

STEERING, SUSPENSION, WHEELS AND TIRES

SECTION 00 SERVICE INFORMATION

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TROUBLE SHOOTING

Steering System

PROBLEM	POSSIBLE CAUSE	CORRECTION
Objectionable "Hiss"	Noisy relief valve. There is some noise in all power steering systems. One of the most common is a hissing sound most evident at standstill parking. Hiss is a high frequency noise similar to that experienced while slowly closing a water tap. The noise is present in every valve and results from high velocity fluid passing valve orifice edges. There is no relationship between this noise and performance of the steering. "Hiss" may be expected when the steering wheel is at end of travel or when slowly turning at stand still.	Do not replace the valve unless "hiss" is extremely objectionable. A replacement valve will also exhibit slight noise and is not always a cure.
Rattle or Chuckle Noise in the Steering Gear	<ol style="list-style-type: none"> 1. Gear housing loose on frame. 2. Steering linkage looseness. 3. Pressure hose touching other parts of the truck. 4. Loose pitman shaft over center adjustment. A slight rattle may occur on turns because of increased clearance off the "high point." This is normal and clearance must not be reduced below specified limits to eliminate this slight rattle. 5. Loose pitman arm. 	<ol style="list-style-type: none"> 1. Check gear mounting. Torque the bolts to specifications. 2. Check linkage pivot points for wear. Replace if necessary. 3. Adjust the hose position. Do not bend tubing by hand. 4. Adjust. 5. Torque the pitman arm nut.
Groan Noise in the Steering Pump	<ol style="list-style-type: none"> 1. Low oil level. 2. Air in the oil. Poor pressure hose connection. 	<ol style="list-style-type: none"> 1. Fill the reservoir to the proper level. 2. Torque the connector. Bleed the system.
Rattle or Knock Noise in the Steering Pump	Loose pump gear nut.	Torque the nut.
Rattle Noise in the Steering Pump	<ol style="list-style-type: none"> 1. Vanes not installed properly. 2. Vanes sticking in the rotor slots. 	<ol style="list-style-type: none"> 1. Install properly. 2. Repair or replace.
Switch Noise in the Steering Pump	Defective flow control valve.	Replace or repair.
Whine Noise in the Steering Pump	Pump shaft bearing scored.	Replace the housing and shaft. Flush and bleed the system.
Growl Noise in the Steering Pump	Excessive back pressure in hoses or the steering gear caused by restriction.	Locate the restriction and correct. Replace the part if necessary.
Growl Noise in the Steering Pump (Particularly Noticeable at Standstill Parking)	<ol style="list-style-type: none"> 1. Scored pressure plates, thrust plate or rotor. 2. Extreme wear of the cam ring. 	<ol style="list-style-type: none"> 1. Replace the parts and flush the system. 2. Replace the parts.

PROBLEM	POSSIBLE CAUSE	CORRECTION
<p>Excessive Play or Looseness in the Steering System (Steering Wanders)</p>	<ol style="list-style-type: none"> 1. Front wheel bearing loosely adjustment. 2. Worn coupling or steering shaft joints. 3. Worn steering linkage ball joints. 4. Worn upper or lower ball joints. 5. Steering wheel loose on the shaft, loose pitman arm, tie rods, steering arms, or steering linkage ball studs. 6. Steering gear worm bearing loosely adjusted. 7. Excessive pitman shaft to ball nut lash in the steering gear. 8. Toe-in out of adjustment or worn drag link or tie rod sockets. 9. Steering system out of alignment. 10. Tires badly worn, edge of the tires are rounded off. 11. Lack of lubrication in the linkage and kingpins. 12. Air in the system. 13. Steering gear mounting loose. 	<ol style="list-style-type: none"> 1. Adjust the bearing or replace with new parts as necessary. 2. Replace. 3. Replace steering linkage. 4. Replace ball joints. 5. Torque the fastener. 6. Adjust the preload. 7. Adjust the preload. 8. Replace the tie rod ends if worn, adjust to correct the toe-in, and inspect the steering arm and tie rod for bent condition. 9. Align caster, camber, and toe-in. Inspect spring components for condition and wear. Repair or replace as required. 10. Install new tires, and check alignment; abnormal tire wear indicates improper alignment. 11. Lubricate. Free up any components which are frozen and will not take lubrication. 12. Add oil to the pump reservoir and bleed the system. Check hose connectors for proper torque. 13. Tighten attaching bolts to the specified torque.

00-4 SERVICE INFORMATION

PROBLEM	POSSIBLE CAUSE	CORRECTION
Vibration and Shimmy	<ol style="list-style-type: none"> 1. Seal damage and leakage resulting in loss of lubricant, corrosion and excessive wear. 2. Tires, wheels, or brake drums out of balance. 3. Bent wheel or out of bound tire. Wheel nuts torqued unevenly. 4. Loose steering linkage components. 5. Worn steering linkage ball joints. 6. Worn upper or lower end ball joints. 7. Wheel loose on the hub. 8. Drive line universal joints rough or defective. This condition may be confused with steering vibration. 9. Engine misses or is out of balance, this may also be confused with steering shimmy. 10. Faulty shock absorbers. 	<ol style="list-style-type: none"> 1. Replace damaged parts as necessary. 2. Balance the tires and wheels, preferably with an on-vehicle type balancer, as this method balances the entire wheel and drum assembly. 3. Replace the wheel and remount the tire, or replace the assembly. 4. Adjust, torque, and repair the linkage as necessary. 5. Replace steering linkage. 6. Replace ball joints. 7. Inspect the wheel bolt holes for damage, and replace the wheel or torque the nuts. 8. Repair the drive line. 9. Correct the miss in the engine, or repair the out of balance condition, clutch, pressure plate, or harmonic balancer, etc. 10. Replace the shock absorbers.
Hard Steering or Excessive Effort Required at Steering Wheel	<ol style="list-style-type: none"> 1. Low or uneven tire pressure. 2. Steering linkage kingpins or ball joints need lubrications. 3. Tight or frozen intermediate rod, tie rod or idler socket. 4. Steering gear to column misalignment. 5. Steering gear adjust too tightly. 6. Front wheel alignment incorrect. 7. Steering gear adjusted too tight. 8. Frozen or tight shaft bearings. 9. Lower the U-joint flange rubbing against the adjuster. 10. Tight or binding conditions in steering column. 11. Power cylinder rod nicked or marred. 	<ol style="list-style-type: none"> 1. Inflate to specified pressures. 2. Lubricate, and free up kingpins or ball joints. Make certain all fittings take lubricant properly. 3. Lubricate or replace as necessary. 4. Align the column. 5. Adjust preload. 6. Check alignment and correct as necessary. 7. Adjust the steering gear. 8. Replace the bearings. 9. Loosen the bolt, assemble and torque properly. 10. Adjust the steering column. 11. Replace the cylinder.

PROBLEM	POSSIBLE CAUSE	CORRECTION
<p>Pump Inoperative, Poor, or No Assist (Hard Steering)</p>	<ol style="list-style-type: none"> 1. Low oil level. 2. Air in the oil. 3. Defective hoses or steering gear. 4. Flow control valve stuck. 5. Loose nut in end of flow control valve. 6. Pressure plate not flat against ring. 7. Extreme wear of pump ring. 8. Scored pressure plate, thrust plate. 9. Vanes not installed properly. 10. Vanes sticking in rotor slots. 11. Faulty flow control valve assembly. 	<ol style="list-style-type: none"> 1. Fill the reservoir to the proper level. 2. Locate the source of the air leak and correct it. 3. Repair or replace. 4. Repair or replace. 5. Torque nut. 6. Repair or replace. 7. Repair or replace. 8. Repair or replace. 9. Repair or replace. 10. Repair or replace. 11. Repair or replace.
<p>Moment Increase in Effort when Turning Wheel Fast to Right or Left</p>	<ol style="list-style-type: none"> 1. Low oil level in pump. 2. High internal leakage in hydraulic pump. 3. High internal leakage in steering gear. 	<ol style="list-style-type: none"> 1. Add power steering fluid as required. 2. Check the pump pressure. (See the pump pressure test.) 3. Repair
<p>Steering Wheel Surges or Jerks when Turning with Engine Running Especially During Parking</p>	<ol style="list-style-type: none"> 1. Low oil level. 2. Insufficient pump pressure. 3. Defective gear relief valve. 4. Sticky flow control valve. 	<ol style="list-style-type: none"> 1. Fill as required. 2. Check the pump pressure. (See the pump pressure test.) Replace relief valve if defective. 3. Replace the gear relief valve. 4. Repair or replace.
<p>Steering Pulls to Left or Right</p>	<ol style="list-style-type: none"> 1. Camber incorrectly adjusted. Steering will generally pull to the side of the axle having the greatest positive camber. 2. Low air pressure in the right or left tire. Steering will pull to the side having the air pressure. 3. Axle loose and shifted at the spring U-bolts. 4. Rear axle loose at the spring U-bolt. If shifted axle is shifted at one side, it will cause the steering to pull. 5. Unbalanced steering gear valve. If this is the cause, steering effort will be very light in the direction of the lead and heavy in the opposite direction. 	<ol style="list-style-type: none"> 1. Adjust camber. 2. Inflate the tire to the correct pressure, check for air leak and repair as required. 3. Align the axle, and torque the U-bolt nuts. Inspect for damaged parts. Replace if required. 4. Align the rear axle and replace the defective parts, if any. Torque the U-bolt. 5. Replace the valve.

00-6 SERVICE INFORMATION

PROBLEM	POSSIBLE CAUSE	CORRECTION
Poor Return of the Steering Wheel	<ol style="list-style-type: none"> 1. Lack of lubrication in the linkage. 2. Steering gear to column misalignment. 3. Tires not properly inflated. 4. Improper front wheel alignment. 5. Steering linkage binding. 6. Steering wheel rubbing against the directional signal housing. (Turn the steering wheel and listen for internal rubbing in the column.) 7. Tight steering shaft bearings. 8. Sticky or plugged valve spool. 9. Steering gear out of adjustment. 10. Tight kingpin bushings. 11. Lower U-joint flange rubbing against the steering gear adjust plug. 12. Upper or lower end ball joint blinding. 	<ol style="list-style-type: none"> 1. Lubricate the linkage. 2. Align the steering column. 3. Inflate to the specified pressure. 4. Check and adjust as necessary. 5. Replace the pivots. 6. Adjust the steering jacket. 7. Replace the bearings. 8. Repair or replace valve. 9. Check adjustment. Adjust as required. 10. Lubricate or replace as required. 11. Loosen the pinch bolt and assemble it properly. 12. Replace ball joints.
Snapping or Chucking in the Steering Column or Wheel	<ol style="list-style-type: none"> 1. Loose steering gear at the frame. 2. Worn steering shaft universal joints. 3. Worn steering linkage components. The effect of these components will telescope through the steering system and be felt in the steering wheel. 4. Steering gear incorrectly adjusted. 	<ol style="list-style-type: none"> 1. Torque the mounting bolts. 2. Replace and repair the joints as necessary. 3. Adjust, torque, and repair the components. 4. Adjust steering gear.
Excessive Road Shock	<ol style="list-style-type: none"> 1. Tire air pressure too high. 2. Wheel bearings adjusted too loose. 3. Camber adjustment incorrect. 4. Weak or broken front spring. 5. Defective shock absorbers. 6. Loose suspension components. 	<ol style="list-style-type: none"> 1. Deflate to the correct pressure. 2. Adjust the bearings. 3. Adjust the camber. 4. Replace the spring. 5. Replace the shock absorbers. 6. Inspect, adjust or repair, and replace as necessary.

Front and Rear Suspension

PROBLEM	POSSIBLE CAUSE	CORRECTION
Spring Noise	<ol style="list-style-type: none"> 1. Loose U-bolts. 2. Loose or worn eye bushings. 3. Lack of lubrication. 4. Defective shock absorber. 	<ol style="list-style-type: none"> 1. Tight to recommended torque. 2. Replace eye bushings. 3. Lubricate as required. 4. Replace shock absorber.
Spring Sag or Bottom	<ol style="list-style-type: none"> 1. Inoperative shock absorber. 2. Broken spring leaf. 3. Severe operation or overloading. 	<ol style="list-style-type: none"> 1. Replace shock absorbers. 2. Replace leaf or spring assembly. 3. Check load capacity rating.
Spring Breakage	<ol style="list-style-type: none"> 1. Loose U-bolts. 2. Normal fatigue. 3. Overloading. 	<ol style="list-style-type: none"> 1. Tighten to recommended torque. 2. Replace springs. 3. Do not overload vehicle.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Excessive Road Shock	<ol style="list-style-type: none"> 1. Tire air pressure too high. 2. Wheel bearings adjusted too loose. 3. Camber adjustment incorrect (Negative camber contributes to road shock). 4. Weak or broken spring. 5. Defective shock absorbers. 6. Loose suspension components. 	<ol style="list-style-type: none"> 1. Deflate to correct pressure. 2. Adjust bearings. 3. Adjust camber. 4. Replace spring. 5. Replace shock absorbers. 6. Inspect, adjust or repair and replace as necessary.

Wheels

PROBLEM	POSSIBLE CAUSE	CORRECTION
Wheel Hop (Vehicle Vibration and Rough Steering)	<p>Wheels</p> <ol style="list-style-type: none"> 1. Rocks and debris wedged between dual disc wheels. 2. Out-of- balance tire and/or hub and drum/rotor assembly. 3. Improper positioning of the side rings split. <p>Vehicle</p> <p>Loose or worn driveline or suspension.</p>	<ol style="list-style-type: none"> 1. Remove rocks and debris. 2. Determine the out-of-balance component and balance or replace. 3. Reassemble with ring split opposite (180 degrees) the valve opening to improve balance. <p>Identify location of vibration carefully as it may be transmitted through the frame making a rear end vibration appear to come from the front. Then repair or replace loose or worn parts. (Refer to PROPELLER SHAFT [SEC. 4A] for vehicle vibration.)</p>
Stripped Threads	Excessive clamp load.	Replace studs — follow proper torque procedure.
Rust Streaks from Stud Holes Correction	Loose cap nuts.	Check complete assembly, replace damaged parts and follow proper torque procedure.

Tires

PROBLEM	POSSIBLE CAUSE	CORRECTION
Wobble (Vehicle Vibration and Rough Steering)	<p>Wheels</p> <ol style="list-style-type: none"> 1. Bent or distorted disc from overloading or improper handling. 2. Loose mountings, damaged studs, cap nuts, enlarged stud holes, worn or broken hub face, or foreign material on mounting surfaces. 3. Improper positioning of the side rings split. <p>Vehicle</p> <ol style="list-style-type: none"> 1. Improper alignment. 2. Loose, worn or broken suspension parts. 	<ol style="list-style-type: none"> 1. Replace wheel. 2. Replace worn or damaged parts. Clean mounting surfaces. 3. Reassemble with ring split opposite (180 degrees) the valve opening to improve balance. <ol style="list-style-type: none"> 1. Have vehicle aligned. 2. Repair or replace.

00-8 SERVICE INFORMATION

PROBLEM	POSSIBLE CAUSE	CORRECTION
Cracked or Broken Wheel Discs (Cracks Develop in the Wheel Disc from Handhole to Rim, or from Handhole to Stud)	Metal fatigue resulting from overloading.	Replace wheel. Check position of wheel on vehicle for working load specifications.
Damaged Stud Holes (Stud Holes Become Worn, Elongated or Deformed, Metal Builds up Around Stud Hole Edges, Cracks Develop from Stud Hole to Stud Hole)	Loose wheel mounting.	Replace wheel and check for: <ul style="list-style-type: none"> • Installation of correct studs and nuts. • Cracked or broken studs — replace. • Worn hub face — replace. • Broken or cracked hub barrel — replace. • Clean mounting surfaces and retorque cap nuts periodically. • Rust streaks fanning out from stud holes indicate that the cap nuts are or have been loose.
Damaged Stud Threads	Sliding wheel across studs during assembly	Replace stud following proper wheel installation.
Loose Drum	Improper drum bolt.	Replace with proper length bolt.
Loose Inner Wheel	<ol style="list-style-type: none"> 1. Excessive stud standout from mounting face of hub allowing wheel nut to bottom out. 2. Improper torque. 	<ol style="list-style-type: none"> 1. Replace with proper length bolt. 2. Use recommended torque procedure.
Broken Wheel Studs	<ol style="list-style-type: none"> 1. Loose cap nuts. 2. Overloading. 	<ol style="list-style-type: none"> 1. Replace stud and follow proper torque procedure. 2. Replace stud.
Tire Slippage on Rim	<ol style="list-style-type: none"> 1. Improper storage or operating conditions. 2. Poor maintenance. 3. Rust, corrosion on bead seating. 4. Loss of pressure. 	<ol style="list-style-type: none"> 1. Correct as required. 2. Follow proper maintenance procedures. 3. Correct as required. 4. Follow proper maintenance procedures.
Tire Mounting Difficulties	<ol style="list-style-type: none"> 1. Mismatch tire and rim sizes. 2. Defective or mismatched rings for rim use. 3. Overinflation of tires. 4. Corrosion and dirt. 	<ol style="list-style-type: none"> 1. Correct as required. 2. Correct as required. 3. Follow recommended tire pressure. 4. Correct as required.
Tires Show Excessive Wear on Edges of Tread	<ol style="list-style-type: none"> 1. Underinflated tires. 2. Vehicle overloading. 3. High speed cornering. 4. Incorrect toe-in setting. 	<ol style="list-style-type: none"> 1. Properly inflate to recommended pressure. 2. Correct as required. 3. Correct as required. 4. Set to correct specifications.
Tires Show Excessive Wear in Center of Tread	Tire overinflated.	Properly inflate to recommended pressure.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Excessive Tire Wear	<ol style="list-style-type: none">1. Improper tire pressure.2. Incorrect tire/wheel usage.3. Defective shock absorbers.4. Front end out of alignment.5. Loose, worn or damaged steering linkage, joints, suspension components, bushing and ball joints.	<ol style="list-style-type: none">1. Properly inflate to recommended pressure.2. Install correct tire/wheel combination.3. Repair or replace.4. Align front end.5. Inspect, repair or replace as required.
Dual Tires Rubbing	Insufficient wheel spacing.	Check tire and wheel sizes.

MAIN DATA AND SPECIFICATIONS

Front End Alignment

	Wishbone Suspension	NHR Rigid	NKR Rigid	NPR	NQR	NPS
Steering Angle						
Inner (deg.)	38.0°	37.5°	38.5° (7.00-15 Tire)	47.5° (7.00-16 Tire)	42.5° (7.50-16 Tire)	37.5°
Outer (deg.)	35.0°	33.0°	35.5° (7.00-16 Tire)	42.5° (7.50-16 Tire)	36.5° (8.25-16 Tire)	29.8°
Wheel Alignment						
Toe-in mm (in.)	-2-2 (-0.08-0.08)					
Camber (deg.)	0°15'±45'	1°15'±45'	0°15'±45'	0°15'±45'	0°15'±45'	0°15'±45'
Caster (deg.)	1°00'±1°	1°30'±1°	3°00'±1°	2°45'±1°	2°45'±1°	2°00'±1°
King Pin Inclination (deg.)	9°45'±30'	7°15'	12°00'	12°00'	12°00'	7°15'

Power Steering Unit

	Right Hand Drive	Left Hand Drive
Type	Integral rotary valve type	
Number of Ball	28	
Gear Ratio	22.6 NKR (Indep) 22.6 NKR (Rigid)	
Ball Screw Lead mm (in.)	18.8 — 20.9 NPR, NQR, NPS (Rigid) 9.172 (0.361) NHR, NKR (Rigid) 9.922 (0.391) NPR, NQR, NPS 9.922 (0.391) NKR (Indep)	
Torsion Bar Spring Constant N-cm/deg (kg-cm/deg.)	15.7 (16.0)	
Valve Operating Angle (deg.)	±7°	
Regulated Oil Pressure kPa (kg/cm ² /psi)	10,297 (105/1,439) 11,287 (115/1,635)	
Regulated Oil Flow Volume (minimum) liter/min (US gal/min / UK gal/min)	8 (2.11/1.76)	

Power Steering Oil Pump Unit

		4J Series Engine	4H Series Engine
Type		Vane type	
Theoretical Delivery	(cm ³ /rev)	7.2	8.1
Regulated Oil Flow volume	(liter/min)	8.5 — 6.5	8.0 — 6.5
Regulated Oil Pressure	kPa (kg/cm ² /psi)	10,297 (105/1,493)	10,297 (105/1,493)
	NHR, NKR		10,787 (110/1,564)
	NPR, NPS		11,278 (115/1,635)
	NQR		
Maximum Allowable Speed	(r.p.m)	6,500	6,500

Tandem Hydraulic Pump

		Hydraulic Booster Pump	Power Steering Pump
Type		Vane type	
Theoretical Delivery	(cm ³ /rev)	13	8.4
Regulated Oil Flow volume	(liter/min)	8.0	8.0 — 6.5
Regulated Oil Pressure	kPa (kg/cm ² /psi)	11,770 (120/1,706)	10,790 (110/1,564)
Maximum Allowable Speed	(r.p.m)	6,500	

Manual Steering Unit

		NHR, NKR	NPR, NQR
Type		Recirculating ball type	
Sector Shaft Outside Diameter	mm (in.)	34.295	38.1
Number of Ball		28 × 2	50 × 2
Gear Ratio		24.5 — 28.5	27.7 — 31.7

SERVICE STANDARD

ITEMS	SERVICE STANDARD	SERVICE LIMIT
Power Steering		
Sector Shaft Outside Diameter	mm (in)	
RHD&LHD		39,975 (1.574)
Play between Sector Shaft and Bearing	mm (in)	
RHD	—	0.12 (0.0047)
LHD	—	0.20 (0.0080)
Backlash between Sector Shaft and Ball Nut	mm (in)	
RHD&LHD		0.12 (0.0047)
Steering Wheel Free Play	mm (in)	10 — 50 (0.4 — 2.0)
Power Steering Fluid Pressure (at idling engine speed)	kPa (kg/cm ² /psi)	
NQR without HBB		11,278 (115/1,635)
NPR/NPS/NQR with HBB		10,787 (110/1,564)
except Above Models		10,297 (105/1,493)
Manual Steering		
Sector Shaft Outside Diameter	mm (in)	
NHR, NKR		34.925 (1.375)
NPR, NQR		38.100 (1.500)
Play between Sector Shaft and Needle Bearing	mm (in)	—
Ball Nut Axial Play	mm (in)	—
Worm Shaft Starting Torque	N·m (kg·m/lb·ft)	
(Without Sector Shaft)		
NHR, NKR		0.34 — 0.64 (0.035 — 0.065/ 0.25 — 0.47)
NPR, NQR		0.29 — 0.69 (0.030 — 0.070/ 0.22 — 0.51)
(With Sector Shaft)		
NHR, NKR		0.54 — 1.03 (0.055 — 0.105/ 0.40 — 0.76)
NPR, NQR		0.98 (0.1/0.72) or less
Backlash between Sector Shaft and Ball Nut	mm (in)	
NHR, NKR		0.2 (0.0079) or less
NPR, NQR		0.5 (0.0197) or less
Steering Wheel Free Play	mm (in)	10 — 30 (0.4 — 1.2)
Suspension		
Spring Pin Outside Diameter	mm (in)	25 (0.98)
		24.7 (0.019)

SERVICE INFORMATION 00-13

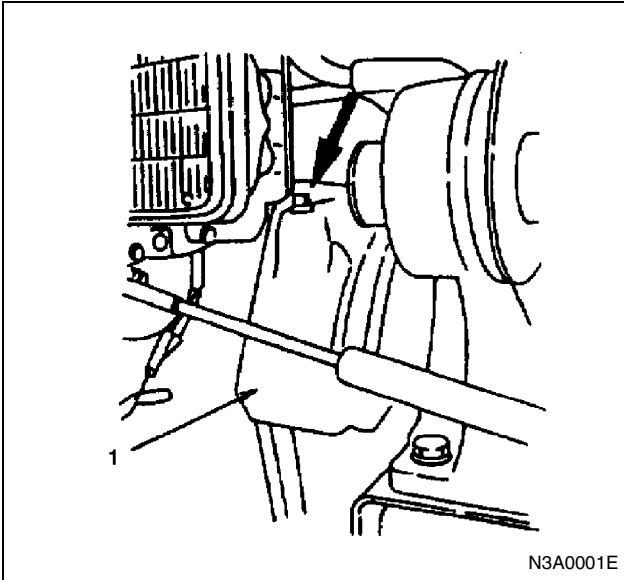
ITEMS	SERVICE STANDARD	SERVICE LIMIT
Clearance between Shackle Pin and Bushing	0.1 (0.0039)	0.5 (0.019)

SERVICING

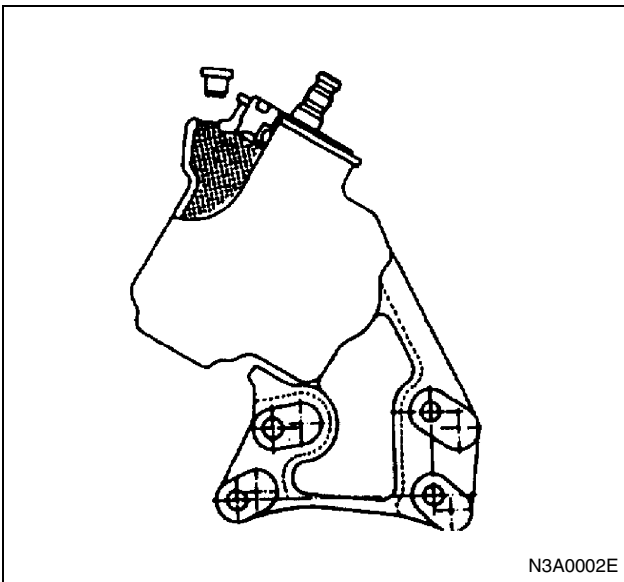
Steering System

Manual Steering Gear Oil

1. Remove the filler plug on the steering unit (1).



2. Fill the gear box to the level of filler plug with specified gear oil through the filler hole.
3. Install and tighten the filler plug.



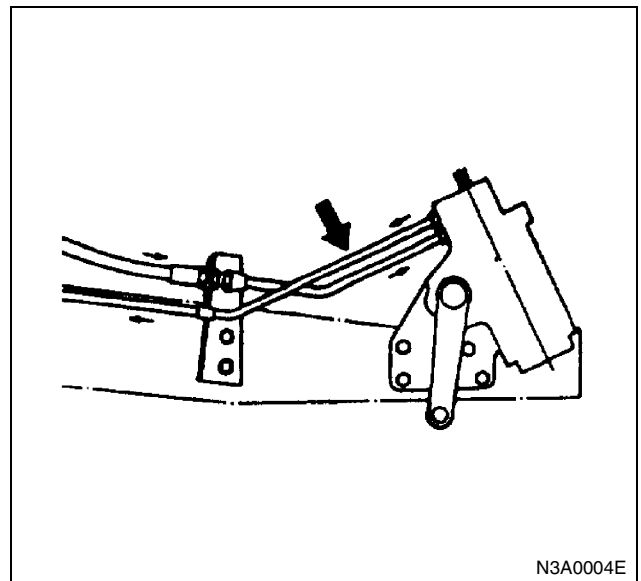
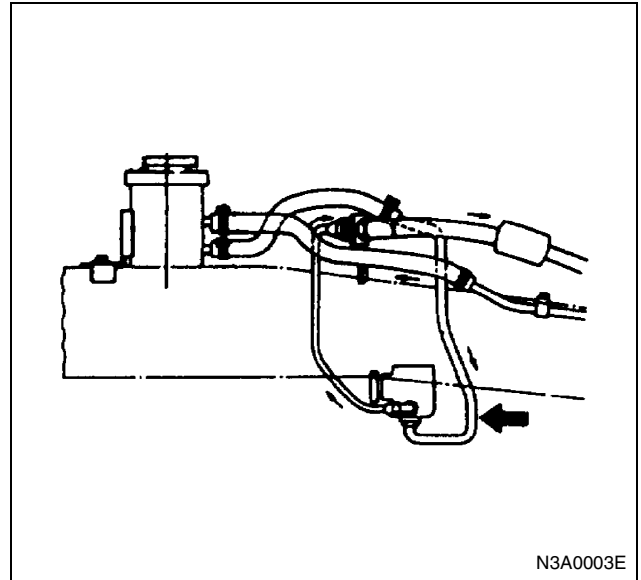
Power Steering Fluid

Draining

1. Jack up the front wheels until they are clear of the ground.
2. Disconnect the fluid pipes between the steering unit and fluid reservoir, and the fluid hose between the pump and the fluid reservoir.
3. When draining is completed, remove remaining fluid within hydraulic system by turning the steering wheel to stop in both directions several times.

Hose Replacement

Replace the power steering hoses at intervals of fluid change.



Refilling

1. Connect the fluid lines securely and fill the fluid reservoir with specified automatic transmission fluid.
2. When the fluid reservoir is filled to specified level, allow 2 or 3 minutes. While refilling, keep fluid reservoir replenished as necessary to prevent air from entering the hydraulic system.
3. Lower the front wheels to the ground. Start and let the engine idle for a few minutes. Recheck the fluid level and replenish if necessary.

Steering Wheel Free Play

Inspection

1. Check the amount of the steering wheel play by turning the wheel in both directions until the tires

begin to move with the front wheels properly in the straight ahead position.

Notice:

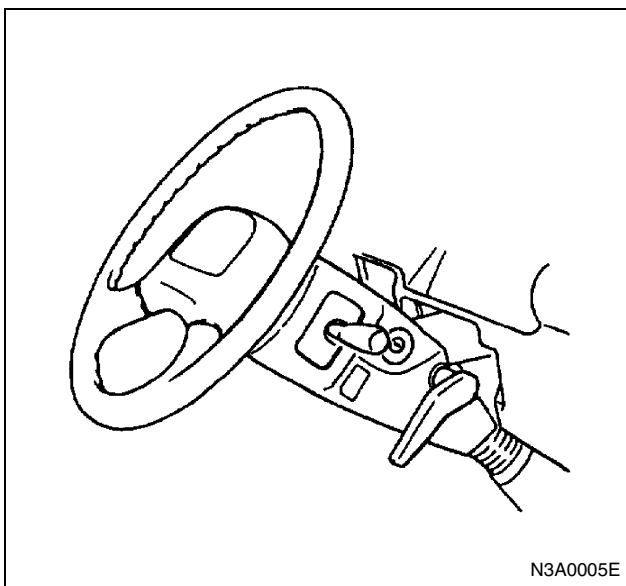
If the vehicle is equipped with a power steering unit, the wheel free play should be checked with the engine running.

Steering Wheel Free Play

Manual Steering: 10 — 30 mm (0.4 — 1.2 in)

Power Steering: 10 — 50 mm (0.4 — 2.0 in)

2. Also check the steering wheel for play and looseness in mount by moving it back and forth and sideways. While driving, check for hardsteering, shimmy and tendency of steering to pull to one side.

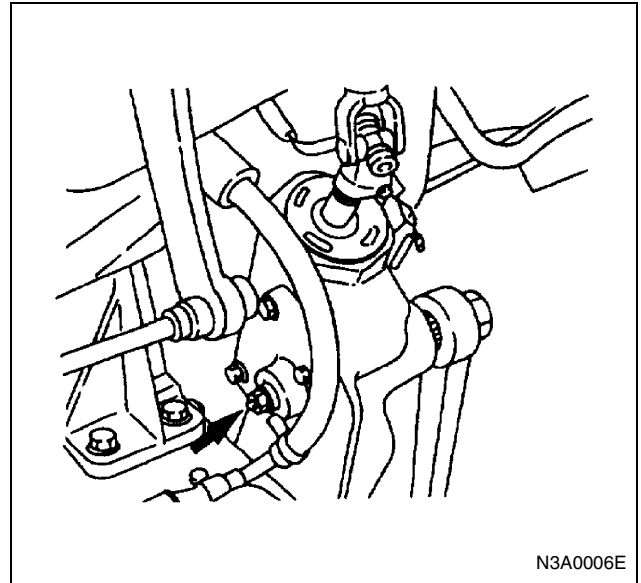


Adjustment

1. Align the front wheels properly in the straight ahead position.
2. Loosen the lock nut on the adjusting screw of the steering unit.
3. Turn the adjust screw clockwise to decrease free play or counter-clockwise to increase.
4. After check of specified free play, tighten the lock nut to specified torque.

Tighten:

- Lock nut to
Manual Steering: 25 N·m (2.5 kg·m / 18 lb·ft)
Power Steering: 69 N·m (7.0 kg·m / 51 lb·ft)



Power Steering Fluid Pressure

Preparation

1. Install the power steering fluid pressure gauge between the pump and steering unit as figure.
Gauge: 5-8840-0162-0
2. Start and let the engine idle until oil temperature reaches 50 — 60°C (122 — 140°F).
3. Take measurement of the pressure gauge when the steering wheel is turned clockwise or counter-clockwise to lock.

Standard Pressure (at idle speed)

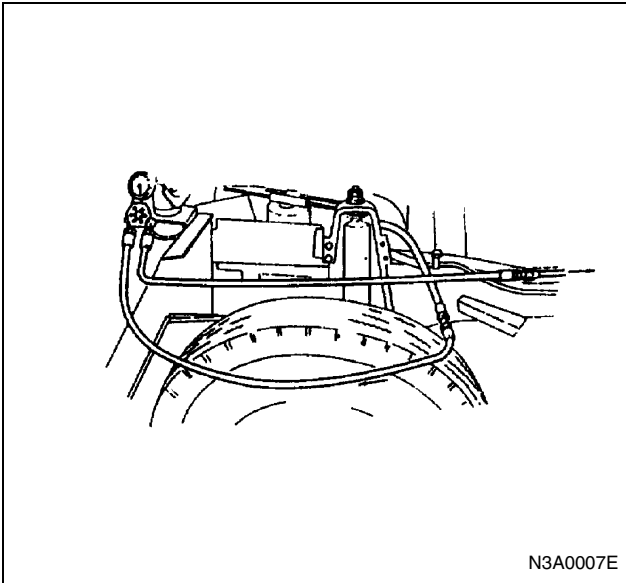
- NQR without HBB: 11,275 kPa (115 kg/cm²/1,635 psi)
- NPR/NPS/NQR with HBB: 10,787 kPa (110 kg/cm²/1,563 psi)
- except Above Models: 10,297 kPa (105 kg/cm²/1,439 psi)

Excess pressure means pump trouble.

Less pressure means steering unit trouble.

Notice:

This test should be done within ten seconds.



Steering Function

Check the following items.

- Steering wheel shake
- Steering shimmy
- Hard steering
- Turning radius
- Steering wheel return
- Steering pull to one side

Inspection of Wheel Alignment

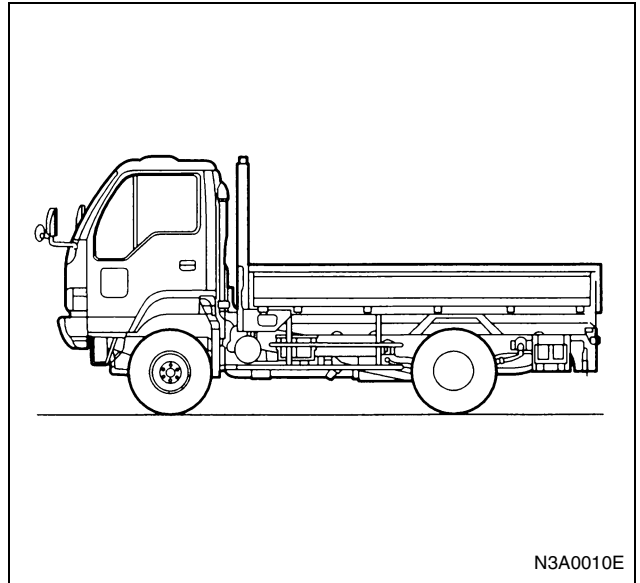
The points listed below must be checked prior to inspection front wheel alignment.

- Tire pressure and abnormal wear
- Front hub bearing for axial play
- Ball joint on steering linkage for play
- Operation of shock absorbers
- Tightness of suspension parts
- King pin bearings for play

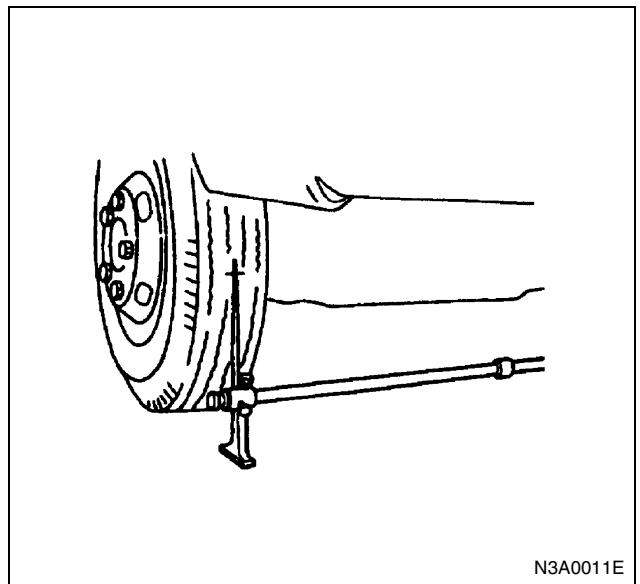
Toe-In

Measurement should be taken with the vehicle on a surface plate.

If a surface plate is not available, toe-in should be checked with the vehicle parked on a level floor.



1. Set front wheels to its straight ahead position.
2. Align the toe-in gauge with center height of each wheels at front end.
3. Apply center marks to each wheel, then take measurement of distance A between the center marks on each wheel.
4. Move slowly the vehicle rearward until center marks get its rear end position.
5. Take measurement of distance B between the center marks at rear end.



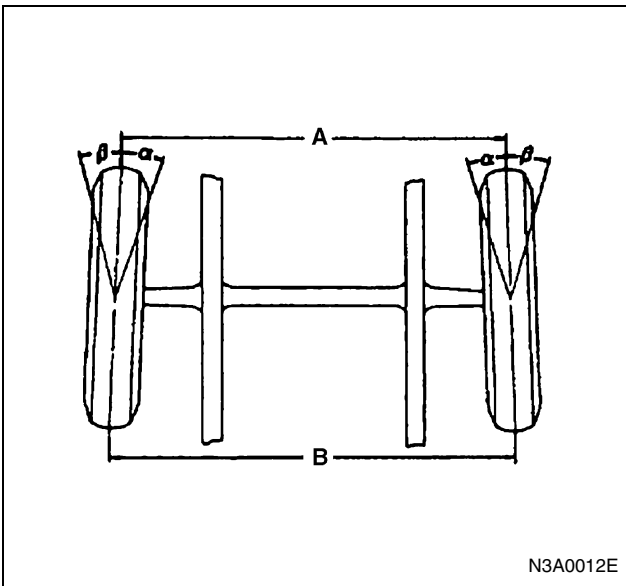
Toe-in can be calculated with next formula.

$$\text{Toe-in} = B - A$$

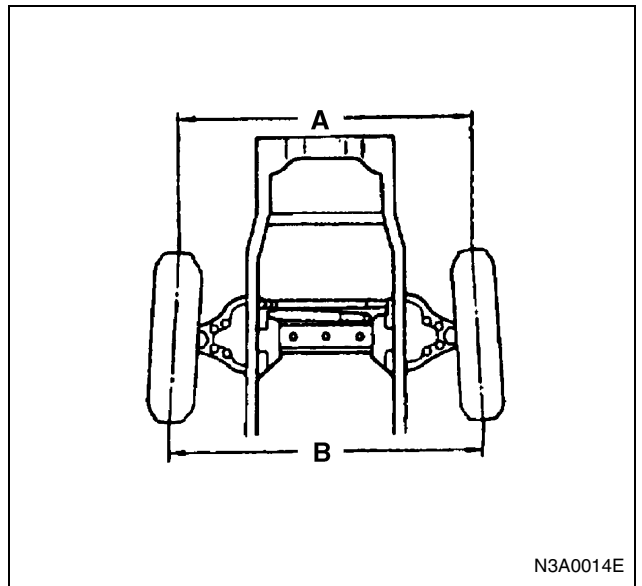
Toe-in

-2 — 2 mm (-0.08 — 0.08 in)

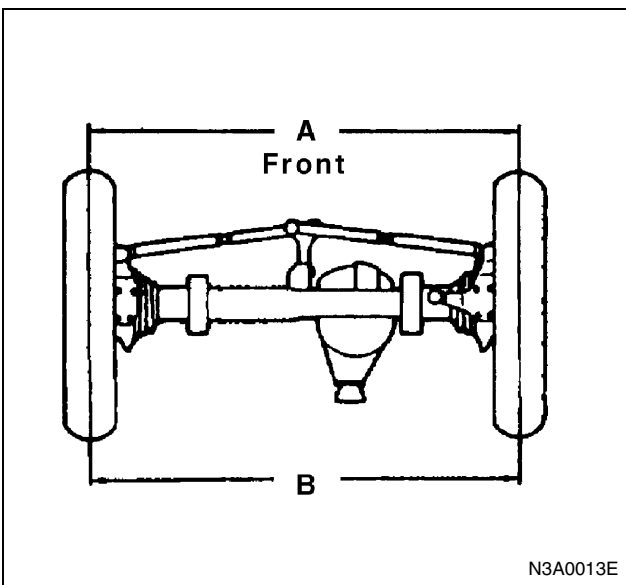
• Rigid Suspension



• Wishbone Suspension



• NPS

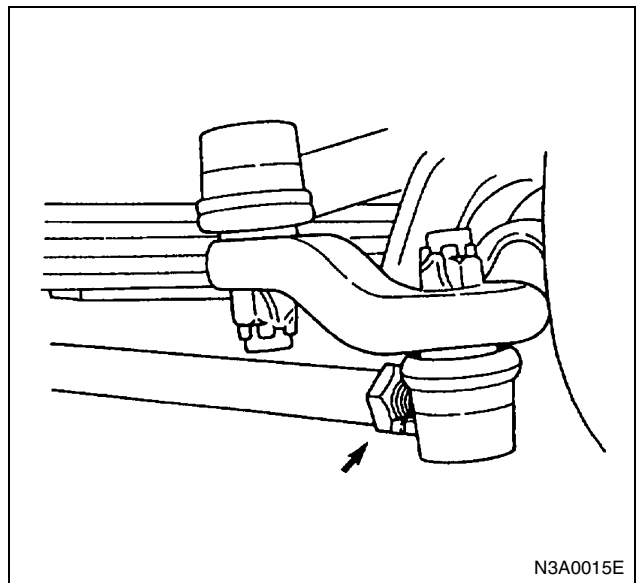


Adjustment

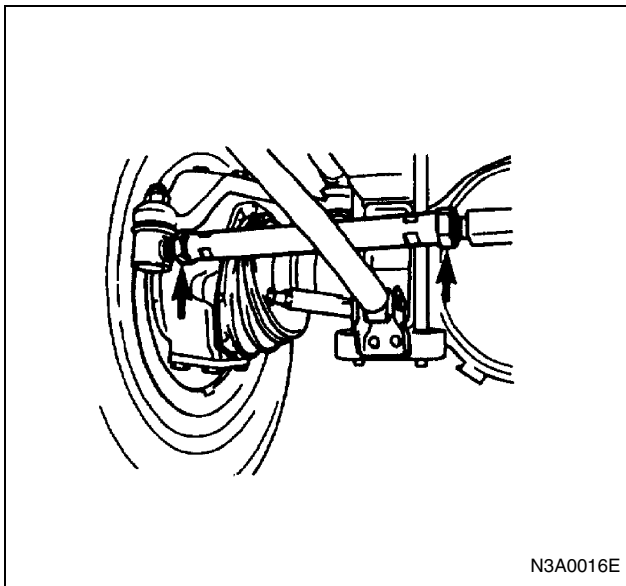
1. Loosen the lock nuts on the tie rod or outer truck rod ends.
2. Adjust length of the tie rod by turning the connecting rod on outer truck rod.
3. Tighten the lock nuts to specified torque.

Tighten:

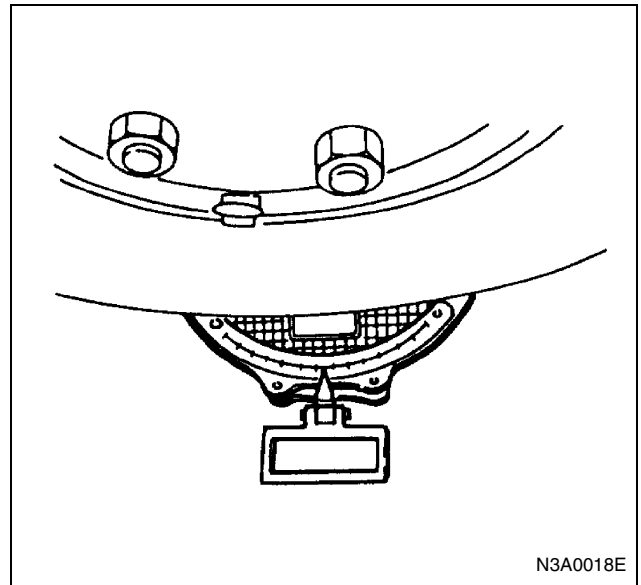
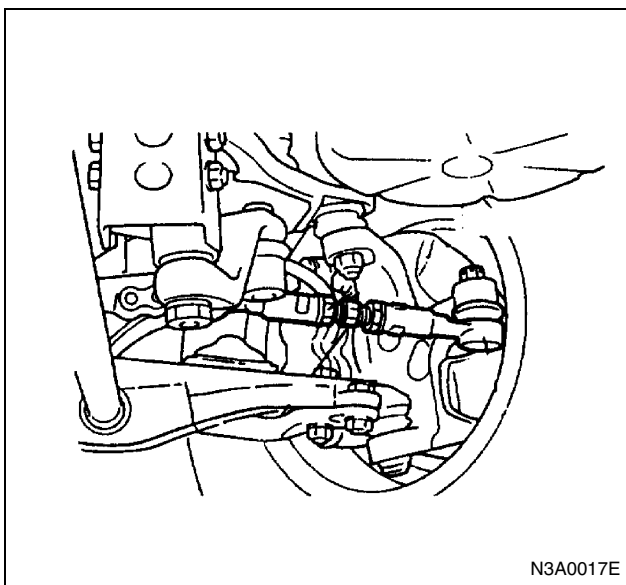
- Lock nut to
 - Rigid Suspension, NPS: 113 N·m (11.5 kg·m / 183 lb·ft)
 - Wishbone Suspension: 167 N·m (17.0 kg·m / 123 lb·ft)
- Rigid Suspension



- NPS



- Wishbone Suspension



Steering Angle

Wishbone Suspension Model		(deg.)	
Vehicle Model	Outer	Inner	
NKR (7.00-15 Tire)	35.0	38.0	

Rigid Suspension Model		(deg.)	
Vehicle Model	Outer	Inner	
NHR	33.0	37.5	
NKR (7.00-15 Tire)	29.5	38.5	
NKR (7.00-16 Tire)	27.9	35.5	
NPR (7.00-16 Tire)	35.0	47.5	
NPR, NQR (7.50-16 Tire)	32.7	42.5	
NQR (8.25-16 Tire)	30.0	36.5	
NPS	29.8	37.5	

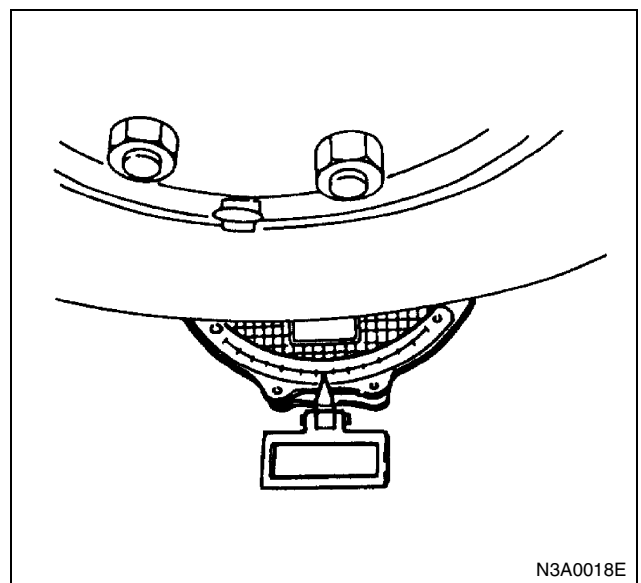
Turning Radius

1. Position a suitable piece of wood equivalent in thickness to the turning radius gauge under each rear wheel.
2. Position each front wheel on a turning radius gauge by aligning the tire center line with the center of the turning radius gauge.
3. Turn the steering wheel clockwise or counterclockwise until the front wheels are locked.

Notice:

Turn the steering wheel with the brake pedal depressed using brake pedal pusher.

Reading of the turning radius gauge directly indicates the steering angle.

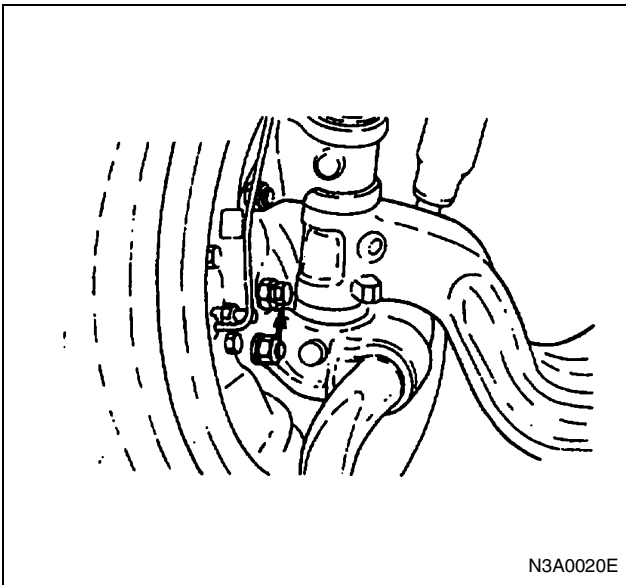


Adjustment

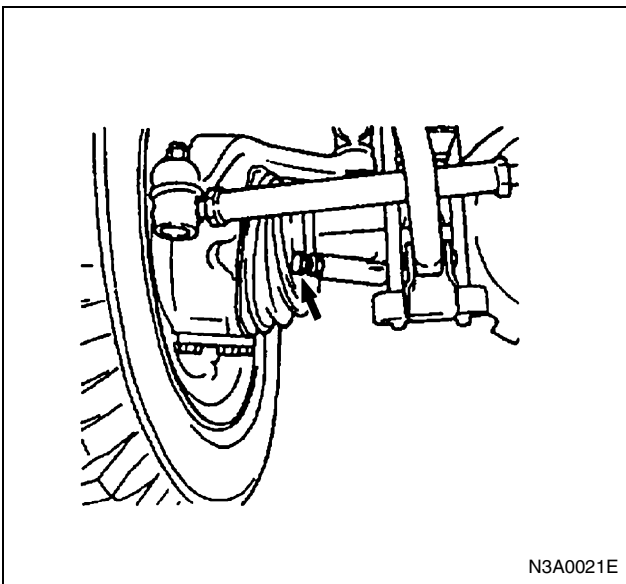
1. Loosen the lock nuts on the steering knuckle or the axle case.
2. Adjust projecting height of the stopper bolts.
3. Tighten the lock nuts to specified torque.

Tighten:

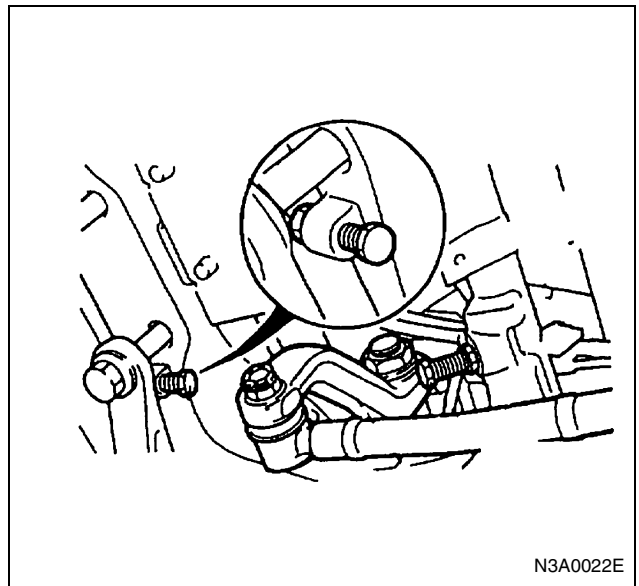
- Stopper bolt to
 - Rigid suspension: 186 N·m (19.0 kg·m / 137 lb·ft)
 - NPS: 49 N·m (5.1 kg·m / 36 lb·ft)
 - Wishbone suspension: 82 N·m (8.4 kg·m / 61 lb·ft)
- Rigid Suspension



- NPS



- Wishbone Suspension



Camber Angle

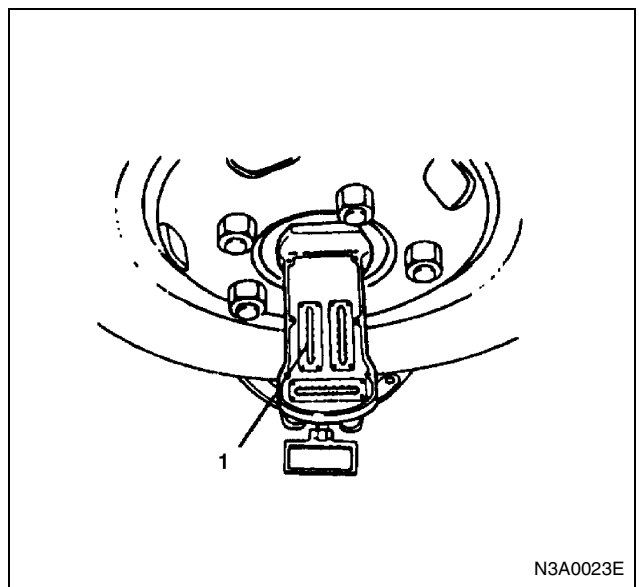
All Model except NPS

Toe-in can be checked on the gauge simultaneously.

1. When inspection of turning radius is completed, calibrate the scale of the turning radius gauge to zero.
2. Remove the front hub cap. Install camber, caster and king pin inclination gauge on end of the knuckle spindle horizontally.

Notice:

When removing hub cap, take care so as not to cause damage to gauge fitting face at end of the spindle. If end of the spindle has been scratched or damaged, correct before setting the gauge.



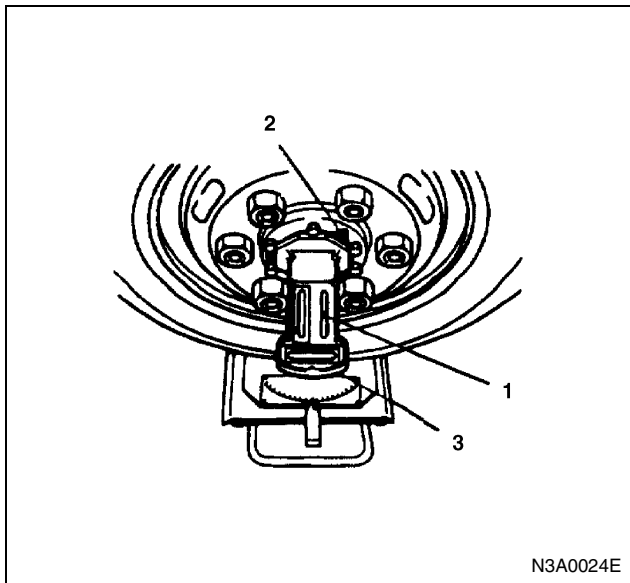
Legend

1. Camber angle

NPS

Remove the free wheel hub lock cover assembly, then install gauge adapter on end of the knuckle spindle. Install camber, caster and king pin inclination gauge on end of gauge adapter.

Gauge Adapter: 5-8840-2188-0



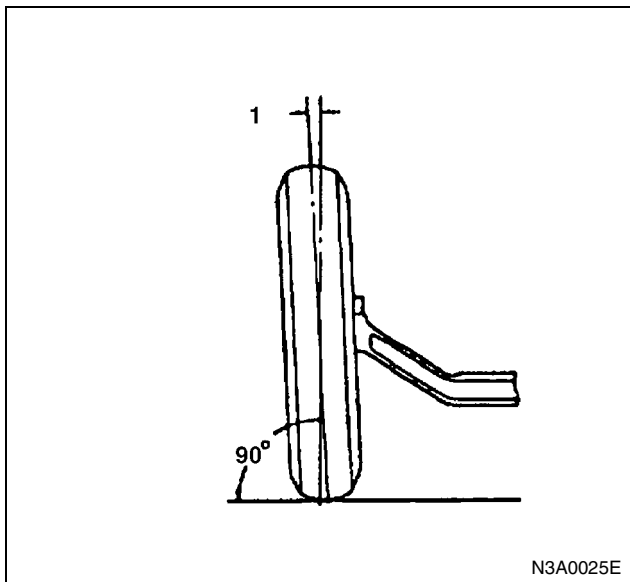
Legend

- 1. Camber angle
- 2. Gauge adapter
- 3. Wheel alignment tester

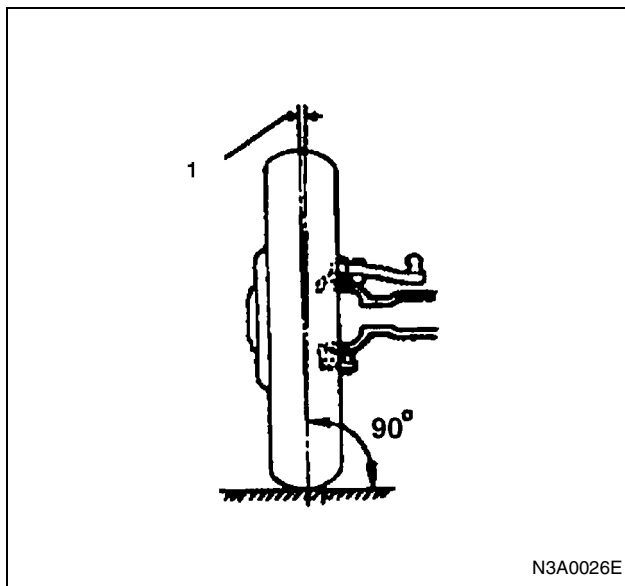
3. Reading of the camber scale directly indicates the camber angle (1).

Camber Angle	(deg.)
NHR Rigid Suspension	1°15'±45'
Rigid Suspension (except NHR)	0°15'±45'
Wishbone Suspension, NPS	0°15'±45'

- NHR, NKR, NPR and NQR



- NPS

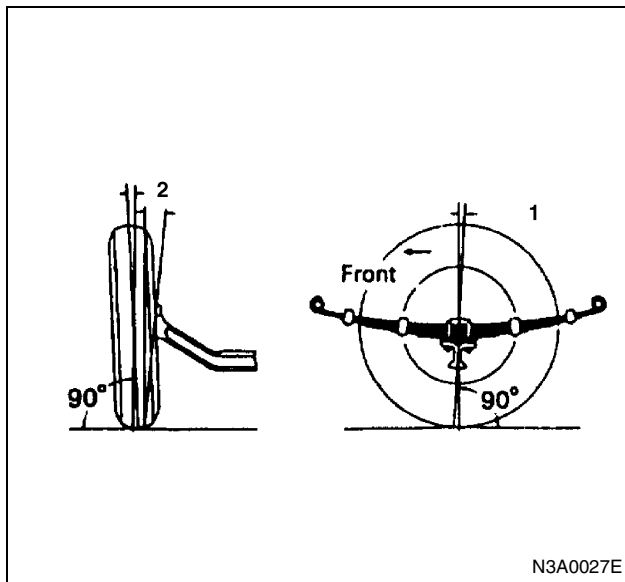


Caster Angle and King Pin Inclination

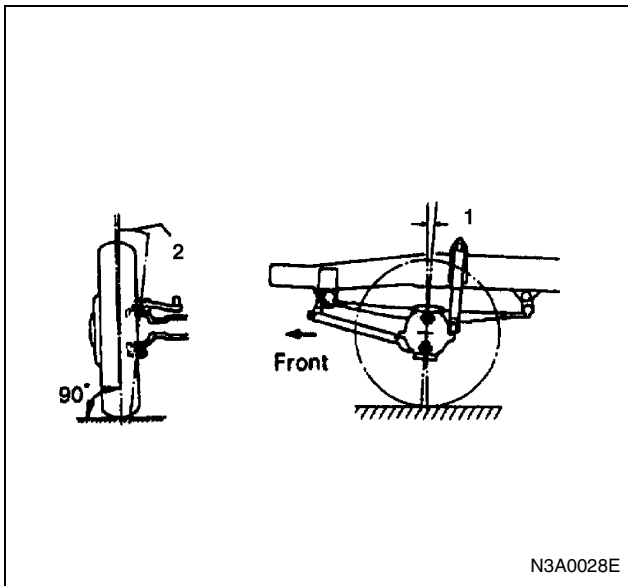
The caster angle and king pin inclination can be checked on the gauge simultaneously.

1. When inspection of camber angle is completed, calibrate the scale of the turning radius gauge to zero and turn the steering wheel clockwise (counterclockwise for checking caster angle (1) and king pin inclination (2) on the left side front wheel) until the front wheels are steered 20 degrees from the straight-ahead position.

- Rigid Suspension

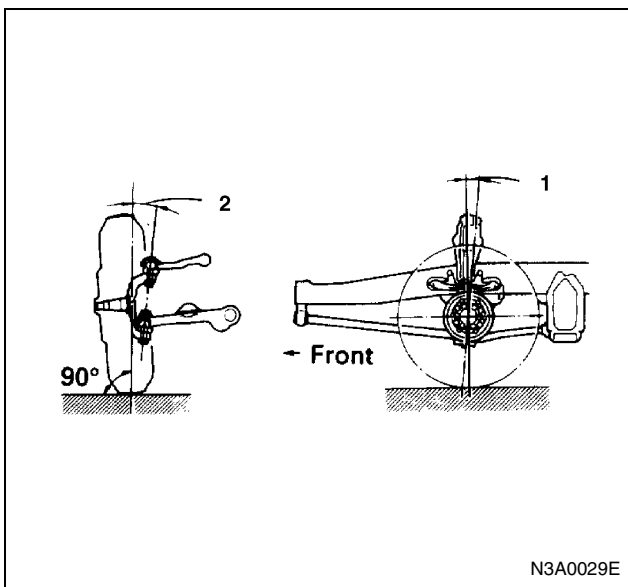


• NPS

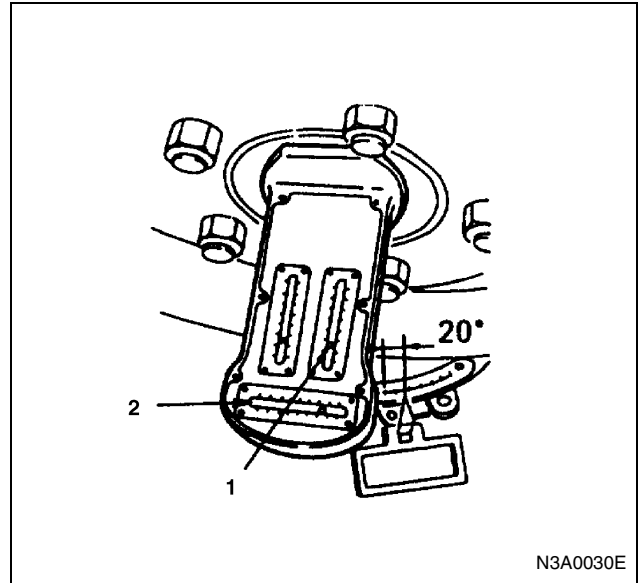


N3A0028E

• Wishbone Suspension



N3A0029E



N3A0030E

Legend

1. Caster angle
2. King pin inclination

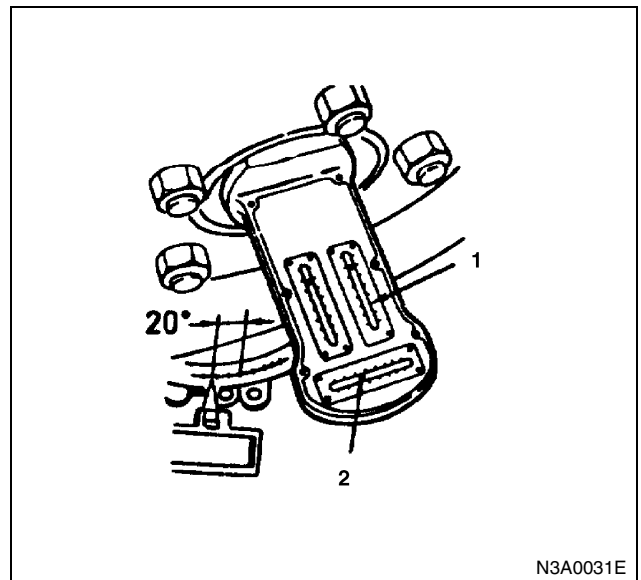
3. Turn the steering wheel in the opposite direction until the front wheels are steered 20 degrees in the opposite direction. Reading of the caster and king pin scales directly indicates the caster and king pin inclination angles being checked.

Caster Angle and King Pin Inclination (deg.)		
	Caster Angle	King Pin Inclination
NHR	1°30'±1°	7°15'
NKR Rigid Suspension	3°00'±1°	12°00'
NPR, NQR	2°45'±1°	12°00'
Wishbone Suspension	1°00'±1°	9°45'±30'
NPS	2°00'±1°	7°15'

Notice:

Turn the steering wheel with the brake pedal depressed using brake pedal pusher.

2. When the front wheels are turned 20 degrees, calibrate the caster and king pin scales to zero turning the camber, caster and king pin gauge adjuster.



N3A0031E

Legend

1. Caster angle
2. King pin inclination

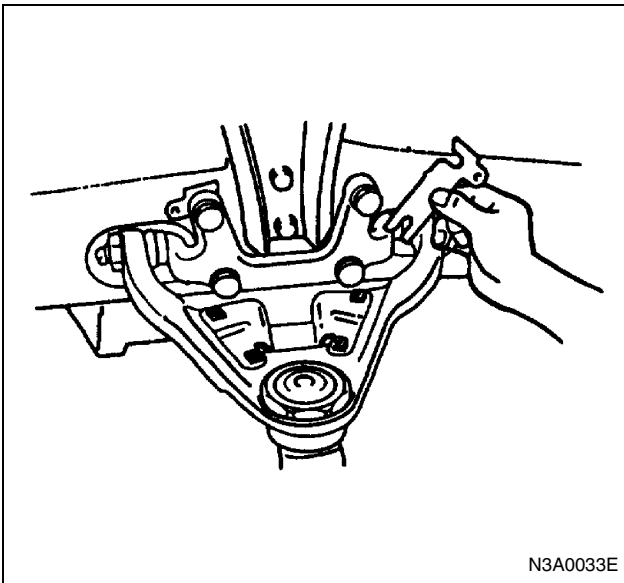
Adjustment**Rigid Suspension**

The camber, caster and king pin inclination are built into front end and are not adjustable. If the camber, caster or king pin inclination is found to be out of alignment, check to locate the cause of trouble against the listing below and replace the parts necessary.

- Front springs for weakening
- Front I-beam (axle case) for distortion
- Bushing in king pin, King pin bearings for wear or determination

Wishbone Suspension

1. Set the jack under the cross member of the suspension and then raise the lower link with the jack and retain the jack with applied in the place.
2. Remove the shock absorber.
3. Attach the fulcrum pin and loosen the bolts to the degree that it will not fall a part to adjust the camber angle using the shims.



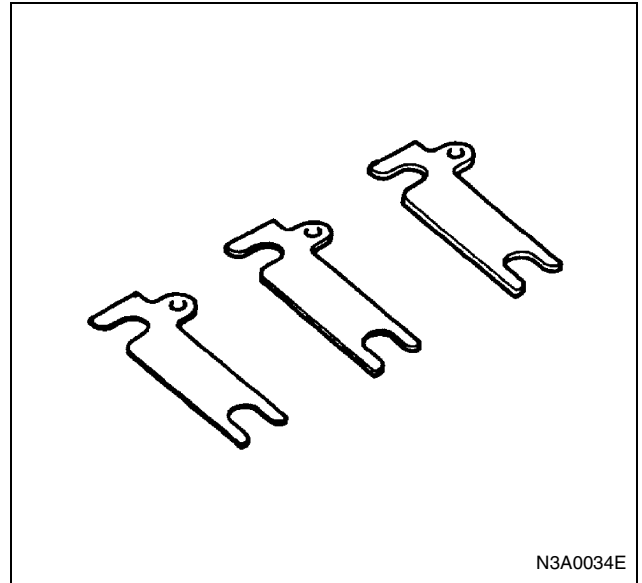
N3A0033E

Camber Angle

If the number of shims are evenly increased both at fore and aft, the camber angle becomes acute, while if decreased, the angle becomes obtuse.

Caster Angle

When the caster angle is obtuse, increase the number of shims at the fore side, while the angle is acute, increase the number of shims at the aft side.



N3A0034E

Thickness of Shims Available

0.8 mm (0.031 in), 1.6 mm (0.063 in), 3.2 mm (0.126 in)

Conditions Where The Shims are Used

Numbers of Shims: 4 or less

Thickness: 9.6 mm (0.378 in) or less

Difference of Thickness (between Front and Rear): 4.8 mm (0.189 in) or less

In case the shim has already reached at the limitation in its number or its thickness, decrease the number of shims at the aft side to adjust the obtuse caster angle, while decrease the number at the fore side to adjust the acute caster angle.

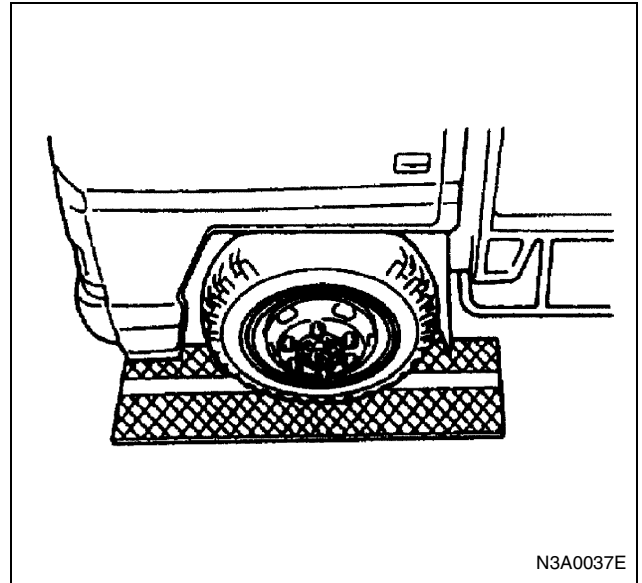
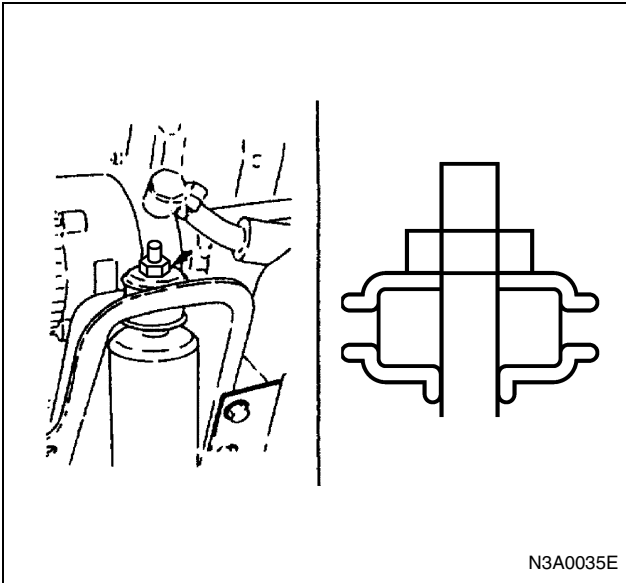
Notice:

Since the number of shims needed for caster angle adjustment varies depending on the conditions of the car, perform the adjustment procedures which are the most suitable for the car conditions.

4. Tighten the mounting bolts of the front shock absorber.

Tighten:

- Shock absorber bolt and nut to
 - Upper: 21 N·m (2.1 kg·m / 16 lb·ft)
 - Lower: 103 N·m (10.5 kg·m / 76 lb·ft)



Front and Rear Suspension

Suspension Function

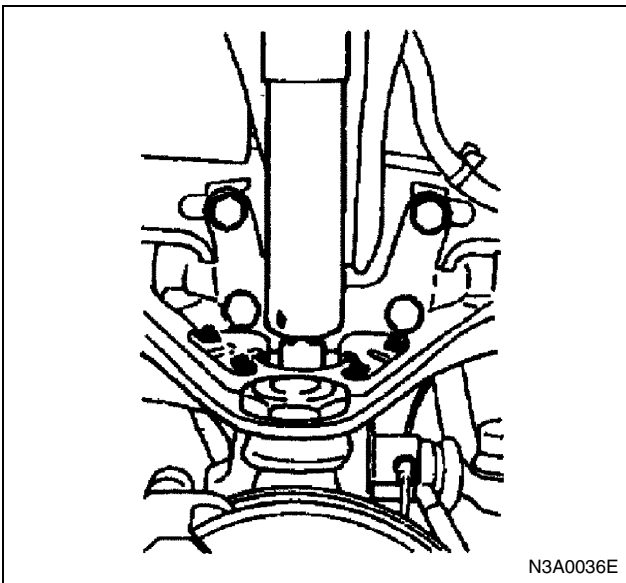
Check the following items.

- Leaf spring breakage
- Body inclination
- Reduction of ground clearance

Lubrication

Lubricate the following points with multi- purpose type grease.

- Spring Pin (NPS only)



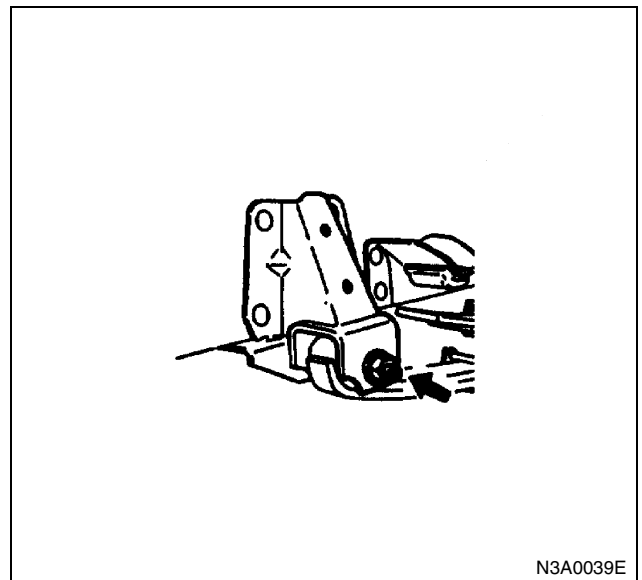
Measurement of Side Slippage

When inspection and adjustments of toe-in, camber, caster and king pin inclination are completed, check for side slippage using a side slip tester.

Roll the wheels over the side slip tester as slowly as possible and take reading on the tester, If the amount of side slippage is in excess of 5 mm per 1 m, recheck the wheel alignment.

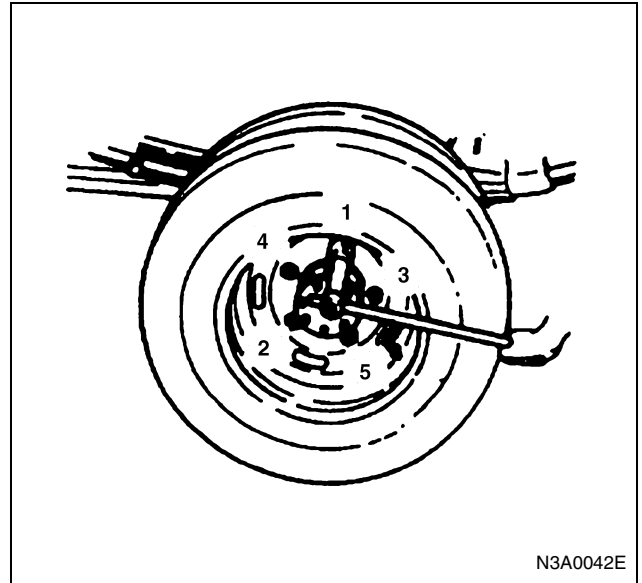
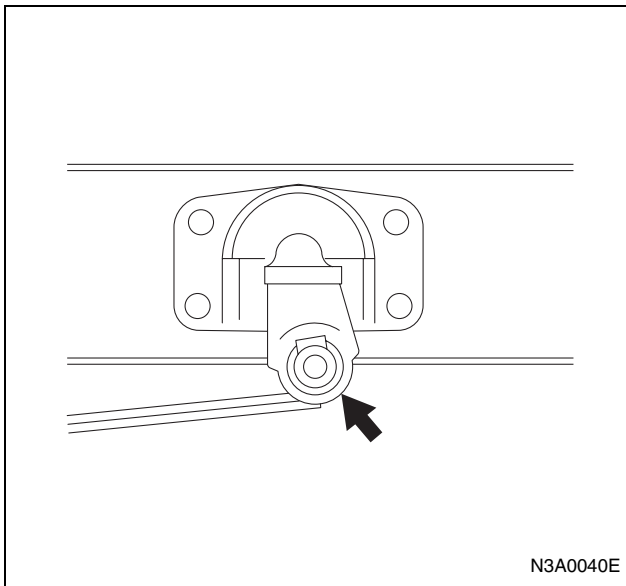
Side Slippage

Limit: 5.0 (0.197) Per 1m

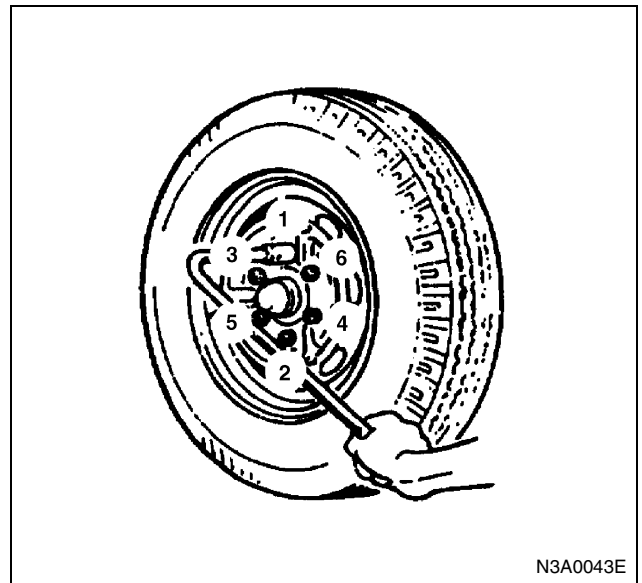
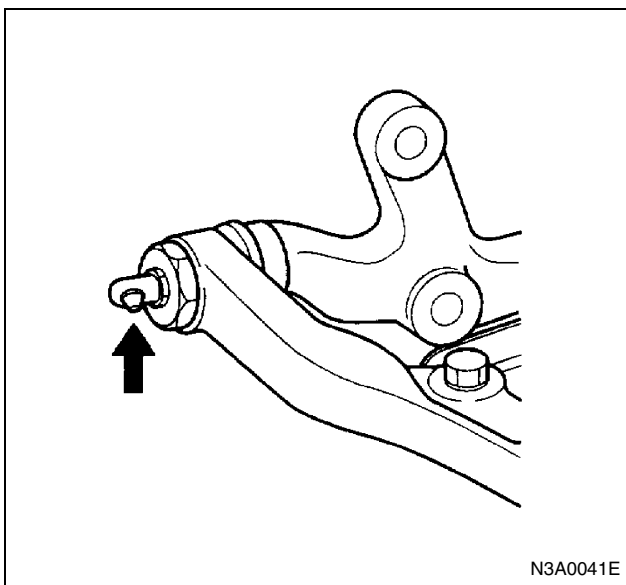


00-24 SERVICE INFORMATION

- Shackle Pin (NPS only)



- Upper Arm (for Wishbone Suspension)



Wheel and Tires

Wheel Nut Retightening

Retighten the wheel nuts to specified torque in sequence as shown in the figure.

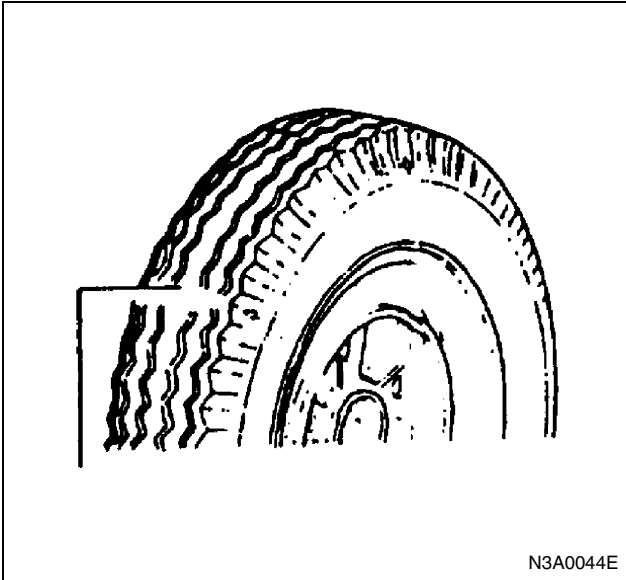
Tighten:

- Front wheel nut to
NHR / NKR single tire, NKR flat low: 167 N·m (17 kg·m / 123 lb·ft)
Except above models: 441 N·m (45 kg·m / 325 lb·ft)
- Rear wheel nut to
NHR / NKR single tire: 167 N·m (17 kg·m / 123 lb·ft)
NHR dual tire, NKR flat low: 294 N·m (30 kg·m / 217 lb·ft)
Except above models: 441 N·m (45 kg·m / 325 lb·ft)

Tread Wear Indicators

The original equipment tires have built-in tread wear indicators to show when tires need replacement.

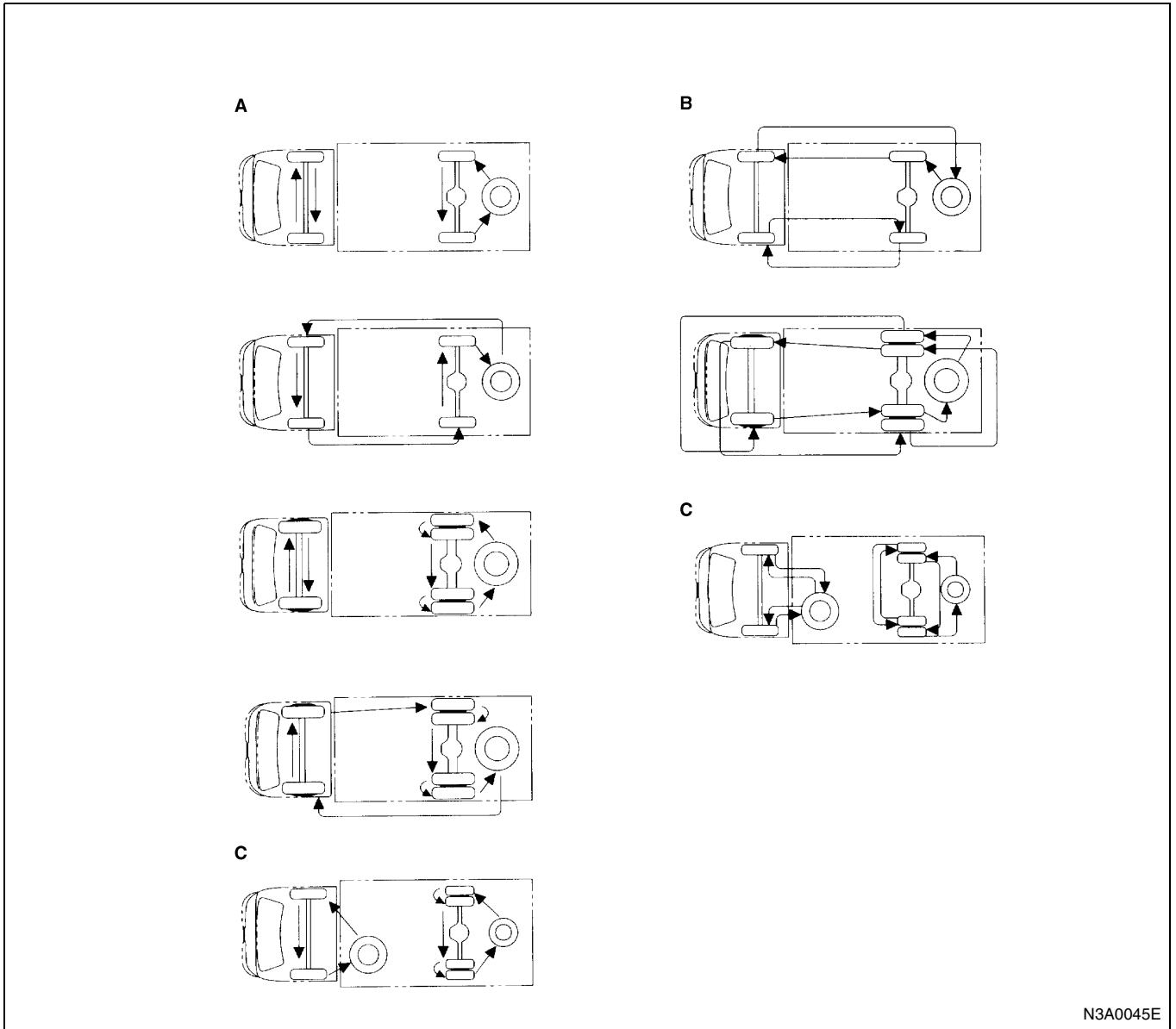
These indicators may appear as wide bands. When the indicators appear in two or more grooves at three locations, tire replacement is recommended.



N3A0044E

Tire Rotation

To allow the tires to wear evenly and to prolong their life, exchange the front and rear tire locations as shown in the figure.



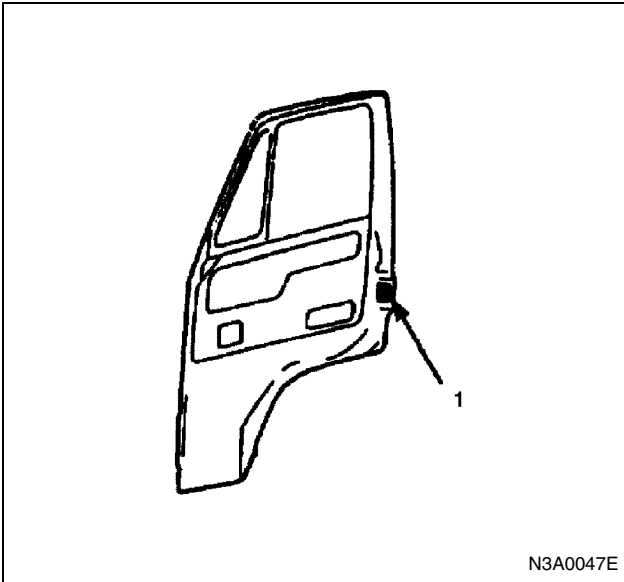
Legend

- A. For bias tires
- B. For radial tires

C. Flat low (Small dual tire)

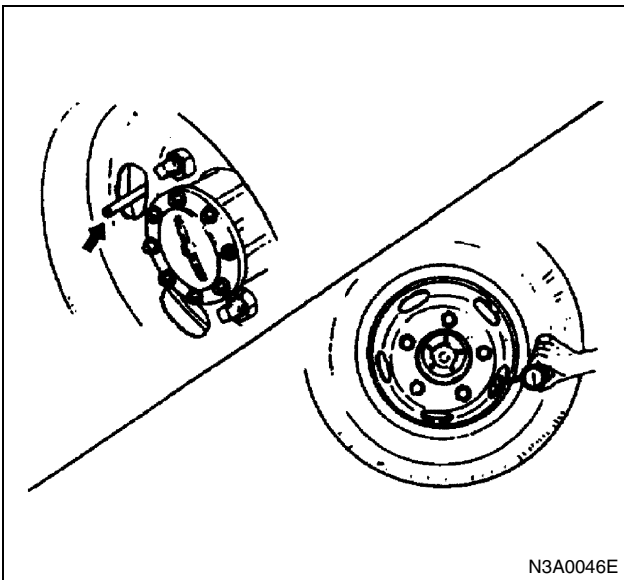
Tire Inflation Pressure

Tire pressure, in cold condition (after vehicle has set for three hours or more, or driven less than one mile), should be checked monthly or before any extended trip. Tire pressure increases approx. 15% when the tires become hot during driving. The pressure specification is shown on the label as figure.



Legend

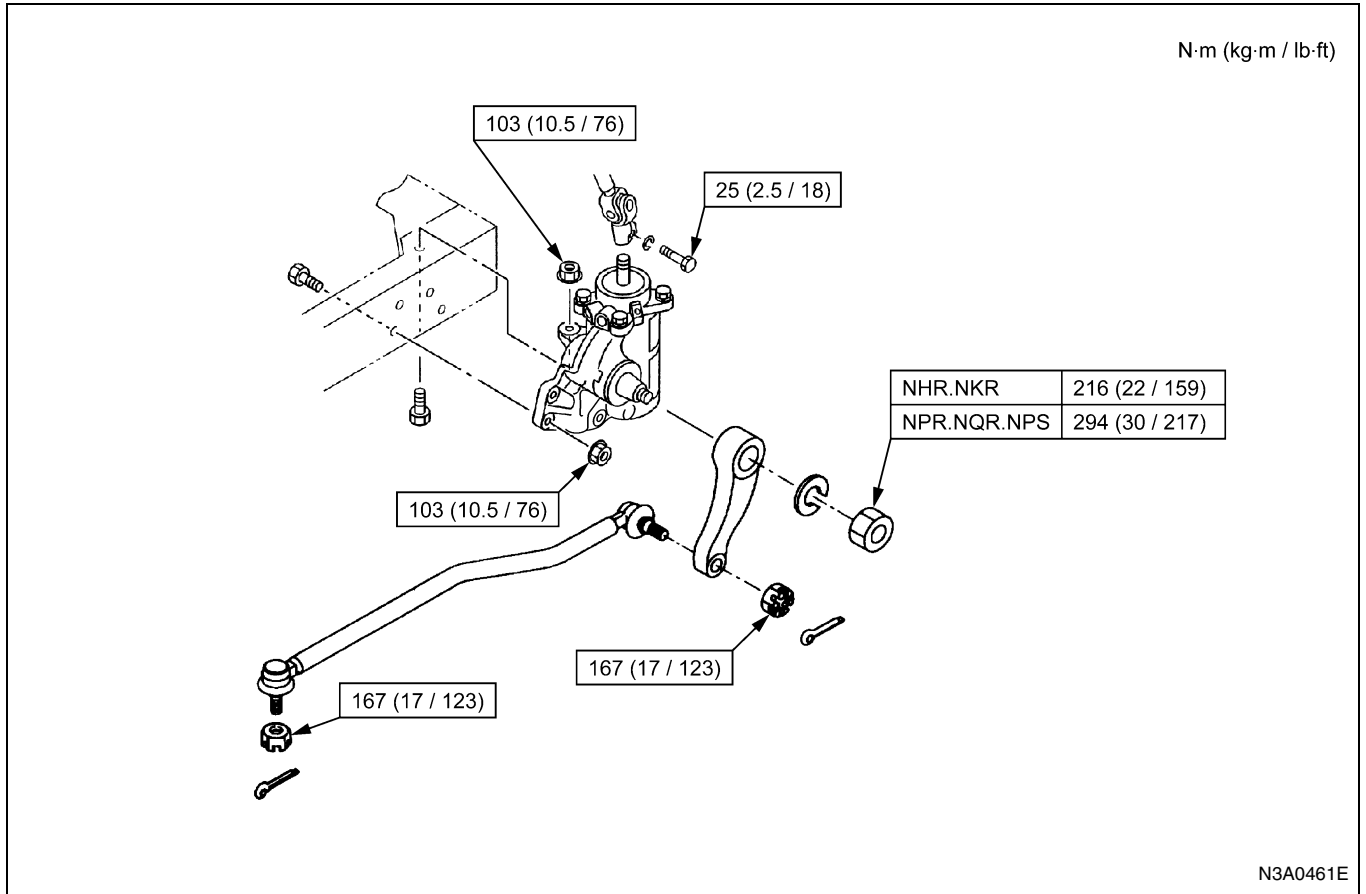
1. Tire air pressure plate (The position of LHD vehicle is opposite)



For tire size and tire inflation pressure, refer to "Tires".

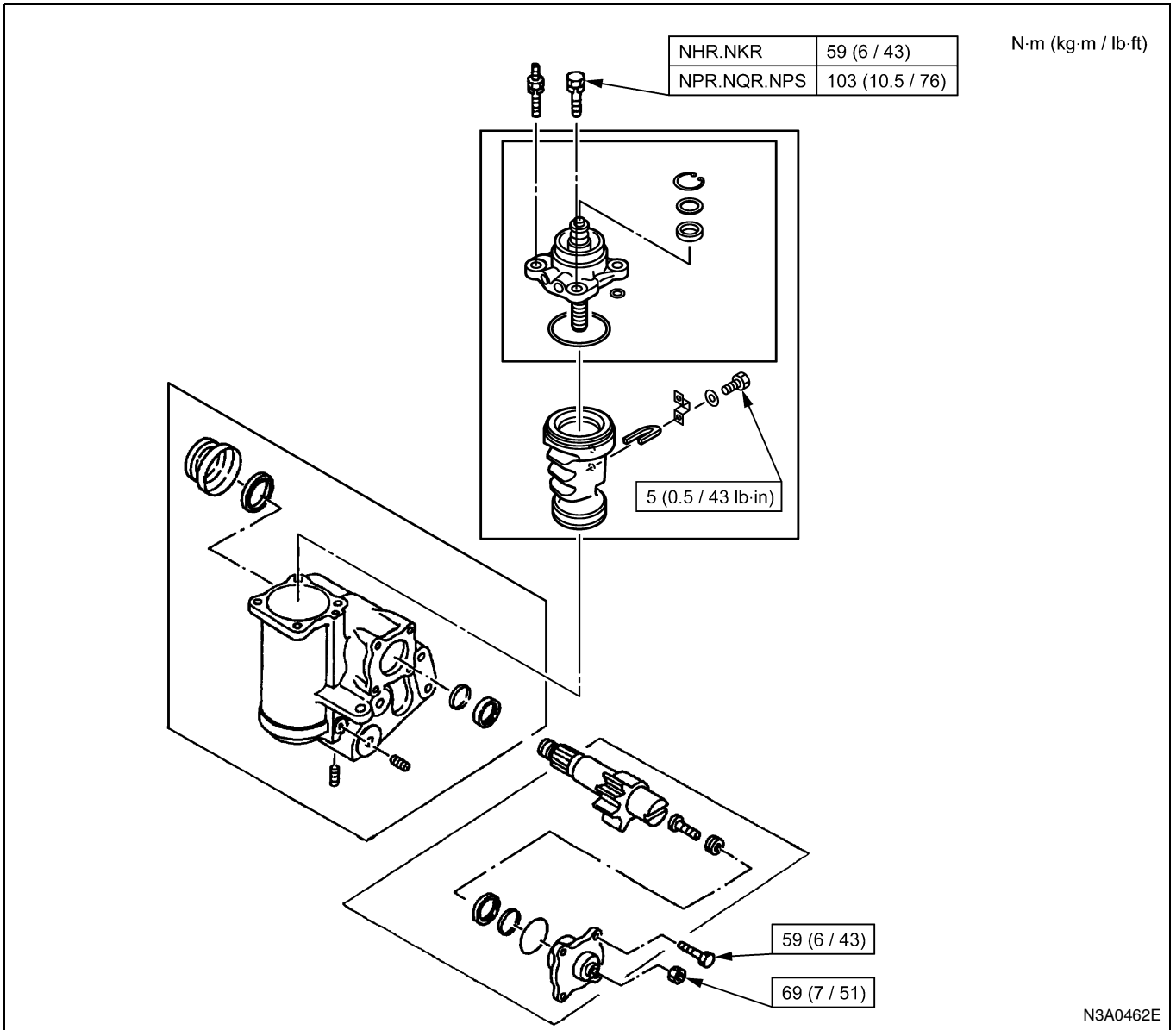
FIXING TORQUE

Steering Unit, Pitman Arm and Drag Link



(This illustration is NHR and NKR model.)

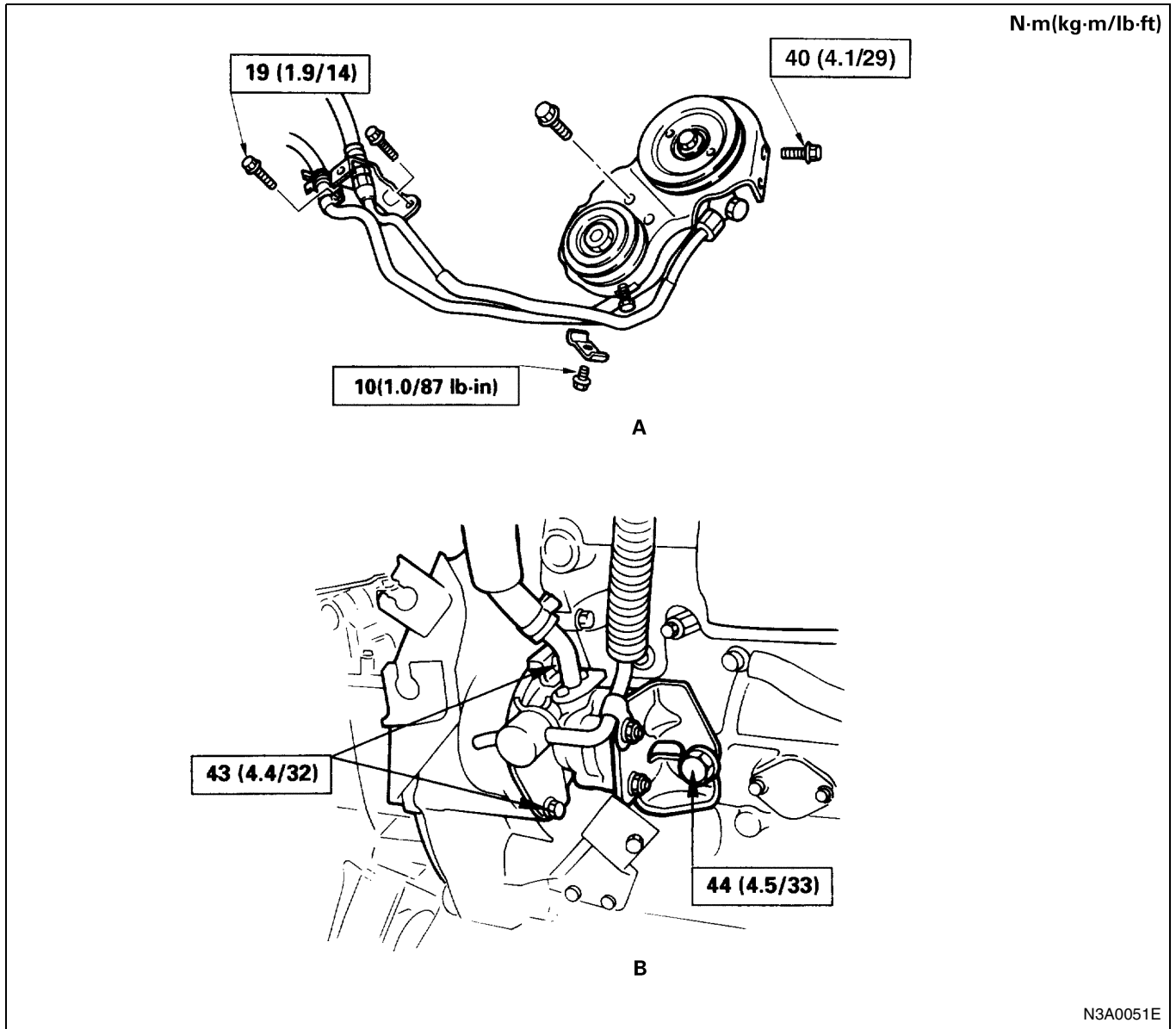
Power Steering Unit



N3A0462E

(This illustration is based on RHD model. Illustration for LHD model are symmetrically opposite.)

Power Steering Pump

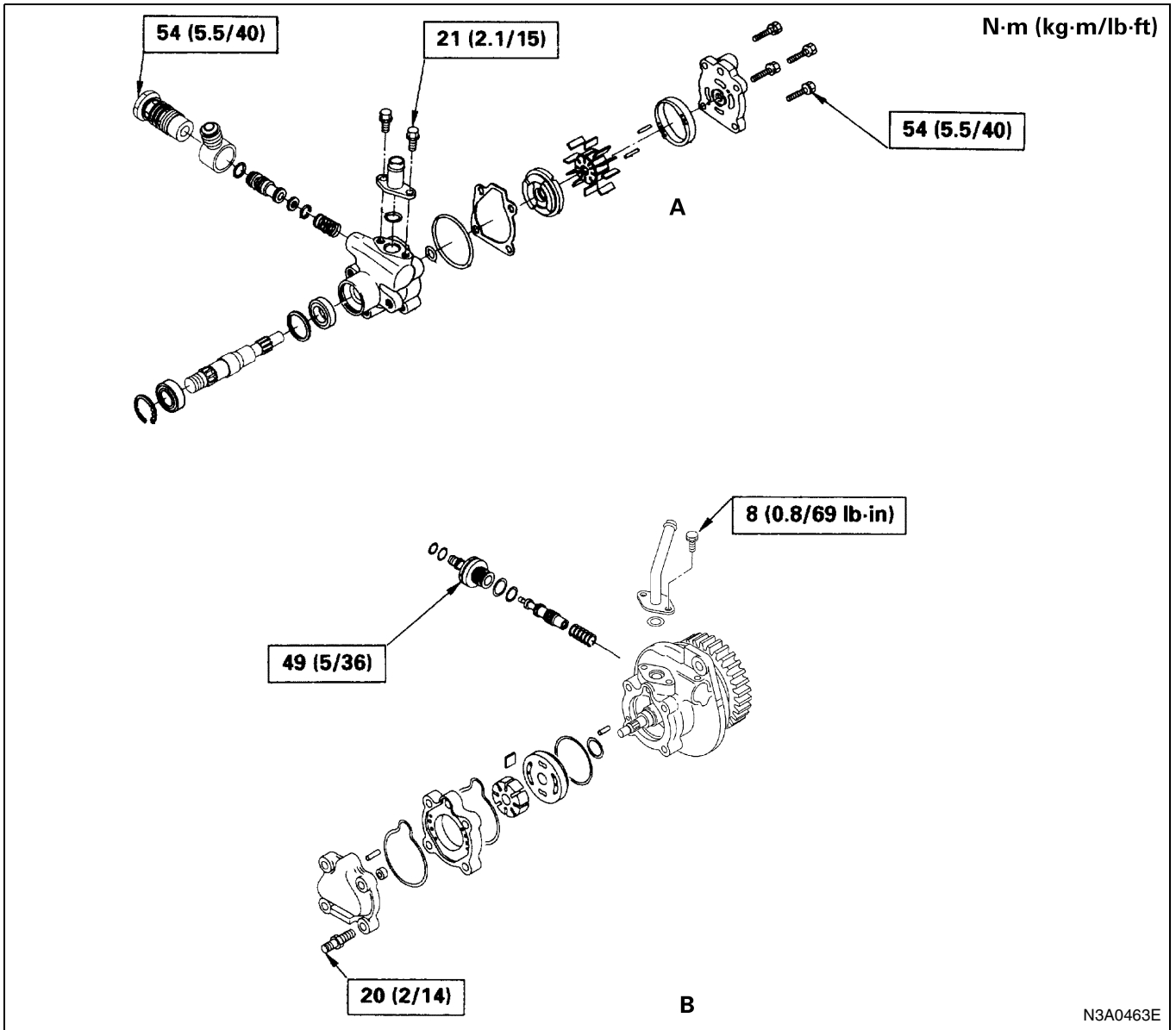


Legend

A. 4J series engine

B. 4H series engine

Power Steering Pump Assembly



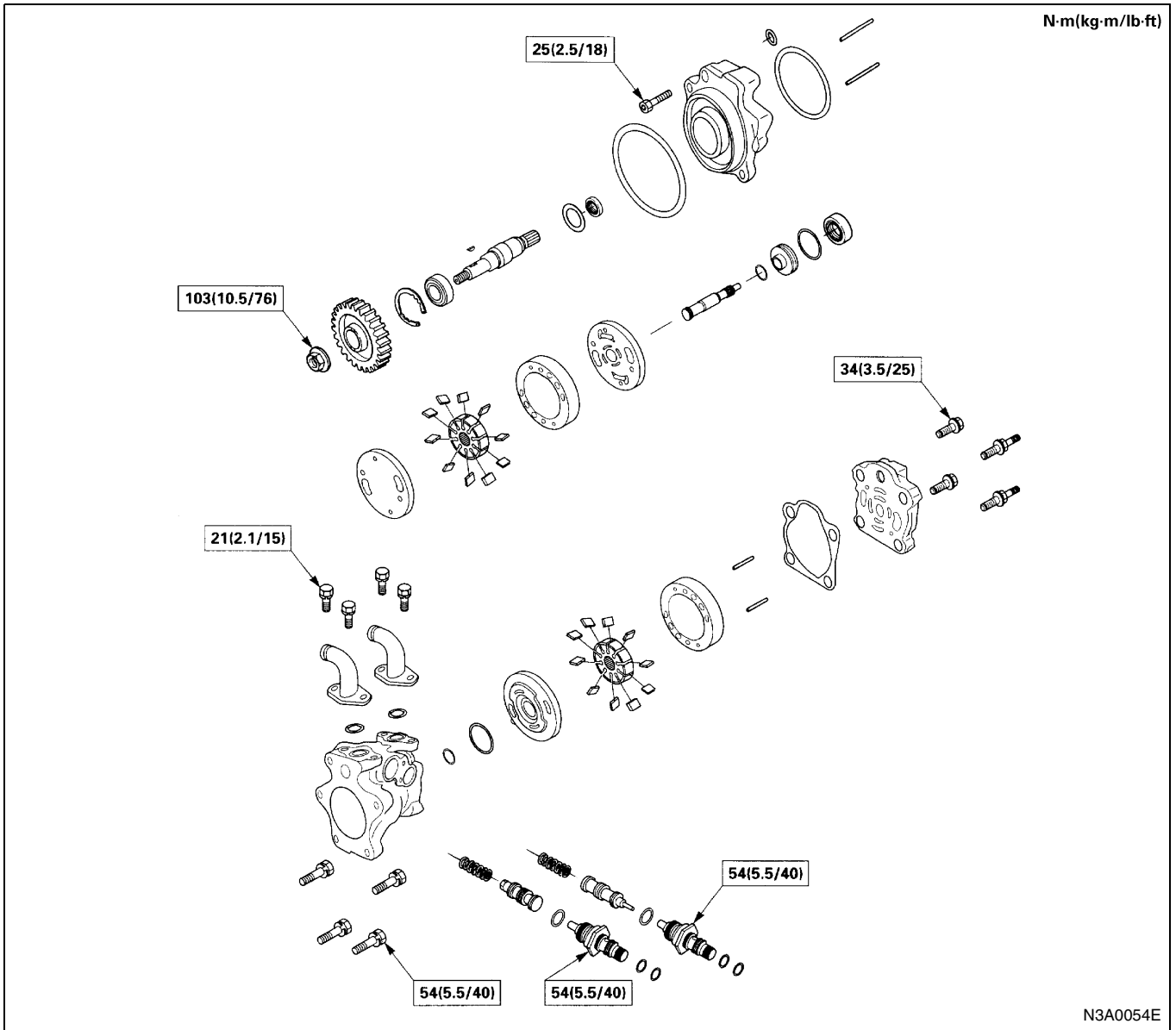
N3A0463E

Legend

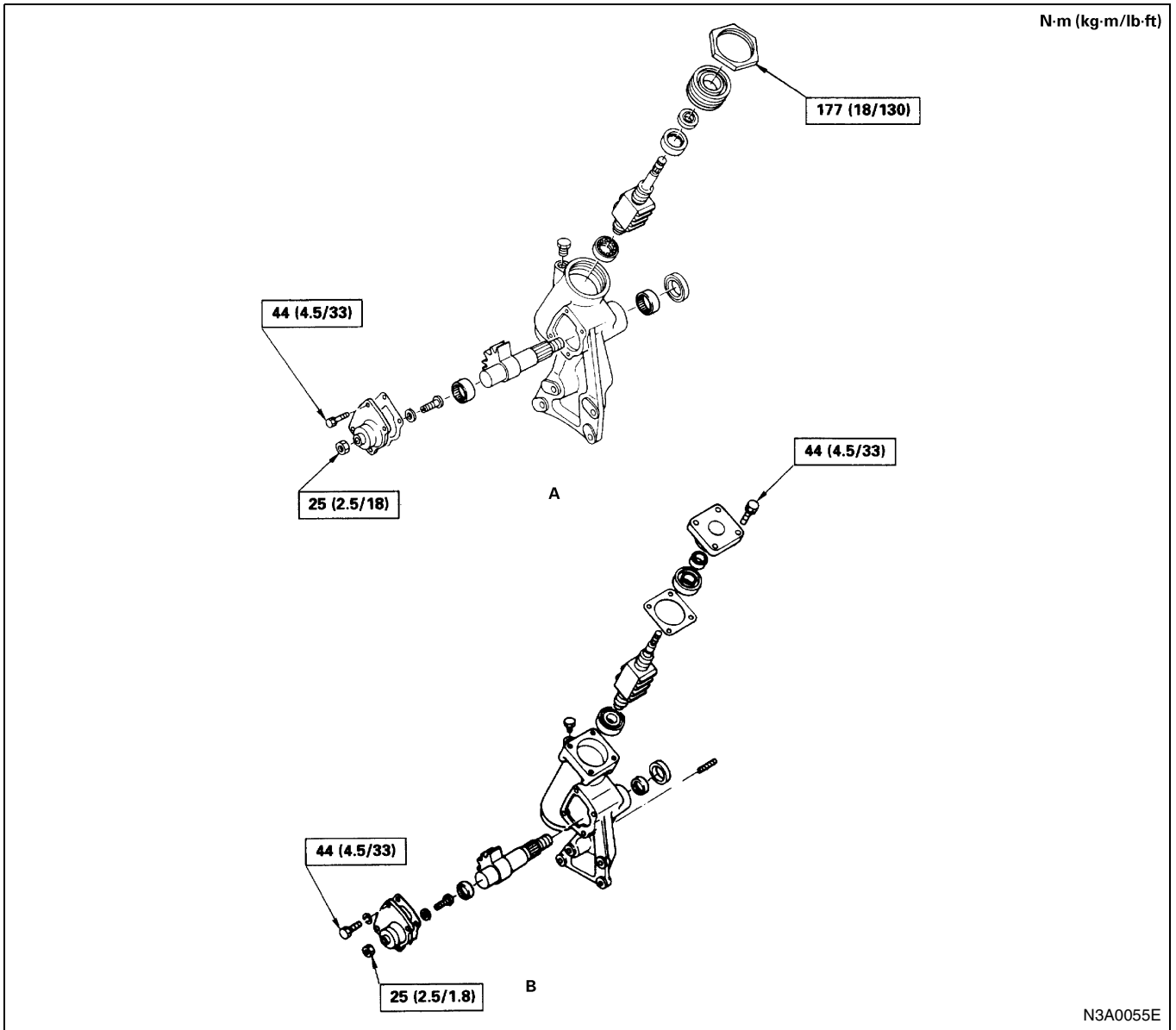
A. 4J series engine

B. 4H series engine

Tandem Hydraulic Pump



Manual Steering Unit

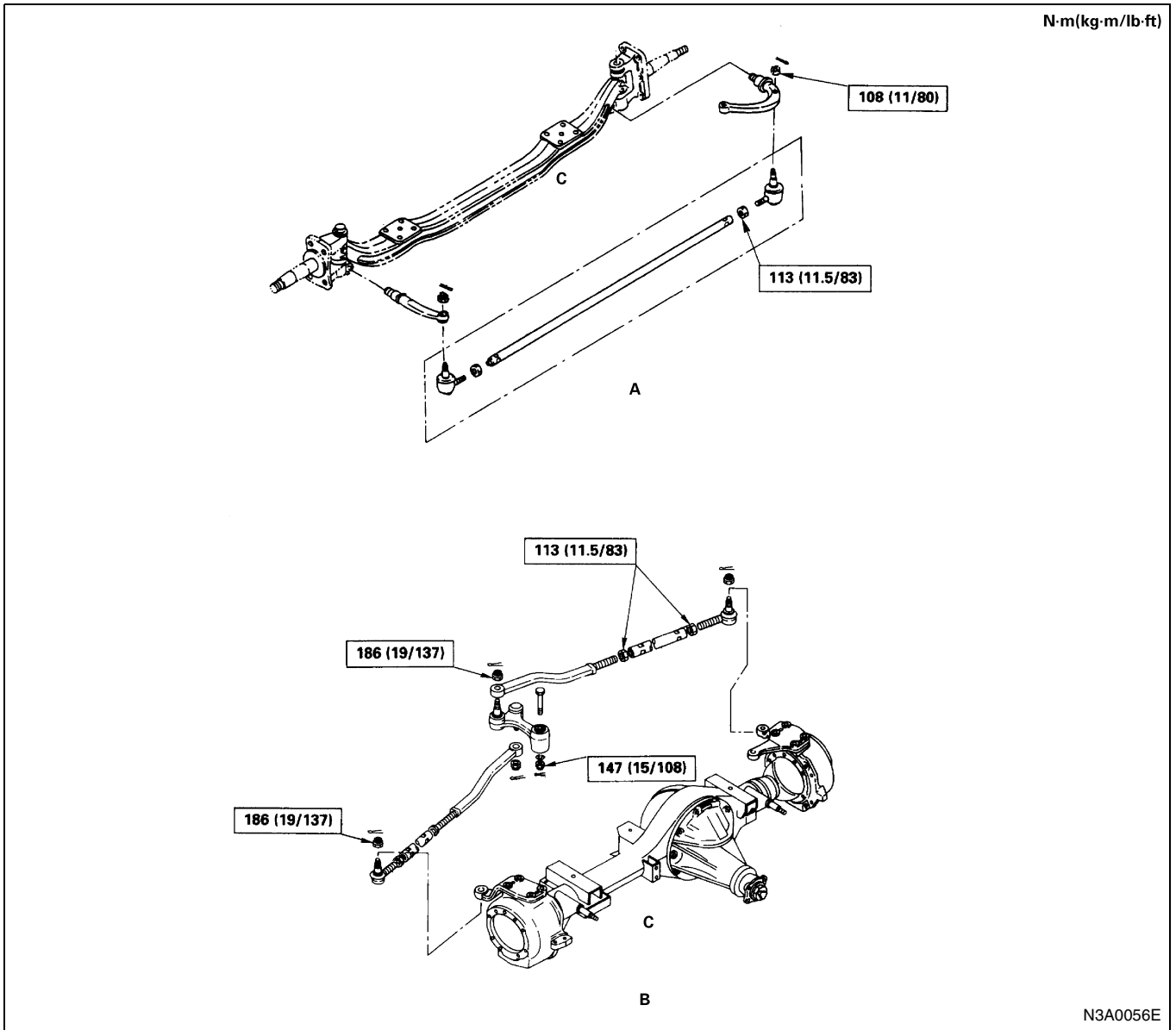


Legend

A. NHR, NKR

B. NPR

Steering Linkage (Rigid Suspension)



N-m(kg-m/lb-ft)

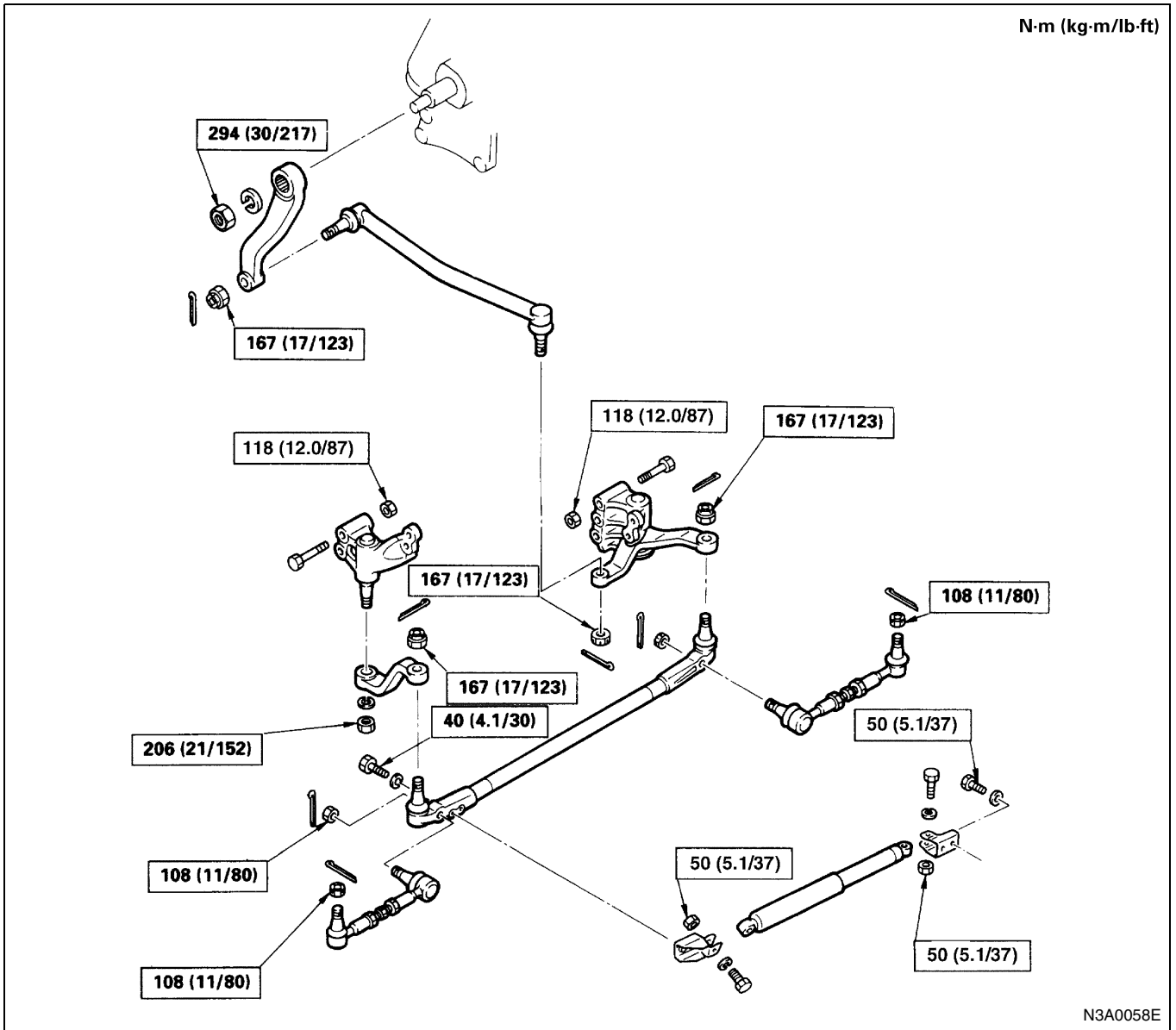
N3A0056E

Legend

- A. NHR, NKR, NPR
- B. NPS

C. Front axle

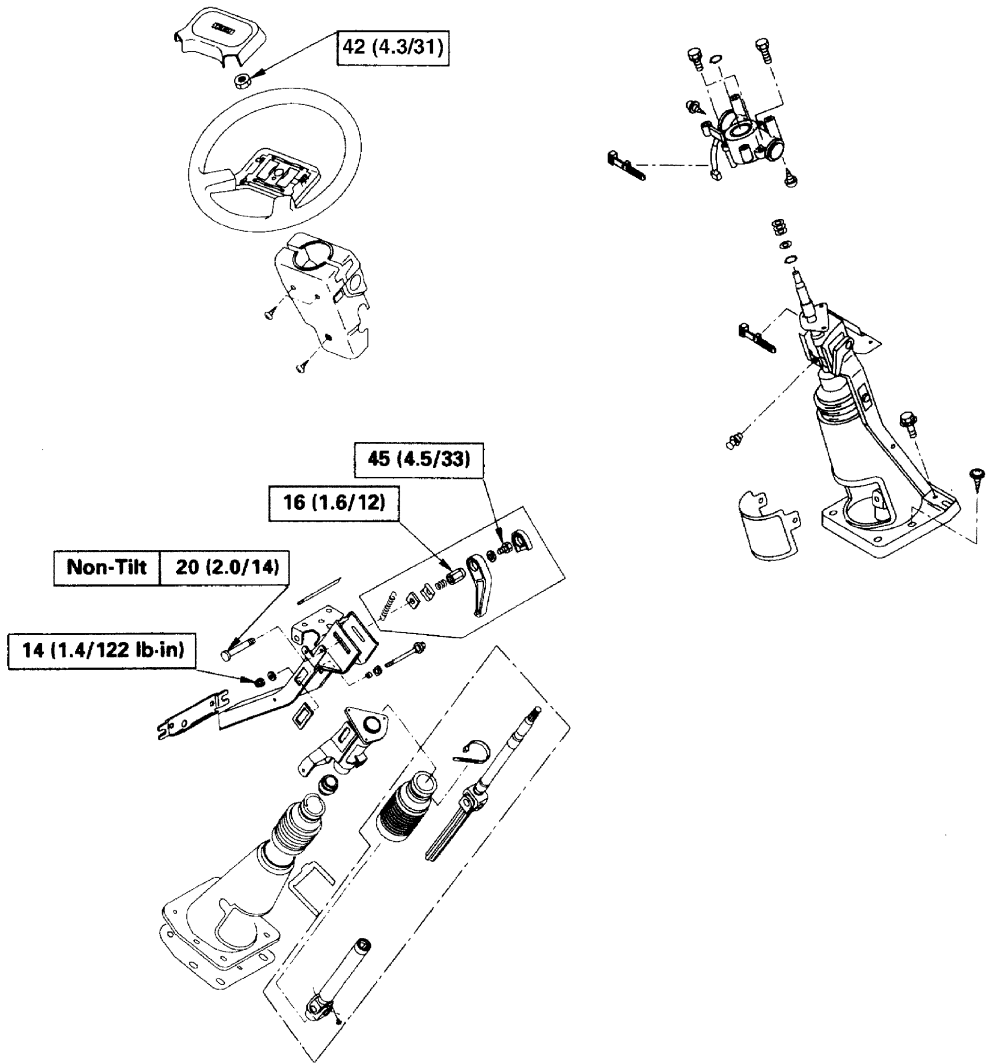
Steering Linkage (Wishbone Suspension)



Steering Column

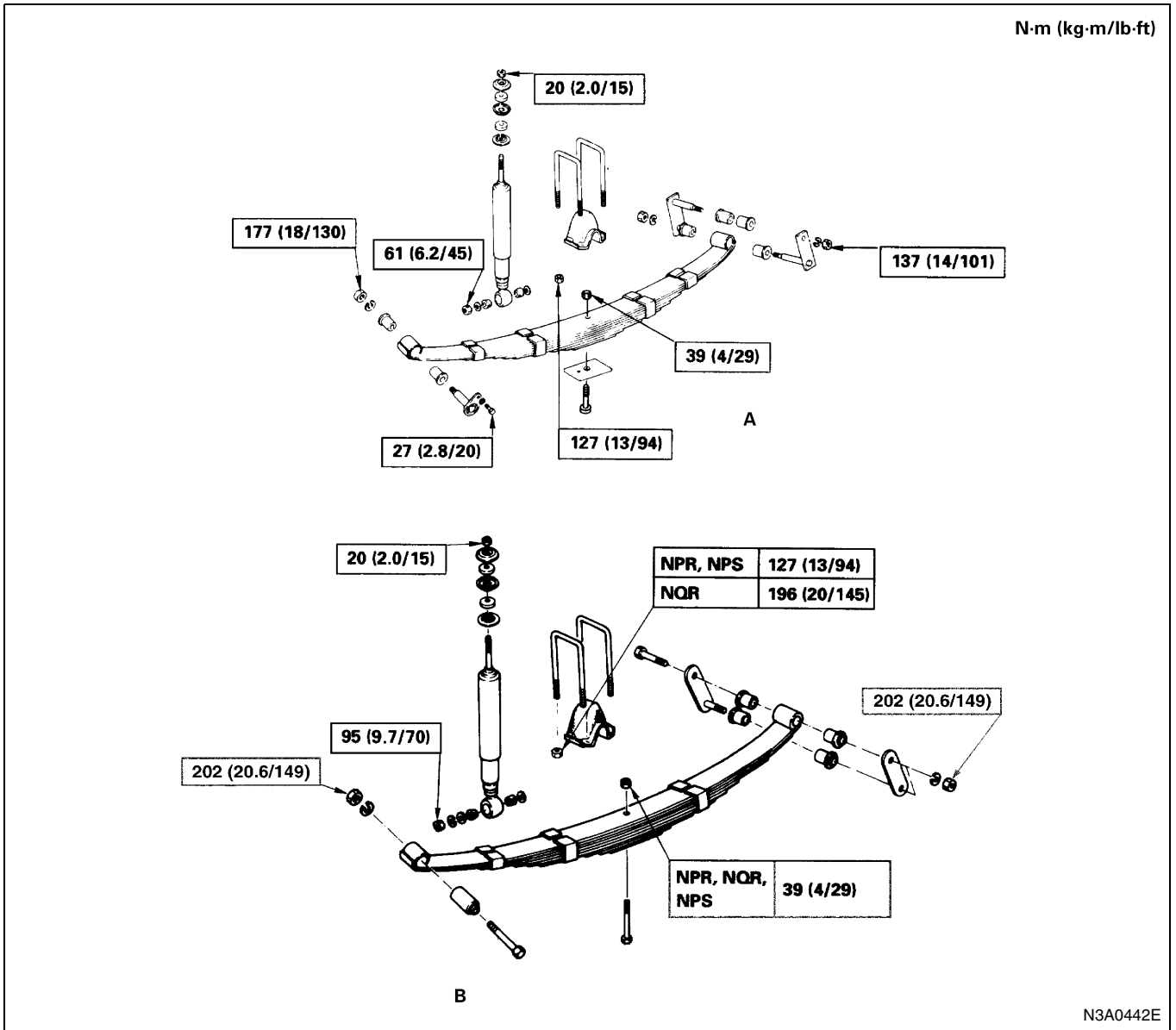
N-m (kg-m/lb-ft)

This illustration is based on tilt and telescopic control type.



N3A0060E

Front Leaf Spring and Shock Absorber

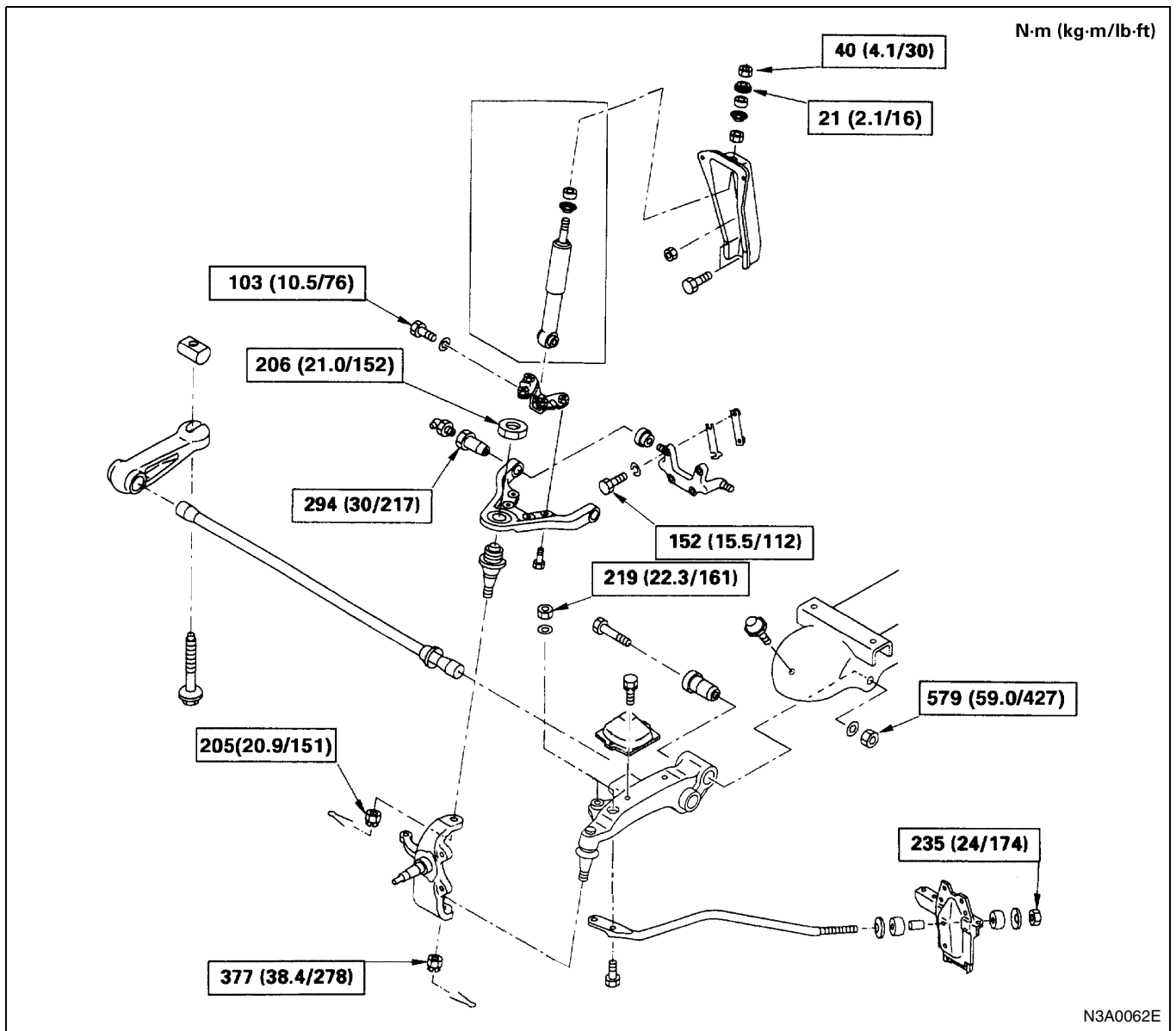


Legend

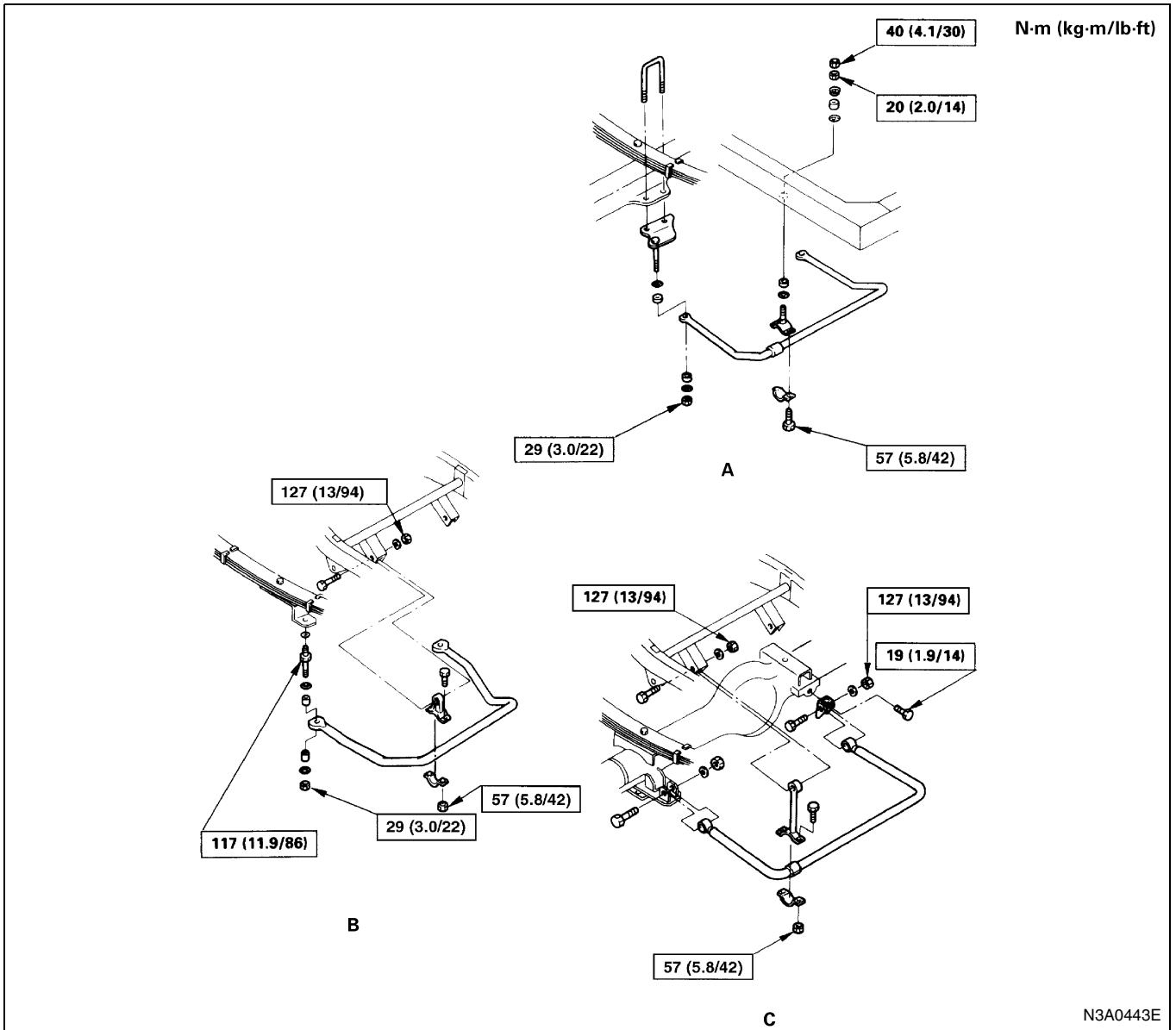
A. NHR, NKR

B. NPR, NQR, NPS

Upper, Lower Link, Torsion Bar and Strut Bar (Wishbone Suspension)



Front Stabilizer



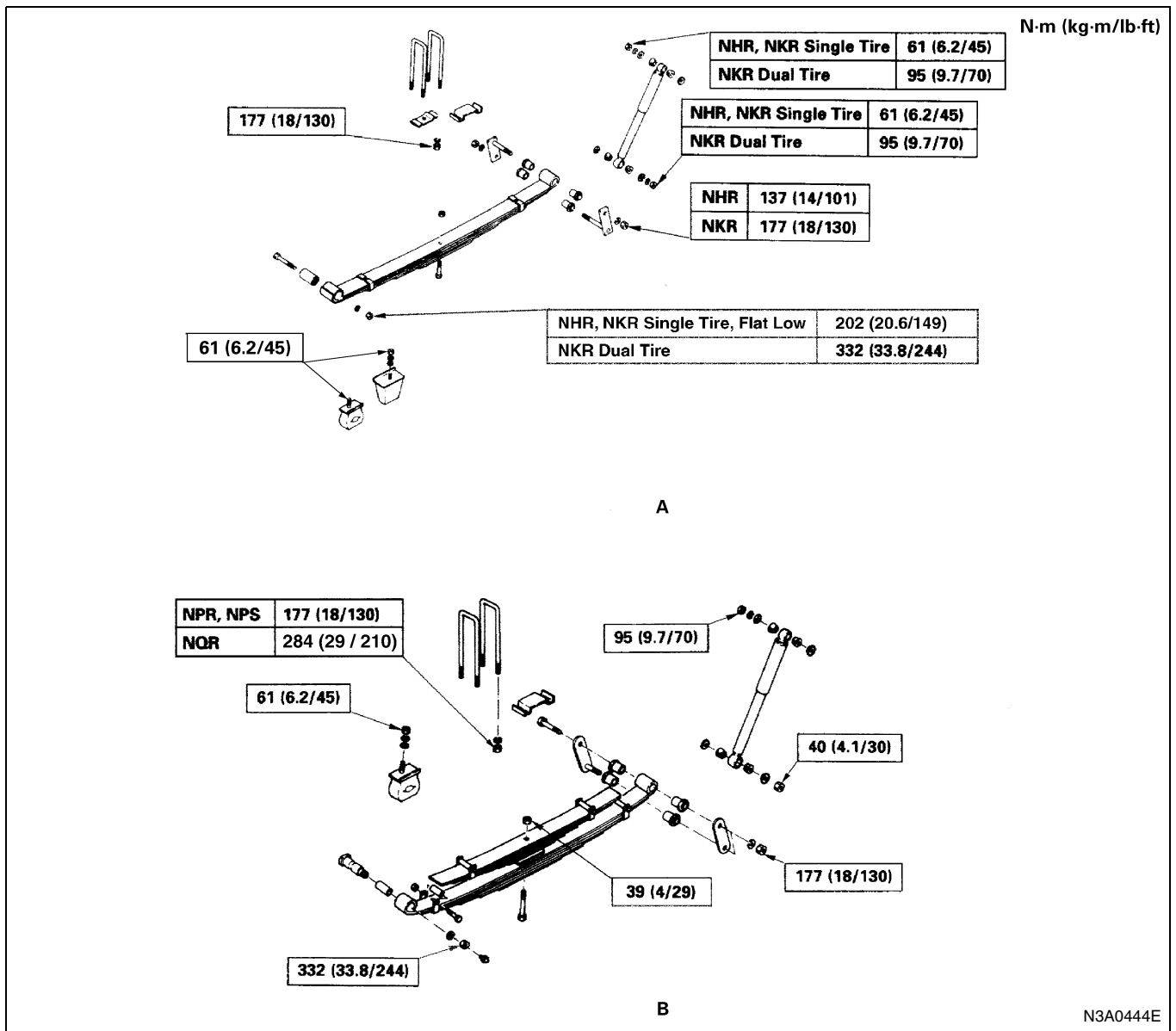
N3A0443E

Legend

- A. NKR
- B. NPR

C. NPS

Rear Leaf Spring and Shock Absorber



N3A0444E

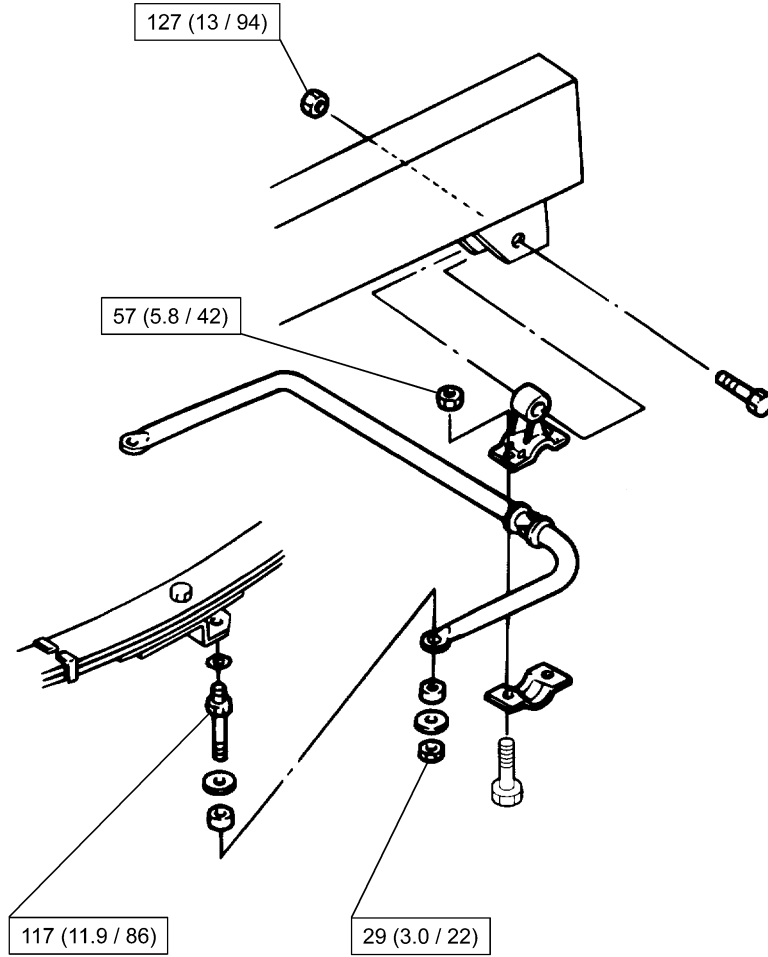
Legend

A. NHR, NKR

B. NPR, NQR, NPS

Rear Stabilizer

N·m (kg·m/lb·ft)



N3A0445E

SPECIAL TOOLS

Steering System

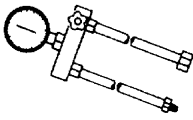
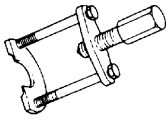
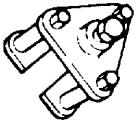

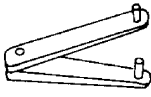

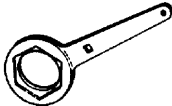

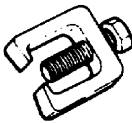
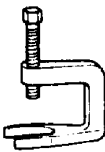
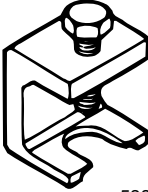
Illustration	Tool Number / Description / Remarks
 5884001620	5-8840-0162-0 / Power steering fluid pressure gauge
 5884020170	5-8840-2017-0 / Ball joint remover
 5884020511	5-8840-2051-1 / Pitman arm puller
 5884020590	5-8840-2059-0 / Lock nut wrench / for Power steering (Left hand drive)
 5884020600	5-8840-2060-0 / End cover wrench / for Power steering (Left hand drive)
 5884020540	5-8840-2054-0 / Steering shaft driver

Illustration	Tool Number / Description / Remarks
 5884020520	5-8840-2052-0 / Steering lock nut wrench / for Manual steering (NHR, NKR)
 5884020530	5-8840-2053-0 / Wrench / for Manual steering (NHR, NKR)
 5884020180	5-8840-2018-0 / Tie rod end remover / for 2WD rigid suspension (assistant side)
 5884022150	5-8840-2215-0 / Steering wheel puller
 5884021890	5-8840-2189-0 / Ball joint remover

Suspension

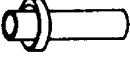




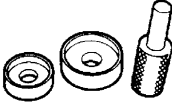
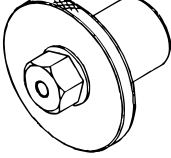
Illustration	Tool Number / Description / Remarks
 <p data-bbox="320 568 427 589">5884020480</p>	<p data-bbox="461 423 743 517">5-8840-2048-1 / Leaf spring bushing remover and installer</p>
 <p data-bbox="320 831 427 851">5884020490</p>	<p data-bbox="461 667 743 792">5-8840-2049-1 / Leaf spring bushing remover and installer / for metal bushing</p>
 <p data-bbox="320 1093 427 1113">5884023660</p>	<p data-bbox="453 943 751 1037">5-8840-2366-0 / Lower link ball joint remover / for wishbone suspension</p>
 <p data-bbox="320 1355 427 1375">5884023640</p>	<p data-bbox="453 1205 751 1299">5-8840-2364-0 / Upper link ball joint remover / for wishbone suspension</p>
 <p data-bbox="320 1615 427 1635">5884023650</p>	<p data-bbox="453 1464 751 1559">5-8840-2365-0 / Upper link ball joint installer / for wishbone suspension</p>

Illustration	Tool Number / Description / Remarks
 <p data-bbox="1031 512 1137 533">5884023670</p>	<p data-bbox="1166 349 1465 474">5-8840-2367-0 / Lower link bushing remover and installer / for wishbone suspension</p>
 <p data-bbox="1031 777 1137 797">5884021880</p>	<p data-bbox="1166 640 1465 703">5-8840-2188-0 / Wheel alignment gauge adapter</p>