
STEERING, SUSPENSION, WHEELS AND TIRES

SECTION 3B2 MANUAL STEERING

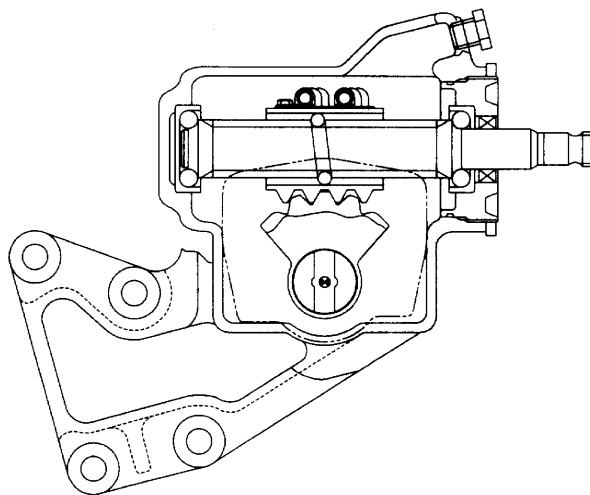
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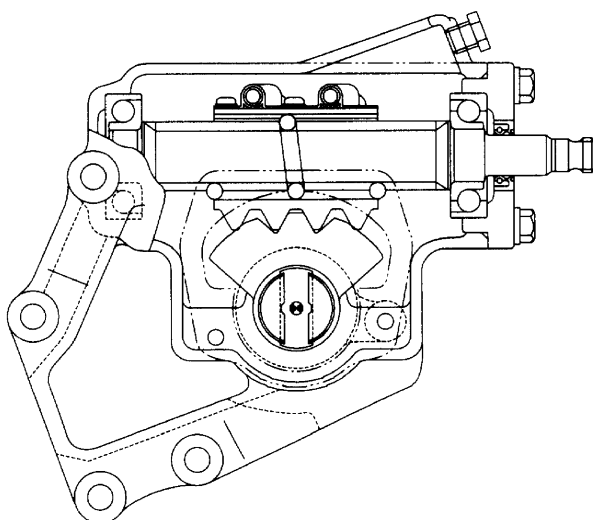
GENERAL DESCRIPTION

Manual Steering Unit

A



B



N3A0248E

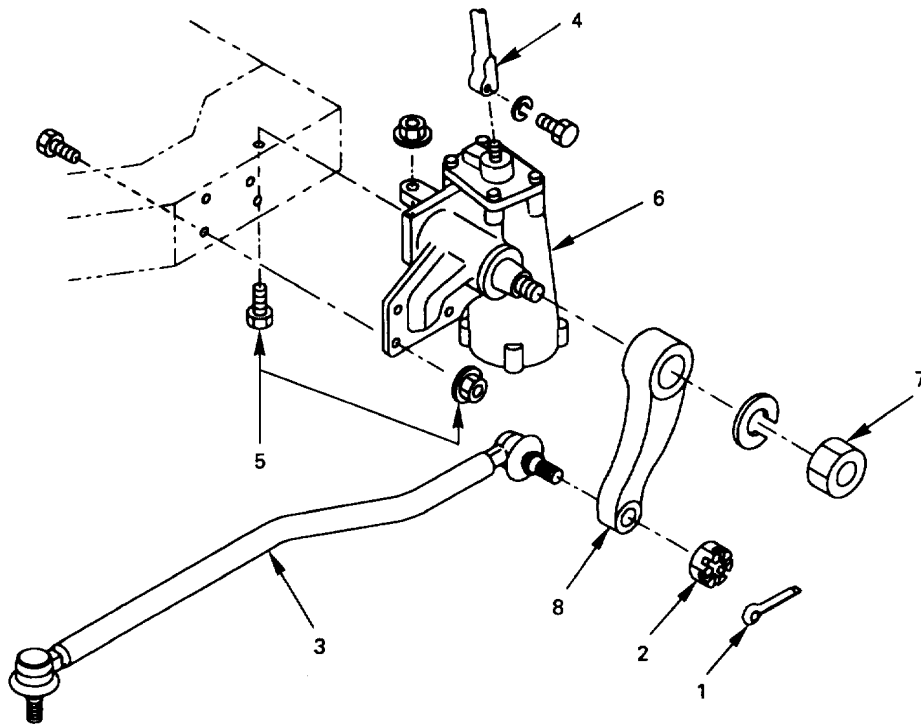
Legend

A. NHR, NKR

B. NPR, NQR

ON-VEHICLE SERVICE

Manual Steering Unit Replacement



N3A0249E

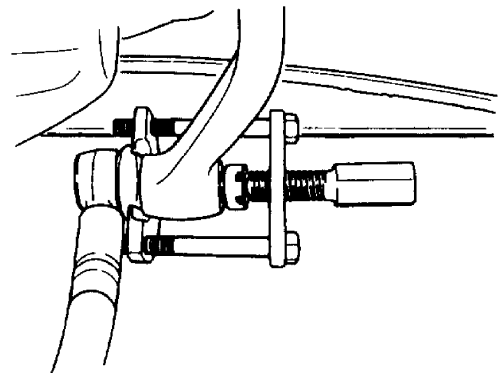
Legend

- | | |
|--------------------|-----------------------------|
| 1. Cotter pin | 5. Unit fixing nut and bolt |
| 2. Nut | 6. Steering unit |
| 3. Drag link | 7. Pitman arm fixing nut |
| 4. Universal joint | 8. Pitman arm |

Removal

1. Remove the head light assembly. (for Non-Tilt Cab Model, driverside only)
Refer to "Headlight Replacement".
2. Remove the under panel. (Non-Tilt Cab Model)
3. Remove the front bumper assembly. (Non-Tilt Cab Model)
4. Cotter Pin
5. Nut
6. Drag Link
Disconnect the drag link at the knuckle arm and the pitman arm.

Remover: 5-8840-2017-0

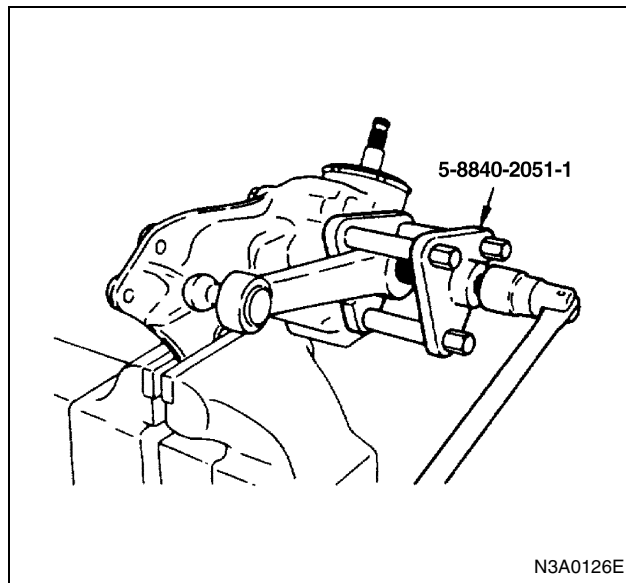
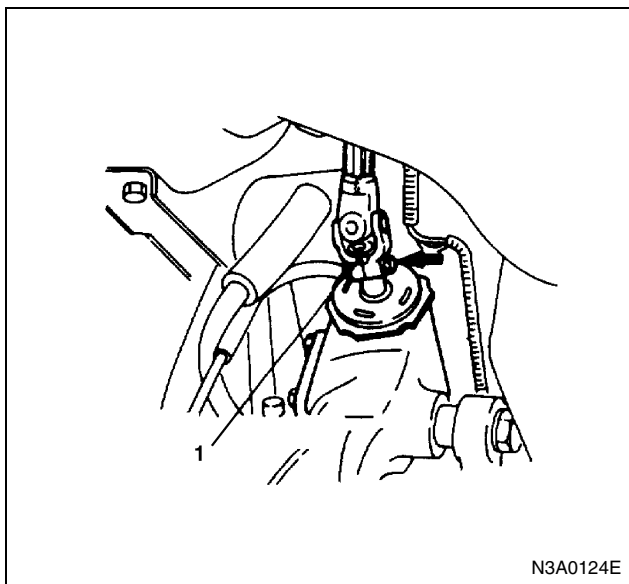


N3A0123E

3B2-4 MANUAL STEERING

7. Universal Joint

Apply a setting mark (1) across the yoke and worm shaft in unit to ensure reassembly of the parts in the original position.



Installation

1. Pitman Arm

Align the setting mark (1) applied at removal.

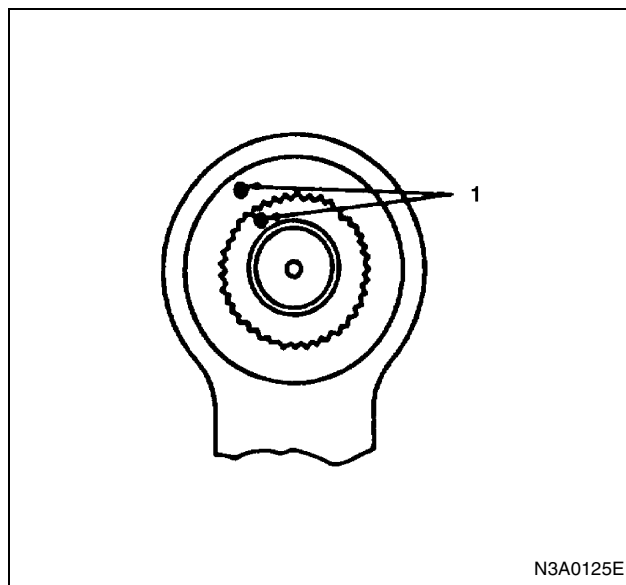
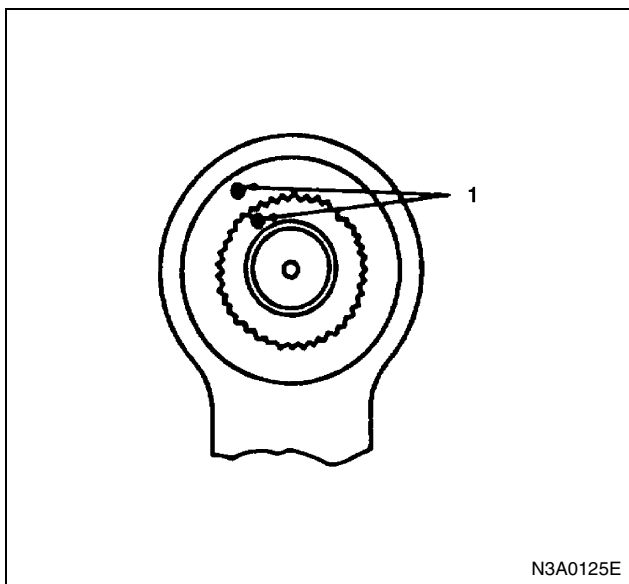
8. Unit Fixing Nut and Bolt

9. Steering Unit

10. Pitman Arm Fixing Nut

11. Pitman Arm

1) Apply a setting mark (1) across the pitman arm and worm shaft.



2. Pitman Arm Fixing Nut

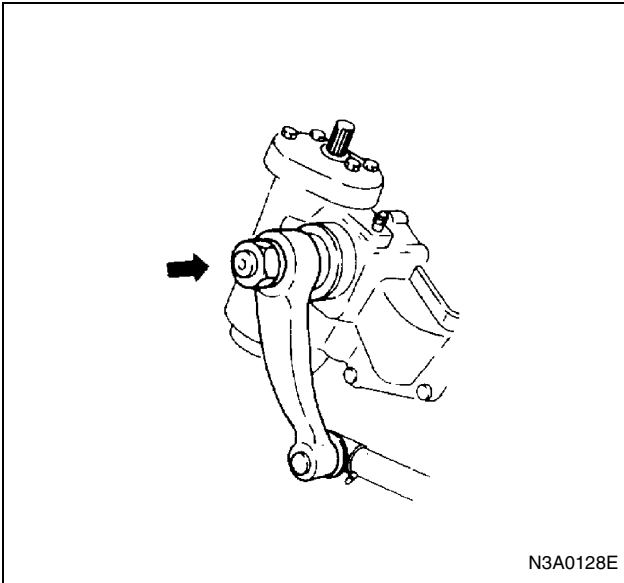
Tighten:

• Nut to

NHR, NKR: 216 N·m (22 kg·m/159 lb·ft)

NPR, NQR: 294 N·m (30 kg·m/217 lb·ft)

Puller: 5-8840-2051-1



3. Steering Unit
4. Unit Fixing Nut and Bolt

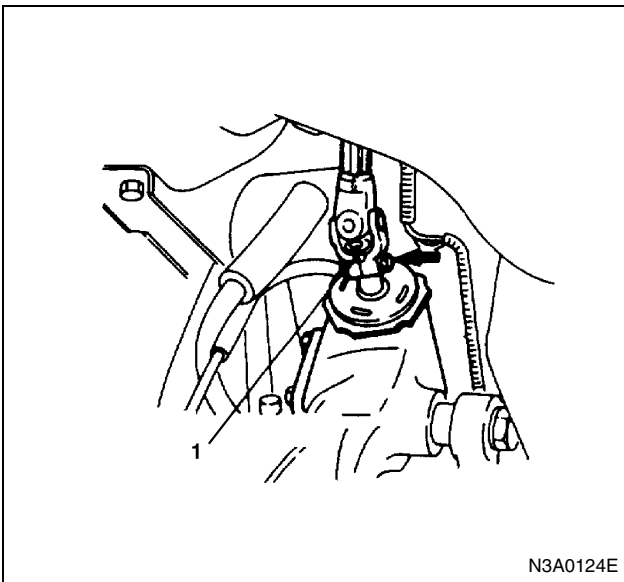
Tighten:

Nut and bolt to 103 N·m (10.5 kg·m/76 lb·ft)

5. Universal Joint
Install the parts by aligning setting marks (1) applied at removal.

Tighten:

- Universal joint bolt to
M8 bolt: 25 N·m (2.5 kg·m/18 lb·ft)



6. Drag Link
7. Nut
8. Cotter Pin
 - 1) Install the drag link to the pitman arm and the knuckle arm.
 - 2) Tighten nuts to specified torque, with just enough additional torque to align cotter pin holes.
Install new cotter pin.

Tighten:

- Nut to 167 N·m (17 kg·m/123 lb·ft)
9. Install the bumper assembly. (Non-Tilt Cab Model)

Tighten:

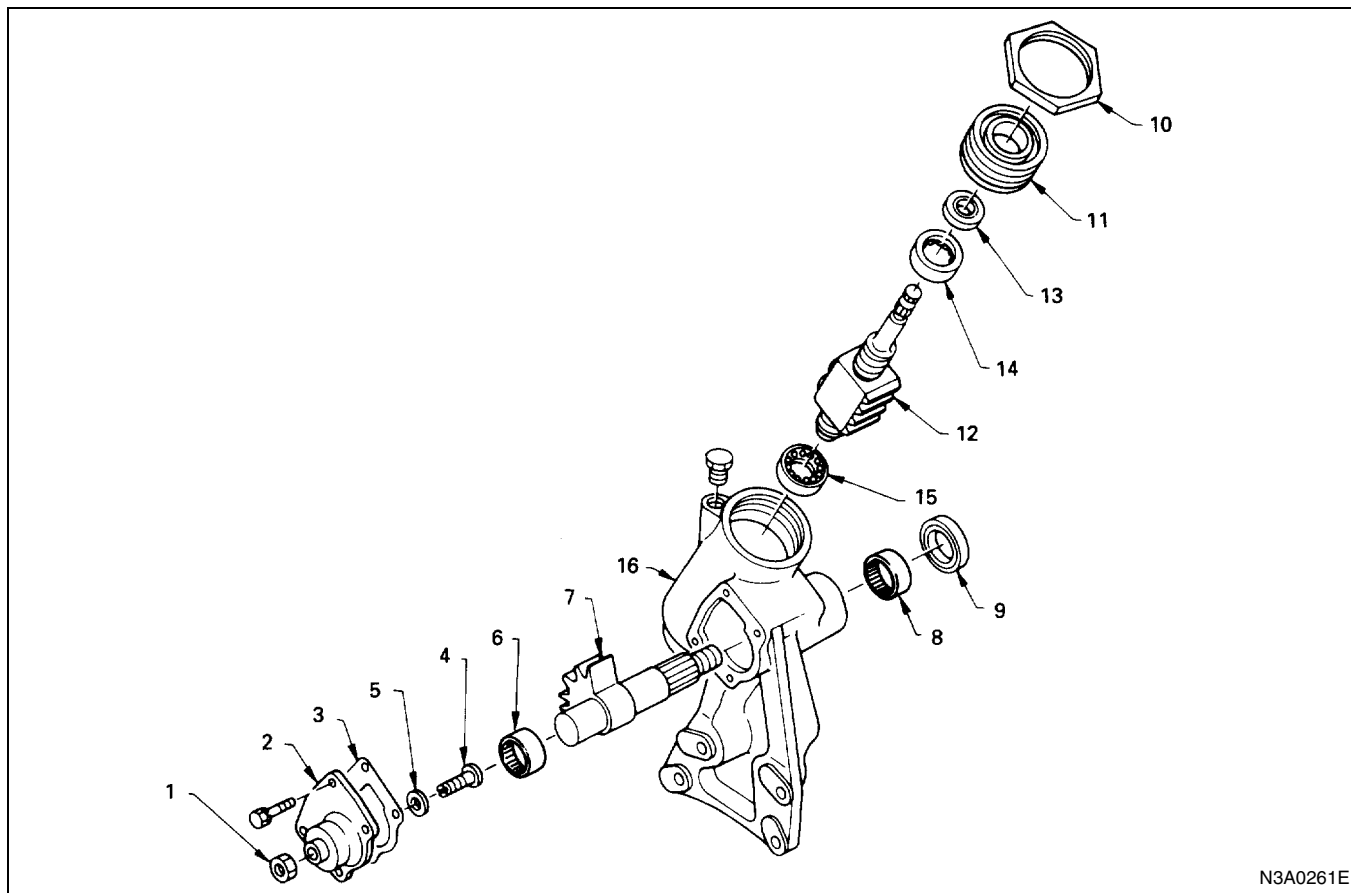
- Bumper bolt to 40 N·m (4.1 kg·m /30 lb·ft)
10. Install the under panel. (Non-Tilt Cab Model)
 11. Install the head light assembly, front grille and front combination light assembly. (for Non-Tilt Cab Model)
Refer to "Headlight Replacement".

Notice:

After installation, adjust head light aiming. Refer to "Cab and Chassis Electrical" in Section 8. (Non-Tilt Cab Model)

UNIT REPAIR

Manual Steering Unit (NHR, NKR)



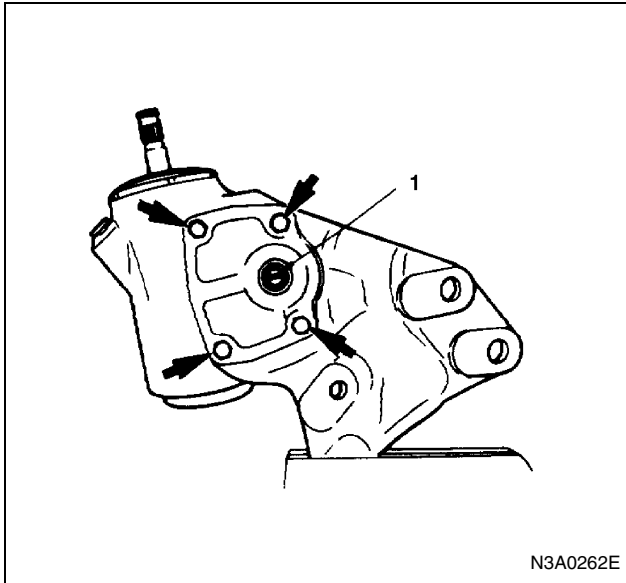
N3A0261E

Legend

- | | |
|-------------------|-----------------------------|
| 1. Lock nut | 9. Oil seal |
| 2. Side cover | 10. Lock nut |
| 3. Gasket | 11. End cover |
| 4. Adjuster screw | 12. Ball nut and worm shaft |
| 5. Adjuster shim | 13. Oil seal |
| 6. Needle bearing | 14. Bearing |
| 7. Sector shaft | 15. Bearing |
| 8. Needle bearing | 16. Gear box |

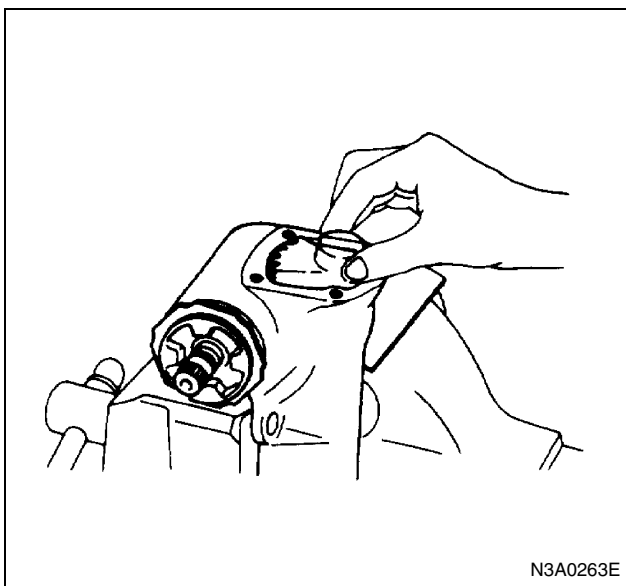
Disassembly

1. Lock Nut
2. Side Cover
 - 1) Turn the adjuster screw (1) counterclockwise slightly, then remove the side cover fixing bolt. (Arrowed in the illustration.)
 - 2) Turn the adjuster screw clockwise with the side cover held from turning.

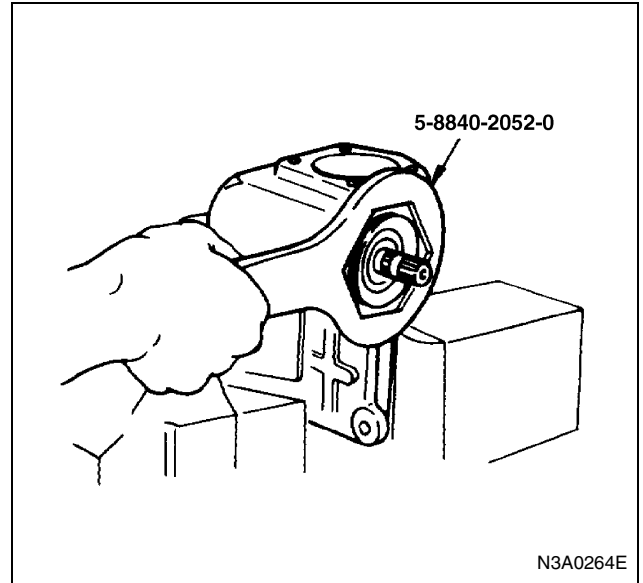


- 3. Gasket
- 4. Adjuster Screw
- 5. Adjuster Shim
- 6. Needle Bearing
- 7. Sector Shaft

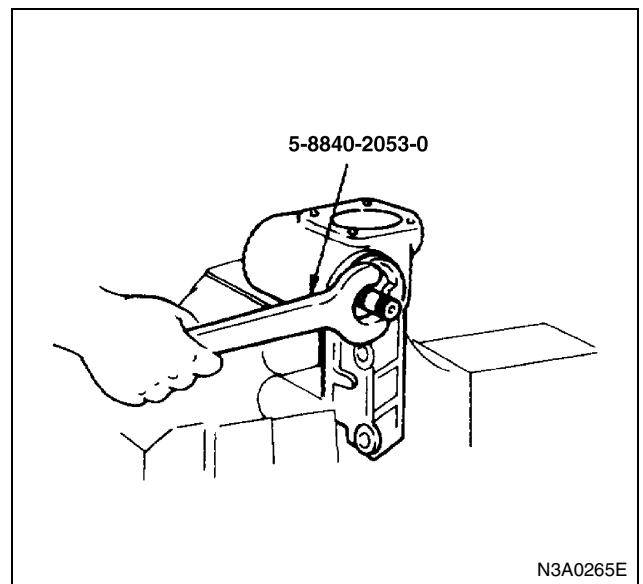
When removing, be careful not to damage the serrations, threads and oil seal.



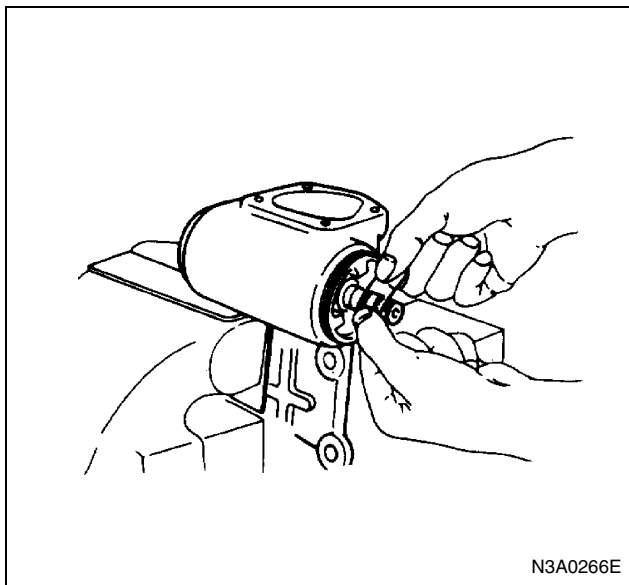
- 8. Needle Bearing
 - 9. Oil Seal
 - 10. Lock Nut
- Steering Lock Nut Wrench : 5-8840-2052-0



- 11. End Cover
- 1) Wrench : 5-8840-2053-0

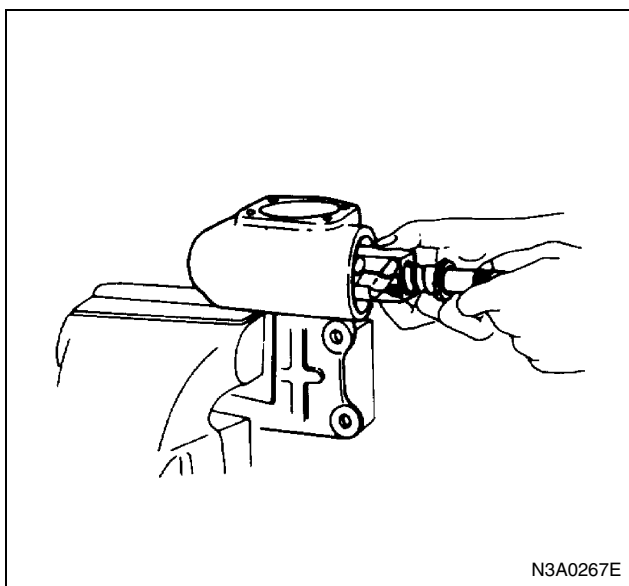


- 2) When removing, be careful not to damage the oil seal.
- Taping the splines will provide some protection.



12. Ball Nut and Worm Shaft

Always keep ball nut assembly in a horizontal position and avoid holding it vertically, or ball nut will slide out.



13. Oil Seal
14. Bearing
15. Bearing
16. Gear Box

Inspection and Repair

Make necessary correction or parts replacement if wear damage, or any other abnormal conditions are found through inspection.

Visual Check

Inspect the following parts for wear, damage or other abnormal conditions.

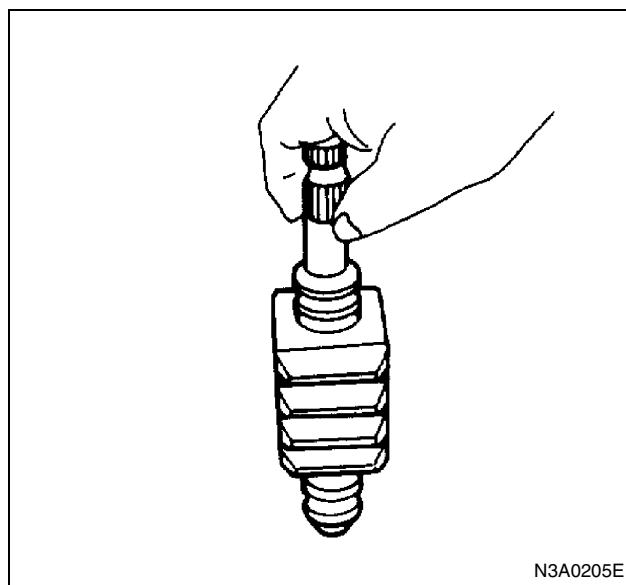
- Bearing
- Sector shaft
- Ball nut and worm shaft

Ball Nut Rotation

Hold the worm shaft vertically and see if the ball nut lowers with turning motion smoothly. If lowering of the ball nut with its own weight is unsmooth, check the worm shaft for bending and ball-groove for burrs, dents and presence of foreign matter.

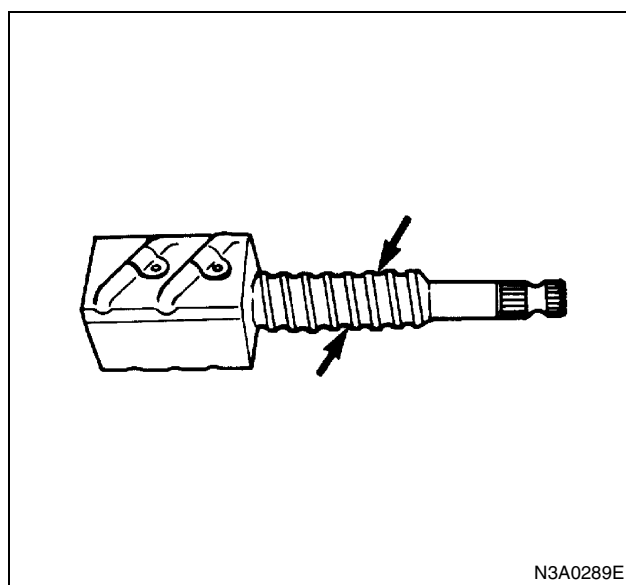
Notice:

When making a test on the ball nut assembly, exercise care so as not to strike ball nut against end of worm shaft, or damage to the ball tubes will result.



If any of the parts in the ball nut and worm shaft assembly is found to be defective, the entire parts should be replaced using a new worm shaft assembly.

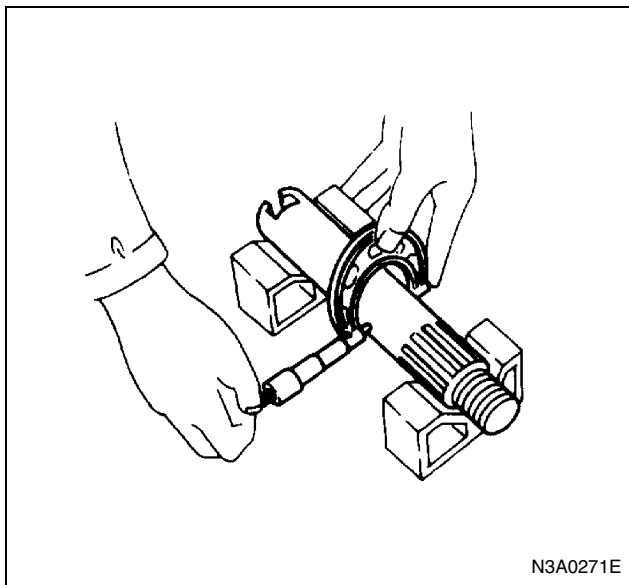
As these parts are of selective combination and are sealed to prohibit disassembly, the faulty parts should not be replaced individually.



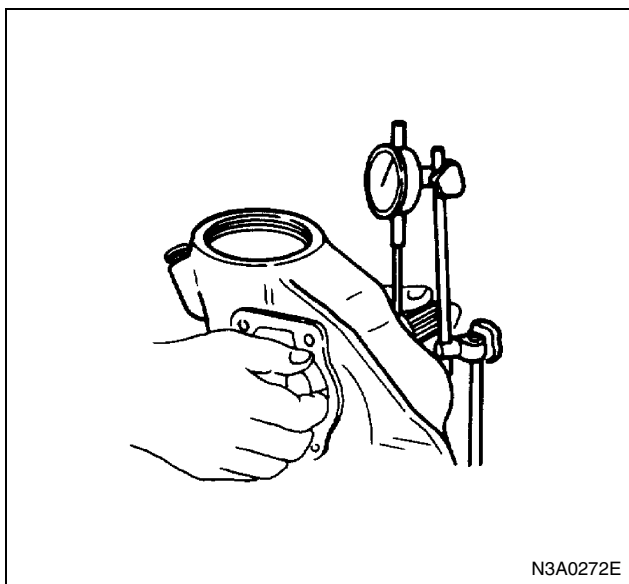
Sector Shaft Outside Diameter

Standard : 34.925 mm (1.375 in)

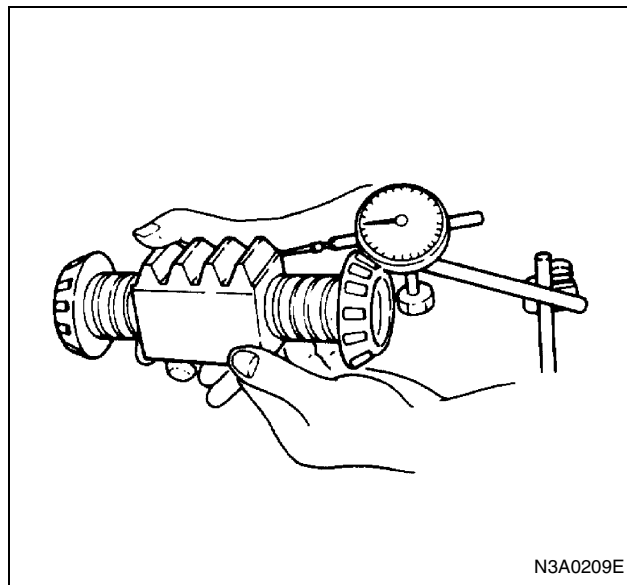
Limit : 34.825 mm (1.371 in)



Sector Shaft and Needle Bearing Play
Limit : 0.2 mm (0.008 in)

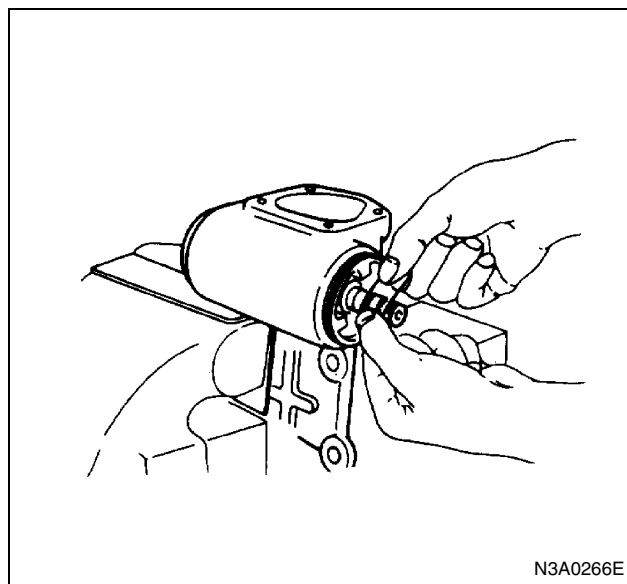


Ball Nut Axial Play
Limit : 0.1 mm (0.004 in)

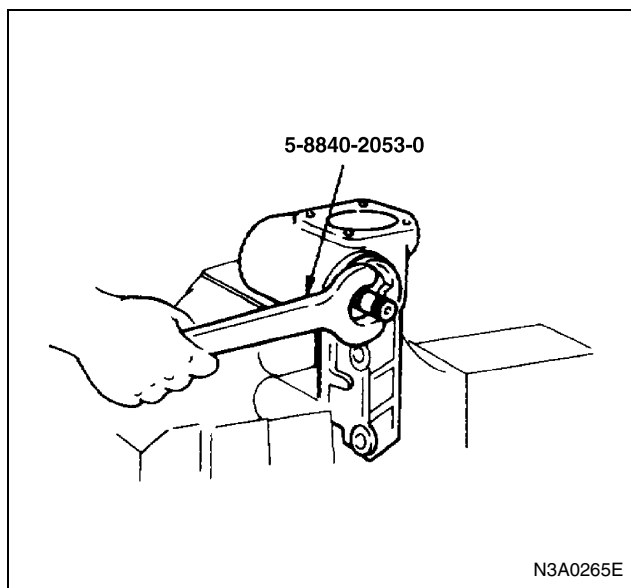


Reassembly

1. Gear Box
2. Bearing
3. Bearing
4. Oil seal
5. Ball Nut and Worm Shaft
6. End Cover
 - 1) When installing, be careful not to damage the oil seal.
Taping the splines will provide some protection.

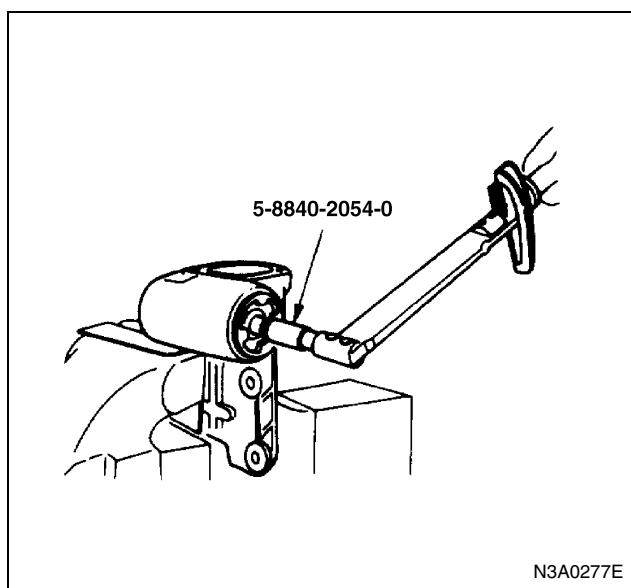


- 2) Adjust the starting torque of steering input shaft by turning the end cover with a special tool.
Wrench : 5-8840-2053-0



Starting Torque

0.34 — 0.64 N·m (0.035 — 0.065 kg·m/0.25 — 0.47 lb·ft)
Steering Shaft Driver : 5-8840-2054-0

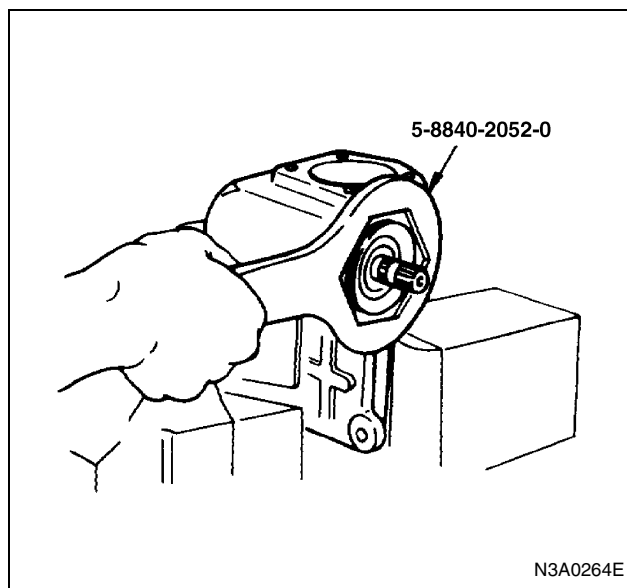


7. Lock Nut

Steering Lock Nut Wrench : 5-8840-2052-0

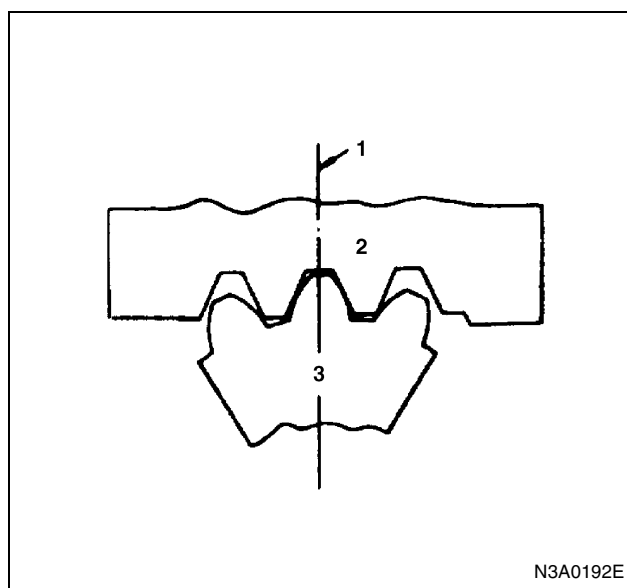
Tighten:

- Lock Nut to 177 N·m (18 kg·m/30 lb·ft)



8. Sector Shaft

Align the center tooth (1) of ball nut (2) with the center tooth (1) of the sector shaft (3).



9. Needle Bearing

10. Oil Seal

11. Needle Bearing

12. Adjuster Shim

13. Adjuster Screw

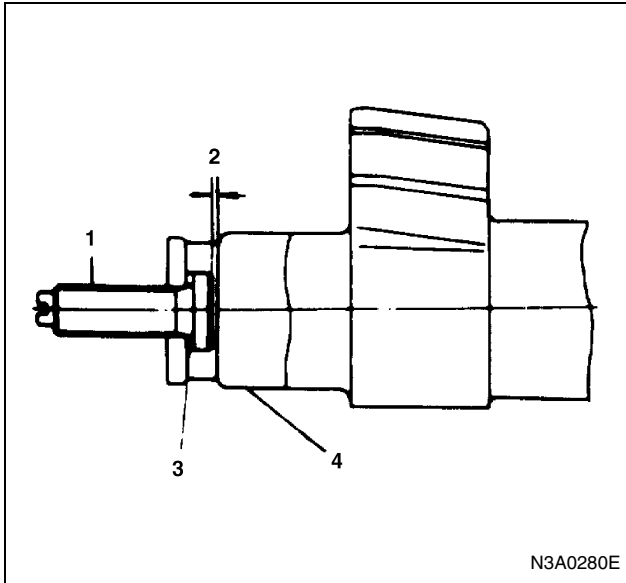
Adjust the clearance and check that the adjuster screw slides freely.

Clearance

0.1 mm (0.0039 in)

Adjust Shims Available

1.53 mm (0.060 in), 1.56 mm (0.061 in), 1.59 mm (0.063 in), 1.62 mm (0.064 in), 1.65 mm (0.065 in)



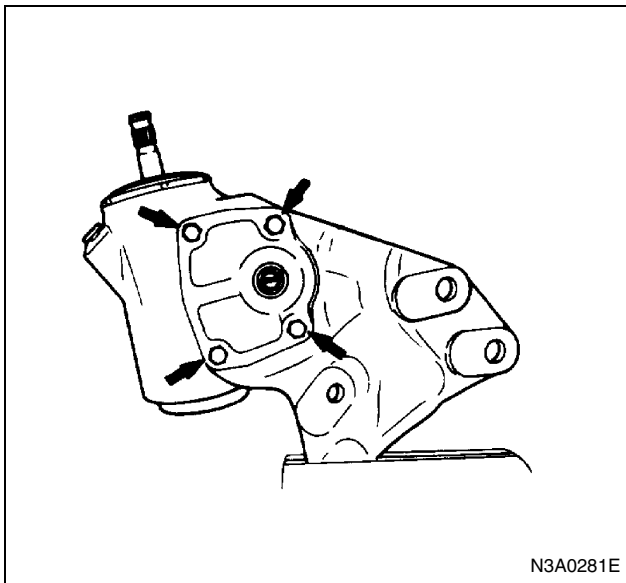
Legend

1. Adjuster screw
2. Clearance
3. Shim
4. Sector shaft

14. Gasket
15. Side Cover

Tighten:

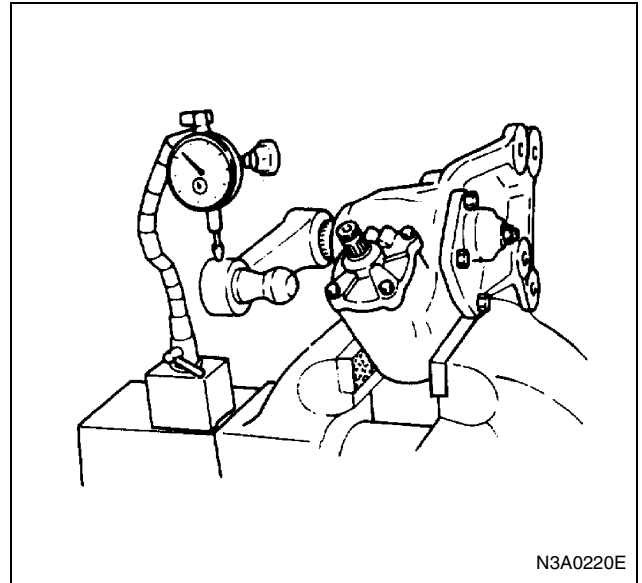
- Side cover bolt to 44 N·m (4.5 kg·m/33 lb·ft)



16. Lock Nut
 - Adjust the backlash between the sector gear and ball nut.
 - 1) Install the pitman arm.
 - 2) Set the sector shaft in a straight ahead position.
 - 3) With the adjuster screw, adjust the backlash to the specification.

Backlash (at End of Pitman Arm)

0.2 mm (0.0079 in) or less



- 4) Lock adjuster screw with lock nut.

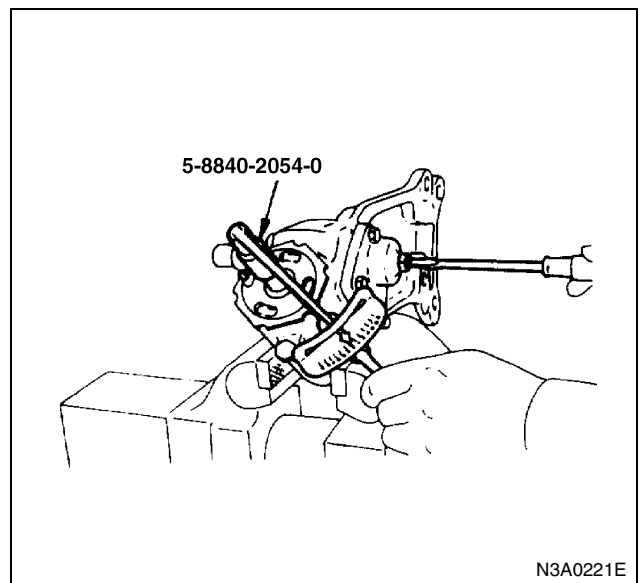
Tighten:

- Lock Nut to 25 N·m (2.5 kg·m/18 lb·ft)
- 5) Inspect the starting torque of the steering input shaft.

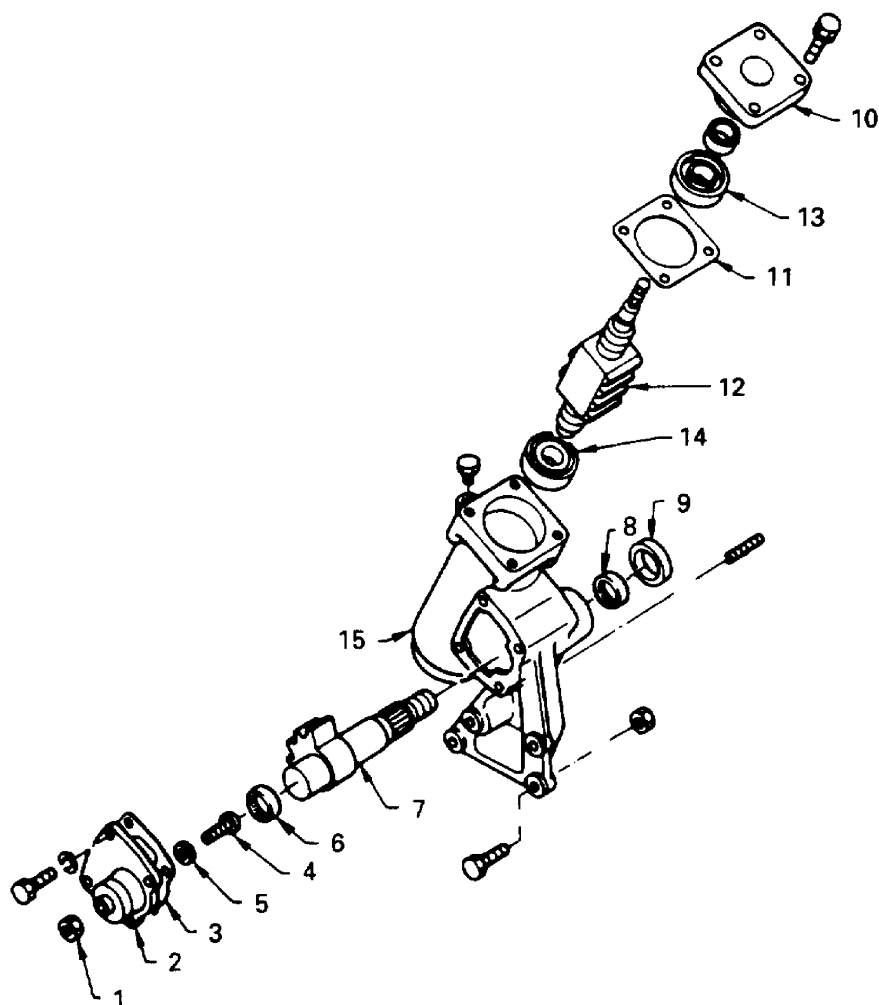
Starting Torque

0.54 — 1.03 N·m (0.055 — 0.105 kg·m/0.40 — 0.76 lb·ft)

Steering Shaft Driver : 5-8840-2054-0



Manual Steering Unit (NPR, NQR)



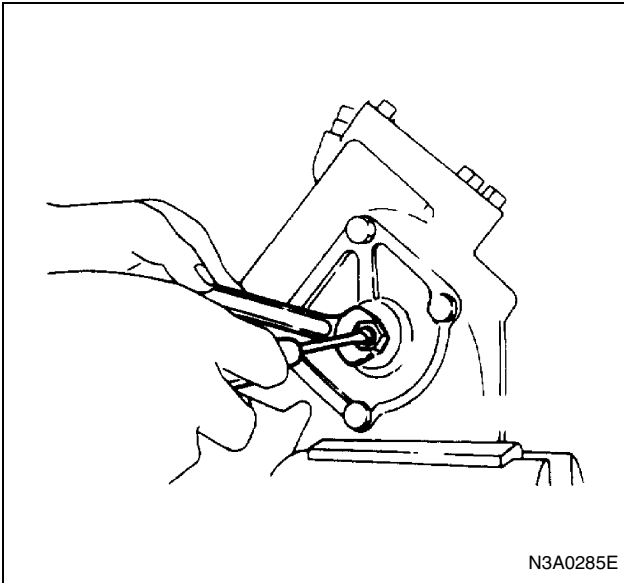
N3A0284E

Legend

- | | |
|-------------------|-----------------------------|
| 1. Lock nut | 9. Oil seal |
| 2. Side cover | 10. End cover |
| 3. Gasket | 11. Adjuster shim |
| 4. Adjuster screw | 12. Ball nut and worm shaft |
| 5. Adjuster shim | 13. Bearing |
| 6. Needle bearing | 14. Bearing |
| 7. Sector shaft | 15. Gear box |
| 8. Needle bearing | |

Disassembly

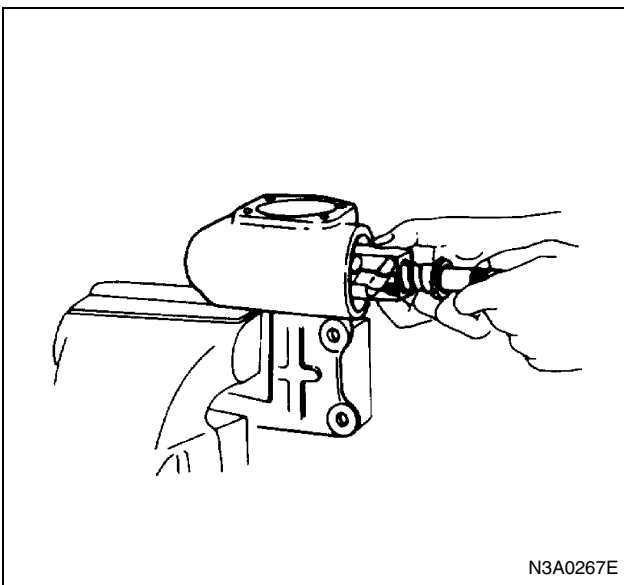
1. Lock Nut
2. Side Cover
 - 1) Turn the adjuster screw counterclockwise slightly, then remove the side cover fixing bolt.
 - 2) Turn the adjuster screw clockwise with the side cover held from turning.



3. Gasket
4. Adjuster Screw
5. Adjuster Shim
6. Needle Bearing
7. Sector Shaft
8. Needle Bearing
9. Oil Seal
10. End Cover
11. Adjuster Shim
12. Ball Nut and Worm Shaft

When removing, be careful not to damage the serrations, threads and oil seal.

Always keep ball nut assembly in a horizontal position and avoid holding it vertically, or ball nut will slide out.



Inspection and Repair

Make necessary correction or parts replacement if wear, damage or any other abnormal conditions are found through inspection.

Visual Checks

Inspect the following parts for wear, damage or other abnormal conditions.

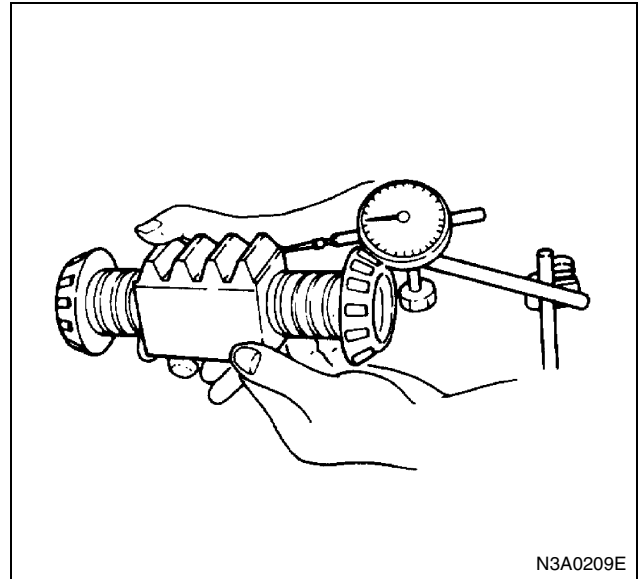
- Bearing
- Sector shaft
- Ball nut and worm shaft

Ball Nut Rotation

Hold the worm shaft vertically and see if the ball nut lowers with turning motion smoothly. If lowering of the ball nut with its own weight is unsmooth, check the worm shaft for bending and ball-groove for burrs, dents and presence of foreign matter.

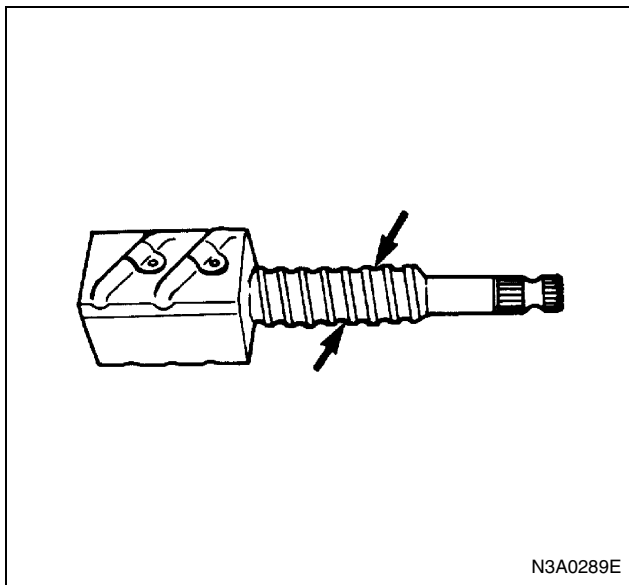
Notice:

When making a test on the ball nut assembly, exercise care so as not to strike ball nut against end of worm shaft, or damage to the ball tubes will result.



If any of the parts in the ball nut and worm shaft assembly is found to be defective, the entire parts should be replaced using a new worm shaft assembly.

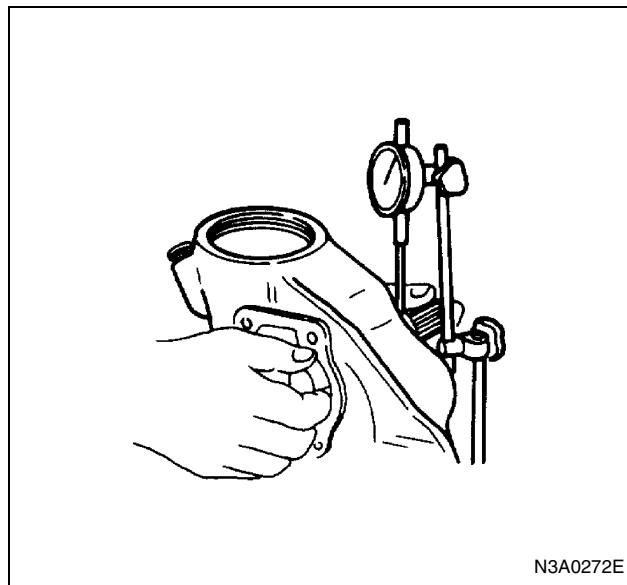
As these parts are of selective combination and are sealed to prohibit disassembly, the faulty parts should not be replaced individually.



Sector Shaft Outside Diameter

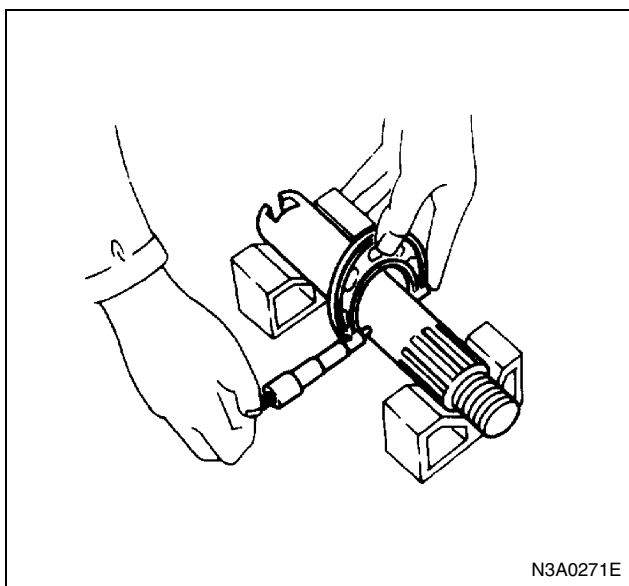
Standard : 38.1 mm (1.50 in)

Limit : 38.0 mm (1.496 in)



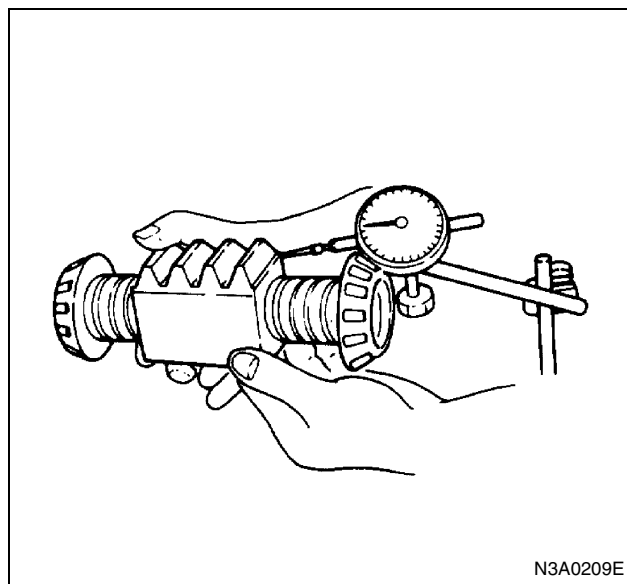
Ball Nut Axial Play

Limit : 0.1 mm (0.004 in)



Sector Shaft and Needle Bearing Play

Limit : 0.2 mm (0.008 in)



Reassembly

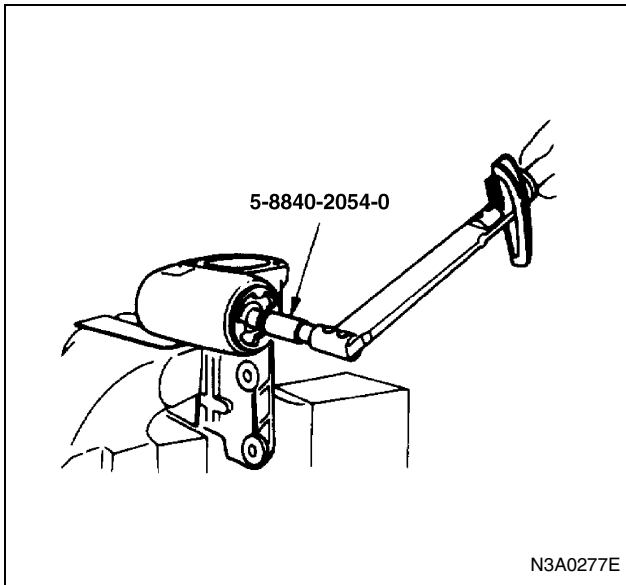
1. Gear box
2. Bearing
3. Bearing
4. Ball Nut and Worm Shaft
5. Adjuster Shim
 - 1) Adjust the starting torque of input shaft by varying shim thickness.
Steering Shaft Driver : 5-8840-2054-0

Starting Torque

0.29 — 0.69 N·m (0.030 — 0.070 kg·m/0.22 — 0.51 lb·ft)

Adjust Shims Available

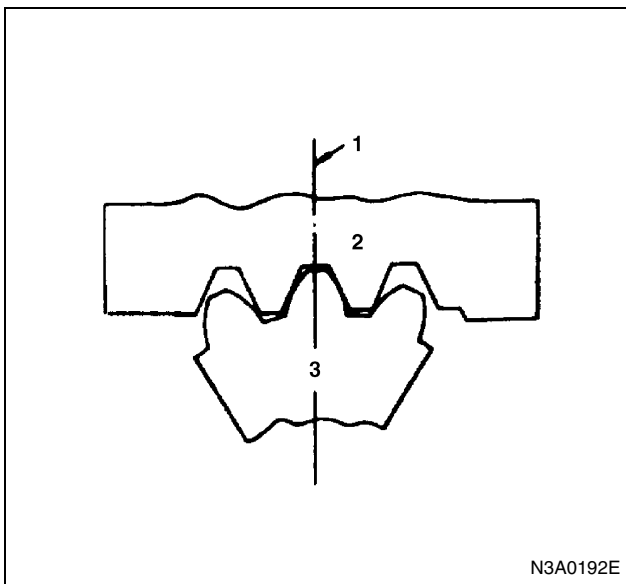
0.01 mm (0.0004 in), 0.02 mm (0.0008 in), 0.05 mm (0.0020 in), 0.07 mm (0.0028 in), 0.08 mm (0.0031 in)



6. End Cover

Tighten:

- Fixing bolt to 44 N·m (4.5 kg·m/33 lb·ft)
- 7. Oil Seal
- 8. Sector Shaft
Align the center tooth (1) of ball nut (2) with that of the sector shaft (3).



9. Sector Shaft

10. Needle Bearing

11. Adjuster Shim

12. Adjuster Screw

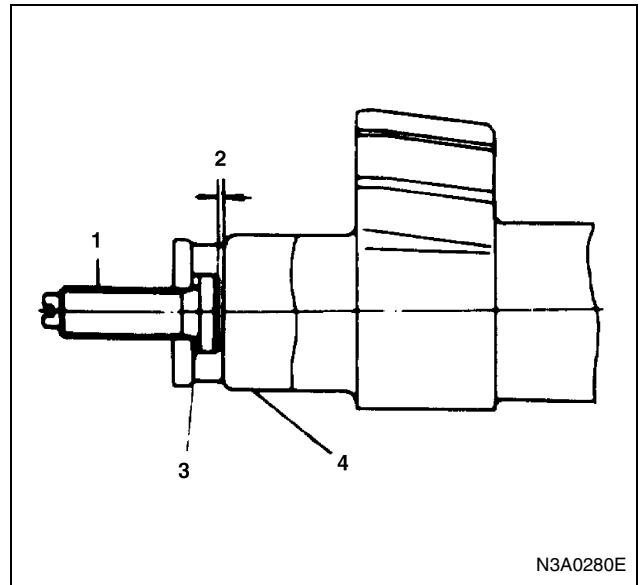
Adjust the clearance and check that the adjuster screw slides freely.

Clearance

0.1 mm (0.0039 in)

Adjust Shims Available

1.53 mm (0.060 in), 1.56 mm (0.061 in), 1.59 mm (0.063 in), 1.62 mm (0.064 in), 1.65 mm (0.065 in)



Legend

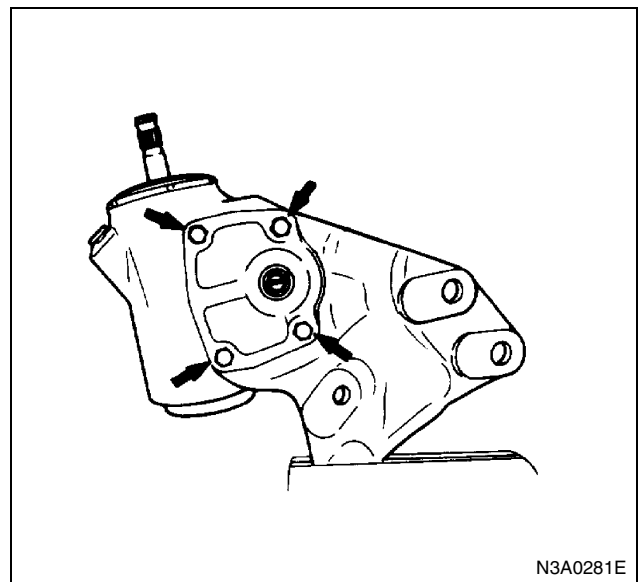
1. Adjuster screw
2. Clearance
3. Shim
4. Sector shaft

13. Gasket

14. Side Cover

Tighten:

- Side cover bolt to 44 N·m (4.5 kg·m/33 lb·ft)



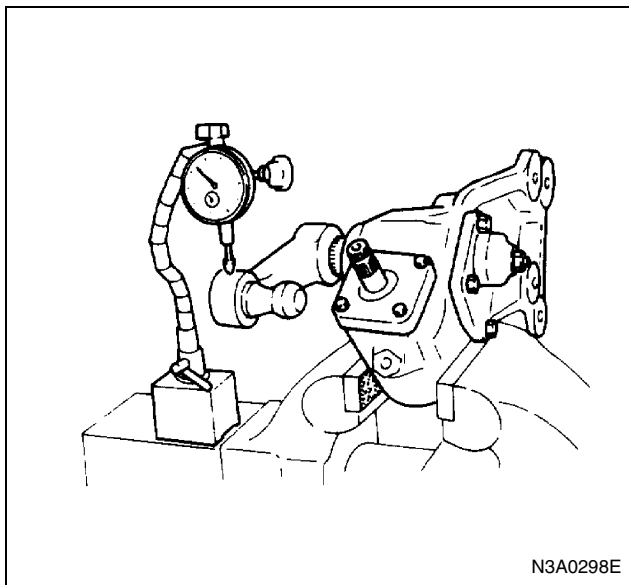
15. Lock Nut

Adjust the backlash between the sector gear and ball nut.

- 1) Install the pitman arm.
- 2) Set the sector shaft in a straight ahead position.
- 3) With the adjuster screw, adjust the backlash to the specification.

Backlash (at End of Pitman Arm)

0.5 mm (0.0197 in) or less



4) Lock adjuster screw with lock nut.

Tighten:

- Lock nut to 25 N·m (2.5 kg·m/ 1.8 lb·ft)

5) Inspect the starting torque of the input shaft.

Starting Torque

0.98 N·m (0.1 kg·m/0.72 lb·ft) or less

Steering Shaft Driver : 5-8840-2054-0

