

6-10. FRONT AND REAR AXLE DRIVE PINION OIL SEAL AND PINION FLANGE MAINTENANCE.

This task covers:	a. Removal	c. Installation
	b. Inspection	

INITIAL SETUP:

Equipment Condition

- Truck raised and supported on jack stands.
- Propeller shaft disconnected from axle.
(See TM 9-2320-289-20)

Materials/Parts

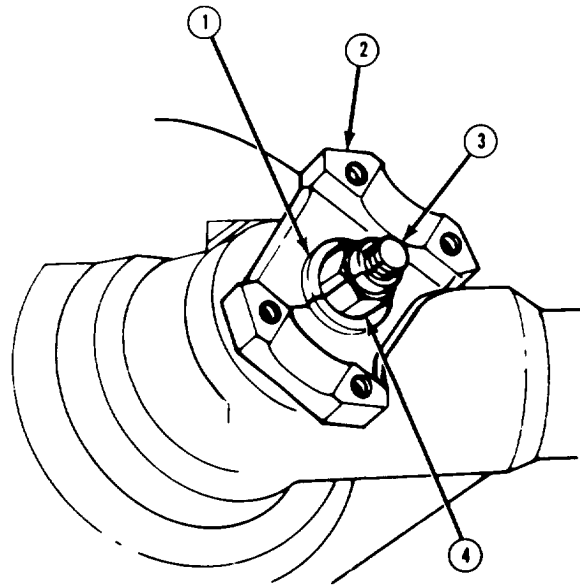
- One flange nut
- One oil seal
- Molybdenum grease
(Item 37, Appendix B)

Too/s/Test Equipment

- Flange holder and remover
- Torque wrench

a REMOVAL

- 1 . At flange nut (4), measure the torque required to rotate drive pinion (3) and record.
- 2 . Scribe a line down drive pinion (3) stem, flange nut (4), and flange (2). Ensure that scribe line accurately shows relationship of components. Count number of exposed threads on drive pinion stem and record.



NOTE

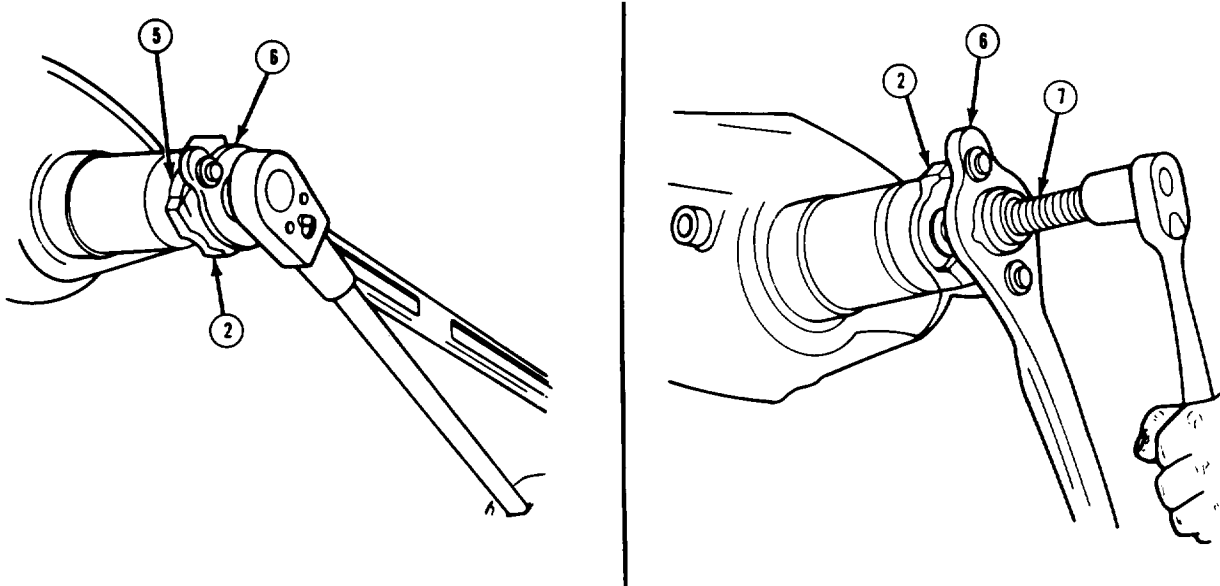
Flange nut (4) should not be discarded at this time.

3. Install flange holder (6) on flange (2) and remove flange nut (4) and washer (1). Thread flange remover bolt into small outside diameter end of flange remover (7). Turn flange remover 1/8 turn to a locked position. Turn flange remover while holding flange holder (6) stationary. Remove flange.

TA50560

6-10. FRONT AND REAR AXLE DRIVE PINION OIL SEAL AND PINION FLANGE MAINTENANCE (Con't).

4. Remove oil seal (5) from housing bore and discard.



b. INSPECTION

1. Inspect flange oil seal contact surface, bearing contact surface, drive splines, and universal joint mount. Replace flange if damaged.
2. If flange deflector requires replacement, remove by tapping from flange. Clean stake points, install new deflector, and stake deflector at 3 new equally spaced positions.

c. INSTALLATION

1. Lubricate cavity between oil seal (5) lips with molybdenum grease and install new oil seal squarely in bore until flush with housing,
2. Install flange (2). Install washer (1) and original flange nut (4). Install flange holder (6) and tighten flange nut until same number of threads on drive pinion (3) stem are exposed as recorded during removal and scribe marks are alined. Remove flange nut and discard. Install new flange nut until snug against washer. Remove flange holder.

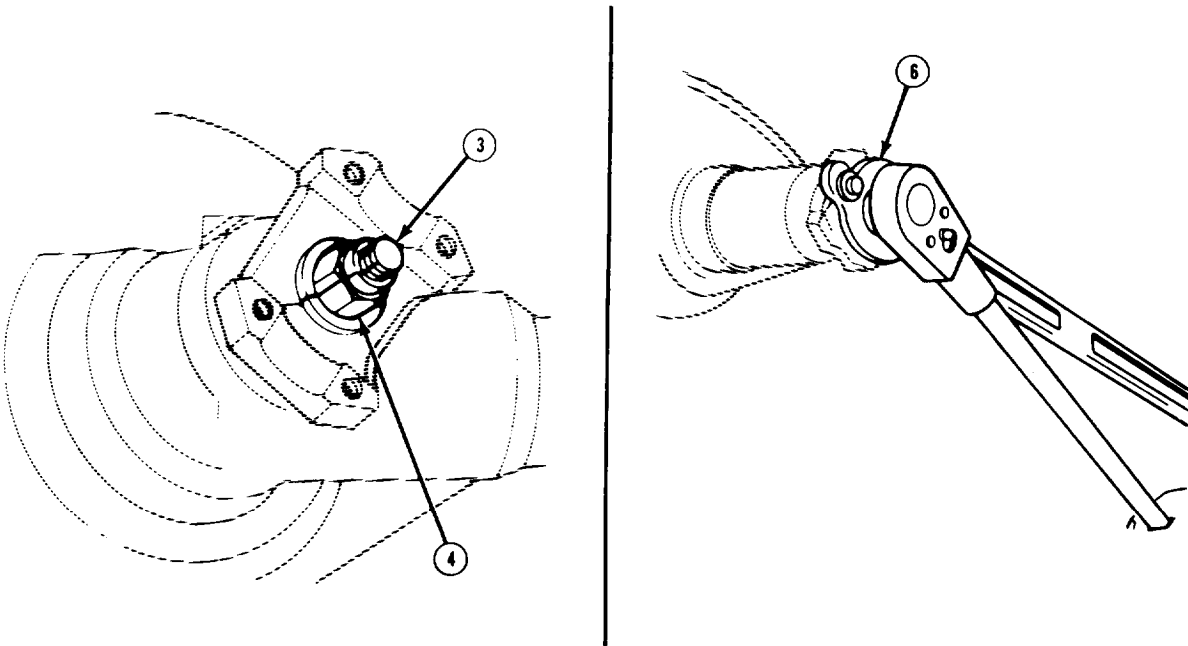
TA50561

6-10. FRONT AND REAR AXLE DRIVE PINION OIL SEAL AND PINION FLANGE MAINTENANCE (Con't).

CAUTION

Care should be taken to ensure that original rotating torque is not exceeded by more than 5 lb.-in. (0.6 N.m). If working on M1009, exceeding torque specifications may compress spacer on drive pinion (3) shaft too far and require replacement of spacer.

3. Measure torque required to turn drive pinion (3) and compare with torque recorded during removal, Install flange holder (6) and tighten flange nut (4) in small increments until rotating torque exceeds original by 1–5 lb.-in. (0. 1-0.6 N.m). Remove flange holder.



FOLLOW-ON TASKS:

- Check differential lubricating oil level and fill as required, (See LO 9-2320-289-12)
- Connect propeller shaft to axle. (See TM 9-2320-289-20)
- Remove jack stands and lower truck.

6-11. STEERING KNUCKLE AND ARM MAINTENANCE (ALL EXCEPT M1009).

This task covers: a. Disassembly b. Assembly

INITIAL SETUP:

Equipment Condition

- Steering tie-rod removed.
(See TM 9-2320-289-20)
- Connecting rod disconnected from steering arm (left side). (See TM 9-2320-289-20)
- Front axle shaft removed,
(See paragraph 6-4)

Materials/Parts

- One gasket
- Two seals
- Eight lockwashers
- Grease (Item 36, Appendix B)

Tools/Test Equipment

- Socket wrench adapter, J-26871-A
- Torque wrench

General Safety Instructions

- Nuts at steering arm, or bolts at upper kingpin bearing cap, must be removed alternately and with caution.

a. DISASSEMBLY

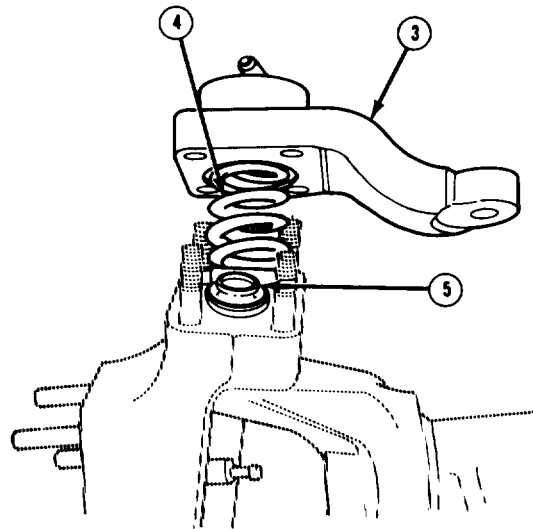
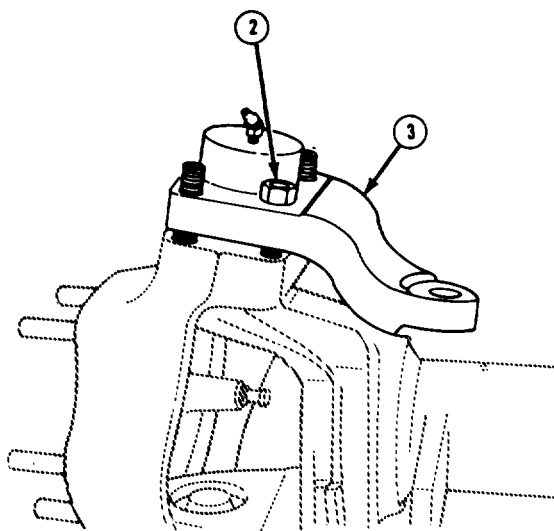
WARNING

Nuts at steering arm or bolts at upper kingpin bearing cap must be removed alternately and with caution. Compression spring underneath steering arm or bearing cap could fly up during removal, causing serious injury to personnel.

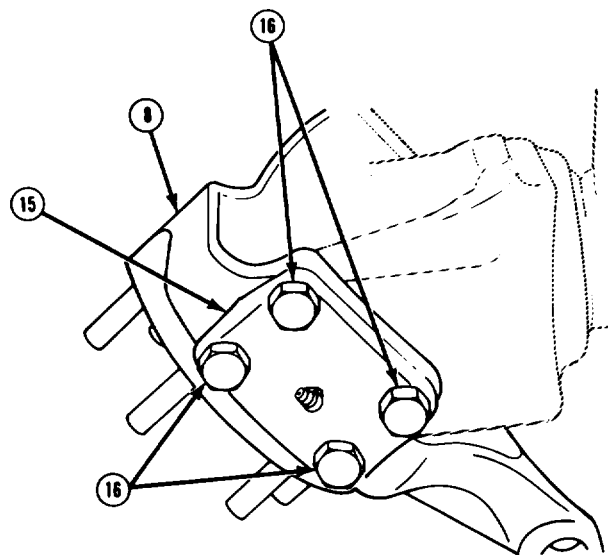
6-11. STEERING KNUCKLE AND ARM MAINTENANCE (ALL EXCEPT M1009)
(Con't).

NOTE

- On left side, steering arm (3) is installed to steering knuckle (8) with 4 nuts (2). On right side, upper kingpin bearing cap is installed to steering knuckle with 4 bolts and lockwashers.
 - Left side disassembly is given.
1. Remove 4 nuts (2) alternately at steering arm (3). Remove steering arm, spring (4), and spring retainer (5). Remove gasket and discard. If present, discard 4 lockwashers.



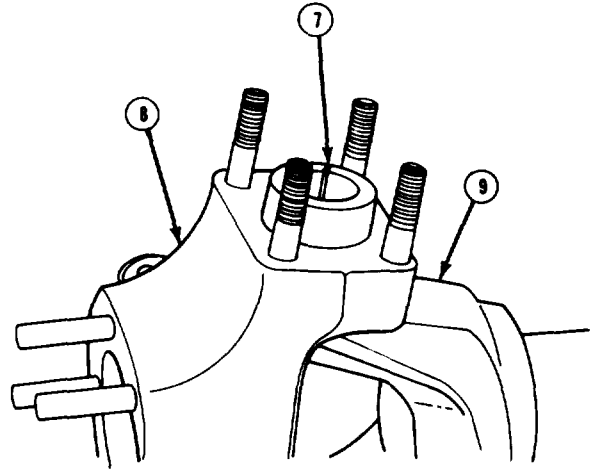
2. Remove 4 bolts (16), lockwashers, and lower kingpin bearing cap (15) from steering knuckle (8). Discard lockwashers,



TA50563

6-11. STEERING KNUCKLE AND ARM MAINTENANCE (ALL EXCEPT M1009) (Con't).

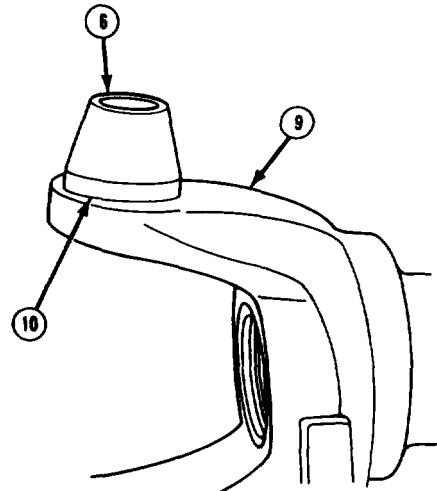
3. Remove kingpin bushing (7) from top of steering knuckle (8). Remove steering knuckle from axle housing (9).



NOTE

Upper kingpin (6) is tightened to 550 lb.-ft. (746 N.m).

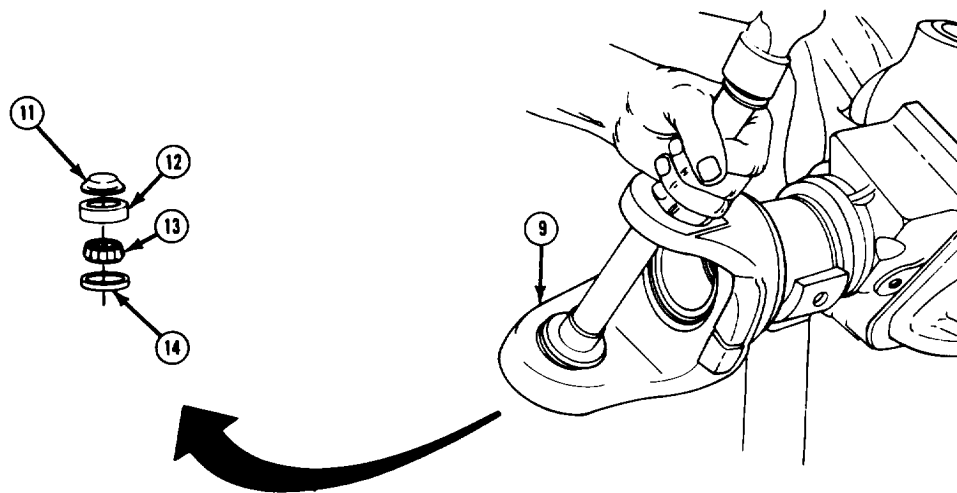
4. Remove seal (10) from upper kingpin (6). Remove upper kingpin from axle housing (9). Discard seal.
5. inspect upper kingpin (6) and kingpin bushing (7) for damage. Replace if damaged.



TA50564

6-11. STEERING KNUCKLE AND ARM MAINTENANCE (ALL EXCEPT M1009)
(Con't).

6. Remove seal (14) and bearing (13). Inspect bearing for damage and binding, Replace if damaged or binding. Discard seal. If damaged, remove bearing cup (12) and retainer (11).
7. Inspect all grease fittings and replace if damaged.

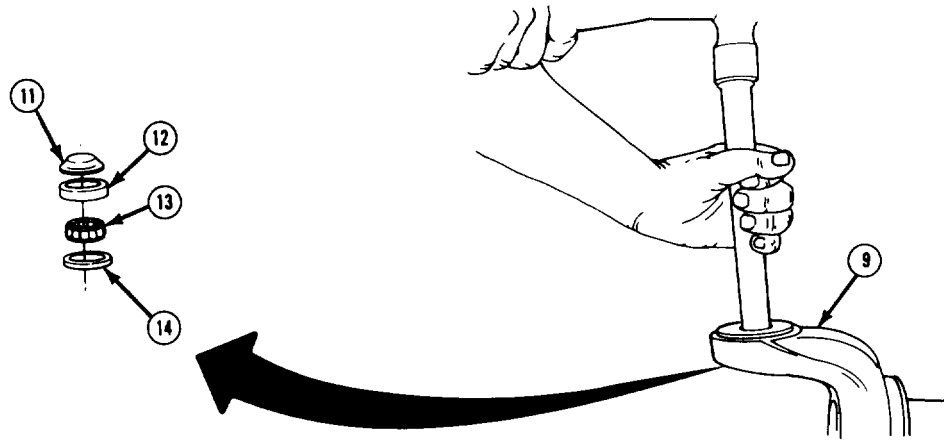


b. ASSEMBLY

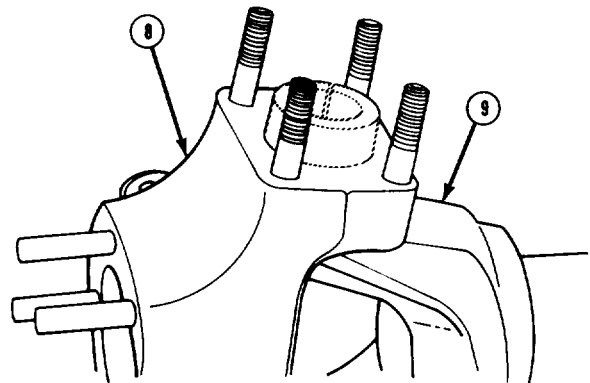
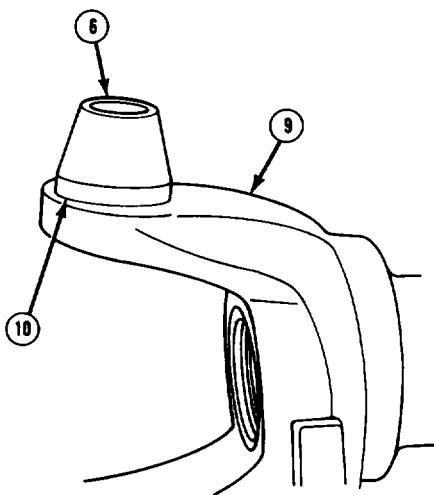
NOTE

- On left side, steering arm is installed to steering knuckle (8) with 4 nuts. On right side, upper kingpin bearing cap is installed to steering knuckle with 4 bolts and lockwashers.
 - Left side assembly is given,
 - Seal (14) will protrude slightly from surface of axle housing (9) flange when installed.
1. If removed, assemble retainer (11) and bearing cup (12), and install to axle housing (9) flange. Fill area in retainer with grease. Grease bearing (13) and install, Install new seal (14).

6-11. STEERING KNUCKLE AND ARM MAINTENANCE (ALL EXCEPT M1009)
(Con't).

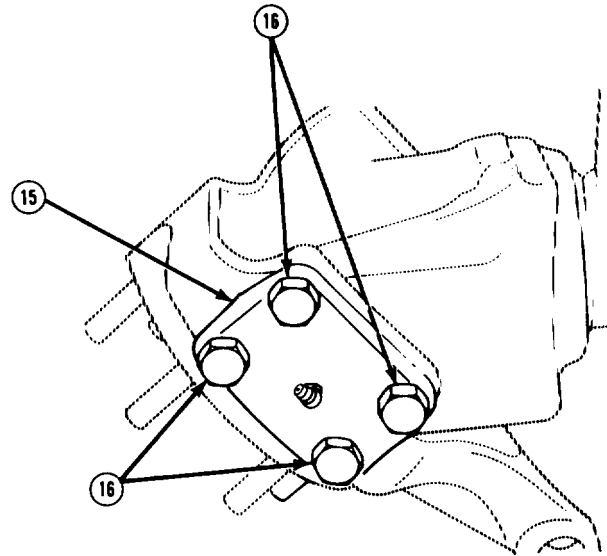


2. Install upper kingpin (6) to axle housing (9) and tighten to 550 lb.-ft. (746 N.m). Install new seal (10) to upper kingpin with lip facing up.
3. Grease upper kingpin (6) and install steering knuckle (8) to axle housing (9).

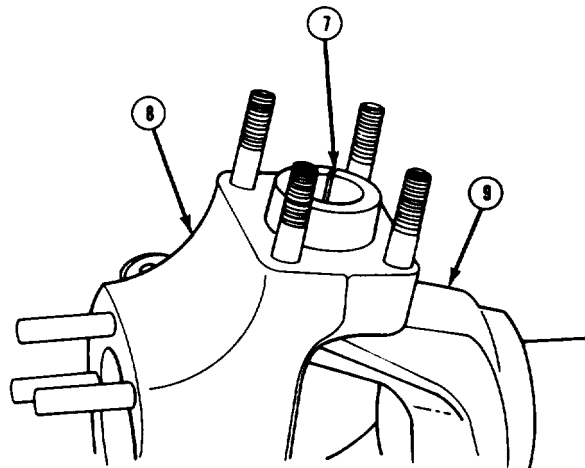


6-11. STEERING KNUCKLE AND ARM MAINTENANCE (ALL EXCEPT M1009)
(Con't).

4. Install lower kingpin bearing cap (15) with 4 new lockwashers and bolts (16). Tighten bolts to 80 lb.-ft. (108 Nom).



5. Install kingpin bushing (7) to top of steering knuckle (8) with ridge on bushing indexed with slot in axle housing (9).



TA50567

 6-11. STEERING KNUCKLE AND ARM MAINTENANCE (ALL EXCEPT M1009)
 (Con't).

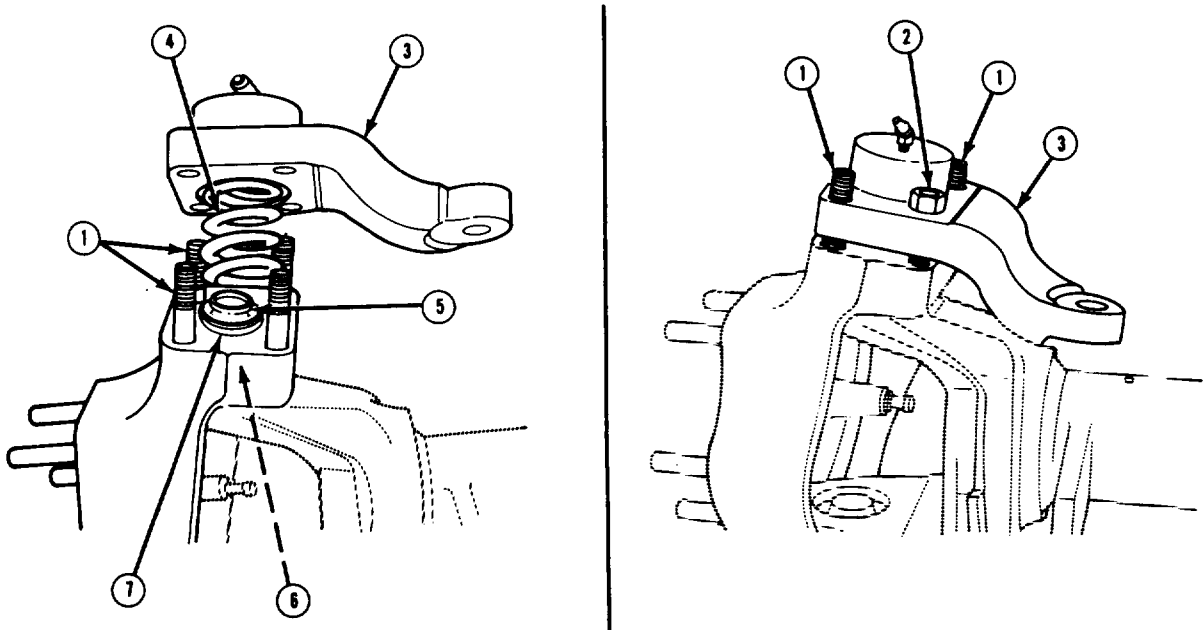
CAUTION

Nuts (2) at steering arm (3) or bolts at upper kingpin bearing cap should be installed alternately and in increments. Failure to follow this caution may result in damage to stud threads or to bolts.

NOTE

On right side, 4 new lockwashers are used with bolts.

6. Assemble spring retainer (5) with collar facing up and spring (4) on kingpin bushing (7) over upper kingpin (6). Install new gasket and steering arm (3) over steering knuckle studs (1). Install 4 nuts (2), and tighten alternately and in increments to 80 lb.-ft. (108 N.m).



FOLLOW-ON TASKS:

- Lubricate steering knuckle and arm. (See LO 9-2320-289-12)
- Install front axle shaft. (See paragraph 6-4)
- Connect connecting rod to steering arm if removed. (See TM 9-2320-289-20)
- Install steering tie-rod. (See TM 9-2320-289-20)

TA50568

6-12. STEERING KNUCKLE, ARM, AND BALL JOINT MAINTENANCE (M1009).

This task covers: a. Disassembly b. Assembly

INITIAL SETUP:

Equipment Condition

- Steering tie-rod removed.
(See TM 9-2320-289-20)
- Connecting rod disconnected from steering arm (left side only), (See TM 9-2320-289-20)
- Front axle shaft removed. (See paragraph 6-4)

Materials/Parts

- One flat washer
- One steering knuckle socket repair kit
- One cotter pin
- Three locknuts

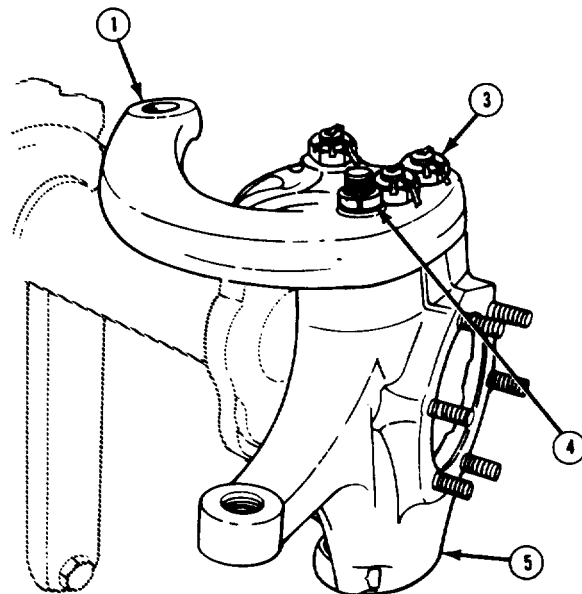
Tools/Test Equipment

- Ball joint adapter set, J-23454-D
 - Ball stud adjuster sleeve, J-23447
 - Lower ball joint remover, J-33122
 - "C" clamp
 - Snapping pliers
 - Torque wrench
-

a. DISASSEMBLY

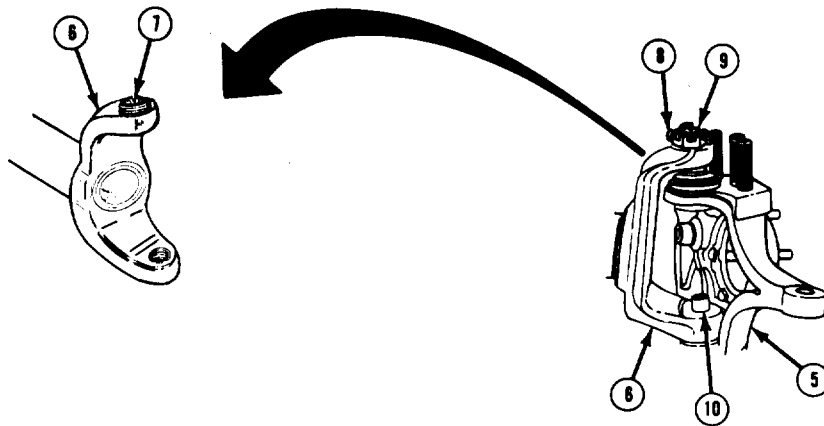
NOTE

- Left side steering knuckle (5), arm (1), and ball joint (12) disassembly is given.
 - Right side steering knuckle (5) has no steering arm (1).
 - It may be necessary to apply heat to loosen steering arm (1).
 - If removing steering arm (1), perform step 1,
1. Remove 3 locknuts (3) at steering arm (1), Remove 3 stud adapters (4). Remove steering arm from steering knuckle (5). Discard locknuts.



6-12. STEERING KNUCKLE, ARM, AND BALL JOINT MAINTENANCE (M1009) (Con't).

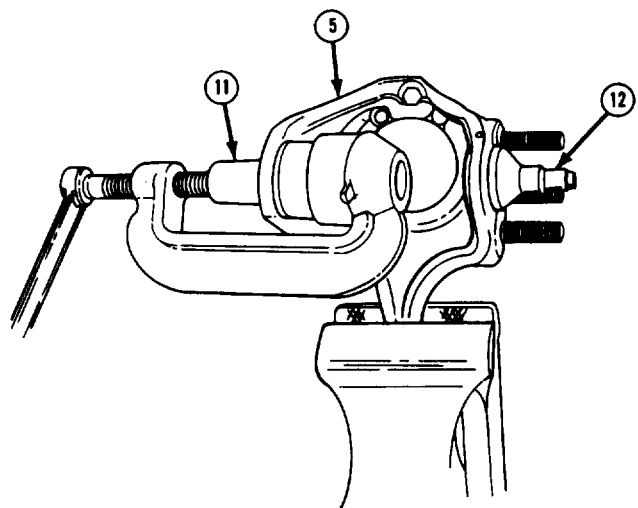
2. Remove cotter pin (8) from upper ball stud nut (9). Remove upper and lower ball stud nuts (9 and 10). Discard cotter pin and upper and lower ball stud nuts.
3. Loosen upper ball stud adjusting sleeve (7) until flush with underside of axle housing (6).
4. Use a suitable wedge-shaped tool between lower ball stud and axle housing (6). Tap on tool to release steering knuckle (5). Repeat at upper ball stud and remove steering knuckle from axle housing.



NOTE

Ensure that lower ball joint (12) has been removed before repairing upper ball joint.

5. Place steering knuckle (5) in vise. Remove snapping at lower ball joint (12). Using adapters J-23454-1 and J-23454-4, install ball joint removal tools on lower ball joint. Install flat washer between "C" clamp and adapter (11). Tighten "C" clamp until lower ball joint is pressed out. Discard lower ball joint and snapping.
6. Place ball joint removal tools on upper ball joint (12) and remove in same manner as lower ball joint. Discard upper ball joint.



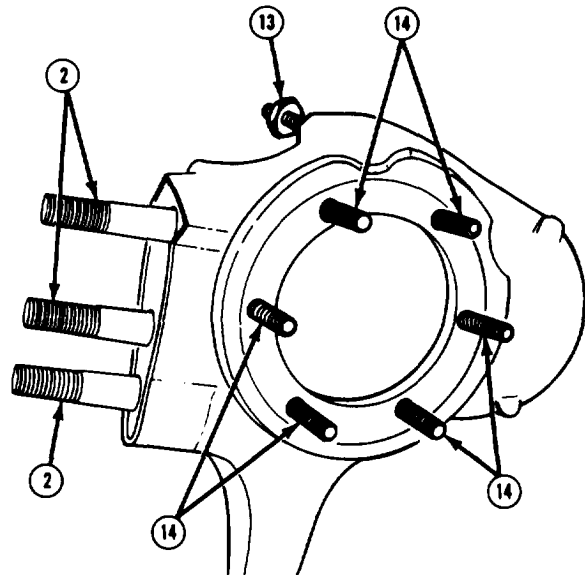
TA50570

6-12. STEERING KNUCKLE, ARM, AND BALL JOINT MAINTENANCE (M1009)
(Con't).

NOTE

If stop (13) requires replacement, position and number of exposed threads should be noted for installation.

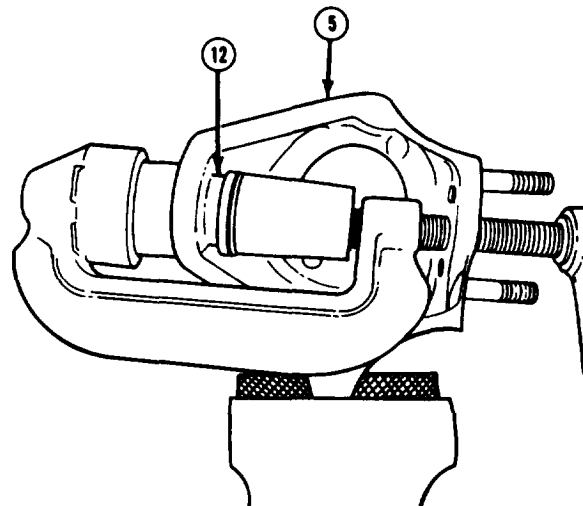
7. Inspect 3 steering arm studs (2), 6 spindle bolts (14), and stop (13). Replace if damaged.
8. Inspect upper ball stud adjusting sleeve (7) at axle housing (6) and replace if damaged.



b. ASSEMBLY

NOTE

- Left side steering knuckle (5), arm, and ball joint (12) assembly is given,
 - M1 009 steering knuckle ball joints (12) do not require lubrication.
 - Ensure that lower ball joint (12) (ball joint without cotter pin hole in stud) is straight before it is pressed in place.
1. Position new lower ball joint (12) in steering knuckle (5). Using ball joint installation tools and adapters J-23454-2 and J-23454-4, press lower ball joint into place. Install new snapping.
 2. Remove rubber retaining cup from new upper ball joint (12). Position upper ball joint at steering knuckle (5) and install in same manner as lower ball joint. Install rubber retaining cup to upper ball joint.



TA50571

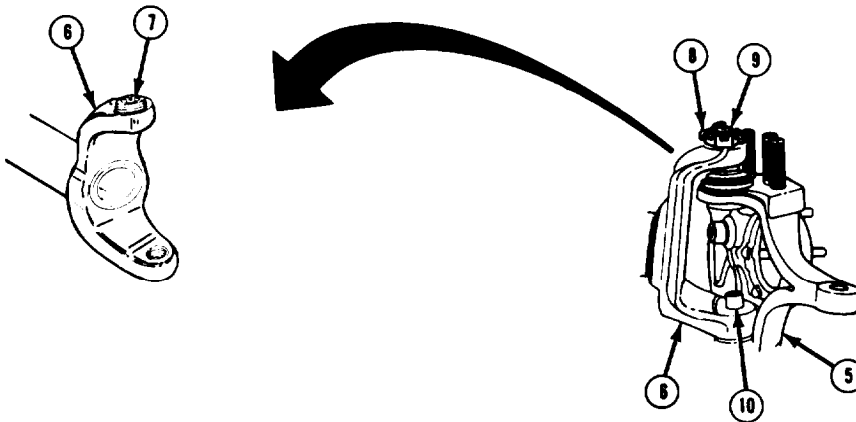
6-12. STEERING KNUCKLE, ARM, AND BALL JOINT MAINTENANCE (M1009) (Con't).

3. Position steering knuckle (5) and sockets at axle housing (6). Install lower ball stud nut (10) finger tight.

NOTE

Torque values in steps 4-7 are necessary to maintain proper alignment of steering knuckle (5) to axle housing (6).

4. Push up on steering knuckle (5) to keep ball socket from turning in knuckle and partially tighten lower ball stud nut (10) to 30 lb.-ft. (41 N.m).
5. Tighten upper ball stud adjusting sleeve (7) to 50 ft.-lb. (68 N.m).



NOTE

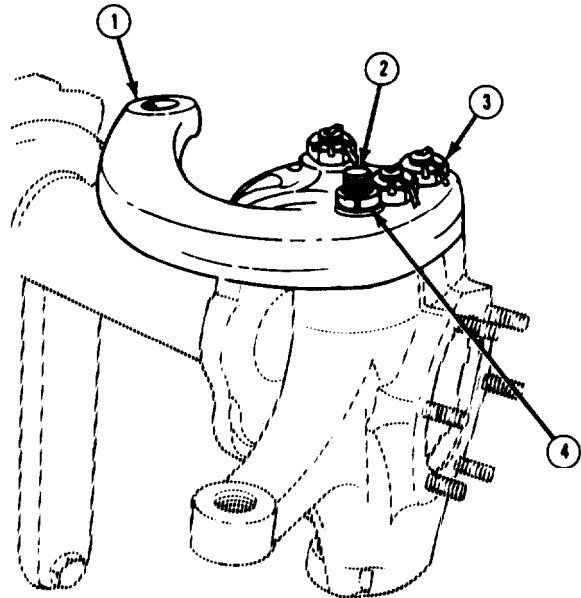
Nut (9) should be tightened only, to align holes for cotter pin (8).

6. Install new upper ball stud nut (9) and tighten to 100 lb.-ft. (136 N.m). Install new cotter pin (8).
7. Fully tighten lower ball stud nut (10) to 70 lb.-ft. (95 N.m).

TA50572

6-12. STEERING KNUCKLE, ARM, AND BALL JOINT MAINTENANCE (M1009)
(Con't).

8. If removed, install steering arm (1) over 3 steering arm studs (2). Install 3 stud adapters (4). Install 3 new locknuts (3) and tighten to 90 lb.-ft. (122 N.m).



FOLLOW-ON TASKS:

- Install front axle shaft. (See paragraph 6-4)
- Connect connecting rod to steering arm if removed. (See TM 9-2320-289-20)
- Install steering tie-rod. (See TM 9-2320-289-20)

6-13. REAR AXLE ASSEMBLY REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Equipment Condition

- Parking brake released.
- Truck raised and frame supported on jack stands.
- Rear wheels removed. (See TM 9-2320-289-20)
- Rear propeller shaft disconnected from rear axle differential. (See TM 9-2320-289-20)
- Parking brake cable disconnected at equalizer. (See TM 9-2320-289-20)
- Rear brake lines disconnected from wheel cylinders and differential housing. (See TM 9-2320-289-20)
- Proportioning valve lever disconnected from differential housing. (See TM 9-2320-289-20)
- Rear shock absorbers disconnected from axle. (See TM 9-2320-289-20)
- Rear stabilizer bar removed (M1028A2 and M1028A3). (See TM 9-2320-289-20)

Tools/Test Equipment

- Torque wrench

Personnel Required

- MOS 63W (2)

General Safety Instructions

- Rear axle assembly is heavy. Use extreme caution, provide support, and use assistance during removal and installation.
-

6-13. REAR AXLE ASSEMBLY REPLACEMENT (Con't).

a. REMOVAL

1. Slide clamp up rear axle vent hose (8) and disconnect rear axle vent hose from rear axle differential (7).
2. Place suitable jack under rear axle differential (7).

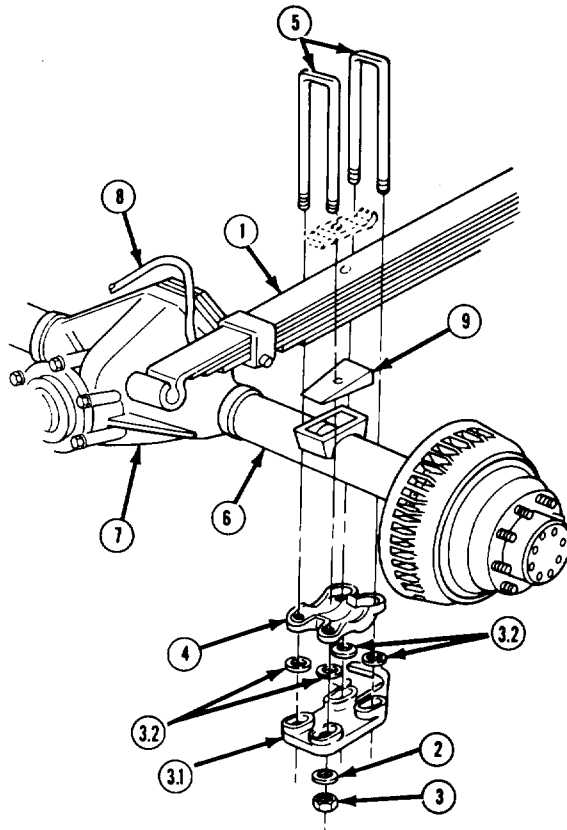
WARNING

Rear axle assembly (6) is heavy. Use extreme caution, provide support, and use assistance during removal. Failure to follow this warning may result in serious injury to personnel or damage to rear axle assembly.

NOTE

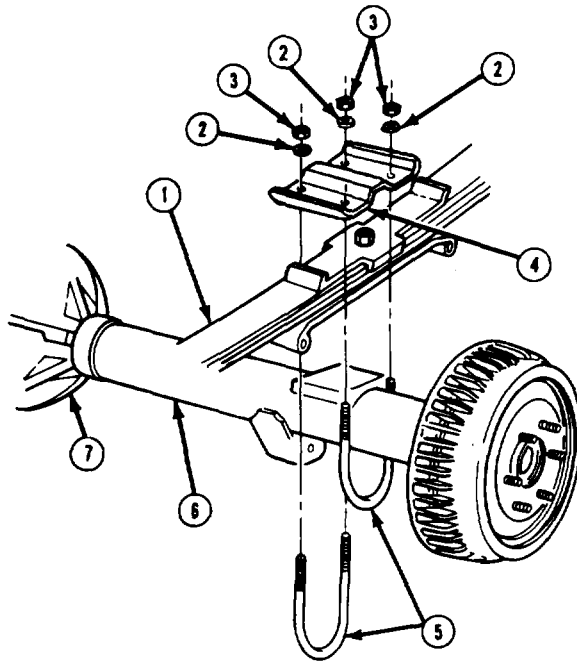
For M1028A2 and M1028A3, skip step 3 and perform step 4.

3. Remove 4 nuts (3), washers (2), 2 "U" bolts (5), and anchor plate (4) at each spring assembly (1). Lower rear axle assembly (6) and remove. If present, remove 2 shims (9) from axle housing.
4. Remove 4 nuts (3), washers (2), adapter (3.1), 4 washers (3.2), 2 "U" bolts (5), and anchor plate (4) at each spring assembly (1). Lower rear axle assembly (6) and remove. If present, remove 2 shims (9) from axle housing.

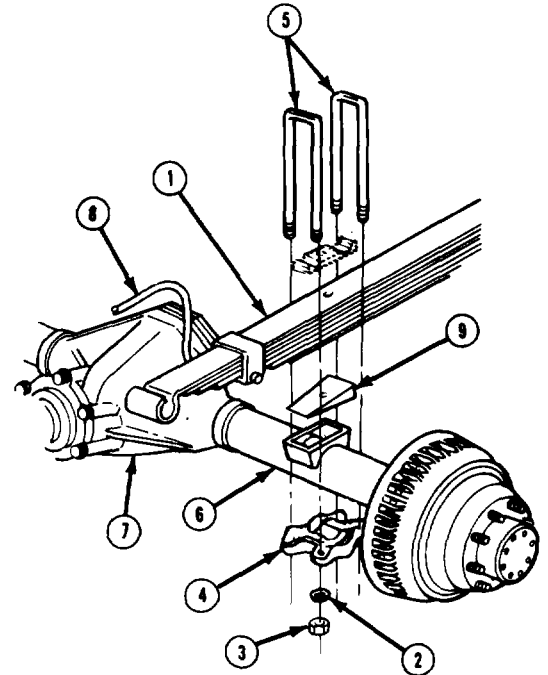


M1028A2 and M1028A3

6-13. REAR AXLE ASSEMBLY REPLACEMENT (Con't).



M1009



All Except M1009, M1028A2, and M1028A3

b. INSTALLATION

WARNING

Rear axle assembly (6) is heavy. Use extreme caution, provide support, and use assistance during installation. Failure to follow this warning may result in serious injury to personnel or damage to rear axle assembly,

NOTE

For M1028A2 and M1028A3, skip steps 1 and 2 and perform steps 2.1 and 2.2.

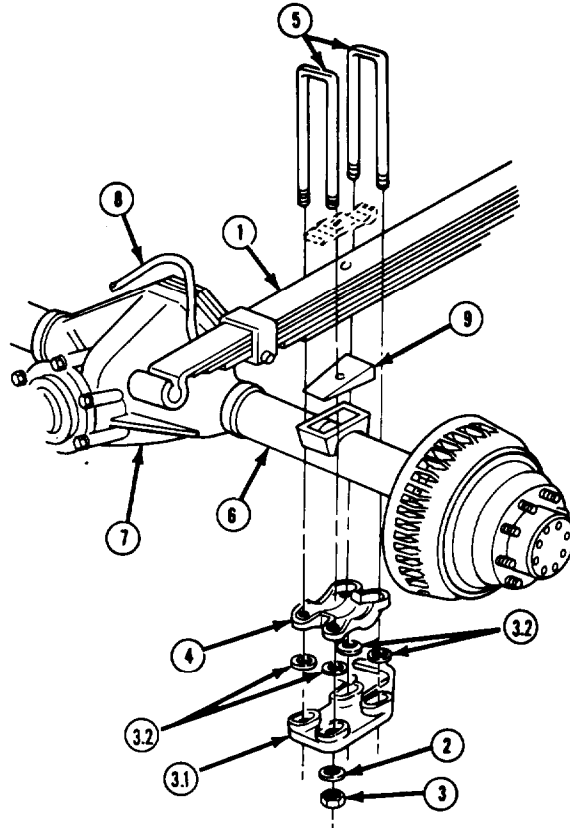
- 1 . Position rear axle assembly (6) on suitable jack and raise into position. If removed, install 2 shims (9) on axle housing with thinner edges facing front. Aline holes in shims with holes in axle housing and spring assembly (1) center bolt.
- 2 . Loosely install anchor plate (4) at each spring assembly with with 2 " U" bolts (5), 4 washers (2), and nuts (3). Install all nuts to uniform engagement on "U" bolts to retain and position anchor plate.

6-13. REAR AXLE ASSEMBLY REPLACEMENT (Con't).

NOTE

Adapters (3.1) are mismarked on casting as to left-hand and right-hand. Install adapters as shown, with ribs up and curved arm to rear facing inboard.

- 2.1. Position rear axle assembly (6) on suitable jack and raise into position. If removed, install 2 shims (9) on axle housing with thinner edges facing front. Aline holes in shims with holes in axle housing and spring assembly (1) center bolt.
- 2.2. Loosely install anchor plate (4) and adapter (3, 1) at each spring assembly with 2 "U" bolts (5), 4 washers (3.2), washers (2), and nuts (3). Install all nuts to uniform engagement on "U" bolts to retain and position anchor plate and adapter,



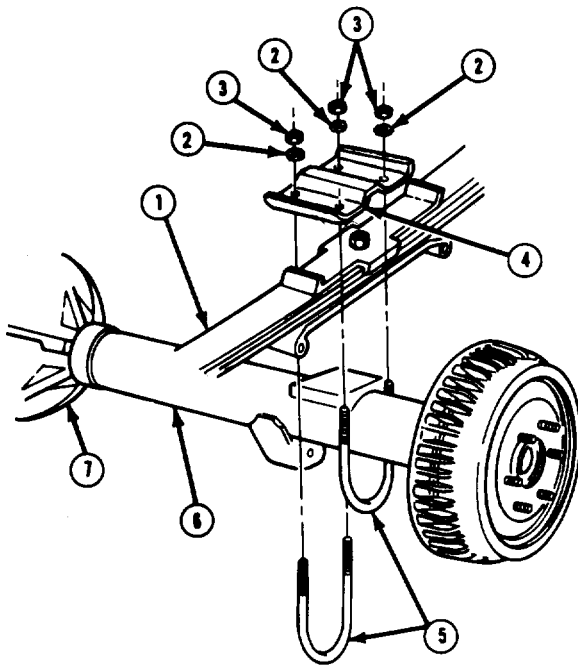
M1028A2 and M1028A3

NOTE

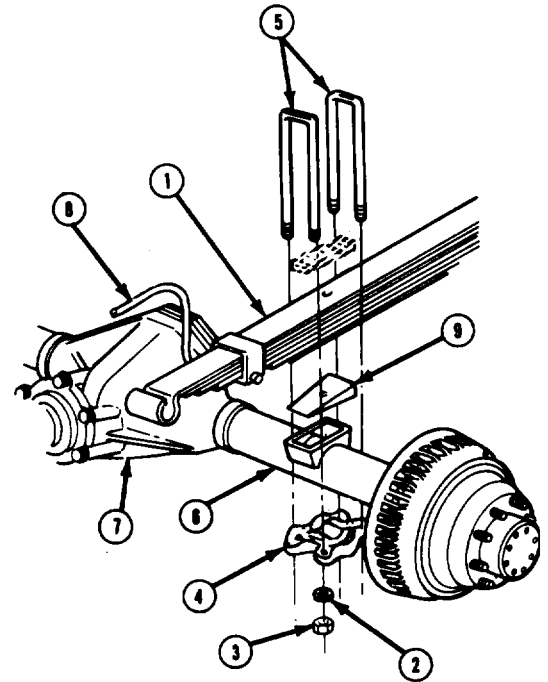
All nuts (3) must be tightened evenly to ensure that "U" bolts (5) and spring assemblies (1) seat properly,

3. Partially tighten all nuts (3) in diagonal sequence to 25 lb.-ft. (34 N.m). Fully tighten nuts on M1009 in same diagonal sequence to 145 lb.-ft. (197 N.m). On M1028A2, tighten all nuts in same diagonal sequence to 150 lb.-ft. (180 N.m). On all others, tighten all nuts in same diagonal sequence to 170 lb.-ft. (231 N.m).
4. Remove jack from rear axle differential (7),
5. Connect rear axle vent hose (8) to rear axle differential (7) and install clamp,

6-13. REAR AXLE ASSEMBLY REPLACEMENT (Con't).



M1009



All Except M1009, M1028A2, and M1028A3

FOLLOW-ON TASKS:

- Install rear stabilizer bar (M1028A2 and M1028A3). (See TM 9-2320-289-20)
- Connect rear shock absorbers to axle. (See TM 9-2320-289-20)
- Connect proportioning valve lever to differential housing. (See TM 9-2320-289-20)
- Connect rear brake lines to wheel cylinders and differential housing. (See TM 9-2320-289-20)
- Connect parking brake cable at equalizer. (See TM 9-2320-289-20)
- Connect rear propeller shaft to rear axle differential. (See TM 9-2320-289-20)
- Install rear wheels. (See TM 9-2320-289-20)
- Remove jack stands and lower truck.
- Road test truck and check torque of "U" bolt nuts.

6-14. REAR AXLE SHAFT, OUTER SEAL, BEARING, AND BACKING PLATE REPLACEMENT (M1009).

This task covers: a. Removal c . Installation
 b. Cleaning and inspection

INITIAL SETUP:

Equipment Condition

- Brake drum removed.
(See TM 9-2320-289-20)
- Brake shoes and attaching hardware removed (if removing backing plate),
(See TM 9-2320-289-20)
- Rear brake line disconnected from wheel cylinder (if removing backing plate),
(See TM 9-2320-289-20)
- Emergency brake cable disconnected from backing plate (if removing backing plate).
(See TM 9-2320-289-20)

Materials/Parts

- One bearing
- One differential cover gasket
- One lockscrew
- One rear axle outer oil seal
- Four lockwashers
- Dry cleaning solvent
(Item 23, Appendix B)
- Grease (Item 36, Appendix B)
- Gear lubricating oil
(Item 44, Appendix B)

Tools/Test Equipment

- Annular bearing inserter, J-23690
- Axle seal installer, J-29713
- Drive handle, J-8092
- Puller kit
- Torque wrench

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).
-

a. REMOVAL

NOTE

- If removing rear axle shaft (8), perform steps 1-3.
 - If removing rear axle outer oil seal, perform steps 1-4.
 - If removing rear axle outer oil seal and bearing, perform steps 1-3, and 5.
 - If removing backing plate, perform steps 1-3 and 6.
 - Ensure that rear axle differential cover is clean before proceeding.
1. Remove 10 bolts at differential cover, Carefully move brake line and bracket, brake line block bracket, and emergency brake cable mounting bracket out of the way. DO NOT kink lines. Remove differential cover and allow all lubricating oil to drain into a suitable container. Remove differential cover gasket and discard.

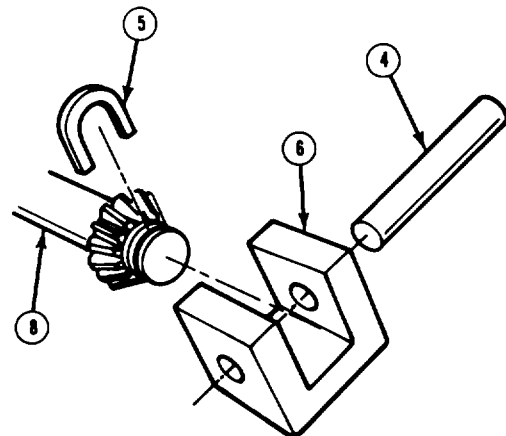
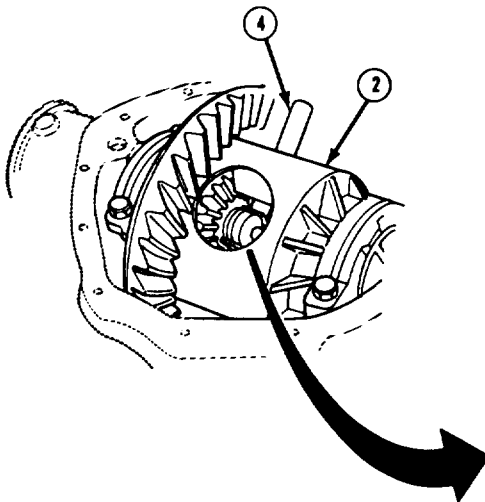
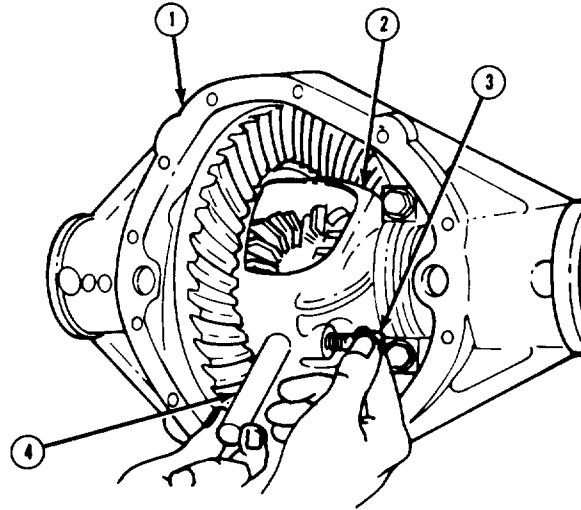
CAUTION

When removing rear axle shaft (8), ensure that outer oil seal is not damaged. Failure to follow this caution may result in damage to outer oil seal and axle lubricant leakage.

6-14. REAR AXLE SHAFT, OUTER SEAL, BEARING, AND BACKING PLATE REPLACEMENT (M1009) (Con't).

CAUTION

- DO NOT allow pinion shaft (4) to come completely out,
2. Rotate differential case (2) assembly as required to gain access to lock screw (3). Support pinion shaft (4) so that it does not fall into differential case assembly. Remove lock screw. Withdraw pinion shaft part way and rotate differential case assembly until pinion shaft touches bottom edge of housing (1).
 3. Rotate rear axle shaft (8) until "C" lock (5) is aligned with thrust block (6). Push flange of rear axle shaft toward the differential case (2) assembly and remove "C" lock. Remove rear axle shaft. Loosely reinstall pinion shaft (4) and lock screw (3) to ensure that differential gears do not become mispositioned.



TA50575

6-14. REAR AXLE SHAFT, OUTER SEAL, BEARING, AND BACKING PLATE REPLACEMENT (M1009) (Con't).

NOTE

Perform step 4 if removing outer oil seal (10) only.

- 4 . Insert button end of rear axle shaft (8) behind steel case of outer oil seal (10), Remove outer oil seal and discard.

NOTE

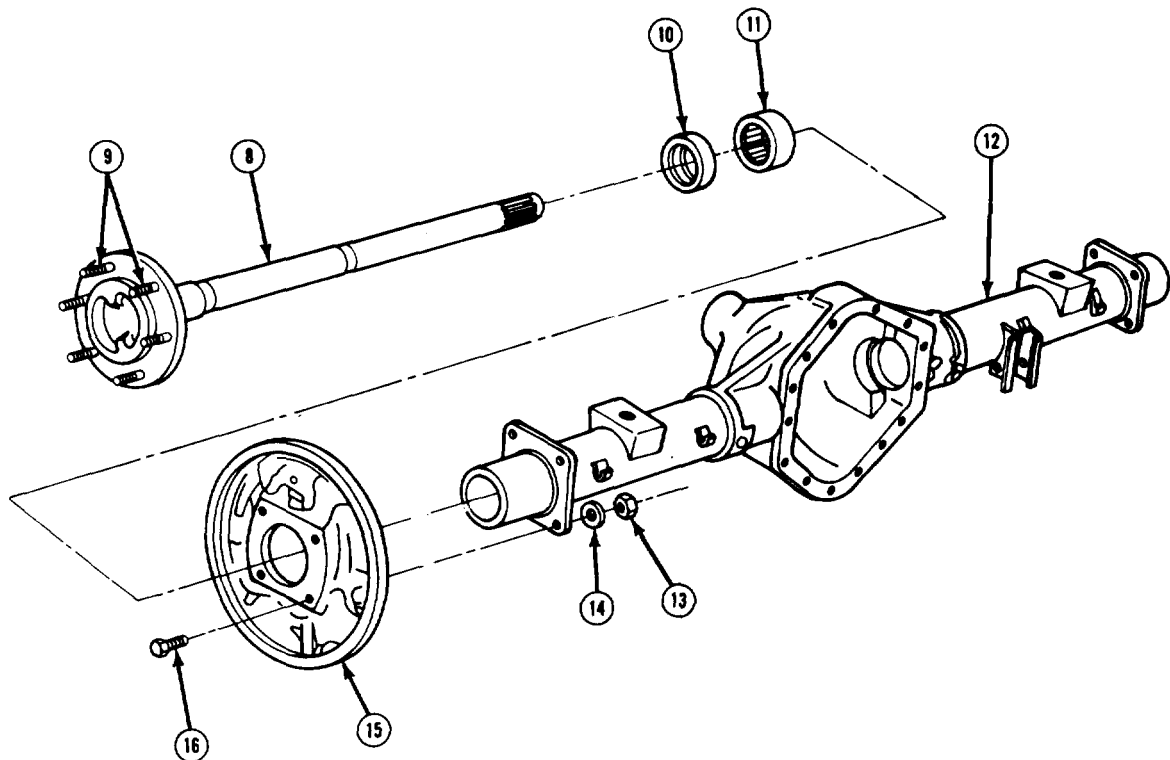
Perform step 5 if removing outer oil seal (10) and bearing (11).

- 5 . Insert puller into bore so that tool grasps behind bearing (11). Remove bearing and outer oil seal (1 O). Discard bearing and outer oil seal.

NOTE

Perform step 6 only if backing plate (15) is damaged.

- 6 . Remove 4 nuts (13), lockwashers (14), bolts (16), and remove backing plate (15) from axle housing (1 2), Discard lockwashers.



TA50576

6-14. REAR AXLE SHAFT, OUTER SEAL, BEARING, AND BACKING PLATE REPLACEMENT (M1009) (Con't).

b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent P-D-660 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.
1. Clean all removed components in dry cleaning solvent and dry with compressed air. Clean all gasket material from differential cover and housing.
 2. Inspect rear axle shaft for damage. Replace if damaged.
 3. Inspect wheel studs (9) at rear axle shaft for damage. Replace if damaged.
 4. Inspect backing plate for damage. Replace if damaged.

c. INSTALLATION

NOTE

- If installing backing plate (15), perform step 1.
 - If installing rear axle bearing (11), perform step 2.
 - If installing rear axle outer oil seal (10), perform step 3.
 - If installing rear axle shaft (8), perform steps 4-6.
1. If removed, install backing plate (15) on axle housing (12) with 4 bolts (16), new lockwashers (14), and 4 nuts (13). Tighten nuts to 35 lb.-ft. (47 Nm).
 2. Lubricate new rear axle bearing (11) with grease. Install new rear axle bearing until bearing installer tool bottoms against tube of axle housing (12).
 3. Lubricate cavity between new outer oil seal (10) lips with grease. Install new outer oil seal until seal installer tool bottoms against tube of axle housing (12) and outer oil seal is flush with end of tube.

6-14. REAR AXLE SHAFT, OUTER SEAL, BEARING, AND BACKING PLATE REPLACEMENT (M1009) (Con't).

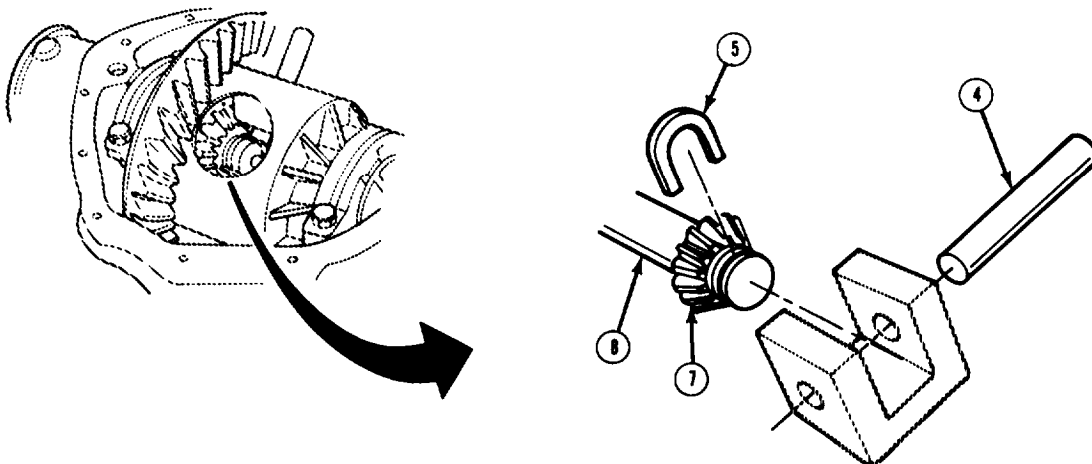
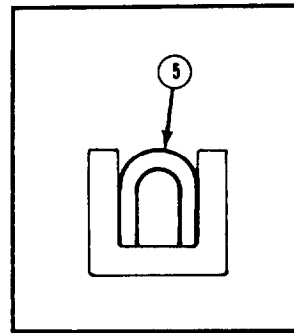
WARNING

Ensure that "C" lock (5) is correctly seated in differential side gear (7), Failure to correctly seat "C" lock may result in loss of truck's wheel and serious Injury or death to personnel.

CAUTION

When Installing rear axle shaft (8), ensure that splines on end of shaft do not damage outer oil seal. Failure to follow this caution may result in damage to outer oil seal and axle lubricant leakage.

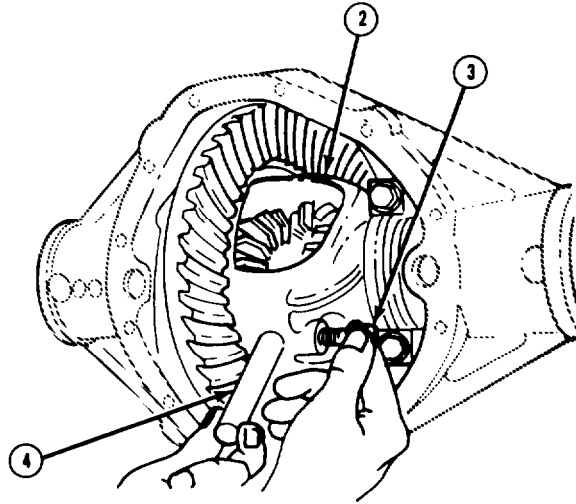
4. Slide rear axle shaft (8) into position with splines engaged into differential side gear (7), Remove lockscrew (3) and partially withdraw pinion shaft (4), Position "C" lock (5) on end of rear axle shaft, Pull rear axle shaft flange outward and seat "C" lock in differential side gear, Discard lockscrew.



TA50577

6-14. REAR AXLE SHAFT, OUTER SEAL, BEARING, AND BACKING PLATE REPLACEMENT (M1009) (Con't).

5. Aline hole in pinion shaft (4) with lockscrew (3) hole in differential case (2) assembly. Install pinion shaft and new lockscrew. Tighten lockscrew to 25 lb.-ft. (34 N.m).
6. Install new gasket and differential cover. Carefully position emergency brake cable mounting bracket, brake line block bracket, and brake line and bracket. DO NOT kink lines. Install 10 bolts and tighten to 35 lb.-ft. (47 N.m).

**FOLLOW-ON TASKS:**

- Connect emergency brake cable to backing plate if removed. (See TM 9-2320-289-20)
- Connect rear brake line to wheel cylinder if removed. (See TM 9-2320-289-20)
- Install brake shoes and attaching hardware if removed. (See TM 9-2320-289-20)
- Install brake drum. (See TM 9-2320-289-20)
- Fill rear axle differential with lubricating oil. (See LO 9-2320-289-12)

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009).

This task covers:

a. Removal	d. Assembly
b. Disassembly	e. Installation
c. Cleaning and Inspection	

INITIAL SETUP:

Equipment Condition

- Rear axle shafts removed.
(See TM 9-2320-289-20)

Tools/Test Equipment

- Wrench nut (differential), J-24429
- Dial indicator
- Puller kit
- Spring tester
- Torque wrench

Manual References

- TM 9-214

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).
 - Tightly hold differential case assembly together to absorb spring pressure during removal and installation of ring gear bolts.
-

NOTE

When removing differential cover bolts, location of clips Should be noted.

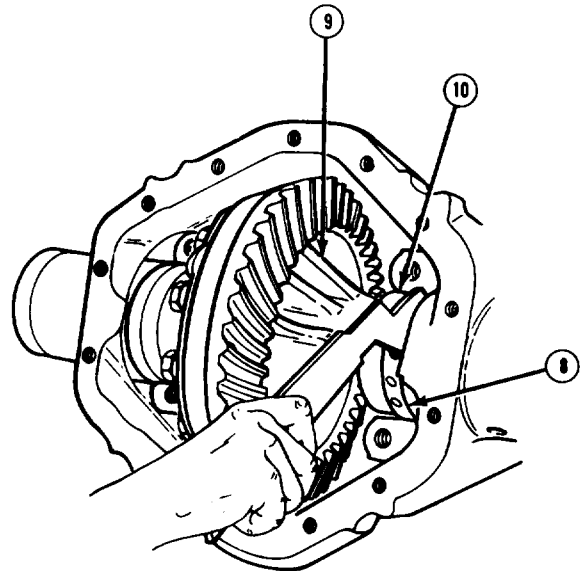
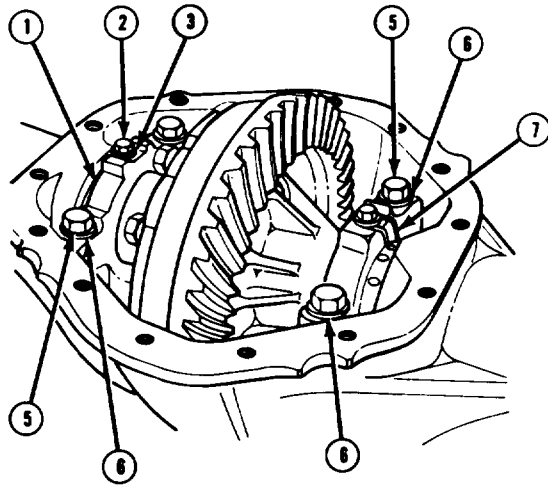
1. Place a suitable container under housing. Remove 14 bolts at differential cover and move vent tube bracket, brake line and bracket, and proportioning valve lever out of the way. Remove differential cover and allow all lubricating oil to drain. Remove gasket, if present, and discard.

NOTE

Ensure that bearing caps (1) are marked for installation in same position.

2. Remove bolt (2), washer (3), and adjusting nut lock (7) from each bearing cap (1), Remove 4 bolts (5), lockwashers (6), and 2 bearing caps. Discard lockwashers.
3. Loosen 2 adjusting nuts (8). Remove differential case (9) assembly from housing. Remove 2 bearing cups (10) from differential case assembly side bearings (11) and tag for installation.

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).



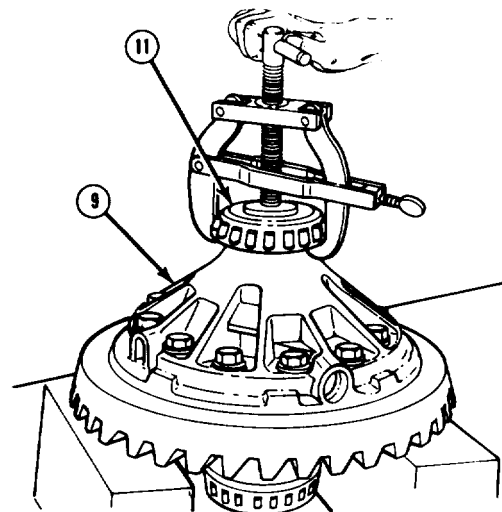
b. DISASSEMBLY

1. Place differential case (9) assembly in vise.

CAUTION

Ensure that puller fingers are installed into notches of differential case (9) assembly so that only inner race is contacted. Failure to follow this caution may result in damage to side bearings (11).

2. Tag side bearings (11) for assembly on their original side. Install bearing puller on side bearing and remove side bearing. Repeat for remaining side bearing.



TA50579

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

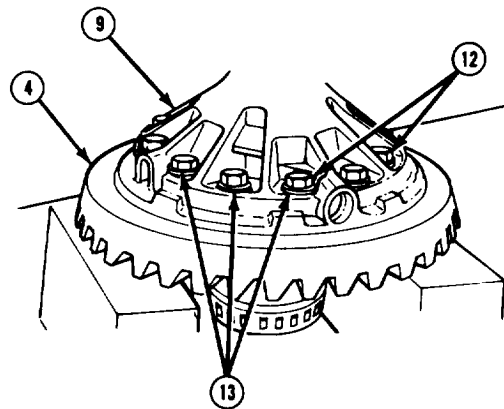
WARNING

Tightly hold differential case (9) assembly together to absorb spring pressure as last ring gear bolts (12) are removed. Failure to follow this warning may result in injury to personnel or damage to differential case assembly components.

NOTE

Shop rags placed around vise will help protect ring gear (4) teeth from damage should ring gear fall during disassembly.

3. Scribe a line on differential case (9) assembly and ring gear (4) to ensure assembly in same position. Remove 12 ring gear bolts (12) and lockwashers (13). Using a soft-faced hammer, tap ring gear loose from differential case assembly. Remove differential case assembly from vise and remove ring gear. Discard lockwashers.
4. Separate differential case (9) assembly halves.

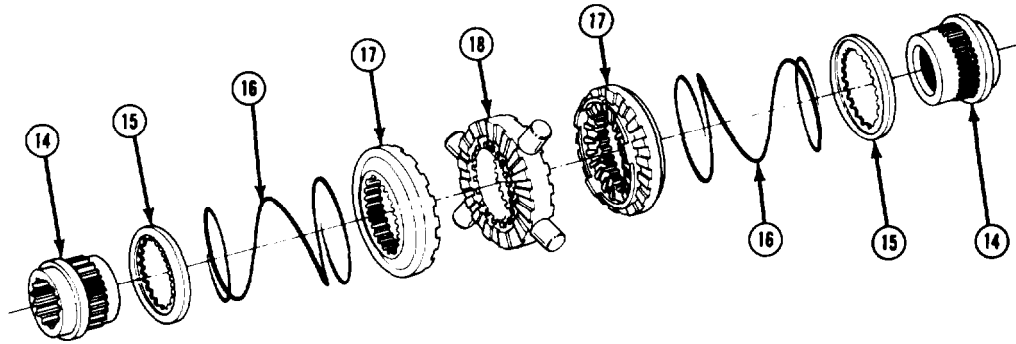


NOTE

Ensure that differential case (9) assembly internal components are kept separated so that they may be assembled in same position.

5. From 1 differential case (9) half remove side gear (14), retainer (15), spring (16), driven clutch (17), and spider assembly (18). From other differential case half remove driven clutch, spring, retainer, and side gear.

 6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).



 c. CLEANING AND INSPECTION

 WARNING

- Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.

⚠ Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.

 CAUTION

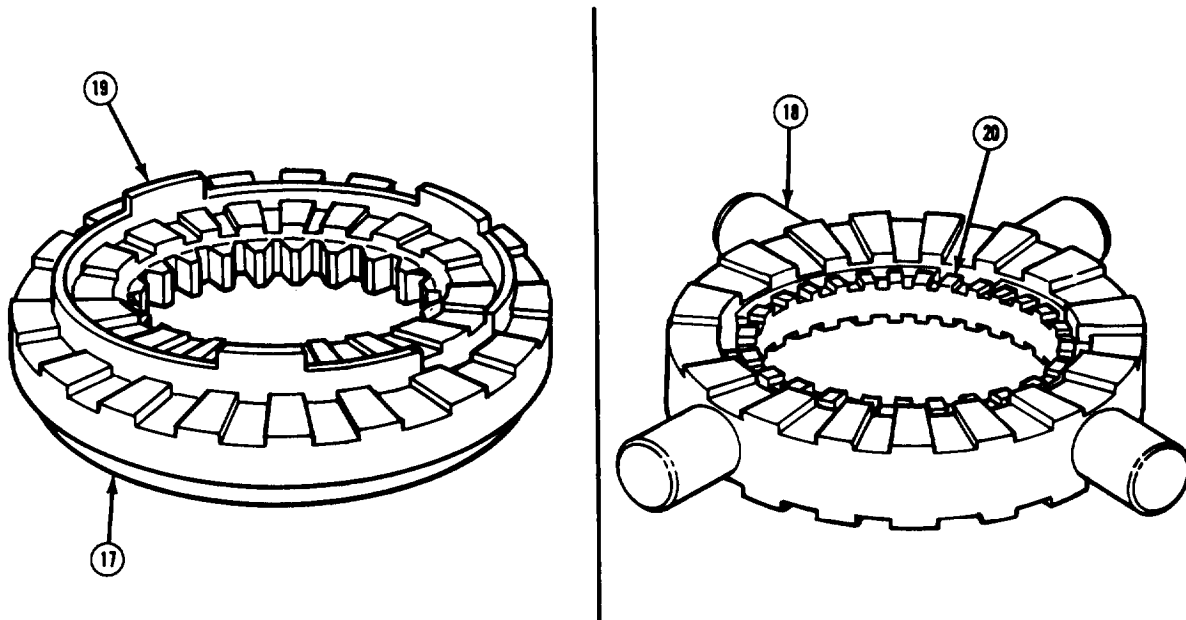
If major components (e.g. spider assembly or driven clutch assemblies) show excessive wear or damage, the entire no-spin unit should be replaced. If any part is replaced, mating parts should also be replaced as they are probably also damaged. Failure to follow this caution may result in a recurrence of original problem.

1. Clean all components in dry cleaning solvent and dry with compressed air.
2. Clean and inspect side bearings in accordance with TM 9-214,

TA50581

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

3. Inspect splines on driven clutches and remove any burrs or nicks found. If driven clutch teeth are chipped, or if burrs and nicks cannot be repaired, replace driven clutch.
4. Inspect holdout ring (19) on driven clutches (17) for fractures or chipped teeth. Replace if fractured or chipped.
5. inspect teeth on spider (18) and center cam (20) for fractures or chipping. Inspect center cam to ensure that it moves freely in spider, Replace spider assembly if fractured, chipped or if center cam does not move freely.



6. Inspect side gears for damage, Replace if damaged.
7. Inspect the fit of side gear to mating axle shaft, Replace side gear if it binds in axle shaft.
8. Using a spring tester, measure each spring load at operating height. When height of spring is 0.72 in. (18.29 mm), load should be 65 lb.±6 lb. (30 kg ±3 kg). Replace springs if measurement is not within specification.
9. Inspect differential case for damage. Remove any nicks or burrs found, Replace if damaged or if nicks or burrs cannot be removed.

NOTE

If ring gear is replaced, ring gear bolts and drive pinion must also be replaced. (See paragraph 6-17)

10. inspect ring gear and ring gear bolts for damage. Replace if damaged.

TA60582

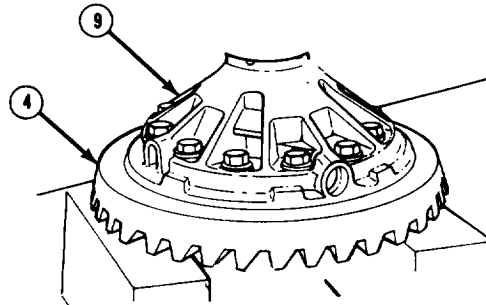
6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

d. ASSEMBLY

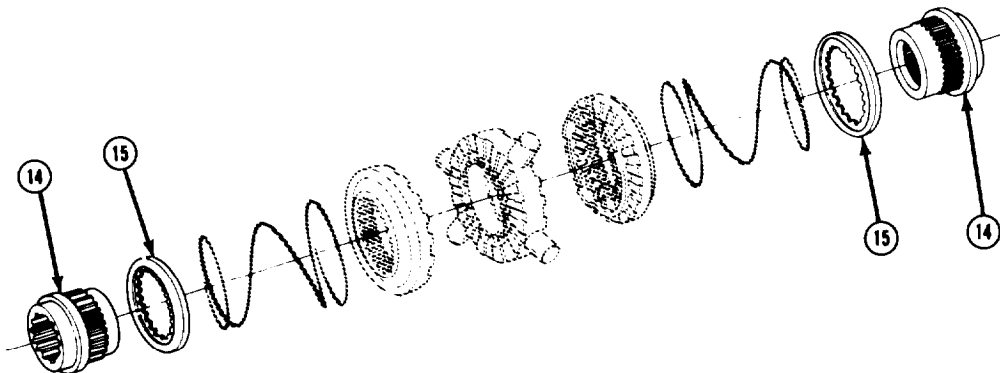
NOTE

Ensure that all components are lubricated with lubricating oil as they are assembled.

1. Place ring gear (4) and flanged half of differential case (9) on wooden blocks with bearing end of hub facing downward.



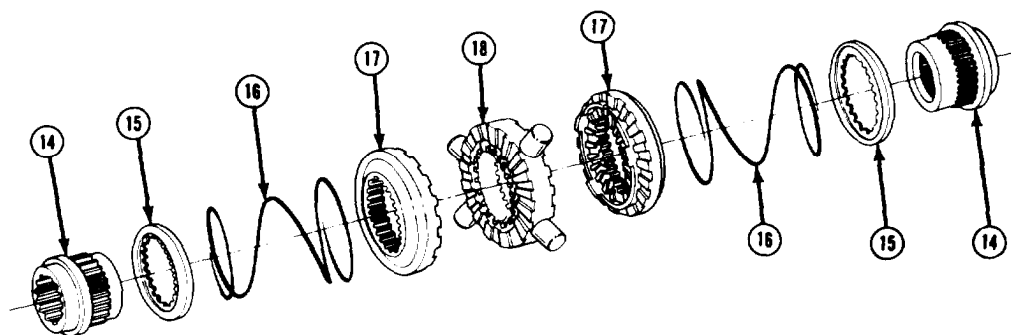
2. Place hub of side gear (14) into bore of differential case (9). Ensure that side gear will rotate freely. Install retainer (15) over side gear splines with retainer lip facing upwards and retainer seated against side gear shoulder.



TA50583

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

3. Install spring (16) over side gear (14) spline against retainer (15) lip with smaller end of spring against retainer.
4. Install driven clutch (17) over spring (16) with teeth facing upwards.

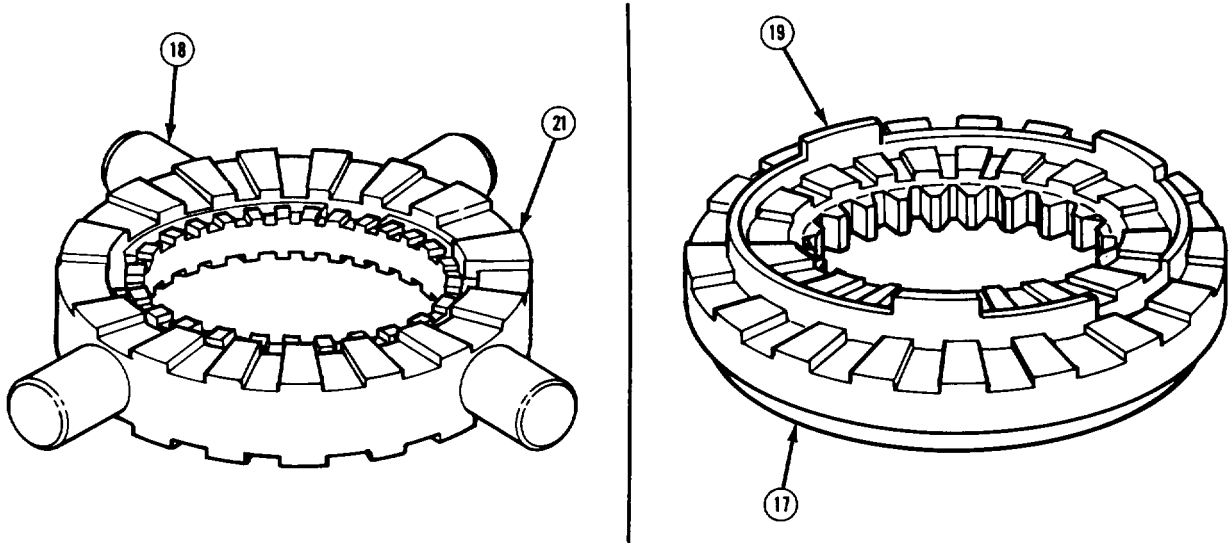


NOTE

Ensure that slot in driven clutch (17) holdout ring (19) engages long spider key (21).

5. Place spider (18) assembly over driven clutch (17),
6. Place remaining driven clutch (17) over spider (18) assembly.

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).



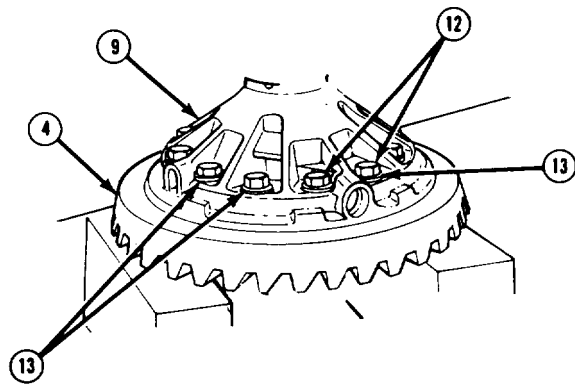
7. Assemble remaining retainer (15), spring (16), and side gear (14).

WARNING

Tightly hold differential case (9) assembly together to absorb spring pressure until 2 or more ring gear bolts (12) are installed. Failure to follow this warning may result in injury to personnel or damage to differential case assembly components.

NOTE

Ensure that ring gear (4) and differential case (9) assembly halves are assembled as marked.



8. Install remaining differential case (9) half over side gear (14) and compress springs (16). Install 12 new lockwashers (13) and ring gear bolts (12). Tighten bolts alternately to 120 lb.-ft. (163 N.m).

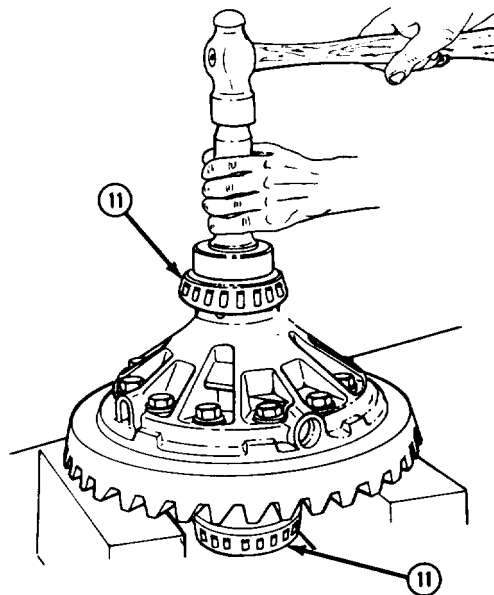
TA50585

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

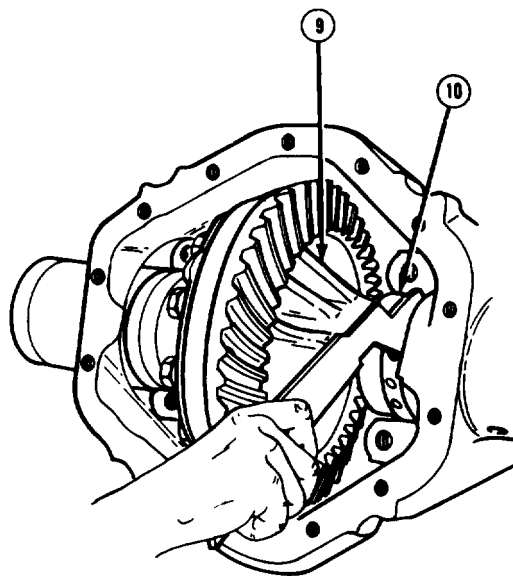
Side bearings (11) should rotate freely once installed.

9. Install 2 side bearings (11) as tagged.



e. INSTALLATION

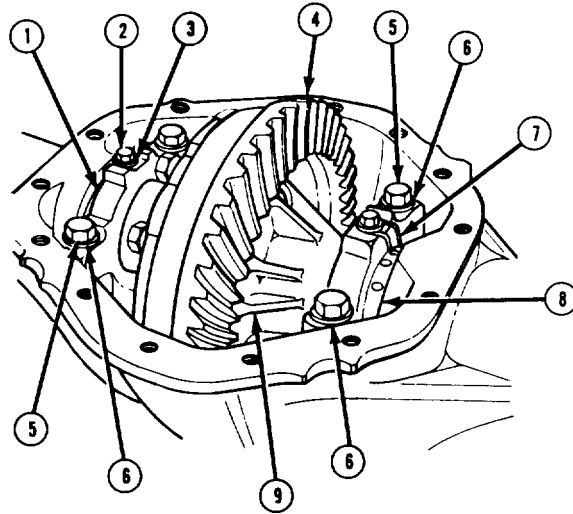
1. Install 2 bearing cups (10) as tagged to side bearings (11). Install differential case (9) assembly inside housing.



TA50586

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

2. Install 2 bearing caps (1) in their original positions with 4 new lockwashers (6) and bolts (5). Tighten bolts just enough to hold bearing caps in place.
3. Loosen right side adjusting nut (8) and tighten left side adjusting nut until ring gear (4) contacts drive pinion gear without binding. This is zero ("O") lash.
4. Back off left side adjusting nut (8) approximately 2 slots. Install left side adjusting nut lock (7), washer (3), and bolt (2) to left side bearing cap (1). Tighten bolt to 20 lb.-ft. (27 N.m).
5. Tighten right side adjusting nut (8) until differential case (9) assembly is forced into solid contact with left side adjusting nut, Loosen right side adjusting nut until it is free from bearing contact then retighten until contact is re-established.



6. When in contact, tighten right side adjusting nut (8) 2 slots if side bearings (11) are reused or 3 slots if side bearings are new. Install adjusting nut lock (7), washer (3), and bolt (2) to right side bearing cap (1). Tighten bolt to 20 lb.-ft. (27 N.m).
7. Tighten 4 bolts (5) to 135 lb.-ft. (183 N.m).

TA50587

6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't).

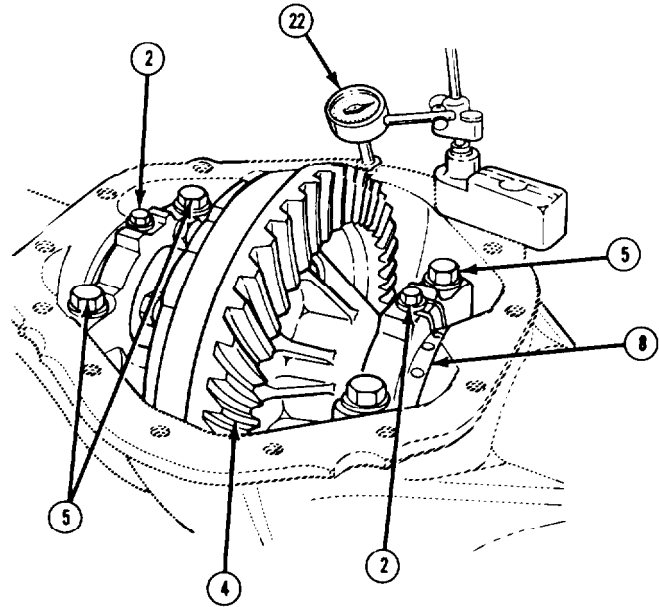
NOTE

At this point, side bearings are preloaded. If any additional adjustments are required, ensure that preload remains as established. If 1 adjusting nut (8) is loosened, the other must be tightened an equal amount to maintain this preload.

8. Mount dial indicator (22) on housing and measure backlash between ring gear (4) and drive pinion gear. Rock ring gear back and forth to measure backlash. Backlash should be between 0.003-0.012 in. (0.076-0.305 mm) with 0.005-0.008 in. (0.127-0.203 mm) preferred,

NOTE

If adjusting nut (8) requires adjustment, bolts (2 and 5) must be loosened. Once final adjustments have been made, bolts must be retightened to proper torque.



9. If backlash is more than 0.012 in. (0.305 mm), loosen right adjusting nut (8) 1 slot and tighten left adjusting nut 1 slot. If backlash is less than 0.003 in. (0.076 mm), loosen left adjusting nut 1 slot and tighten right adjusting nut 1 slot. Remove dial indicator (22) from housing.

NOTE

If ring gear (4) and drive pinion were replaced, perform steps 10-13 to check for proper gear tooth contact pattern.

10. Wipe any lubricant from housing and clean each tooth of ring gear (4).
11. Using a medium stiff brush, sparingly apply prussian blue dye to all ring gear (4) teeth. Area of drive pinion tooth contact should be visible when drive pinion is engaged by hand.

NOTE

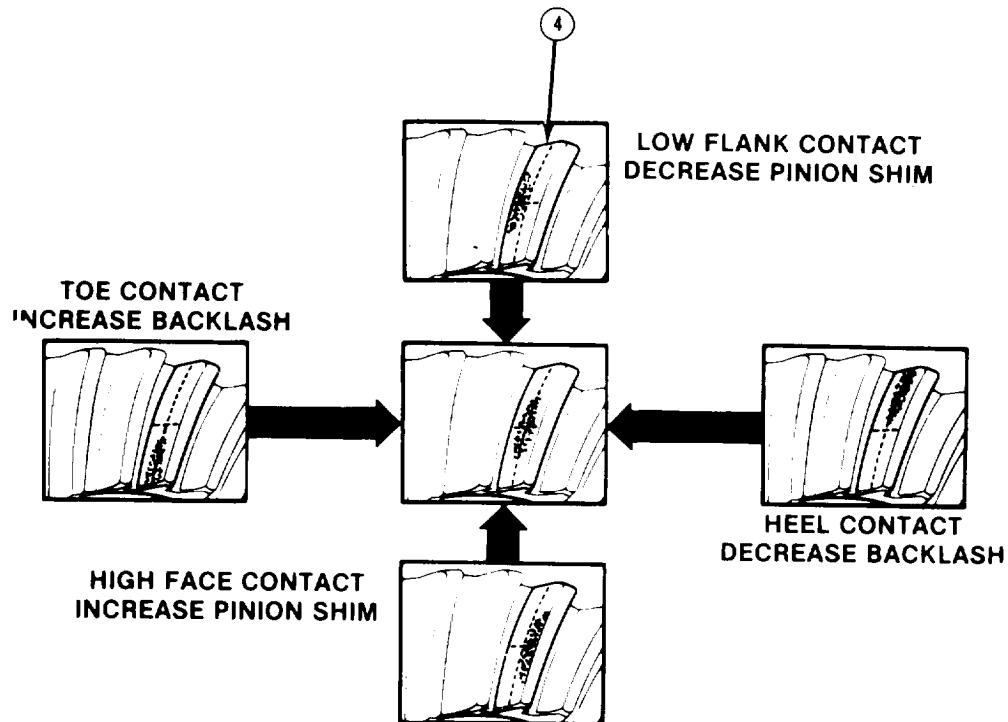
Excessive turning of ring gear (4) is not recommended. Ring gear should be turned only enough to provide tooth contact pattern,

12. Apply load until it takes a torque of 40-50 lb.-ft, (54-68 N.m) to turn drive pinion. Turn companion flange so that ring gear (4) turns 1 full revolution, then reverse so that ring gear turns 1 full revolution in opposite direction.

TA50588

 6-15. REAR AXLE DIFFERENTIAL MAINTENANCE (ALL EXCEPT M1009) (Con't),

13. Contact pattern should be centrally located up and down on the face of the ring gear (4) teeth. Compare tooth contact pattern on ring gear with examples shown and make adjustments as indicated.



NOTE

Ensure that differential cover and magnet are clean.

14. Carefully position vent tube bracket, brake line and bracket, and proportioning valve lever at housing. DO NOT kink lines. Install new differential cover gasket and differential cover with 14 bolts. Tighten bolts to 35 lb.-ft. (47 N.m).

FOLLOW-ON TASKS:

- Install rear axle shafts. (See TM 9-2320-289-20)
- Fill rear axle differential with lubricating oil. (See LO 9-2320-289-12)

6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M10028A2).

This task covers:

a. Removal	d. Assembly
b. Disassembly	e. Installation
c. Cleaning and Inspection	

INITIAL SETUP:

Equipment Condition

- Rear axle assembly removed.
(See paragraph 6-1 3)
- Rear axle shafts removed.
(See TM 9-2320-289-20)

Tools/Test Equipment

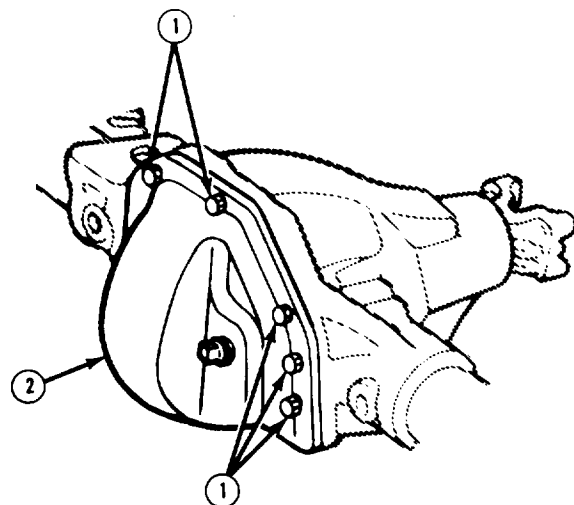
- Axle housing spreader, D-167
- Dial indicator
- Four-piece puller adaptor set, DD-914-95
(use with DD-914P and D-914-8)
- Puller DD-914P
- Puller adapter, D-914-8
- Torque wrench

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

1. Mount axle on axle stand.
2. Place a suitable container under axle housing. Remove 10 bolts (1) and differential cover (2), and allow all lubricating oil to drain. Remove old RTV sealant from differential cover and axle housing.

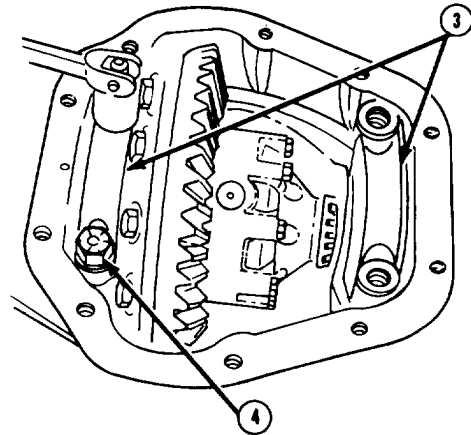


6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

NOTE

Side bearing caps (3) are stamped with letters which match letters stamped on case. Note letters for installation alignment, If side bearing caps are not stamped, mark side bearings caps and axle housing before removal.

3. Remove 4 bolts (4) and 2 side bearing caps (3).

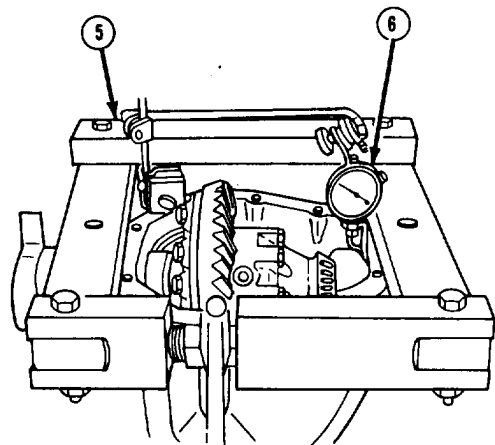


4. Position axle housing spreader (5) with tool dowels fitted into recesses in axle housing. Install dial indicator (6) from edge of axle housing to opposite edge of axle housing. Ensure that dial indicator is preloaded. Set dial indicator to "0, "

CAUTION

Axle housing should not be spread more than 0.015 in. (0.381 mm), Failure to follow this caution may cause damage and permanent distortion to axle housing.

5. Spread axle housing to 0.015 in. (0.381 mm). Remove dial indicator (6).

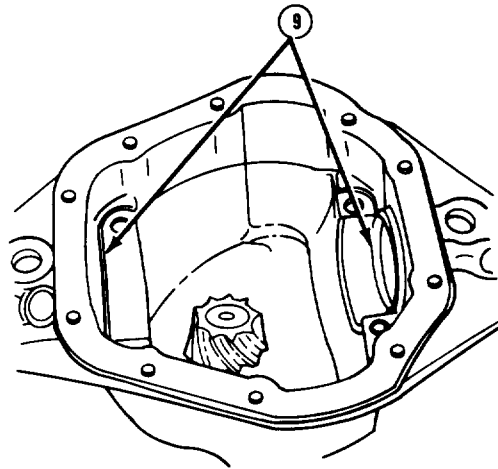
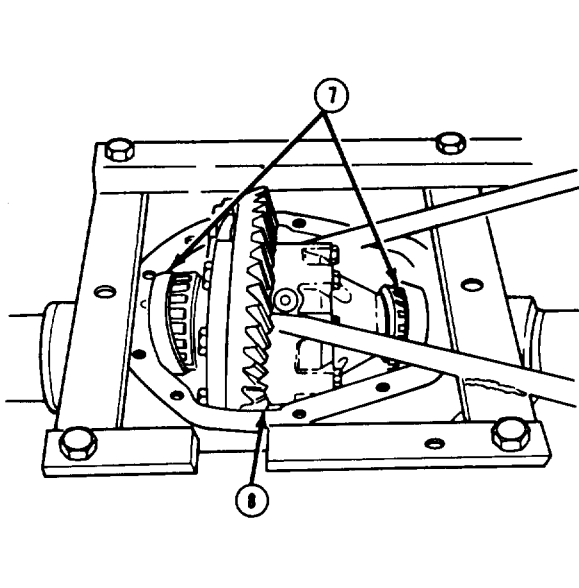


6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

NOTE

Relieve tension on axle housing spreader and remove from axle housing as soon as possible.

6. Remove differential case (8) assembly from axle housing. Remove and tag 2 side bearing cups (7) for installation.
7. Remove 2 preformed packings (9) from axle housing. Discard preformed packings.

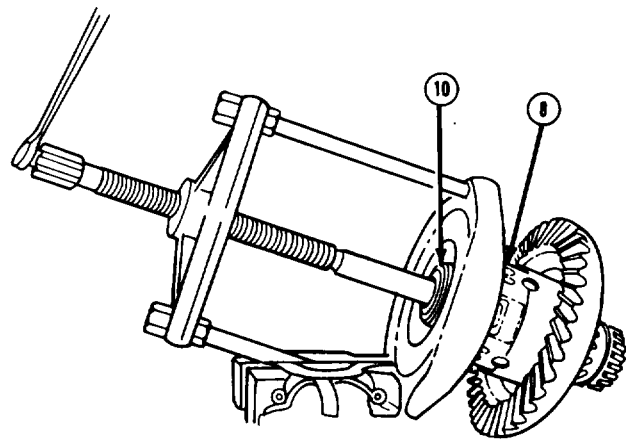


b. DISASSEMBLY

NOTE

DO NOT remove side bearings or ring gear unless damaged. If side bearings and ring gear are not to be replaced, go to step 6.

1. Inspect differential side bearings in accordance with TM 9-214.
2. Inspect ring gear for damage.
3. Place differential case (8) assembly in" vise.



 6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M028A2) (Con't).

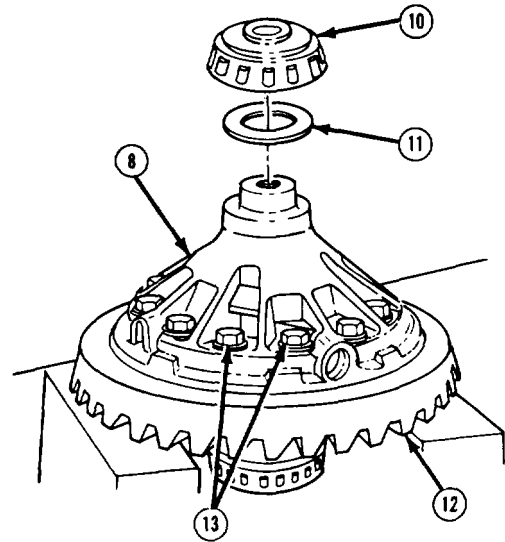
CAUTION

Ensure that puller adapters are installed so that only inner race is contacted. Failure to follow this caution may result in damage to side bearings (10).

4. Tag side bearings (10) for assembly on original side. Install bearing puller, adapter, and four-piece adapter set on side bearing and remove side bearing and shims (11). Repeat for remaining side bearing and shims.

NOTE

- If ring gear (12) is to be replaced, drive pinion must also be replaced. (See paragraph 6-17.1)
 - Shop rags placed around vise will help protect ring gear teeth from damage should ring gear fall during disassembly.
5. Scribe a line on differential case (8) assembly and ring gear (12) to ensure assembly in same position. Remove 12 ring gear bolts (13). Using soft-faced hammer, tap ring gear loose from differential case assembly. Remove differential case assembly from vise and remove ring gear.

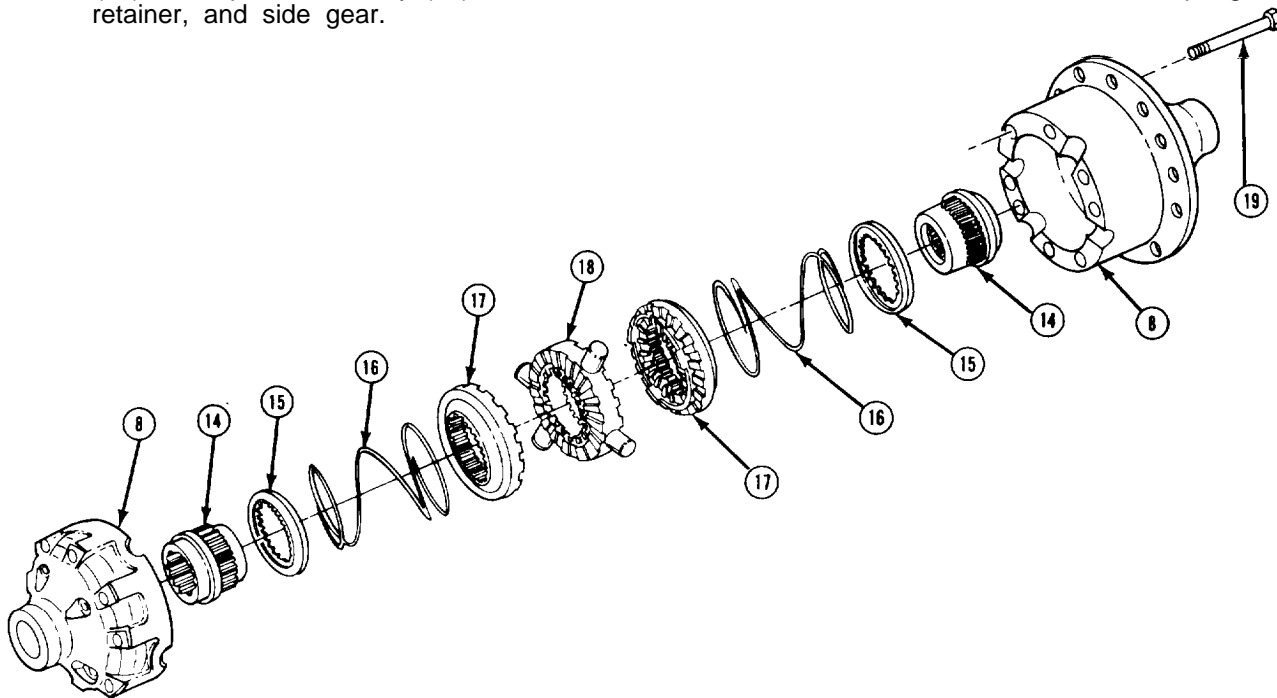


 6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

 WARNING

Tightly hold differential case (8) assembly together to absorb spring pressure as last differential case bolts (19) are removed. Failure to follow this warning may result in injury to personnel or damage to differential case assembly components.

6. Scribe a line on differential case (8) assembly halves. Remove 8 differential case bolts (19) and separate differential case assembly halves.
7. From 1 differential case (8) half, remove side gear (14), retainer (15), spring (16), driven clutch (17), and spider assembly (18). From other differential case half, remove driven clutch, spring, retainer, and side gear.



 c. CLEANING AND INSPECTION

 WARNING

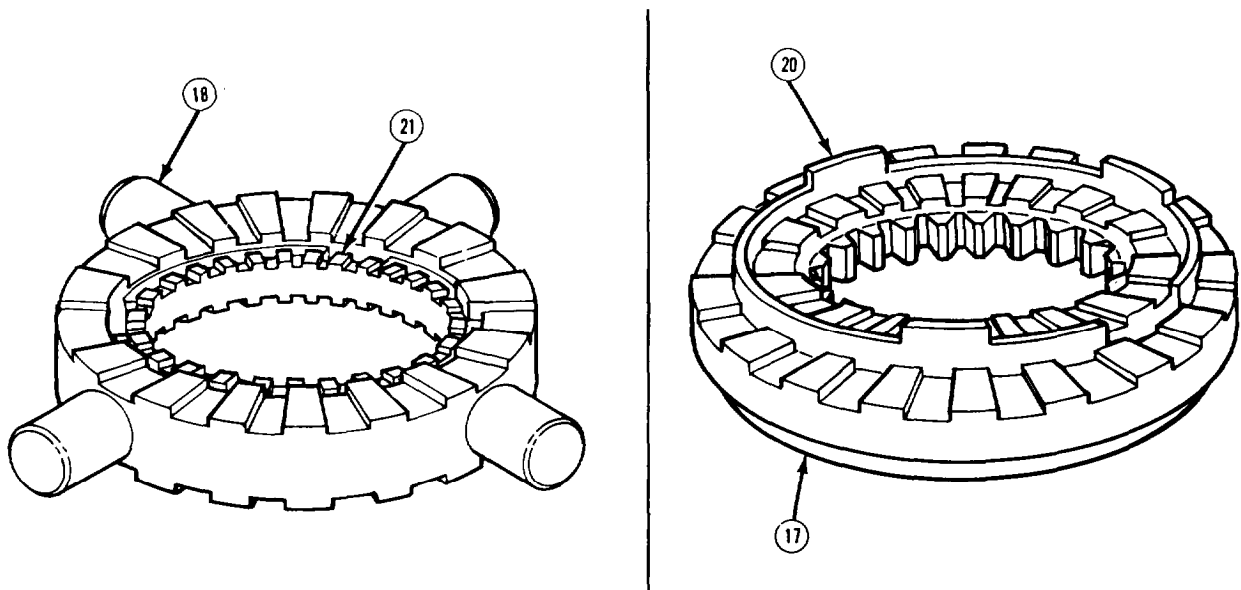
- Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138° F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.

6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

CAUTION

- If major components (e.g. spider assembly or driven clutch assemblies) show excessive wear or damage, differential assembly should be replaced. Failure to follow this caution may result in a recurrence of original problem,
- If any part is replaced, mating parts should also be replaced as they are probably also damaged. Failure to follow this caution may result in a recurrence of original problem.

1. Clean all components in dry cleaning solvent and dry with compressed air.
2. Inspect splines on driven clutches and remove any burrs or nicks found. If driven clutch teeth are chipped, or if burrs and nicks cannot be repaired, replace driven clutch.
3. Inspect holdout ring (20) on driven clutches (17) for fractures or chipped teeth. Replace driven clutches if fractured or chipped.
4. Inspect teeth on spider (18) and center cam (21) for fractures or chipping. Inspect center cam to ensure that it moves freely in spider. Replace spider assembly if fractured, chipped or if center cam does not move freely.



5. Inspect side gears for damage. Replace if necessary.
6. Visually inspect springs for equal height and damage, Replace if springs are of unequal height or damage exists.
7. Inspect differential case halves for damage. Remove any nicks or burrs found. Replace if damaged, or if nicks or burrs cannot be removed.

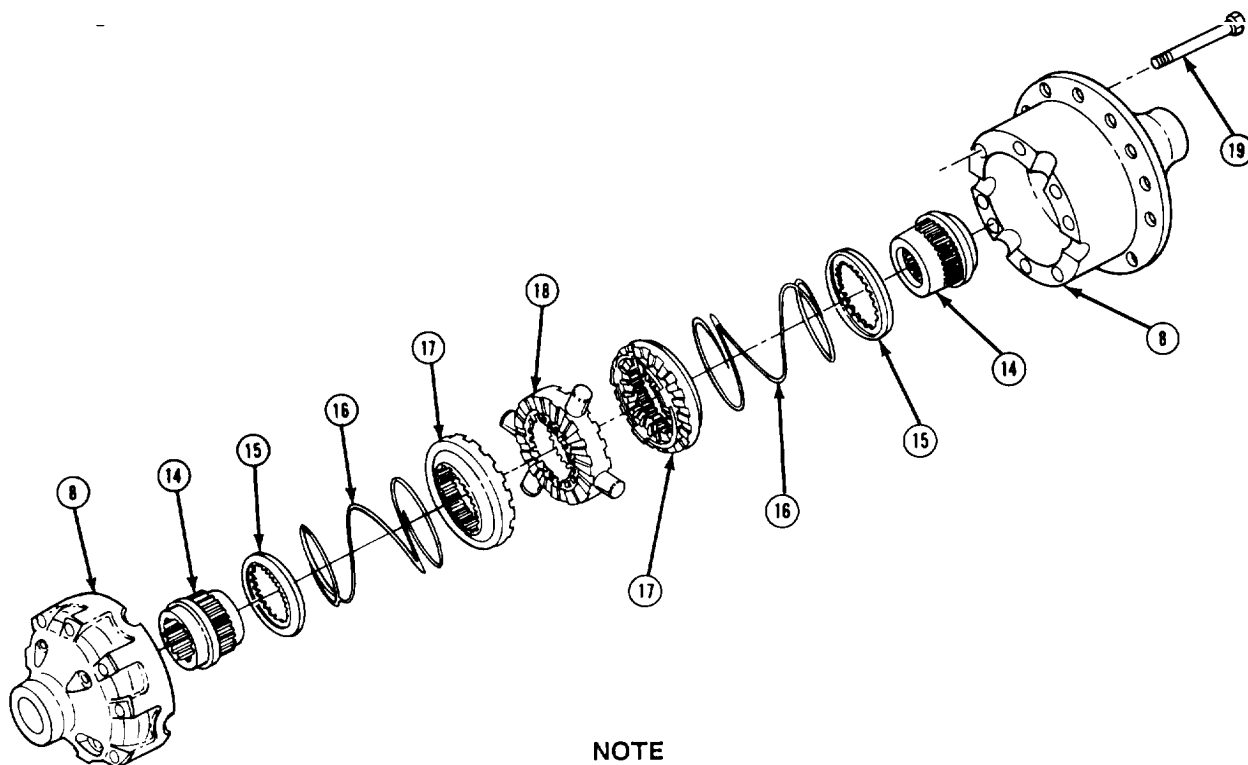
6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

d. ASSEMBLY

NOTE

Ensure that all components are lubricated with gear oil as they are assembled.

1. Place flanged half of differential case (8) on wooden blocks with bearing end of hub facing downward.
2. Place hub of side gear (14) into bore of differential case (8) half. Ensure that side gear will rotate freely. Install retainer (15) over side gear splines with retainer lip facing upward and retainer seated against side gear shoulder.
3. Install spring (16) over side gear (14) spline against retainer (15) lip with smaller end of spring

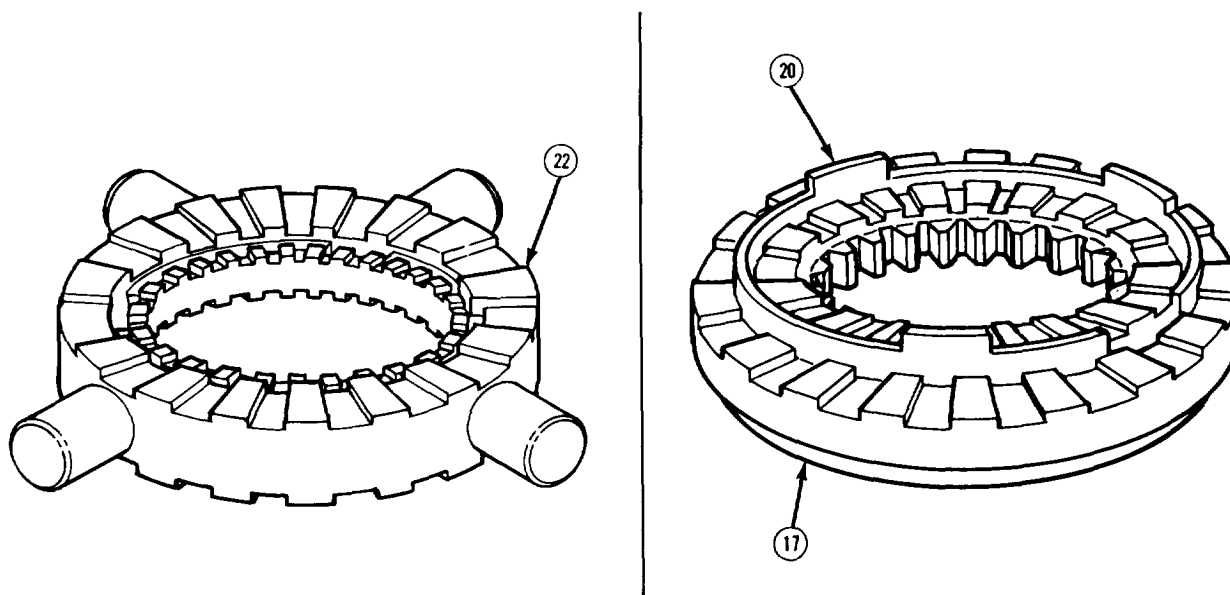


NOTE

Ensure that slot in each driven clutch (17) holdout ring (20) engages long spider key (22) on each side of spider.

4. Install driven clutch (17) on each side of spider (18).
5. While holding driven clutches (17) and spider (18) together, place them over spring (16).
6. Assemble remaining spring (16), retainer (15), and side gear (14).

6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

**WARNING**

Tightly hold differential case (8) assembly together to absorb spring pressure until 2 or more differential case bolts (19) are installed. Failure to follow this warning may result in injury to personnel or damage to differential case assembly components.

NOTE

- Ensure that differential case (8) is assembled as marked.
 - An assistant may help with step 7, if required.
7. Install remaining differential case (8) half over side gear (14) and compress springs (16). Install 8 differential case bolts (19) into differential case halves. Tighten bolts alternately to 70 lb.-ft. (95 N.m).

6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

NOTE

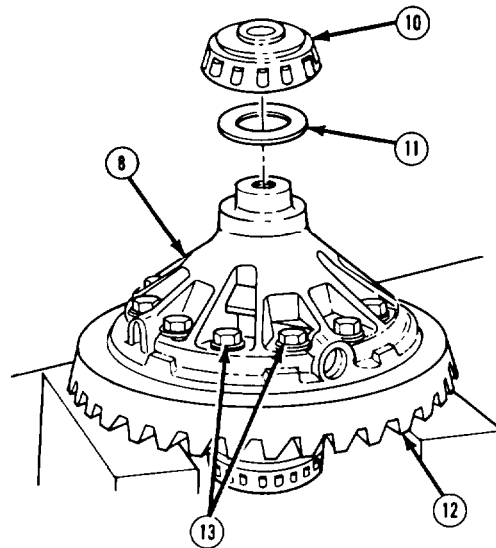
- If ring gear (12) and side bearings (10) were not removed, go to subparagraph e.
- Ensure that ring gear (12) is assembled as marked.

8. Install ring gear (12) to differential case (8), if removed, with 12 ring gear bolts (13). Tighten bolts alternately to 120 lb.-ft. (163 N.m).

NOTE

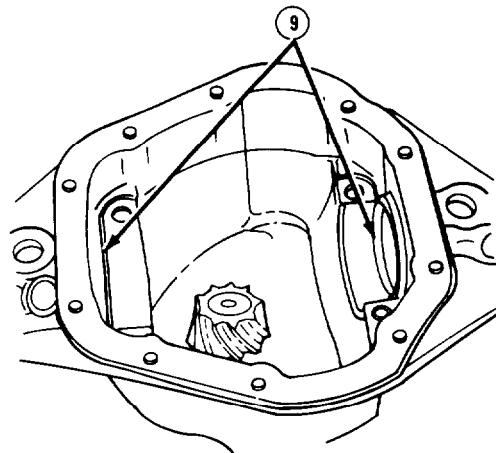
Side bearings (10) should rotate freely once installed.

9. Install original shims (11) under each side bearing (10) as tagged, using arbor press.



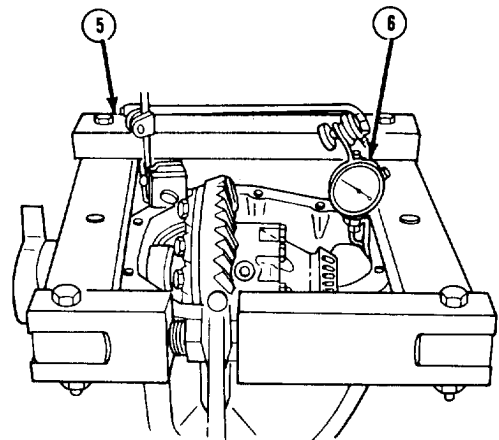
e . INSTALLATION

1. Install 2 new preformed packings (9) inside axle housing side bores.



6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

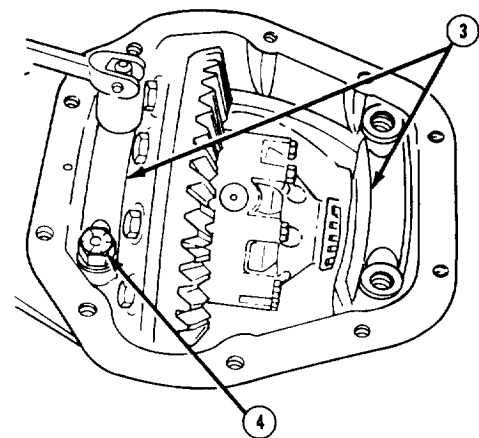
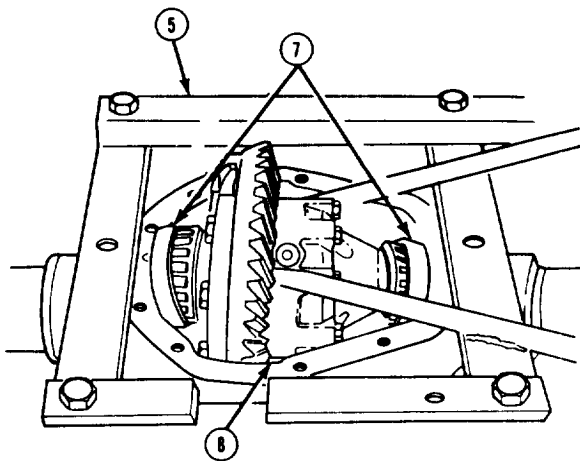
2. Position axle housing spreader (5) with tool dowels fitted into recesses in axle housing, Install dial indicator (6) from edge of axle housing to opposite edge of axle housing, Ensure that dial indicator is preloaded. Set dial indicator to "0."



CAUTION

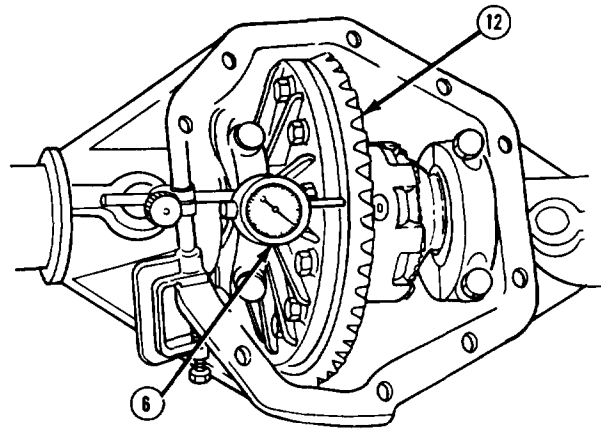
Axle housing should not be spread more than 0.015 in. (0.381 mm). Failure to follow this caution may cause axle housing to become damaged and permanently distorted.

3. Spread axle housing to 0.015 in. (0.381 mm). Install 2 bearing cups (7) as tagged and install differential case (8) assembly inside axle housing.
4. Rotate differential case (8) assembly and tap it with a soft-faced hammer to ensure that differential case assembly is properly seated in axle housing, Install 2 bearing caps (3) in their original position and tighten 4 bearing cap bolts (4) finger tight. Remove axle housing spreader (5) and tighten bearing cap bolts to 85 lb.-ft. (115 N.m).



6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

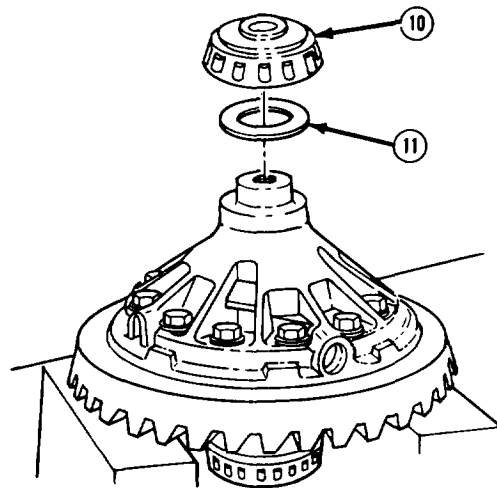
5. Install dial indicator (6) and check ring gear (12) backlash at 4 equally spaced points around ring gear. Backlash must be 0.004-0.009 in. (0.102-0.229 mm) and must not vary more than 0.002 in. (0.051 mm) between 4 points checked.



NOTE

If backlash is correct, go to step 10.

6. Repeat steps 3-6 of subparagraph a.
7. If backlash is not within specification, correct by adjusting thickness of side bearing (10) shim pack. To increase backlash, increase right shim (11) and decrease left shim an equal amount. To decrease backlash, decrease right shim and increase left shim an equal amount.
8. Install new shim pack and side bearings (10), as tagged using arbor press.
9. Repeat steps 1-5 of subparagraph e.



6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

NOTE

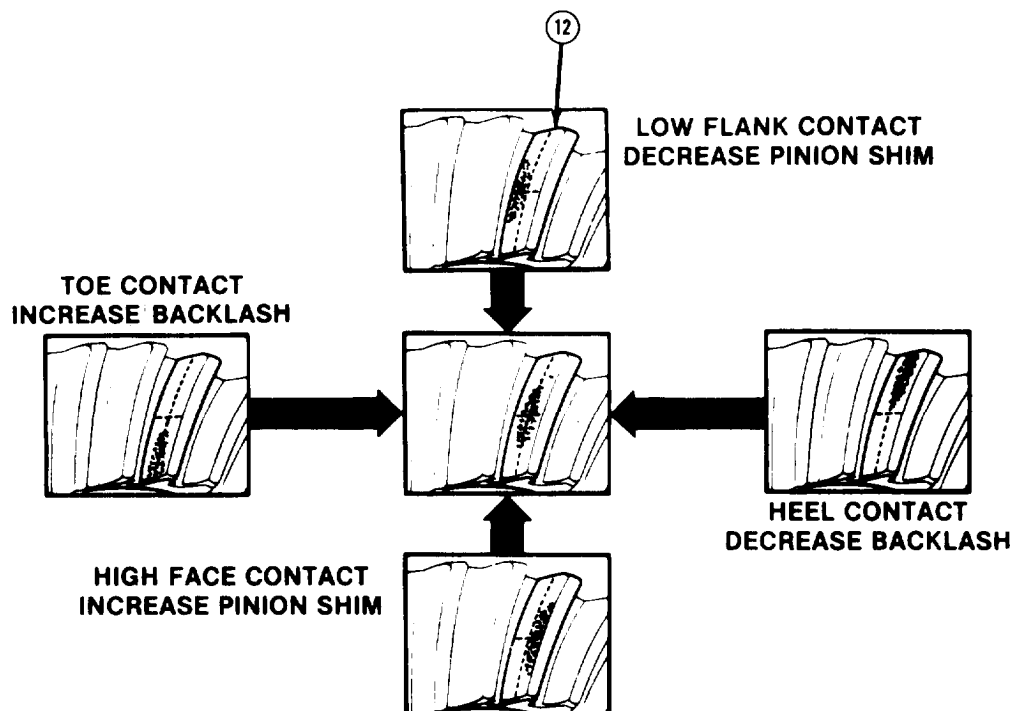
If ring gear (12) and drive pinion were replaced, perform steps 10-13 to check for proper gear tooth contact pattern.

10. Wipe any lubricant from axle housing and clean each tooth of ring gear (12).
11. Using medium stiff brush, sparingly apply prussian blue dye to all ring gear (12) teeth. Area of drive pinion tooth contact should be visible when drive pinion is turned by hand.

NOTE

Excessive turning of ring gear (12) is not recommended. Ring gear should be turned only enough to provide tooth contact pattern.

12. Apply load until it takes a torque of 40-50 lb.-ft, (54-68 N.m) to turn drive pinion. Turn companion flange so that ring gear (12) turns 1 full revolution, then reverse so that ring gear turns 1 full revolution in opposite direction.
13. Contact pattern should be centrally located up and down on face of ring gear (12) teeth. Compare tooth contact pattern on ring gear with examples shown and make adjustments as indicated. (See paragraph 6-17.1, subparagraph c, steps 1-3)

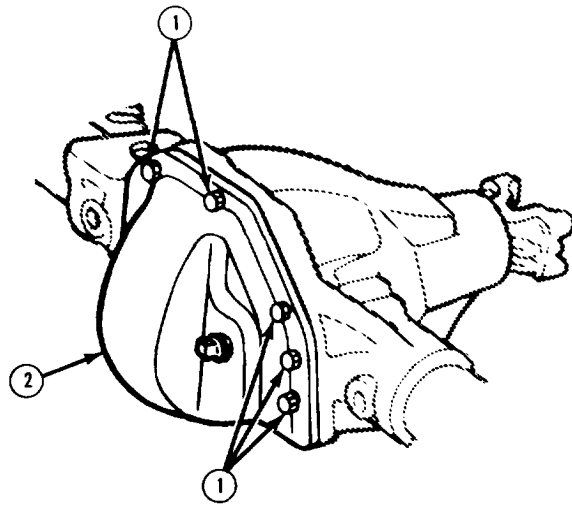


6-15.1. REAR AXLE DIFFERENTIAL MAINTENANCE (M1028A2) (Con't).

NOTE

- Ensure that axle housing is cleaned of all old RTV sealant.
- Differential cover (2) repair kit comes with gasket for different model applications. M1028A2 axle uses RTV sealant.
- When applying RTV sealant to axle housing, ensure that no RTV sealant enters bolt holes.

14. Apply bead of RTV sealant to axle housing and install differential cover (2) with 10 bolts (1). Tighten bolts to 35 lb.-ft. (47 N.m).



FOLLOW-ON TASKS:

- Install rear axle shafts. (See TM 9-2320-289-20)
- Fill rear axle differential with lubricating oil. (See LO 9-2320-289-12)
- Install rear axle assembly. (See paragraph 6-13)

6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009).

This task covers: a. Disassembly c. Assembly
 b. Cleaning and Inspection

INITIAL SETUP:

Equipment Condition

- Rear axle differential removed.
 (See paragraph 6-5)

Materials/Parts

- One latching bracket snapping
- One lockscrew
- Dry cleaning solvent
 (Item 23, Appendix B)
- Gear lubricating oil
 (Item 44, Appendix B)
- Wiping rags (Item 53, Appendix B)

Too/s/Test Equipment

- Bushing remover, J-26252
- Dial indicator
- Micrometer
- Puller kit
- Telescoping gage
- Torque wrench

Manual References

- TM 9-214

General Safety Instructions

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).
-

a. DISASSEMBLY

NOTE

If disassembling latching bracket (6) and governor assembly (7), perform steps 2 and 3.

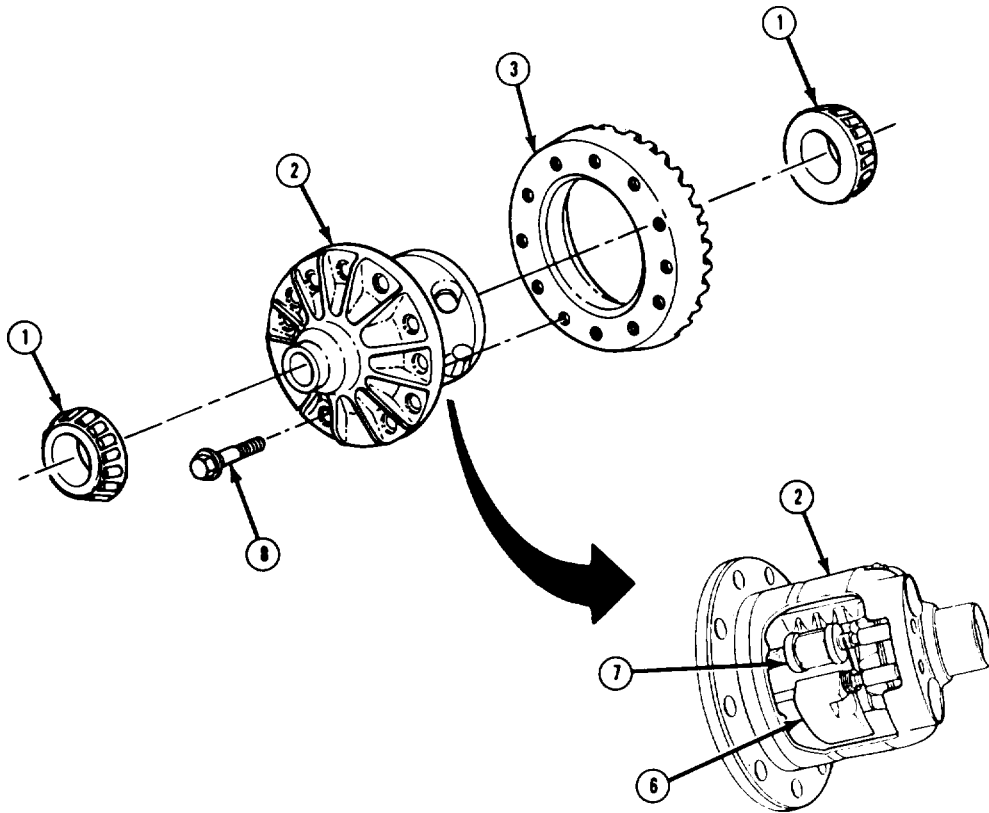
1. Remove 2 side bearings (1) from differential case (2) assembly and tag for installation,

NOTE

- Shop rags placed around vise will help protect ring gear (3) teeth from damage should ring gear fall during disassembly.
- Ring gear bolts (8) have left-hand threads.

2. Place differential case (2) assembly in vise. Mark position of ring gear (3) in relation to differential case assembly for assembly, Remove 10 bolts (8). Using a soft-faced hammer, tap on ring gear to free from differential case assembly. Remove differential case assembly from vise and remove ring gear.

6-16. REAR AXLE DIFFERENTIAL REPAIR (MI 009) (Con't).



TA50590

6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't),

CAUTION

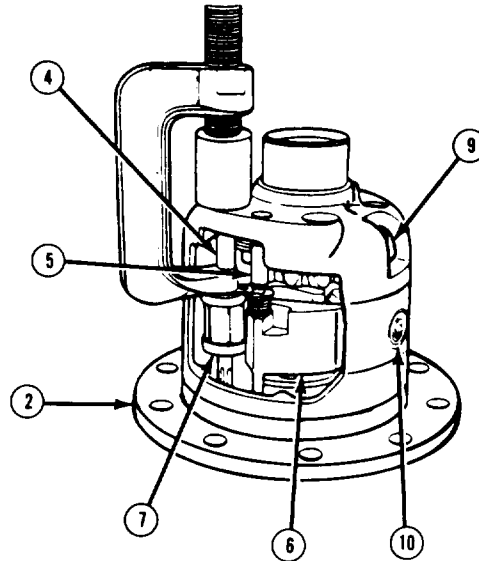
Ensure that latching bracket (6) spring is pulled out of the way when removing bushing (4). Failure to follow this caution may result in damage to governor assembly (7), bushing, or latching bracket spring.

3. Using bushing remover, remove bushings (4 and 5). Remove snapping and spring from latching bracket (6), and remove latching bracket and governor assembly (7). Discard snapping.

NOTE

Axle shaft serves as a tool to help align pinion gears (18), camform side gear (17), and side gear (20).

4. Place axle shaft in vise with 3 in. (76 mm) of axle shaft projecting upwards. Place differential case (2) assembly on axle shaft.

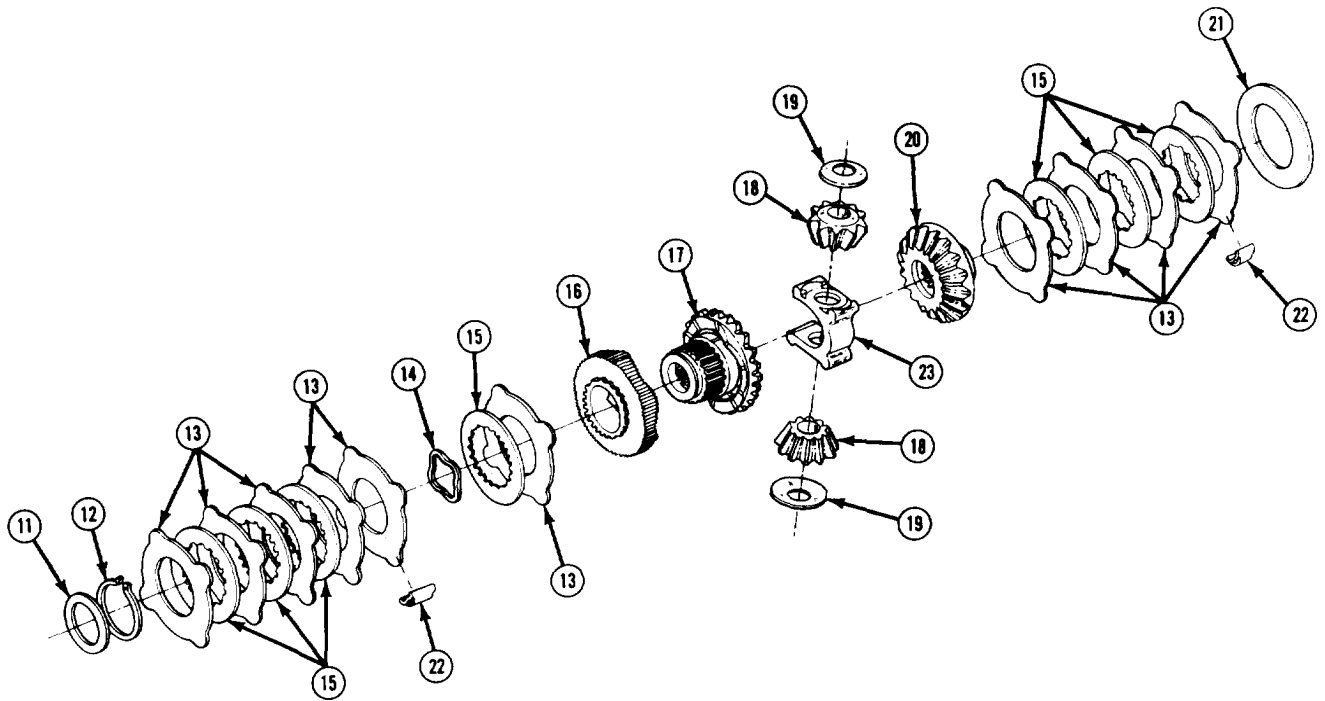


NOTE

Ensure that all thrust washers (19), shims (11 and 21), pinion gears (18), clutch packs (13 and 15), and thrust block (23) are marked for assembly in their original position.

- 5 . Remove lock screw (9) and pinion shaft (10). Rotate differential case (2) assembly, and remove 2 pinion gears (18) and thrust washers (19). DO NOT discard lock screw. Save for measuring purposes during assembly.
- 6 . Remove thrust block (23). Remove right-hand side gear (20), clutch pack (13 and 15), and shim(s) (21). Remove left-hand camform side gear (17), cam plate (16), clutch pack (13 and 15), wave spring (14), and shim(s) (11),

 6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't).



NOTE

Ensure that position of clutch plates (13) and clutch discs (15) is noted for assembly.

7. Remove retainer ring (12) from left-hand clutch pack, Remove 4 clips (22) and remove 3 alternating clutch plates (13) and clutch discs (15). Remove wave spring (14). Remove 2 consecutive clutch plates, another clutch disc, and last clutch plate. Separate cam plate (16) and camform side gear (17).
8. Remove 4 clips (22) and disassemble right-hand clutch pack which has 4 alternating clutch plates (13) and 3 clutch discs (15).
9. Remove differential case (2) from axle shaft.

TA50592

6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.
1. Clean and inspect 2 side bearings in accordance with TM 9-214.
 2. Clean all disassembled components with dry cleaning solvent and dry with compressed air.
 3. Inspect differential case for damage. If differential case is damaged, entire differential case must be replaced,

NOTE

- Internal clearances are such that shims, thrust block, or gears should not be replaced unnecessarily even if slight wear indications are present.
 - If thrust block or shims need replacement, they should be measured to ensure replacement with components of equal size.
 - If ring gear is damaged, ring gear, ring gear bolts, and drive pinion must be replaced as a set.
4. Inspect ring gear, all clutch pack components, thrust block, shims, bushings, and gears for signs of damage. Replace if damaged.
 5. Inspect latching bracket and governor assembly for damage. If either is damaged, both must be replaced.

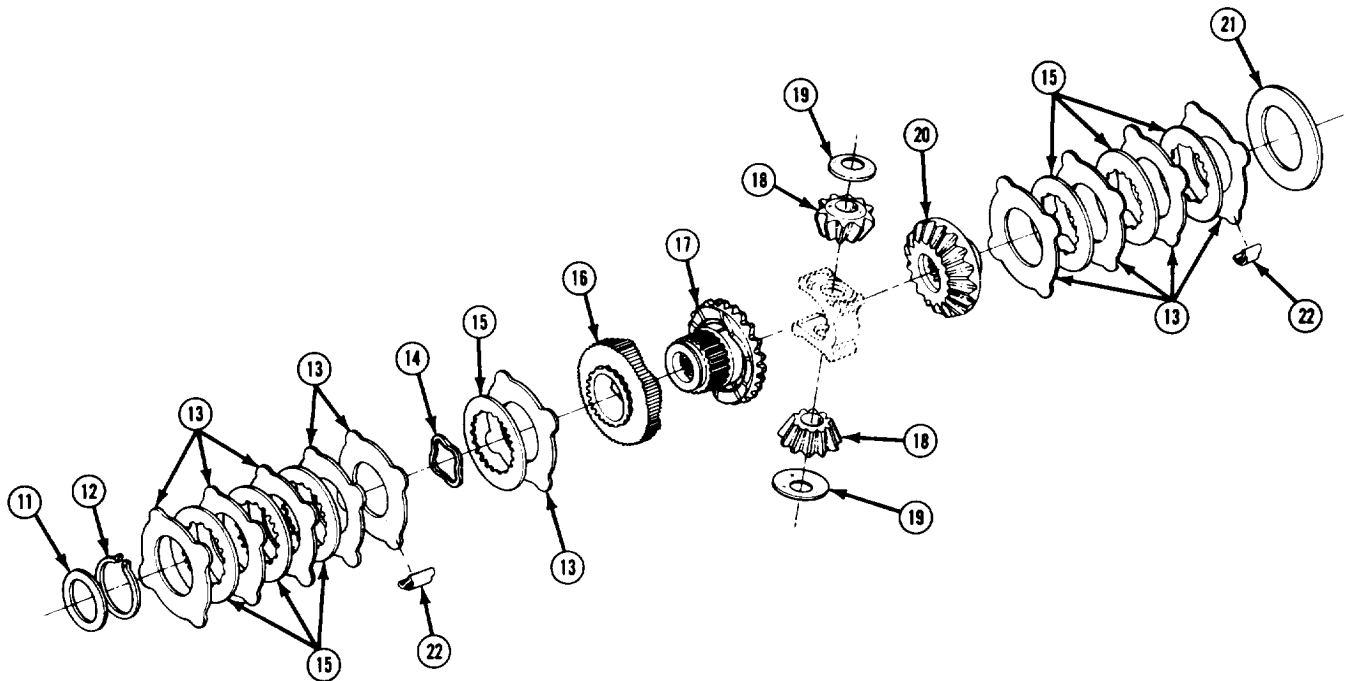
6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

c. ASSEMBLY

NOTE

- Ensure that all components are lightly coated with lubricating oil as they are assembled.
- If original components are to be reused, ensure that all thrust washers (19), shims (11 and 21), pinion gears (18), and clutch packs (13 and 15) are assembled on same side from which they were disassembled.
- If assembling latching bracket and governor assembly, perform steps 19-21.

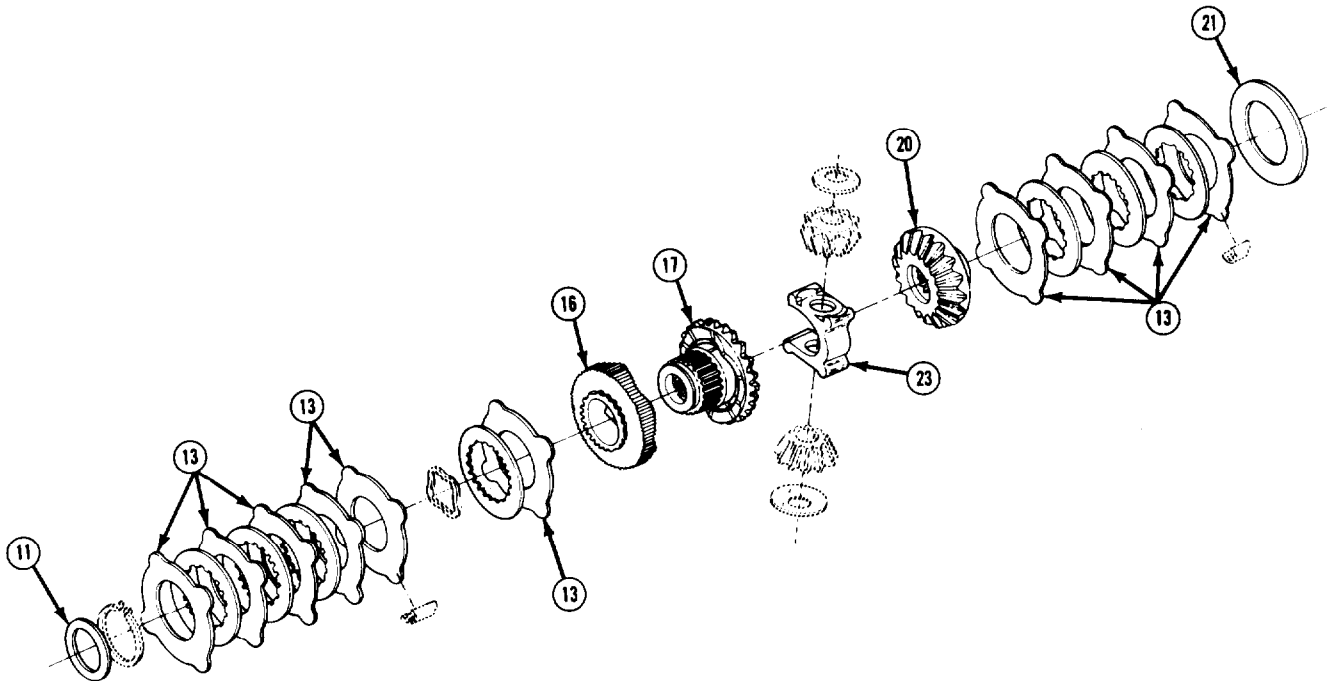
1. Assemble right-hand clutch pack on side gear (20). Starting with clutch plate (13) and alternating, install 4 clutch plates and 3 clutch discs (15). Install 4 clips (22).
2. Install cam plate (16) on camform side gear (17).
3. On cam plate (16) install 1 clutch plate (13), 1 clutch disc (15), then 2 clutch plates. Install wave spring (14). Starting with clutch disc and alternating, install 3 clutch discs and clutch plates. Compress left-hand clutch pack and install retainer ring (12). Install 4 clips (22).



TA50593

6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

4. Install left-hand shim(s) (11) inside differential case (2). Install camform side gear (17), cam plate (16), and clutch pack assembly, indexing clutch plate (13) ears with differential case.
5. Install shim (s) (21) on right-hand clutch pack. Install right-hand clutch pack and side gear (20) assembly inside differential case (2) assembly.



NOTE

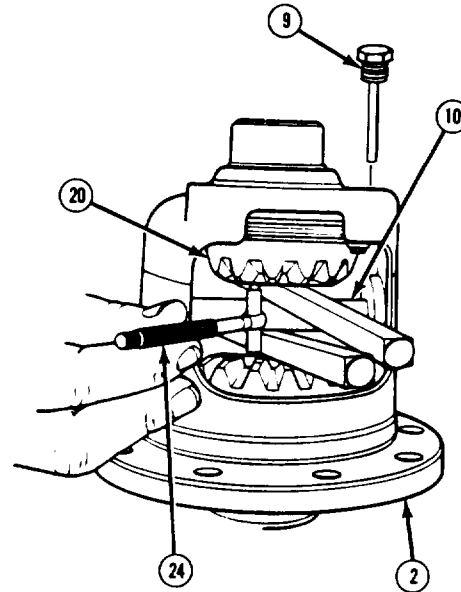
- If new camform side gear (17) and/or side gear (20) was installed, perform steps 6-10 to obtain proper thrust block (23) clearance.
- If new gears were installed and pinion shaft (10) will not line up, shim thickness will have to be decreased.

6. Install pinion shaft (10) and lockscrew (9).

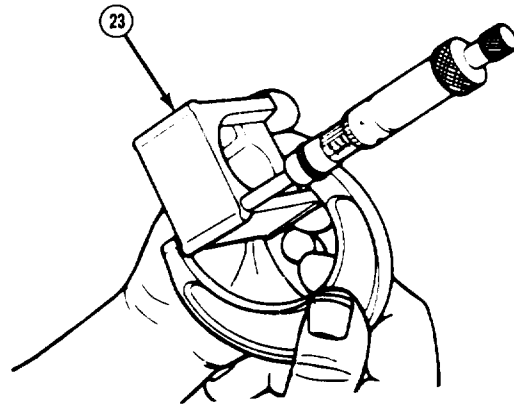
TA50594

6-16. REAR AXLE DIFFERENTIAL REPAIR (MI 009) (Con't).

7. Wedge 2 suitable tools between side gear (20) and pinion shaft (10), and camform side gear (17) and pinion shaft. Insert telescoping gage (24) with gage resting on gear faces, not gear teeth. Measure telescoping gage with micrometer and record reading.



8. Measure thickness of thrust block (23) at outer corner and record reading,
9. If thrust block (23) thickness is not within 0.000-0.006 in. (0.000-0.152 mm) less than spread between side gear (20) and camform side gear (17), adjust clearance by:
- reshimming right-hand clutch pack, or;
 - selecting a new thrust block (23) of correct size to obtain required clearance.
10. Remove lock screw (9) and pinion shaft (10).



TA50595

6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

NOTE

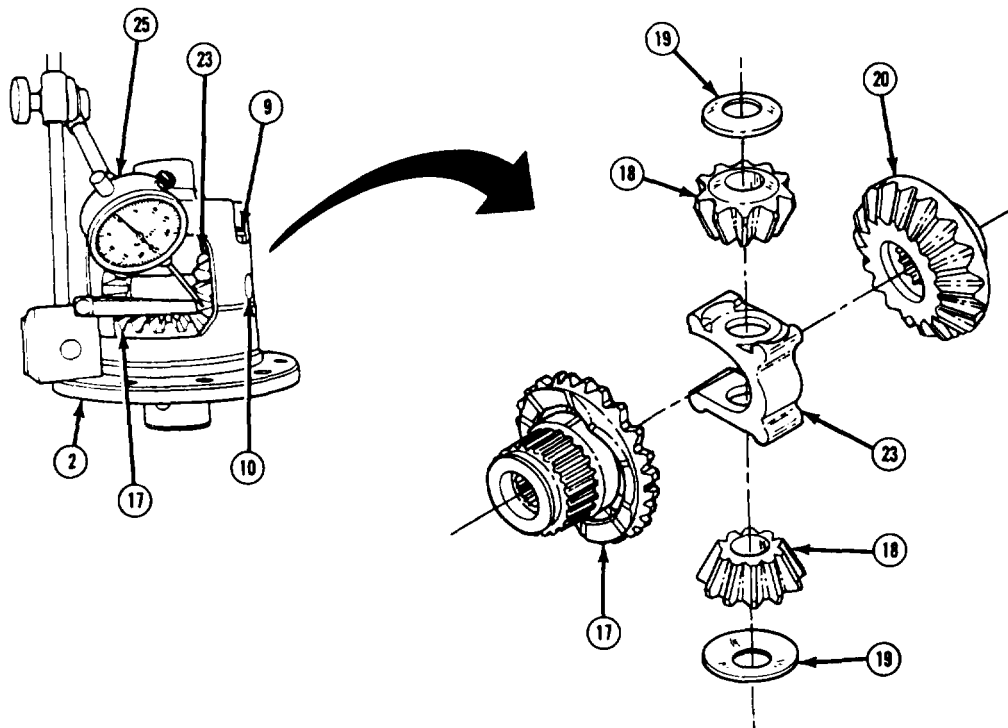
If new camform side gear (17) and side gear (20) were installed, thrust block (23) should not be installed at this time.

11. install thrust block (23).
12. Position 2 thrust washers (19) and pinion gears (18) 180 degrees from each other, and indexed with teeth of camform side gear (17) and side gear (20). Rotate side gears and install thrust washers and pinion gears inside differential case (2) assembly.

NOTE

If original camform side gear (17) and/or side gear (20) were installed, original lock screw (9) should be discarded and new lock screw installed.

13. Install pinion shaft (10) and lock screw (9).



TA50596

6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

NOTE

Perform steps 14-17 to establish correct backlash only if new camform side gear (17) and side gear (20) were installed.

14. Index 1 tooth of pinion gear (18) nearest lock screw (9) so that it points facedown, perpendicular to differential case (2) assembly flange. Wedge a suitable tool between left-hand camform side gear (17) and pinion shaft (10). Using dial indicator (25) mounted on differential case assembly flange, check pinion gear backlash by pulling pinion gear firmly into its seat, and rotating back and forth. Record reading.
15. Repeat procedure of indexing and checking backlash to other pinion gear (18). If backlash is not within 0.010-0.018 in. (0.254-0.457 mm), change shim size on left-hand camform side gear (17) side. The thinner the shim used, the greater the backlash reading will be.
16. Repeat steps 14 and 15 to measure right-hand side gear (20) to pinion gear (18) backlash. Backlash should be 0.002-0.010 in. (0.051 -0.254 mm), If backlash is not within specification, change shim size on right-hand side gear side. The thinner the shim used, the greater the backlash will be.
17. If it was necessary to change shims, recheck thrust block (23) clearance. (See steps 6-8)

NOTE

Perform step 18 only if thrust block (23) has not been installed.

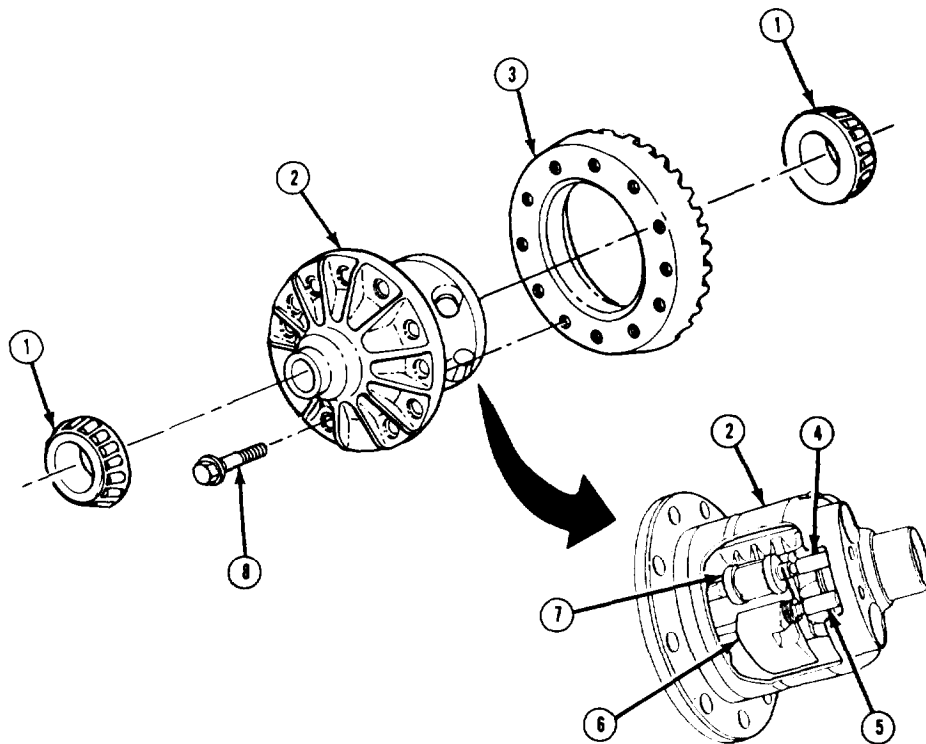
18. Remove lock screw (9) and pinion shaft (10). Discard lock screw. Remove 2 thrust washers (19) and pinion gears (18). Install thrust block (23). Install 2 thrust washers and pinion gears. Install pinion shaft and new lock screw.

6-16. REAR AXLE DIFFERENTIAL REPAIR (M1009) (Con't).

19. Install spring on latching bracket (6) and install new snapping. Install latching bracket in differential case (2) assembly. Install governor assembly (7), placing straight end of latching bracket spring over and to outside of the engagement shaft to preload the latching bracket against the governor assembly.
20. Install bushing (4) until governor assembly (7) end play of 0.004-0.020 in. (0.102-0.508 mm) is reached. Install bushing (5) until latching bracket (6) shaft end play of 0.000-0.003 in. (0.000-0.076 mm) is reached.

NOTE

- Shop rags placed around vise will help protect ring gear (3) teeth from damage should ring gear fall during assembly.
 - Ring gear bolts (8) have left-hand threads.
21. Place differential case (2) assembly on axle shaft in vise with ring gear (3) alined as marked. Install 10 bolts (8) and tighten alternately to 80 lb.-ft. (108 N.m).
 22. Install 2 side bearings (1) as tagged.



FOLLOW-ON TASKS:

- Install rear axle differential. (See paragraph 6-5)

TA50597

6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009).

- | | | |
|-------------------|--|---|
| This task covers: | <ul style="list-style-type: none"> a. Removal b. Disassembly c. Cleaning and Inspection | <ul style="list-style-type: none"> d. Assembly and Preload Adjustment e. Installation and Pinion Depth Adjustment |
|-------------------|--|---|

INITIAL SETUP:

Equipment Condition

- Rear propeller shaft disconnected from pinion flange. (See TM 9-2320-289-20)
- Rear axle differential removed. (See paragraph 6-15)

Tools/Test Equipment

- Drive handle, J-8092
- Flange holder and remover
- Micrometer
- Torque wrench

Materials/Parts

- One flange nut
- One oil seal
- One spacer
- Seven lockwashers
- Dry cleaning solvent (Item 23, Appendix B)
- Molybdenum grease (Item 37, Appendix B)
- Gear lubricating oil (Item 44, Appendix B)

Manual References

- TM 9-214

General Safety Instructions

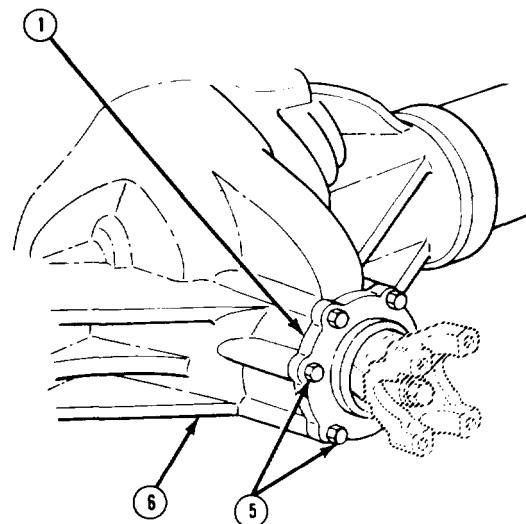
- Dry cleaning solvent is flammable and must not be used near open flame, Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

NOTE

It may be necessary to tap on pilot end of drive pinion to help free assembly from housing (6).

1. Remove 6 bolts (5) and lockwashers securing retainer (1) to housing (6). Remove retainer and drive pinion assembly from housing. Discard lockwashers,
2. Remove shim located between retainer (1) and housing (6). Measure thickness of shim and record, If shim is undamaged, save for installation.

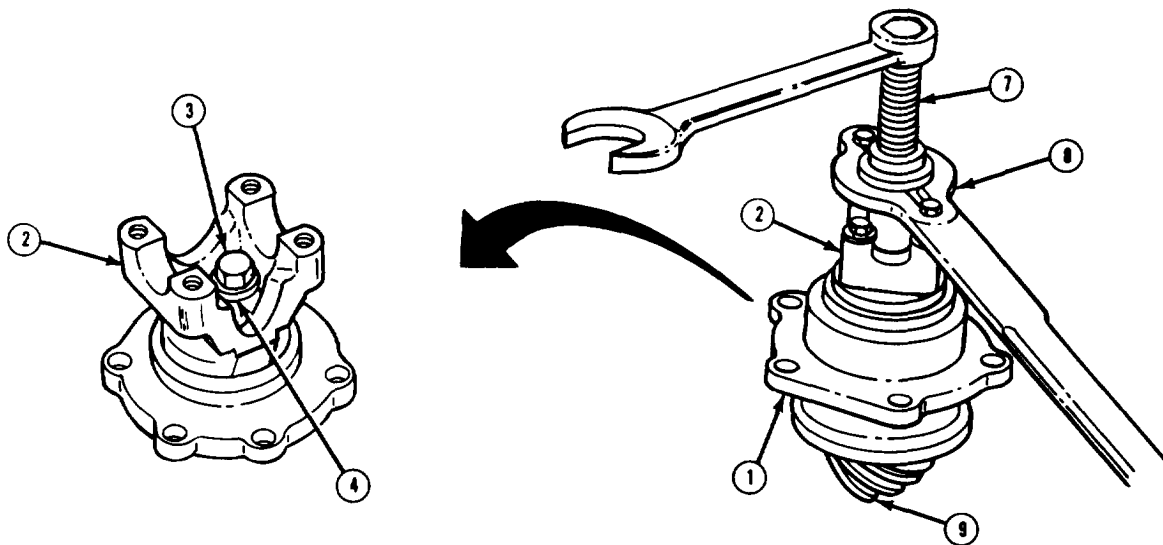


TA50598

6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

b. DISASSEMBLY

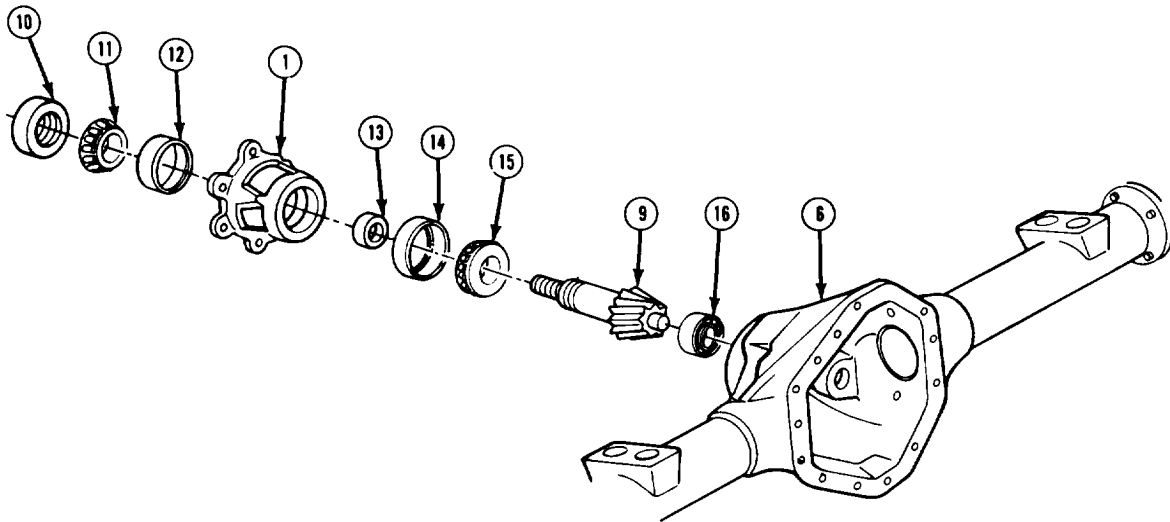
1. Place retainer (1) and drive pinion (9) assembly in a soft-jawed vise. Place flange holder (8) on flange (2), and remove flange nut (3) and lockwasher (4). Discard flange nut and lockwasher.
2. Thread flange remover bolt into small outside diameter end of flange remover (7). Turn flange remover 1/8 turn to a locked position. Turn flange remover while holding flange holder (8) stationary and remove flange (2). If damaged, remove deflector and discard.



3. Support retainer (1) in a press plate and press out drive pinion (9).
4. Remove oil seal (10) from retainer (1) and discard.
5. Remove front bearing (11) from retainer (1). Remove front and rear bearing cups (12 and 14) from retainer.
6. Press spacer (13) and rear bearing (15) from drive pinion (9). Discard spacer.
7. Remove straddle bearing (16) from housing (6).

TA50599

 6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).



 c. CLEANING AND INSPECTION

 WARNING

- Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.
 - Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Failure to follow this warning may result in serious injury to personnel.
1. Clean all components with dry cleaning solvent and dry with compressed air.
 2. Clean and inspect all pinion bearings in accordance with TM 9-214,
 3. Clean pinion bearing bores in retainer to ensure that they are free of dirt or other contamination. Remove any nicks found.

TA50600

6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

NOTE

If drive pinion is damaged, differential ring gear and ring gear bolts must also be replaced. (See paragraph 6-15)

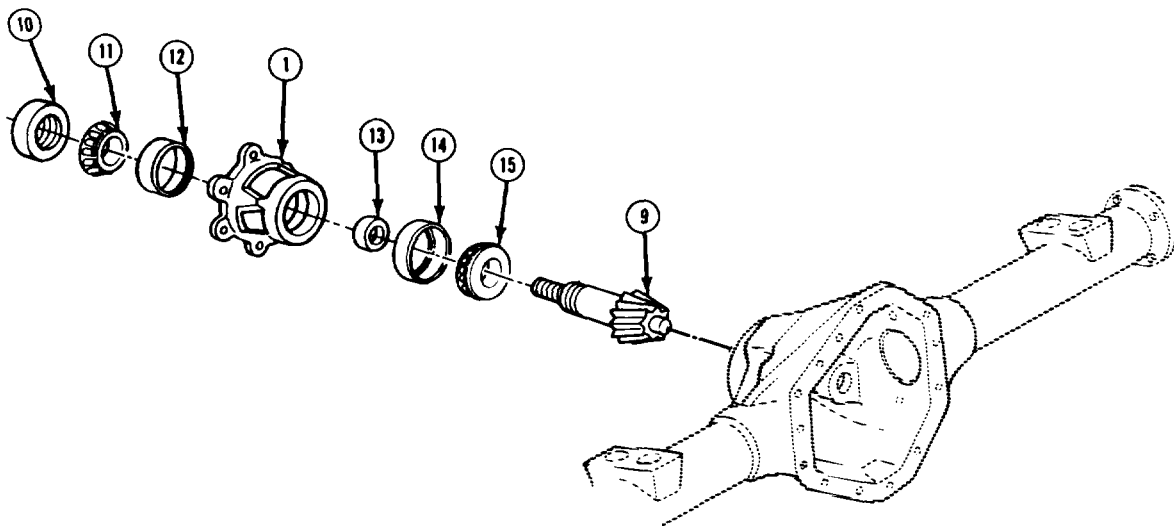
4. Inspect drive pinion for damage. Replace if damaged,
5. Inspect flange for evidence of wear at point of oil seal contact. Replace if worn or damaged.
6. Inspect retainer for damage. Replace if damaged,

d. ASSEMBLY AND PRELOAD ADJUSTMENT

NOTE

Ensure that all components are lubricated with lubricating oil as they are assembled.

1. Press rear bearing (15) onto drive pinion (9).
2. Install front and rear bearing cups (12 and 14) inside retainer (1).
3. Place retainer (1) onto drive pinion (9) and install new spacer (13).
4. Press front bearing (11) onto drive pinion (9).
5. Lubricate new oil seal (10) lips with molybdenum grease and install in retainer (1) bore until seated against internal shoulder.
6. If removed, install new deflector to flange (2). Install flange onto drive pinion (9) splines.



TA50601

6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

- 7 . Clamp drive pinion (9) and retainer (1) assembly in soft-jawed vise. Install flange holder (8). Install new lockwasher (4) and new flange nut (3). Tighten flange nut to approximately 350 lb.-ft. (475 Nom). Remove flange holder.

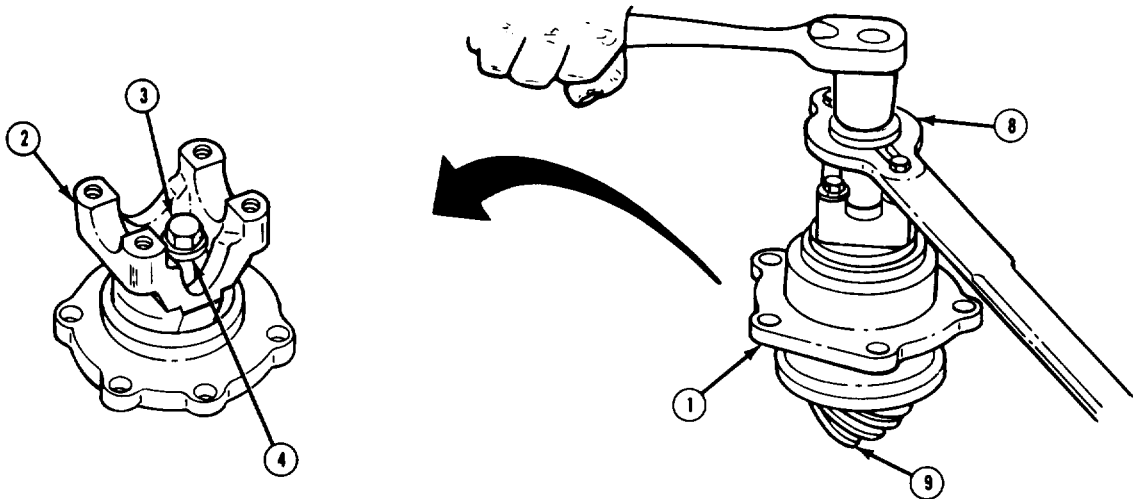
CAUTION

Ensure that flange nut (3) is tightened in small increments as preload is being reached. Exceeding torque specifications may compress spacer (13) on drive pinion (9) too far and require replacement of spacer.

NOTE

Proper preload is reached when torque required to turn drive pinion (9) is 25-35 lb.-in. (3-4 N.m) for new bearings, or 5-15 lb.-in. (1-2 N.m) for reused bearings.

- 8 . Measure turning torque. Continue to tighten flange nut (3) in small increments. Check turning torque after each slight amount of tightening until proper preload is reached.



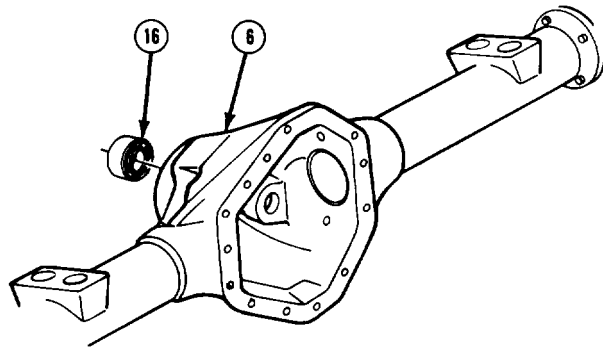
6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

CAUTION

Ensure that straddle bearing (16) is installed with part number facing pinion flange. Failure to follow this caution will result in damage to straddle bearing.

NOTE

If rear axle housing (6) is 1984 or older design, it uses a straddle bearing (16) with rollers that are larger than 1985 design straddle bearing. Ensure that proper size straddle bearing is installed,



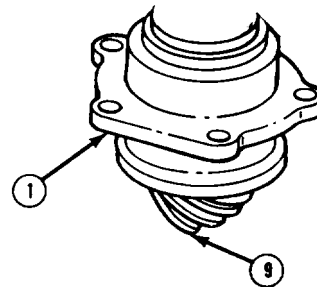
9. Install straddle bearing (16) in housing (6).

e. INSTALLATION AND PINION DEPTH ADJUSTMENT

NOTE

If no number is stamped or painted on drive pinion (9), should be used for code number.

1. Check gear head or shaft of drive pinion (9) for pinion depth code number. Remove retainer (1) and drive pinion assembly from vise.



6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

2. Compare depth code number with number on original drive pinion (9). Using Table 6-4, select proper shim for preliminary setting of pinion depth,

NOTE

If code number on old and new drive pinion (9) are the same, original shim may be reused if undamaged.

3. Refer to thickness of shim as measured in REMOVAL, step 2. Increase or decrease shim thickness as indicated by Table 6-4:

Table 6-4. Determining Drive Pinion Shim Requirements

Code Number On Service Pinion	Code Number On Original Pinion				
	+ 2	+ 1	0	- 1	- 2
+ 2	-	Add 0.001	Add 0.002	Add 0.003	Add 0.004
+ 1	Subtract 0.001	-	Add 0.001	Add 0.002	Add 0.003
0	Subtract 0.002	Subtract 0.001	-	Add 0.001	Add 0.002
- 1	Subtract 0.003	Subtract 0.002	Subtract 0.001	-	Add 0.001
- 2	Subtract 0.004	Subtract 0.003	Subtract 0.002	Subtract 0.001	-

EXAMPLE 1. If original shim measured 0.014 in. (0.36 mm), original code was "-1," and new code is "+2," correct shim would be:

$$0,014 \text{ in.} + 0.003 \text{ in.} = 0.017 \text{ in.}$$

$$(0.36 \text{ mm} + 0.08 \text{ mm} = 0.43 \text{ mm})$$

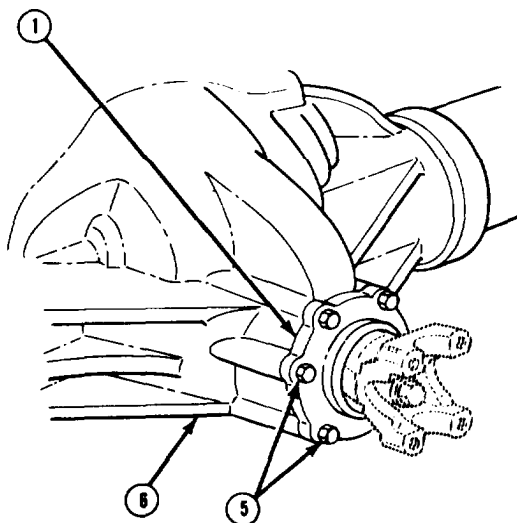
EXAMPLE 2. If original shim measured 0.012 in. (0.30 mm), original code was "+2," and new code is "-2," correct shim would be:

$$0.012 \text{ in.} - 0.004 \text{ in.} = 0,008 \text{ in.}$$

$$(0,30 \text{ mm} - 0.010 \text{ mm} = 0.20 \text{ mm}).$$

6-17. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (ALL EXCEPT M1009) (Con't).

- 4 . Ensure that all mating surfaces are clean. Place shim, as determined in INSTALLATION , step 3. onto housing (6), alining all bolt holes.
- 5 . Install retainer (1) and drive pinion assembly with 6 new lockwashers and bolts (5). Tighten bolts to 65 lb.-ft. (88 N.m).



FOLLOW-ON TASKS:

- Install rear axle differential. (See paragraph 6-15)
- Connect rear propeller shaft to pinion flange. (See TM 9-2320-289-20)

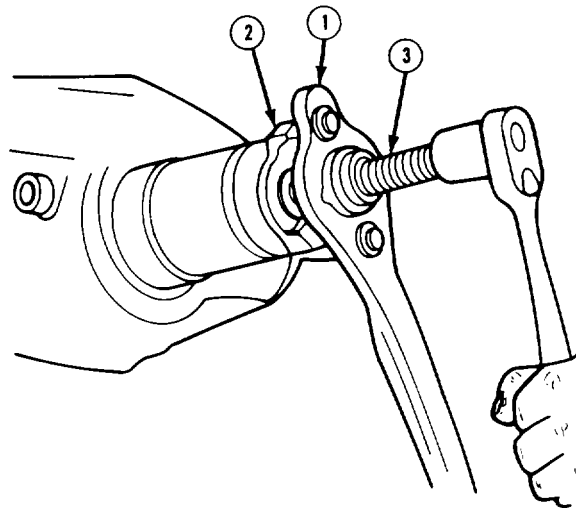
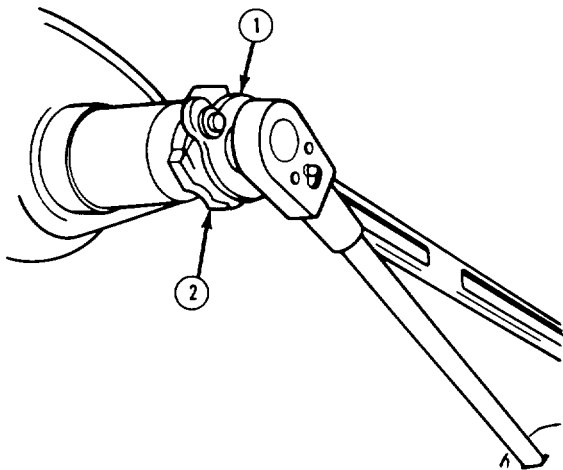
6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

a. REMOVAL

NOTE

- Ensure that shims and slingers are tagged as they are removed and saved for measurement.
- Ensure that flange nut (4) is saved for use during drive pinion (5) installation and measurement. When drive pinion is fully seated, measurements are completed, and ready to receive final torque, a new flange nut must be used.

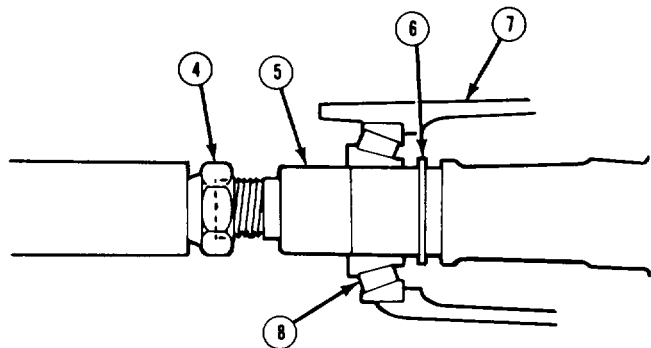
1. Using flange holder (1), remove flange nut (4) and washer from flange (2).
2. Thread flange remover bolt into small outside diameter end of flange remover (3). Turn flange remover 1/8 turn to a locked position. Turn flange remover while holding flange holder (1) stationary. Remove flange (2). Remove deflector from flange if damaged.



NOTE

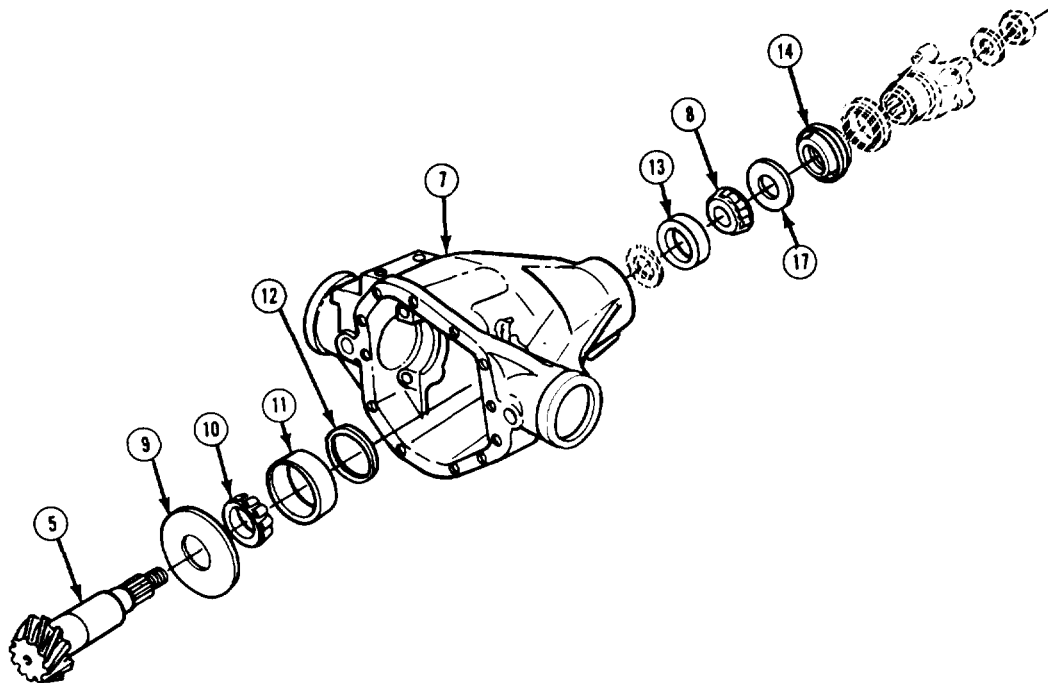
Shim (6) may be on drive pinion (5) shaft or inside housing (7).

3. Install flange nut (4) halfway onto drive pinion (5) threads. Tap on flange nut with soft-faced hammer to loosen drive pinion in front pinion bearing (8). Remove flange nut from drive pinion. Remove drive pinion from housing (7). Remove shim (6).

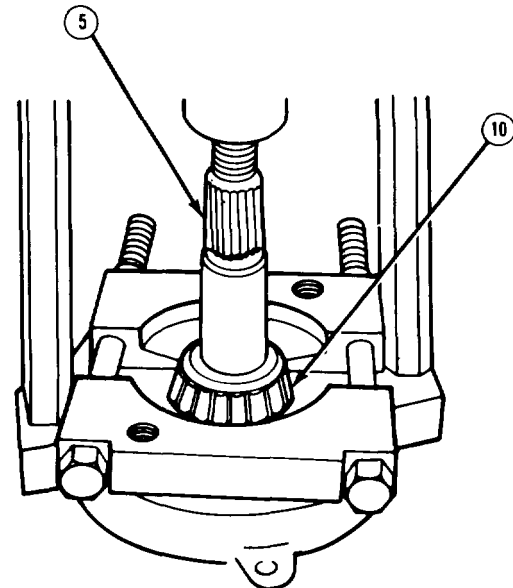


6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

- 4 . Tap on inner race of front pinion bearing (8) to remove pinion oil seal (14), slinger (17), front bearing cup (13) and front pinion bearing. Discard pinion oil seal.



- 5 . Remove rear bearing cup (11) from housing (7). Remove shim (12). Press rear pinion bearing (10) from drive pinion (5) shaft. Remove slinger (9).



6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes with water and get medical aid.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa). Use only effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.), Failure to follow this warning may result in serious injury to personnel.

1. Clean drive pinion, shims, slingers, flange, and deflector with dry cleaning solvent and dry with compressed air.
2. Clean drive pinion bearing bores in housing to ensure that they are free of dirt or other contamination. Remove any nicks found.
3. Clean and inspect front and rear bearing assemblies in accordance with TM 9-214.

NOTE

If drive pinion is replaced, differential ring gear and ring gear bolts must also be replaced, (See paragraph 6-15.1)

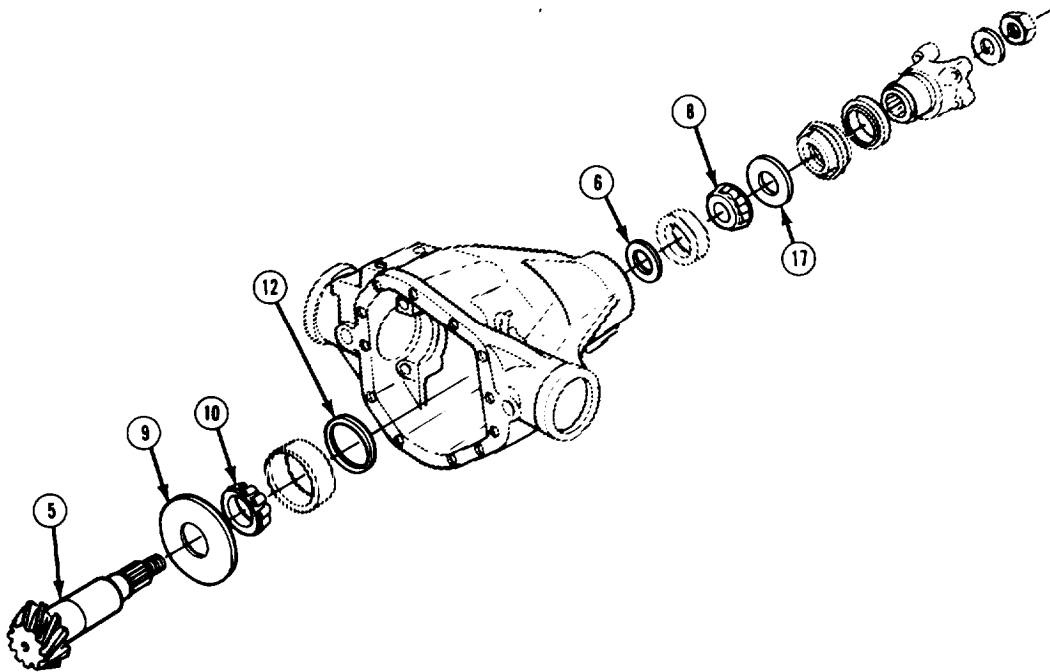
4. Inspect drive pinion for damage. Replace if damaged.
5. Inspect flange for evidence of wear at point of oil seal contact. Replace if worn.

6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

c. INSTALLATION

NOTE

- Ensure that all components are lubricated with lubricating oil as they are installed,
 - If original drive pinion (5) is reused, new shim pack must be built equal in thickness to original one.
 - Slings (9 and 17) are considered part of shim pack.
 - If new drive pinion (5) is installed, adjustments in new shim packs' thickness will be required unless the number etched on gear end of replacement drive pinion is the same as original drive pinion.
- 1 . Measure thickness of shim (12) and slinger (9) to determine thickness of original buildup at rear pinion bearing (10). Measure thickness of shim (6) and slinger (17) to determine thickness of original buildup at front pinion bearing (8). Record measurements. Discard shims and slingers.

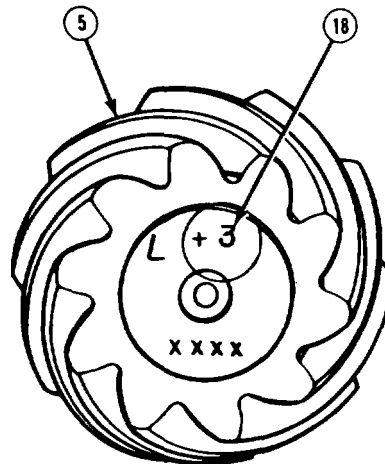


6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

NOTE

Perform steps 2 and 3 only if new drive pinion (5) is being installed.

2. Determine proper rear shim pack for setting pinion depth as follows:
 - (a) Check number (18) etched on gear end of old drive pinion (5) & locate it in "Old Pinion Marking" column of Table 6-3.
 - (b) Check number (18) etched on gear end of new drive pinion (5) and locate it in "New Pinion Marking" column of Table 6-3.
 - (c) Find point where 2 columns intersect to determine adjustment number for new rear shim pack.



NOTE

A "+" means add that amount; a "-" means subtract that amount; and "O" means no change.

3. Add or subtract adjustment number found on Table 6-4.1 to old rear shim pack (9 and 12) to determine new rear shim pack.

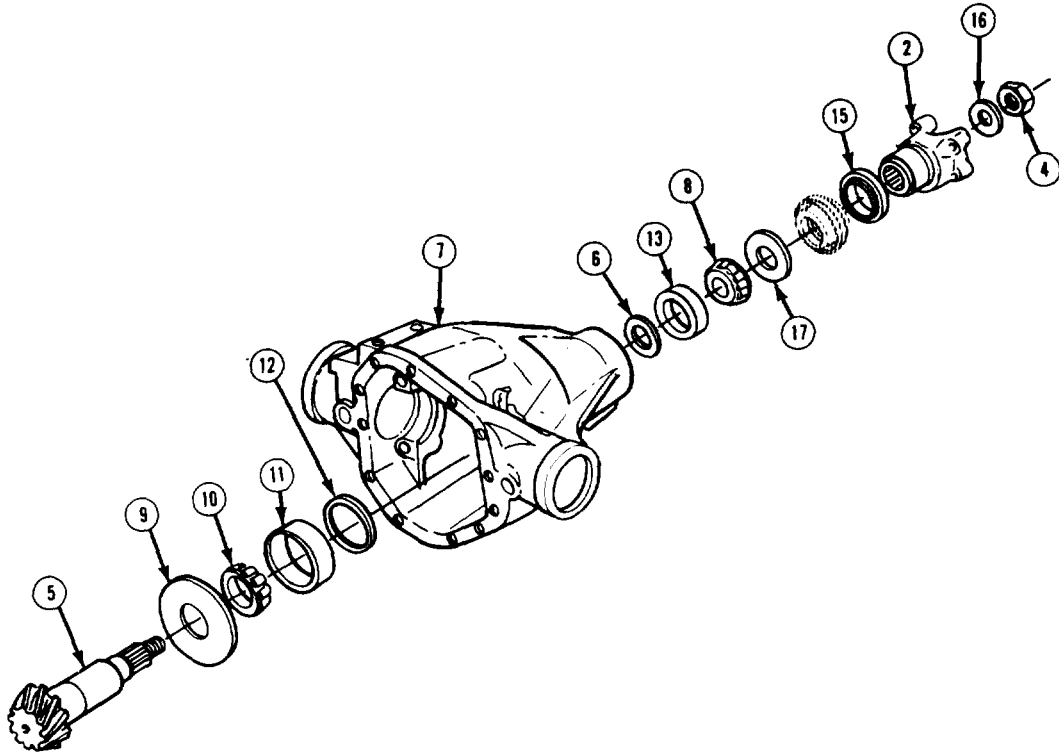
6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

Table 6-4.1. Pinion Setting Charts,

<i>English U.S. Standard Chart</i>									
Old Pinion Marking	New Pinion Marking								
	- 4	- 3	- 2	- 1	0	+ 1	+ 2	+ 3	+ 4
+ 4	+ 0.008	+ 0.007	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0
+ 3	+ 0.007	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001
+ 2	+ 0.006	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	- 0.002
+ 1	+ 0.005	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	- 0.002	- 0.003
0	+ 0.004	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004
- 1	+ 0.003	+ 0.002	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004	- 0.005
- 2	+ 0.002	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004	- 0.005	- 0.006
- 3	+ 0.001	0	- 0.001	- 0.002	- 0.003	- 0.004	- 0.005	- 0.006	- 0.007
- 4	0	- 0.001	- 0.002	- 0.003	- 0.004	- 0.005	- 0.006	- 0.007	- 0.008
<i>Metric Chart</i>									
Old Pinion Marking	New Pinion Marking								
	- 10	- 8	- 5	- 3	0	+ 3	+ 5	+ 8	+ 10
+ 10	+ 0.20	+ 0.18	+ 0.15	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0
+ 8	+ 0.18	+ 0.15	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	- 0.03
+ 5	+ 0.15	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	- 0.03	- 0.05
+ 3	+ 0.13	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	- 0.03	- 0.05	- 0.08
0	+ 0.10	+ 0.08	+ 0.05	+ 0.03	0	- 0.03	- 0.05	- 0.08	- 0.10
- 3	+ 0.08	+ 0.05	+ 0.03	0	- 0.03	- 0.05	- 0.08	- 0.10	- 0.13
- 5	+ 0.05	+ 0.03	0	- 0.03	- 0.05	- 0.08	- 0.10	- 0.13	- 0.15
- 8	+ 0.03	0	- 0.03	- 0.05	- 0.08	- 0.10	- 0.13	- 0.15	- 0.18
- 10	0	- 0.03	- 0.05	- 0.08	- 0.10	- 0.13	- 0.15	- 0.18	- 0.20

6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

4. Install new shim (12) inside rear bearing cup (11) bore. Install rear bearing cup in housing (7).
5. To front shim pack (6 and 17), add or subtract an amount equal to what was added or subtracted to rear shim pack (9 and 12).
6. Install front bearing cup (13) into housing (7) bore.
7. Install new slinger (9) and rear pinion bearing (10) onto drive pinion (5) shaft. Install drive pinion and bearing assembly in housing (7),



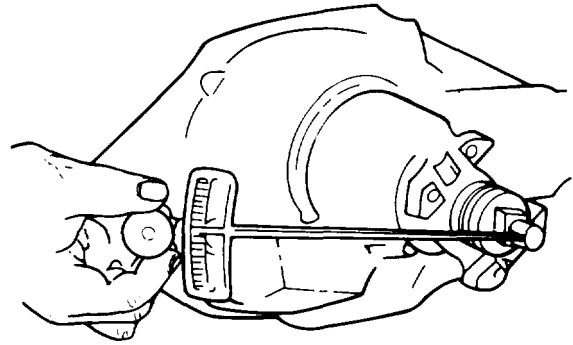
8. Install new shim (6), front pinion bearing (8), and new slinger (17) on drive pinion (5) shaft.
9. If removed, install new deflector (15) to flange (2). Install flange, washer (16), and flange nut (4). Using flange holder and flange remover, tighten flange nut to pull flange onto drive pinion (5) and to fully seat front pinion bearing (8). Tighten flange nut to 255 lb.-ft. (346 N.m). Remove flange holder and flange remover.

6-17.1. REAR AXLE DRIVE PINION AND BEARINGS MAINTENANCE (M1028A2) (Con't).

NOTE

- When measuring rotating torque, torque reading needed to start drive pinion (5) shaft turning should be disregarded,
- Front shim pack (6 and 17) should be increased to reduce rotating torque. Front shim pack should be decreased to increase rotating torque.

10. Measure rotating torque at flange nut (4), Rotating torque should be 20-40 lb.-in. (2-5 N.m) for new bearings, or 10-20 lb.-in. (1-2 N.m) for reused bearings. Adjust front shim pack (6 and 17) by repeating steps 8 and 9 if specifications are not met.



11. Remove flange nut (4), washer (16), and flange (2) from drive pinion (5) shaft. Discard flange nut.
12. Coat lips of new pinion oil seal (14) with molybdenum grease and install squarely into housing (7) bore until flush with housing. Install flange (2), washer (16), and new flange nut (4). Tighten flange nut to 255 lb.-ft. (346 N.m).

FOLLOW-ON TASKS:

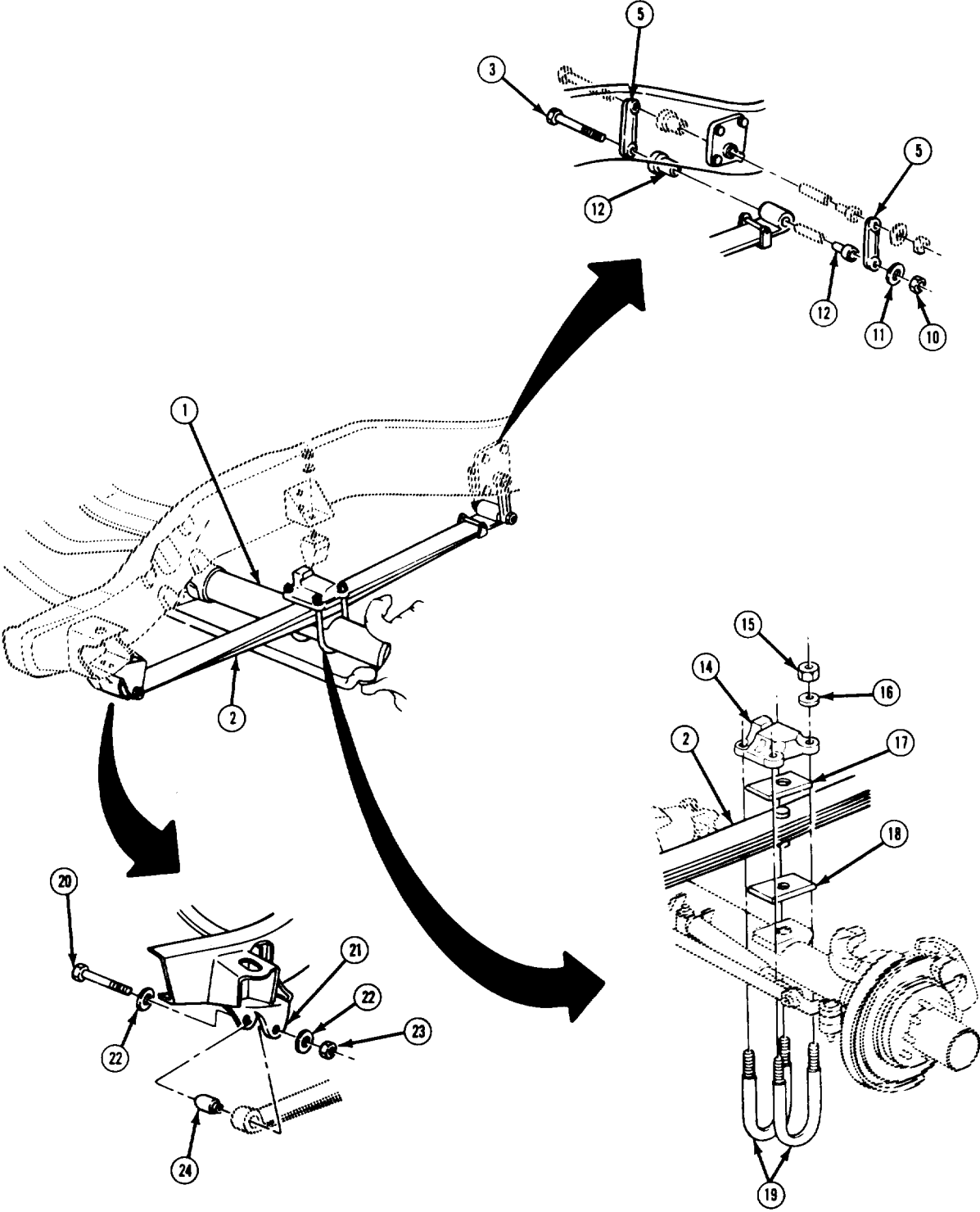
- Install rear axle differential. (See paragraph 6-15.1)

Section III. Suspension MAINTENANCE

6-18. SUSPENSION MAINTENANCE INDEX.

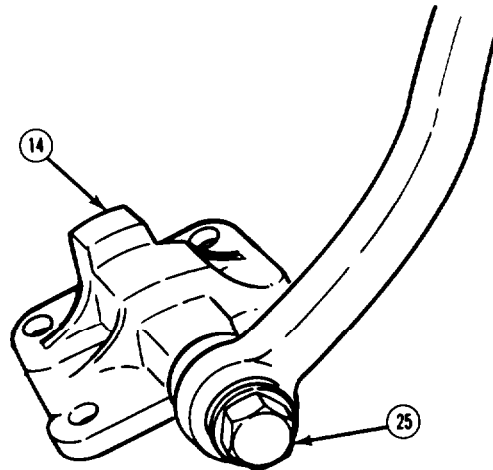
Paragraph Number	Procedures	Page Number
6-19.	Front Spring Assembly and Bushings Replacement	6-124
6-20.	Rear Spring Assembly and Bushings Replacement	6-131

6-19. FRONT SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).



6-19. FRONT SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

6. Inspect anchor plate (14) for damage. If damaged, remove stabilizer bar bolt (25) and remove anchor plate.
7. Inspect shackle (5) and bushings (6) for damage. If damaged perform steps 8-11 to remove.
8. To gain access to shackle (5) and bushings (6) on right side, disconnect exhaust pipe from exhaust manifold and lower exhaust pipe approximately 3 in. (7.62 cm), (See TM 9-2320-289-20)
9. To gain access to shackle (5) and bushings (6) on left side, shift transmission to "L" (Low) and remove plastic shield at rear of fender skirt. (See paragraph 10-6)
10. Remove locknut (9), washer (8), and bolt (4). Remove shackle (5). Discard locknut.
11. Drive out spacer (7) and remove 2 bushings (6) from frame.



b. INSTALLATION

1. If removed, install 2 bushings (6) at frame. Drive in spacer (7).
2. If removed, install shackle (5) to frame with bolt (4), washer (8), and new locknut (9). Tighten locknut to 50 lb.-ft. (68 N.m).
3. If removed, install anchor plate (14) and secure to stabilizer bar with bolt (25). DO NOT fully tighten bolt.

CAUTION

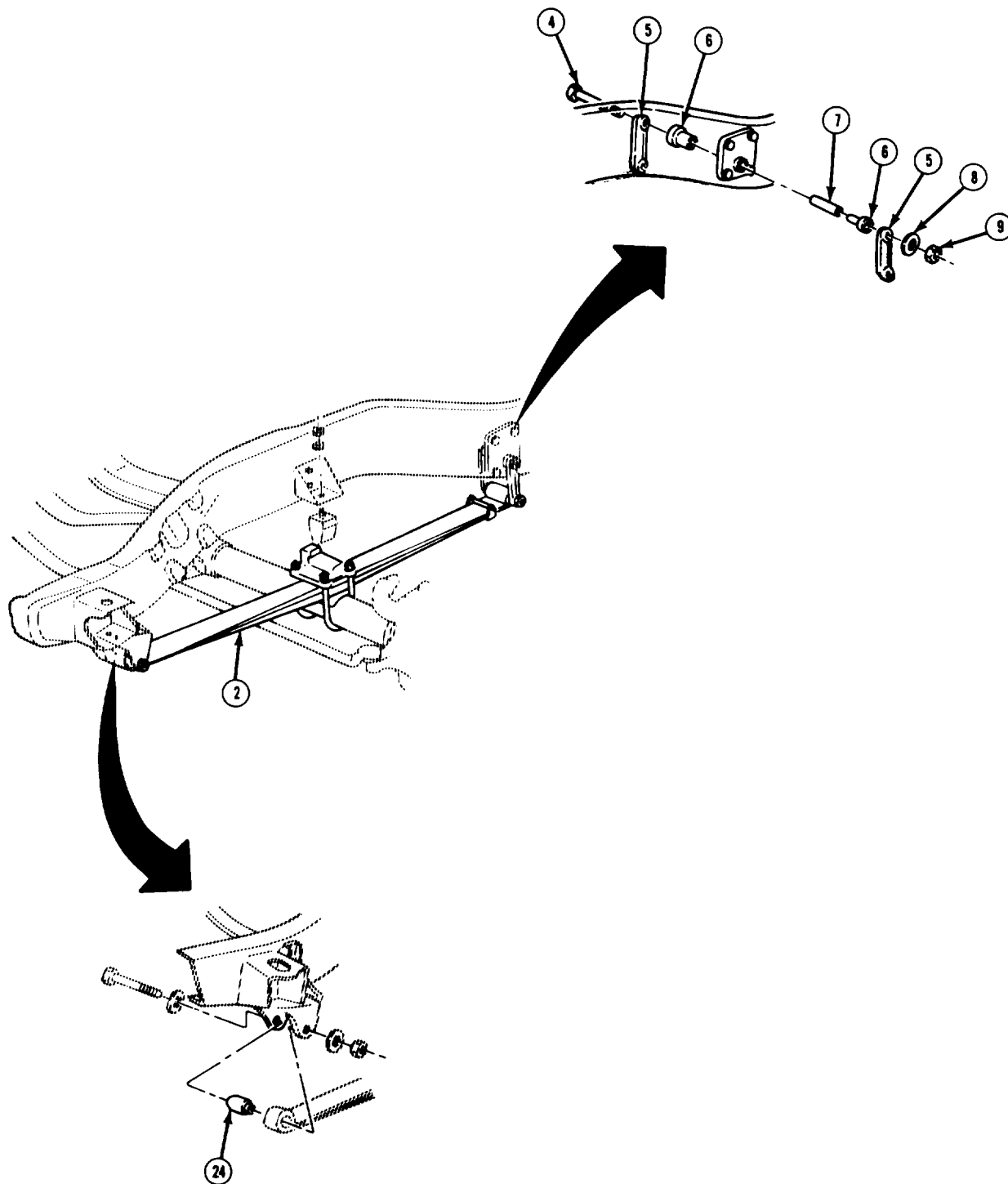
Ensure that press tool contacts steel outer shell of bushing (24). Failure to follow this caution may result in damage to bushing.

NOTE

Ensure that bushing (24) is lubricated with light lubricating oil before installation, Installed bushing should protrude an equal amount on each side.

4. If removed, press bushing (24) into spring assembly (2).

6-19. FRONT SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).



TA50607

6-19. FRONT SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

WARNING

Spring assembly (2) is heavy. Use caution during installation. Failure to follow this warning may result in serious injury to personnel or damage to axle (1) assembly.

- 5 . If removed, install 2 bushings (12) to spring assembly (2) and drive in spacer (13).
- 6 . Position spring assembly (2) over axle (1).
- 7 . Install spring assembly (2) to hanger (21) with bolt (20), 2 washers (22), and new locknut (23). DO NOT fully tighten locknut.
- 8 . Connect spring assembly (2) to shackle (5) with bolt (3), washer (11), and new locknut (10). Tighten locknut (10) to 50 lb.-ft. (68 N.m). Tighten locknut (23) to 90 lb.-ft. (122 N.m).
- 9 . Position bottom spacer (18) on axle (1) housing. Raise axle, alining spring assembly (2) center bolt with hole in bottom spacer and axle housing. Install top spacer (17) alining bolt hole.

NOTE

Right side of all except MI 009 uses only 1 "U" bolt (19), 2 nuts (15), and 2 bolts at anchor plate (14).

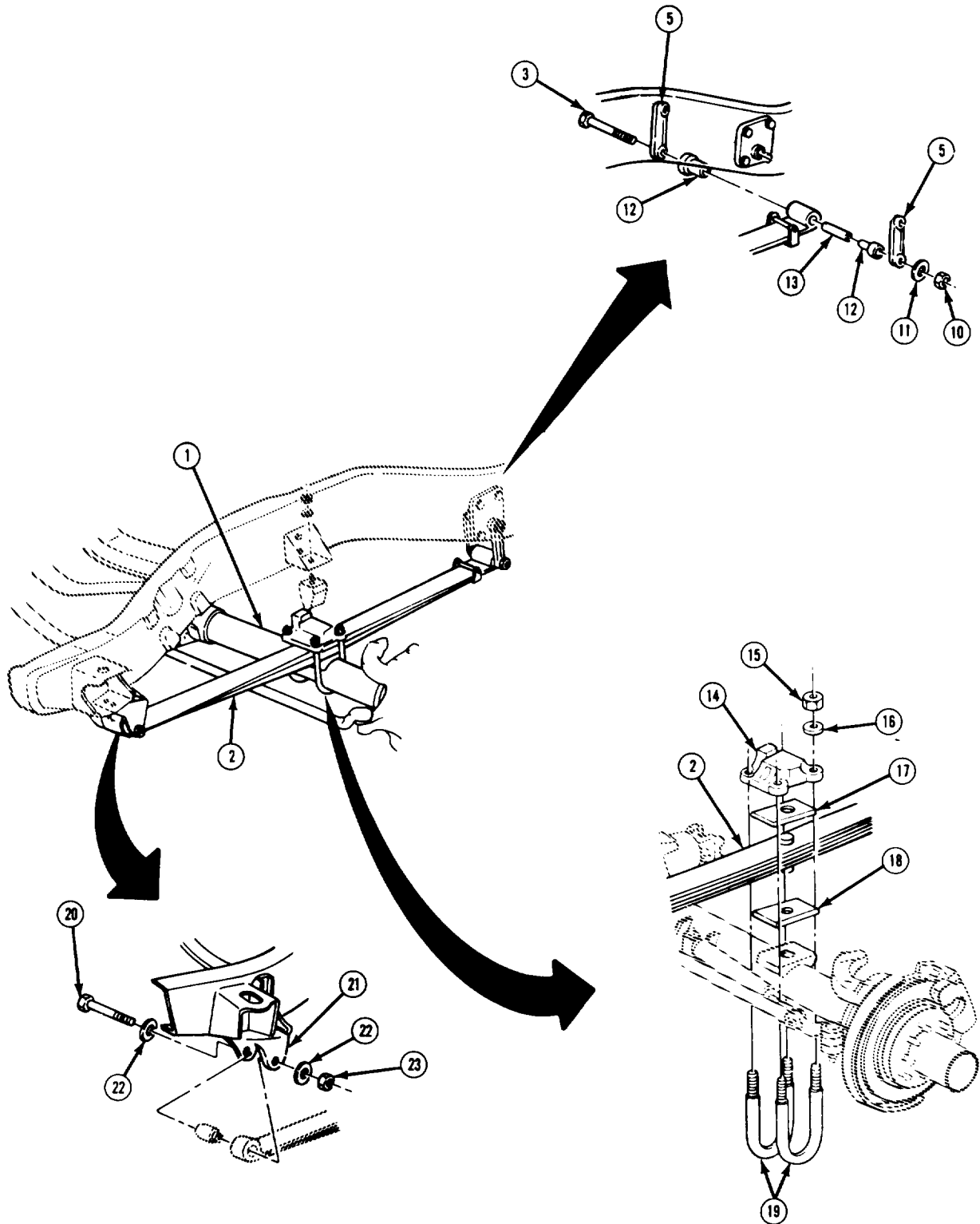
10. Install 2 "U" bolts (19), 4 washers (16), and nuts (15). Install all nuts to uniform engagement on " U" bolts to retain and position anchor plate (14).

NOTE

All nuts (15) must be tightened evenly to ensure that "U" bolts (19) and spring assembly (2) seat properly.

11. Tighten 4 nuts (15) in diagonal sequence to 25 lb.-ft. (34 Nom). Fully tighten all nuts in same diagonal sequence to 150 lb.-ft. (203 N.m).

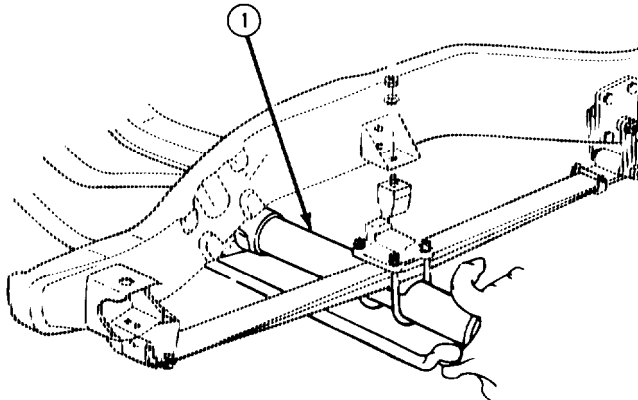
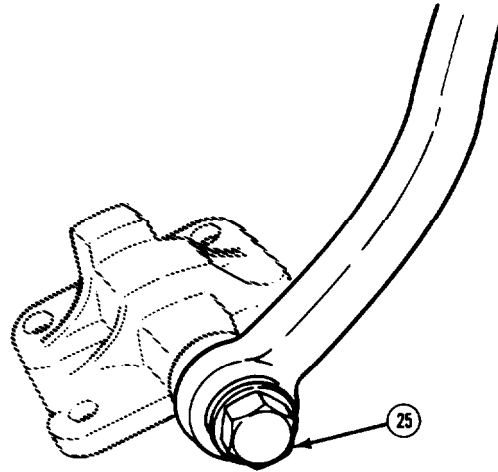
6-19. FRONT SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).



TA50608

6-19. FRONT SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

12. Tighten stabilizer bar bolt (25) to 230 lb.-ft. (312 N.m).
13. Remove jack from axle (1).
14. If removed, install plastic shield to rear of fender skirt on left side. (See paragraph 10-6) If lowered, raise right exhaust pipe to its original position and connect to right exhaust manifold. (See TM 9-2320-289-20) If transmission was shifted to "L" (Low), shift to "P" (Park).



FOLLOW-ON TASKS:

- Install wheel. (See TM 9-2320-289-20)
- Remove jack stands and lower truck.
- Road test truck and check torque of "U" bolt fasteners.

TA50609

6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Equipment Condition

- Truck raised and frame supported on jack stands.
- Wheel removed. (See TM 9-2320-289-20)
- Rear stabilizer bar removed (M1028A2 and M1028A3). (See TM 9-2320-289-20)

Materials/Parts

- One center bolt
- Three locknuts
- Lubricating oil (item 47, Appendix B)

Tools/Test Equipment

- Torque wrench

Personnel required

- MOS 63W (2)

General Safety instructions

- Rear spring assembly is heavy. Use extreme caution and assistance during removal and installation,
 - Use extreme caution when releasing tension from spring assembly and auxiliary spring.
-

a. REMOVAL

NOTE

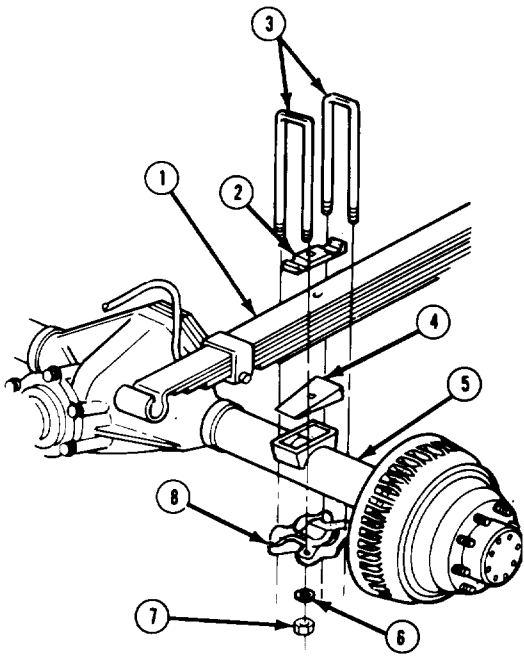
Model differences in spring assembly configuration and attaching hardware to axle and frame will be pointed out as they occur.

6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

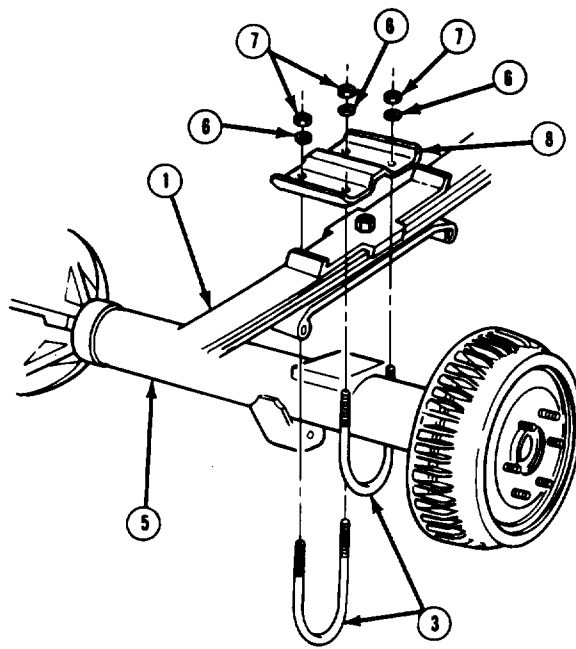
NOTE

Perform step 1 for all except M1028A2 and M1028A3.

1. Place a suitable jack under axle (5), Remove 4 nuts (7), washers (6), 2 "U" bolts (3), and anchor plate (8). Remove spacer (2) if present,



All Except M1009, M1028A2, and M1028A3



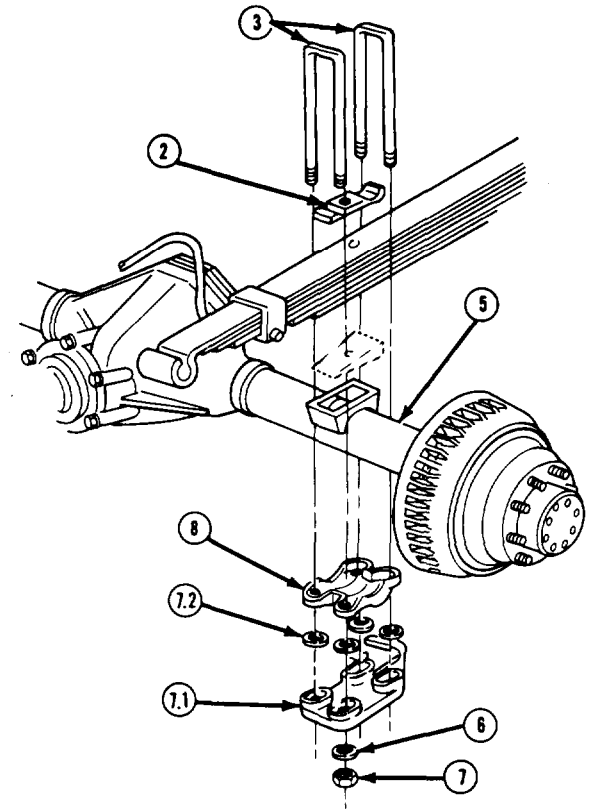
M1009

 6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

NOTE

Perform step 1.1 for M1028A2 and M1028A3.

- 1.1. Place a suitable jack under axle (5). Remove 4 nuts (7), washers (6), adapter (7.1), 4 washers (7.2), 2 "U" bolts (3), and anchor plate (8). Remove spacer (2).



M1028A2 and M1028A3

2. Lower axle (5) until all tension is released from spring assembly (1). Remove shim (4) if present.

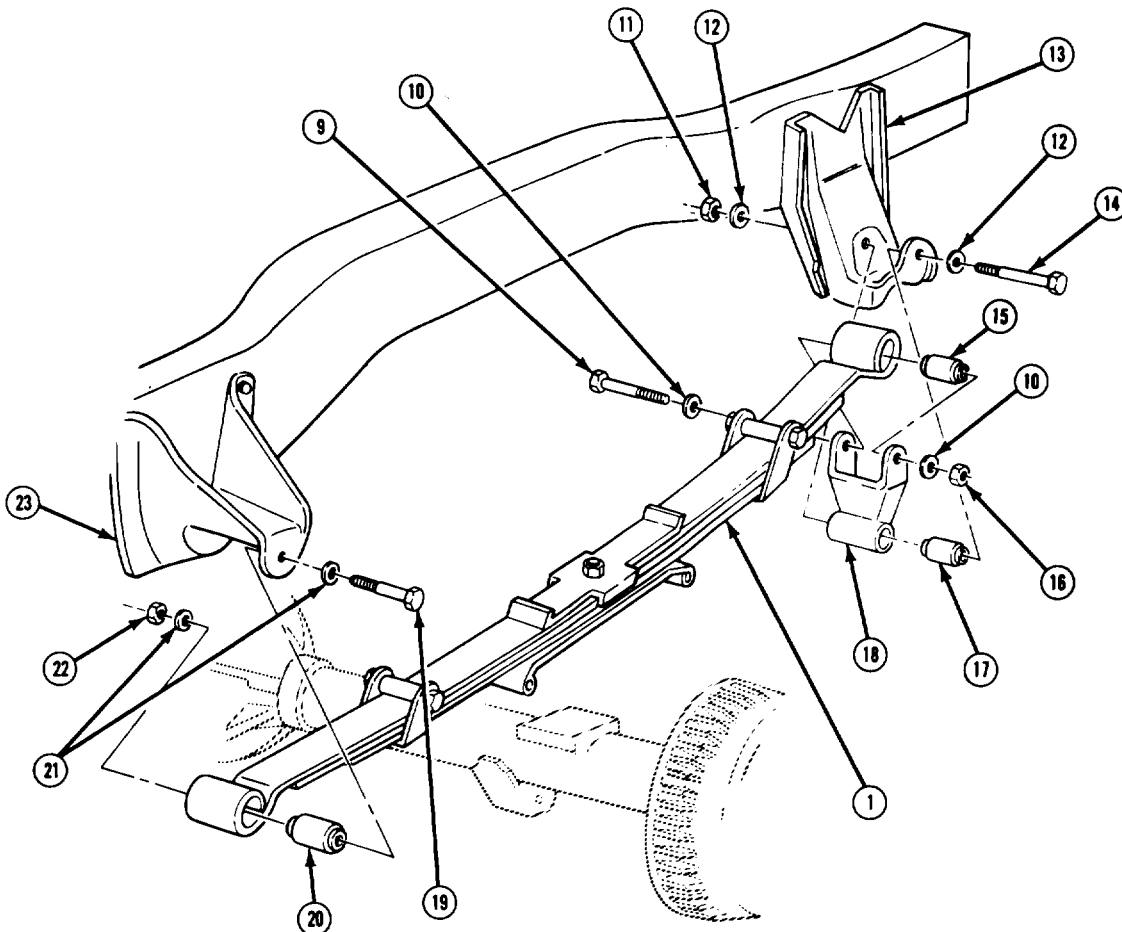
6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

- 3 . Remove locknut (11), bolt (14), and 2 washers (12), and remove shackle (18) from hanger (13), Discard locknut,

WARNING

Spring assembly (1) is heavy. Use extreme caution and assistance during removal. Failure to follow this warning may result in serious injury to personnel or damage to axle assembly.

- 4 . Remove locknut (22), bolt (19), and 2 washers (21) securing spring assembly (1) to hanger (23). Remove spring assembly. Discard locknut.



 6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

NOTE

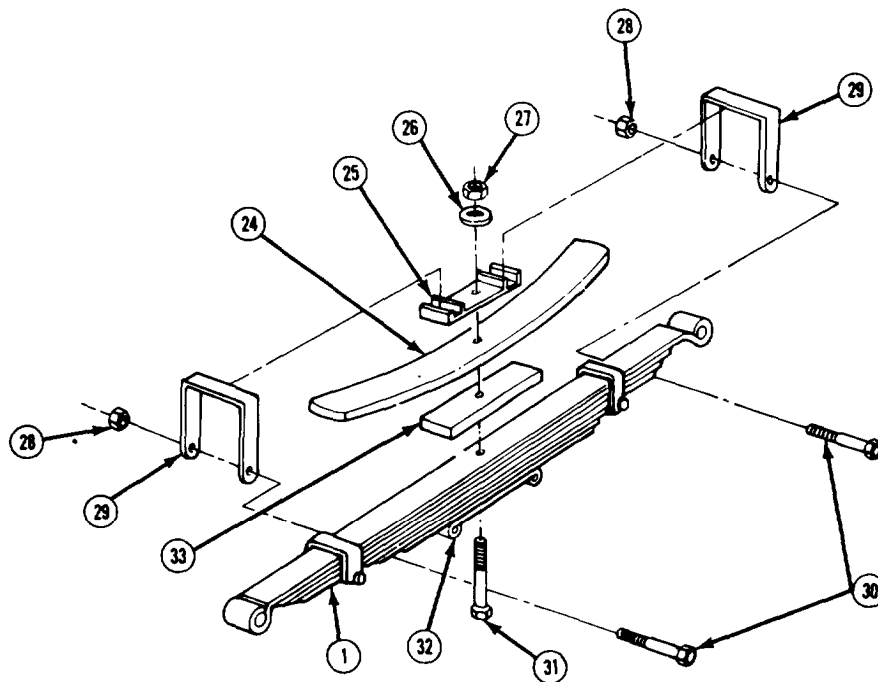
Ensure that position of shackle (18) is noted for installation.

5. Remove locknut (16), bolt (9), 2 washers (10), and remove shackle (18) from spring assembly (1). Discard locknut.
6. If bushings (15, 17, and 20) are damaged, press out 3 bushings.

NOTE

If disassembling MI 028, M1028A1, M1028A2, or M1028A3 auxiliary spring (24) and spring assembly (1), perform steps 7 and 8.

7. Place spring assembly (1) and auxiliary spring (24) *in vise* and compress leaves near center bolt (31). Remove 2 nuts (28), bolts (30), and clips (29), securing auxiliary spring to spring assembly. File peened end of center bolt and remove nut (27), washer (26), and center bolt. Discard center bolt.



6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

WARNING

Use extreme caution when releasing tension from spring assembly (1) and auxiliary spring (24). Springs are under considerable pressure and could cause injury to personnel if suddenly released.

NOTE

Several leaves of spring assembly (1) will be loose when pressure on vise is released.

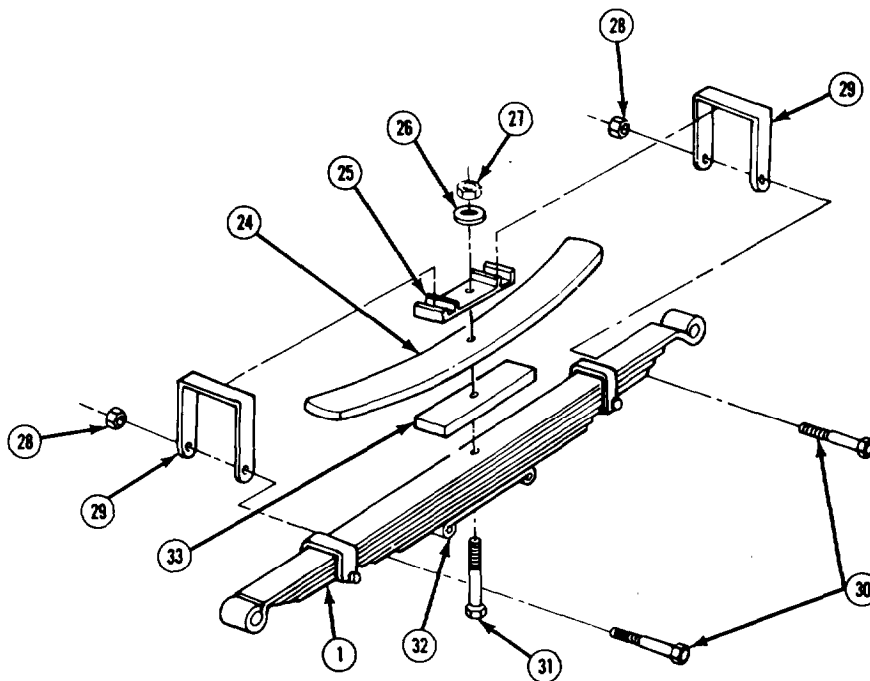
8. Open vise slowly and allow all leaves to expand. Disassemble top retainer (25), auxiliary spring (24), spacer (33), spring assembly (1), and bottom retainer (32).

b. INSTALLATION

NOTE

If assembling M1028, M1028A1, M1028A2, or M1028A3 auxiliary spring (24) and spring assembly (1), perform steps 1 and 2.

1. Assemble bottom retainer (32), spring assembly (1), spacer (33), auxiliary spring (24), and top retainer (25). Align holes in spring assembly leaves, retainers, spacer, and auxiliary spring with a long drift.



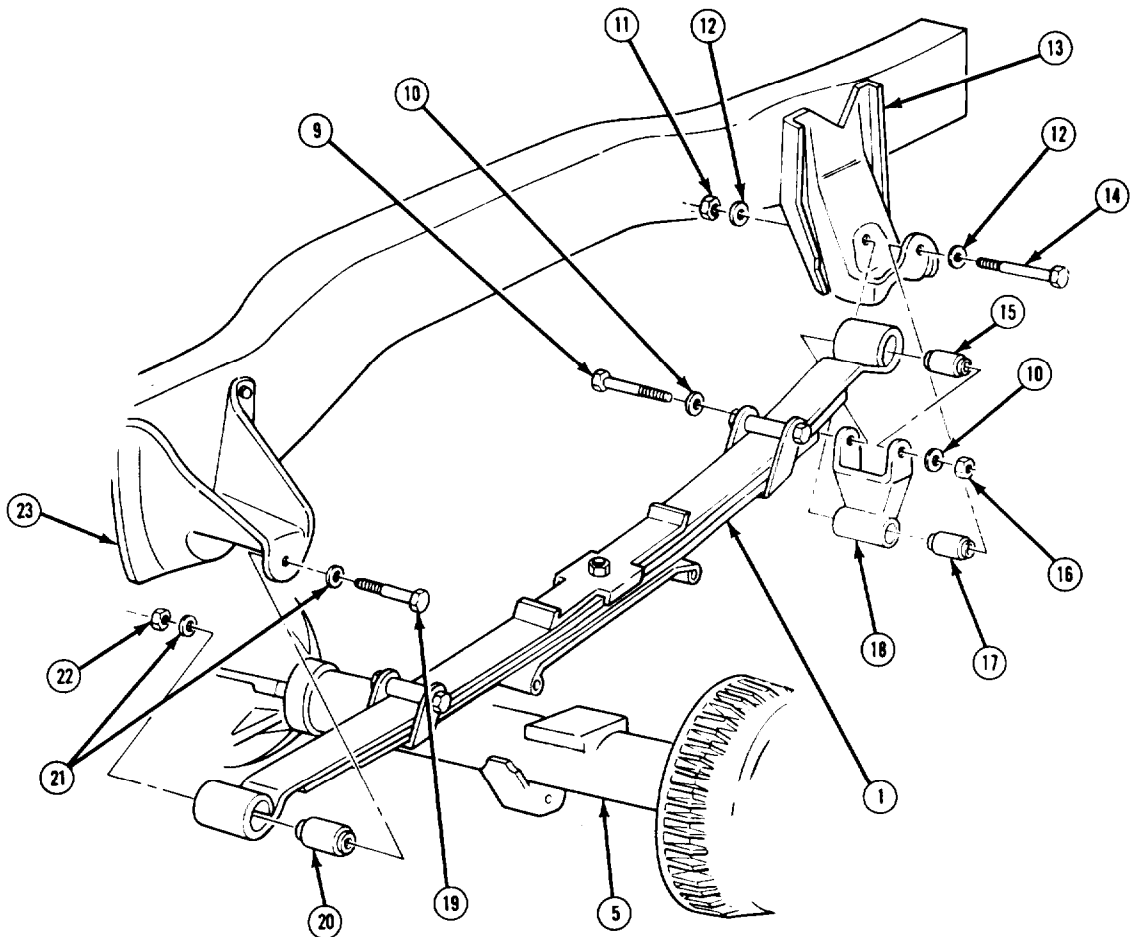
6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

2. Compress all layers in vise near center bolt (31) hole. Remove drift and install new center bolt. Install washer (26) and nut (27). Tighten nut to 35 lb.-ft. (47 N.) and peen bolt to prevent nut from backing off.
3. Reposition spring assembly (1) and auxiliary spring (24) in vise and install 2 clips (29) with bolts (30) and nuts (28). Tighten nuts to 35 lb.-ft. (47 N.m). Remove spring assembly and auxiliary spring from vise.

CAUTION

Ensure that press tool contacts steel outer shell of bushings (15, 17, and 20), Failure to follow this caution may result in damage to bushings.

4. If removed, lubricate 3 bushings (15, 17, and 20) with light lubricating oil and press in.
5. Install shackle (18) to spring assembly (1) with bolt (9), 2 washers (10), and new locknut (16). DO NOT fully tighten locknut.

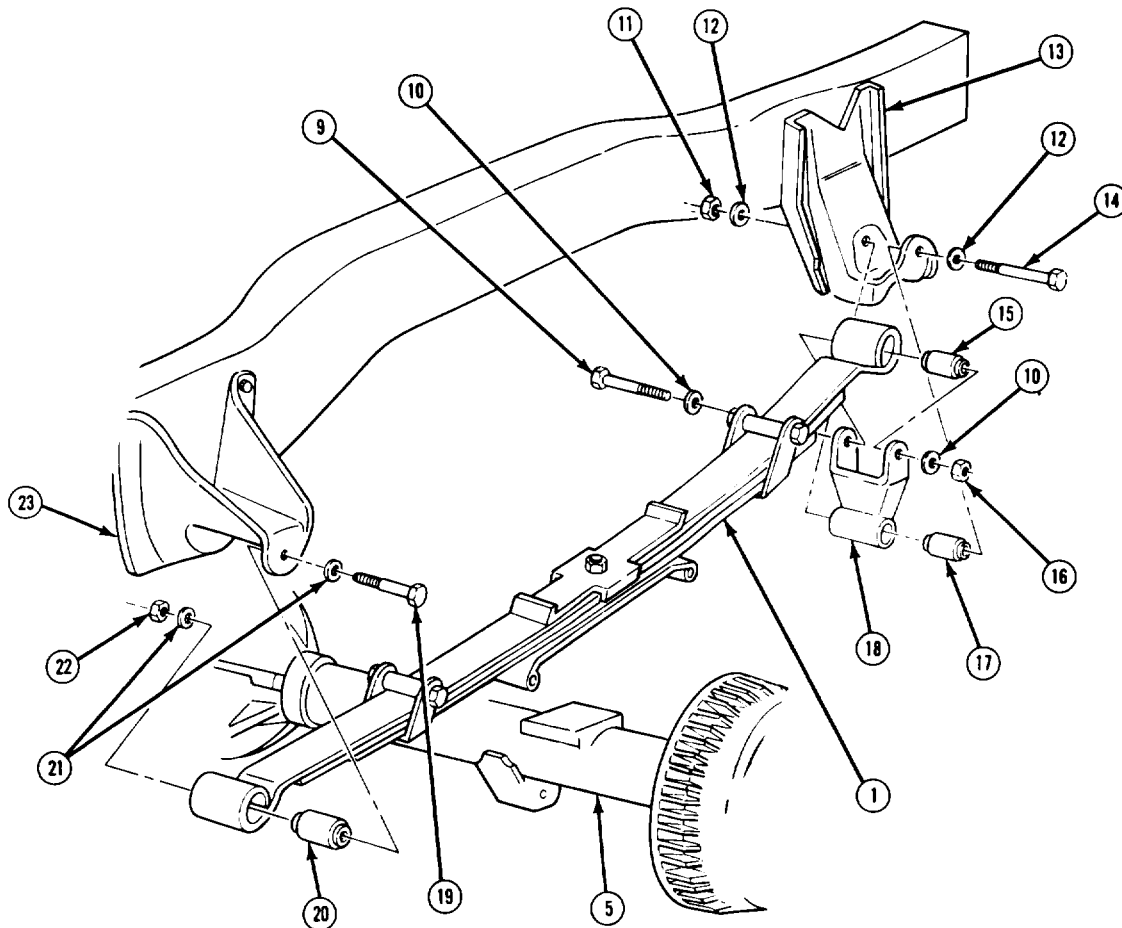


6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't)

WARNING

Spring assembly (1) is heavy. Use extreme caution and assistance during installation. Failure to follow this warning may result in serious injury to personnel or damage to axle (5) assembly,

6. Position spring assembly (1) over axle (5),
7. Install spring assembly (1) to hanger (23) with bolt (19), 2 washers (21), and new locknut (22). DO NOT fully tighten locknut,
8. Install shackle (18) to hanger (13) with bolt (14), 2 washers (12), and new locknut (11). Tighten locknuts (11, 16, and 22) to 110 lb.-ft. (149 N.).

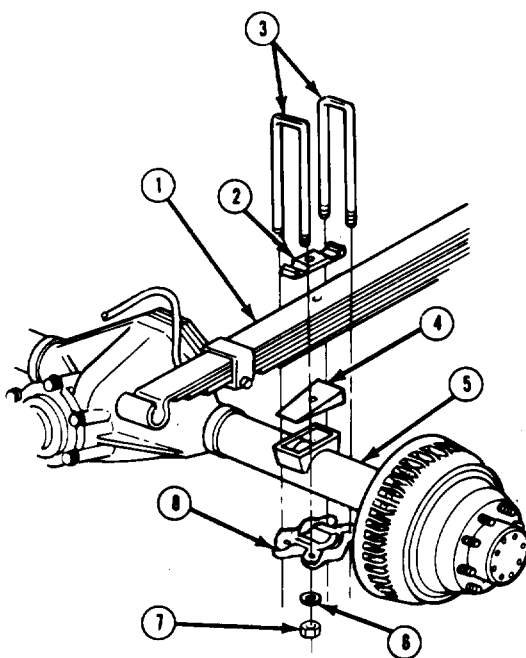


6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

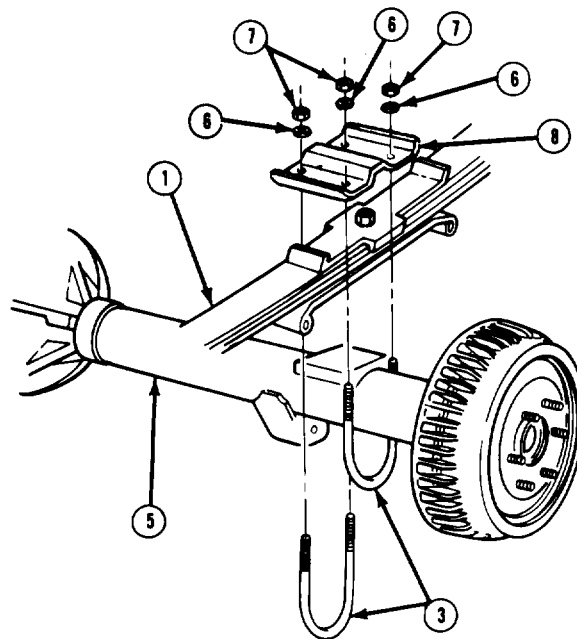
NOTE

Perform step 9 for all except M1028A2 and M1028A3.

9. If removed, install shim (4) on axle (5) housing with thinner edge facing front. Raise axle, aligning spring assembly (1) center bolt hole with hole in shim and axle housing. If removed, install spacer (2). Install anchor plate (8) and 2 "U" bolts (3) with 4 washers (6) and nuts (7), Install all nuts to uniform engagement on "U" bolts to retain and position anchor plate.



■ All Except M1009, M1028A2, and M1028A3



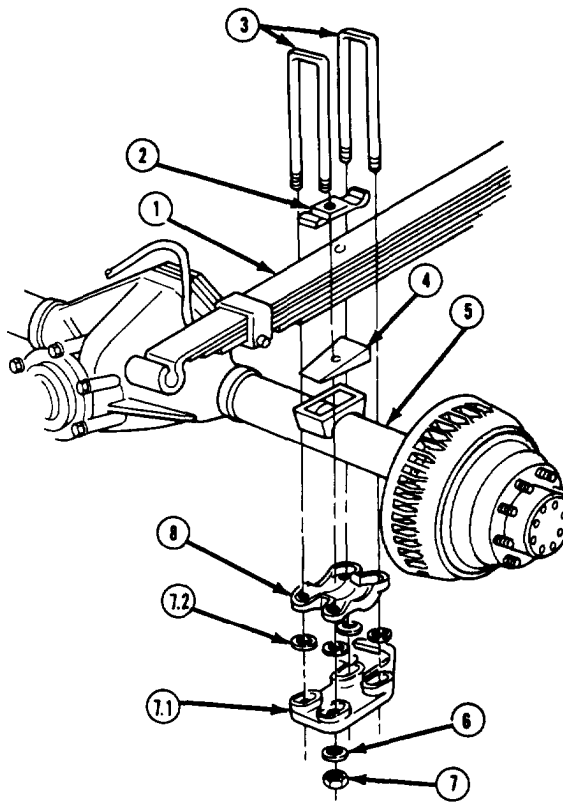
M1009

6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

NOTE

- . Perform step 9,1 for M1028A2 and M1028A3.
- . Adapters (7,1) are mismarked on casting as to left-hand and right-hand. Install adapters as shown, with ribs up and curved arm to rear facing inboard,

- 9.1. If removed, install shim (4) on axle (5) housing with thinner edge facing front. Raise axle, alining spring assembly (1) center bolt hole with hole in shim and axle housing. Install spacer (2). Install anchor plate (8) and 2 "U" bolts (3) with 4 washers (7.2), adapter (7.1), 4 washers (6), and nuts (7). Install all nuts to uniform engagement on "U" bolts to retain and position anchor plate and adapter.
- 9.2 Check axle to see that spring dowel pins are through angle shim and are seated in axle.
- 9.3 Check that "U" bolts are properly positioned in upper spacer grooves.



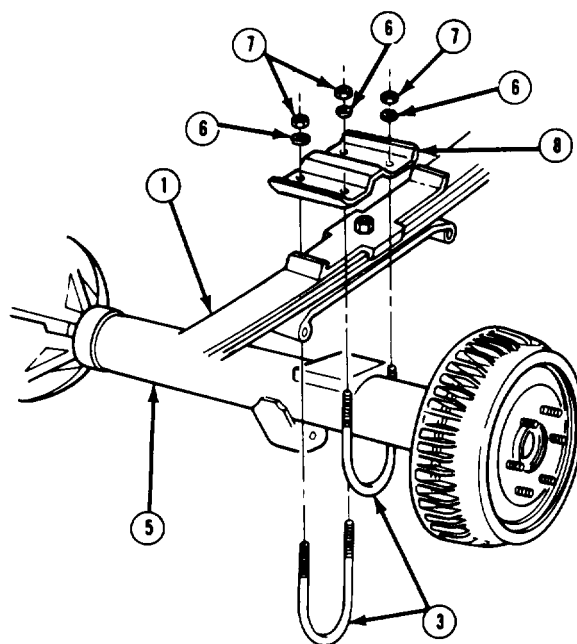
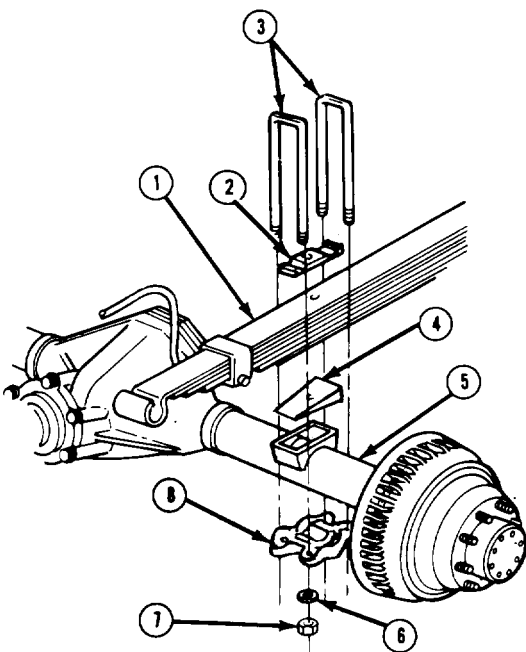
M1028A2 and M1028A3

6-20. REAR SPRING ASSEMBLY AND BUSHINGS REPLACEMENT (Con't).

NOTE

All nuts (7) must be tightened evenly to ensure that "U" bolts (3) and spring assembly (1) seat properly.

10. Tighten 4 nuts (7) in diagonal sequence to 25 lb.-ft. (34 N.m). Fully tighten all nuts on M1009 in same diagonal sequence to 145 lb.-ft. (197 N.). Fully tighten all nuts on all except M1009 M1028A2, and M1028A3 in same diagonal sequence to 170 lb.-ft. (231 N.m). Fully tighten all nuts on M1028A2 and M1028A3 in same diagonal sequence to 150 lb.-ft. (203 N.m).
11. Remove jack from axle (5).



■ All Except M1009, M1028A2, and M1028A3

M1009

FOLLOW-ON TASKS:

- Install rear stabilizer bar (M1028A2 and M1028A3). (See TM 9-2320-289-20)
- Install wheel. (See TM 9-2320-289-20)
- Remove jack stands and lower truck.
- Road test truck and check torque of "U" bolt fasteners.