SECTION D

STEERING LINKAGES

ALL SERIES

CONTENTS

DIVISION I

TROUBLE DIAGNOSIS

90-28 TROUBLE DIAGNOSIS

Condition	Possible Cause	Correction
Excessive play or looseness in steering system.	1. Front wheel bearings loosely adjusted.	1. Adjust bearings or replace with new parts as necessary.
	2. Worn couplings or steering shaft U-joints.	2. Replace

	3. Worn upper ball joints.	3. Replace
	4. Steering wheel loose on shaft, loose pitman arm, tie rods, steering arms or steering linkage ball studs.	4. Tighten to specified torque.
	5. Steering gear worm bearings loosely adjusted.	5. Adjust preload to specification.
	6. Excessive pitman shaft to ball nut lash in steering gear.	6. Adjust preload to specification.
	7. Worn intermediate rod or tie rod sockets.	7. Replace worn part.
Excessive looseness in tie rod or intermediate rod pivots, or excessive vertical lash in idler support.	1. Seal damage and leakage resulting in loss of lubricant, corrosion and excessive wear.	1. Replace damaged parts as necessary.
Hard steering - excessive effort required at steering wheel.	1. Low or uneven tire pressure.	1. Inflate to specified pressures.
	2. Steering linkage or ball joints need lubrication.	2. Lube with specified lubricant.
	3. Tight or frozen intermediate rod, tie rod or idler socket.	3. Lube or replace as necessary.
	4. Steering gear to column misalignment.	4. Align column.
	5. Steering gear adjusted too tightly.	5. Adjust preload to specification.
	6. Front wheel alignment incorrect.	6. Check alignment and correct as necessary.
Poor returnability.	1. Steering linkage or ball joints need lubrication.	1. Lube with specified lubricant.
	2. Steering gear adjusted too tightly.	2. Adjust preload to specification.
	3. Front wheel alignment incorrect.	3. Check alignment and correct as necessary.
	4. Steering gear to column misalignment.	4. Align column.

DIVISION II

DESCRIPTION AND OPERATION

90-29 DESCRIPTION OF STEERING LINKAGE

All Buicks use a parallelogram type steering linkage to connect both front wheels to the steering gear pitman arm. The right and left tie rods are attached to steering arms and to a forged intermediate rod by ball studs. The left end of the intermediate rod is supported by the pitman arm and the right end by an idler arm which pivots on a support attached to the frame. The pitman and idler arms are always parallel to each other and move through symmetrical arcs. See Figure 90-137.

DIVISION III

ADJUSTMENTS AND MINOR SERVICE

90-30 ADJUSTMENT OF STEERING LINKAGE IDLER ARM

The Saginaw linkage requires proper location of the idler arm on its support so that the idler arm ball socket will be level with the pitman arm ball socket. The support must be threaded into the idler arm bushing until the distance from the center of the bolt hole to the top of the idler arm boss is 3 plus or minus 1/16" on 4D-4F-4G-4H Series cars, or from the inboard side of the center of the bolt hole on frame side to bottom of idler arm boss is 3 1/16 plus or minus 1/16" on 4L-4N-4R-4P-4U-4V-4Y Series cars. When the idler arm is installed on the support, it must be free to rotate a minimum of 90 degrees in both directions from straight ahead.

The allowable lash is the idler arm and support assembly is 1/8" with a plus or minus 25 lbs. applied vertically at the intermediate rod end of the idler arm.

If the idler arm support is dismounted from the frame for other work, wire the support to the idler arm so that it cannot turn from its existing position and possibly change the toe-in of the front wheels.

See Group 30 for adjustment of tie rods to obtain proper "toe-in" of front wheels. See Figure 90-137 for correct positioning of tie rod clamps.

DIVISION IV

REMOVAL AND INSTALLATION

When disconnecting any of the steering linkage ball studs, use puller J-5504 where possible. If puller will not work, use remover J-3295 and firmly support the member from which the stud is being removed.

90-31 REMOVAL AND INSTALLATION OF TIE RODS

A. Removal

1. Place vehicle on hoist.

2. Remove cotter pins from ball studs and remove castellated nut.

3. To remove outer ball stud, tap on steering arm at the rod end with a hammer, while using a heavy hammer, or similar tool, as a backing. If necessary, pull downward on tie rod to remove from steering arm.

4. Remove inner ball stud from intermediate rod, using same procedure as described in Steps 2 and 3.

5. To remove tie rod ends from tie rods, loosen clamp bolts and unscrew end assemblies.

Tie rod adjuster components often become rusted in service. In such cases, it is recommended that if the torque required to remove the nut from the bolt after breakaway exceeds 7 lb.ft., discard the nuts and bolts. Apply penetrating oil between the clamp and tube and rotate the clamps until they move freely. Install new bolts and nuts having the same part number to assure proper clamping at the specified nut torque.

B. Installation

CAUTION: *Fasteners in the following steps are important attaching parts in that they could affect the performance of vital components and systems and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

1. If the tie rod ends were removed, lubricate the tie rod threads with EP chassis lube and thread ends of tie rod into the sleeve, making sure both ends are threaded an equal distance into the sleeve.

2. Make sure that threads on ball stud and in ball stud nuts are perfectly clean and smooth. No nicks on taper. Install seals on ball studs. If threads are not clean and smooth, ball studs may turn in tie rod ends when attempting to tighten nut.

3. Install ball studs in steering arms and intermediate rod.

4. Install ball stud nuts and torque to specifications, then advance nuts just enough to insert cotter pins and install cotter pins. Lubricate tie rod ends.

5. Refer to torque specifications at rear of manual for correct torque values.

Before locking clamp bolts on the rods, make sure that the tie rod ends are in alignment with their ball studs (each ball joint is in the center of its travel). If the tie rod is not in alignment with the studs, binding will result.

6. Remove vehicle from hoist.

7. Adjust toe-in.

90-32 REMOVAL AND INSTALLATION OF INTERMEDIATE ROD

A. Removal

1. Place vehicle on hoist.

2. Remove inner ends of tie rods from intermediate rod, as described under "Tie Rod - Removal".

3. Remove cotter pin and nut from intermediate rod ball stud attachment at pitman arm.

4. Detach intermediate rod from pitman arm. Shift steering linkage, as required, to free pitman arm from intermediate rod.

5. Remove cotter pin and nut from idler arm and remove intermediate rod from idler arm.

B. Installation

CAUTION: *Fasteners in the following steps are important attaching parts in that they could affect the performance of vital components and systems and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

1. Install intermediate rod to idler arm, making certain idler stud seal is in place, then install and tighten nut to specifications. Advance nut just enough to align castellation with cotter pin hole and install pin.

2. Raise end of rod and install on pitman arm. Tighten nut to specifications, then advance nut just enough to insert cotter pin and install cotter pin.

3. Install tie rod ends to intermediate rod, as previously described under "Tie Rods". Lubricate tie rod ends.

4. Install ball stud nuts and tighten to specifications, then advance nut just enough to insert cotter pin and install cotter pin.

5. Refer to torque specifications at rear of manual for correct torque values.

6. Remove vehicle from hoist.

7. Adjust toe-in and align steering wheel.

90-33 REMOVAL AND INSTALLATION OF IDLER ARM

A. Removal

1. Place vehicle on hoist.

2. Remove idler arm to two (2) frame nuts, washers, and bolts.

3. Remove cotter pin and nut from idler arm to intermediate rod ball stud.

4. Remove intermediate rod from idler arm by tapping intermediate rod with a hammer, using a heavy hammer as a backing.

5. Remove idler arm.

B. Installation

1. Position support against frame and secure with two (2) bolts, washers, and nuts. Install and tighten nuts to specifications.

2. Install intermediate rod to idler arm, making certain seal is on stud. Install and tighten nut to specifications.

3. Advance nut just enough to insert cotter pin and install cotter pin.

4. Refer to torque specifications at rear of manual for correct torque values.

5. Remove vehicle from hoist.

90-34 REMOVAL AND INSTALLATION OF PITMAN ARM

A. Removal

1. Place vehicle on hoist.

2. Remove cotter pin from pitman arm ball stud and remove nut.

3. Remove intermediate rod from pitman arm by tapping on side of rod or arm in which the stud mounts with a hammer, while using a heavy hammer, or similar tool, as a backing. Pull down on intermediate rod to remove from stud.

4. Remove pitman arm nut and lock washer from pitman shaft and mark relation of arm position to shaft.

5. Remove pitman arm with Tool J-6632. Do not hammer on puller.

B. Installation

CAUTION: *Fasteners in the following steps are important attaching parts in that they could affect the performance of vital components and systems and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

1. Install pitman arm on pitman shaft, lining up the marks made upon removal.

2. Install pitman shaft nut and lock washer. Torque to specifications.

3. Position intermediate rod to pitman arm. Install nut. Torque to specifications. Continue to tighten nut enough to align castellation with hole in stud and install cotter pin.

4. Refer to torque specifications at rear of manual for correct torque values.

5. Remove vehicle from hoist.

DIVISION VI
SPECIFICATIONS

90-35 STEERING LINKAGE SPECIFICATIONS

Tightening Specifications

Use a reliable torque wrench to tighten the parts listed to insure proper tightness without straining or distorting parts. These specifications are for clean and lightly-lubricated threads only. Dry or dirty threads produce increased friction which prevents accurate measurements of tightness.

A. 4D-4F-4G-4H Series

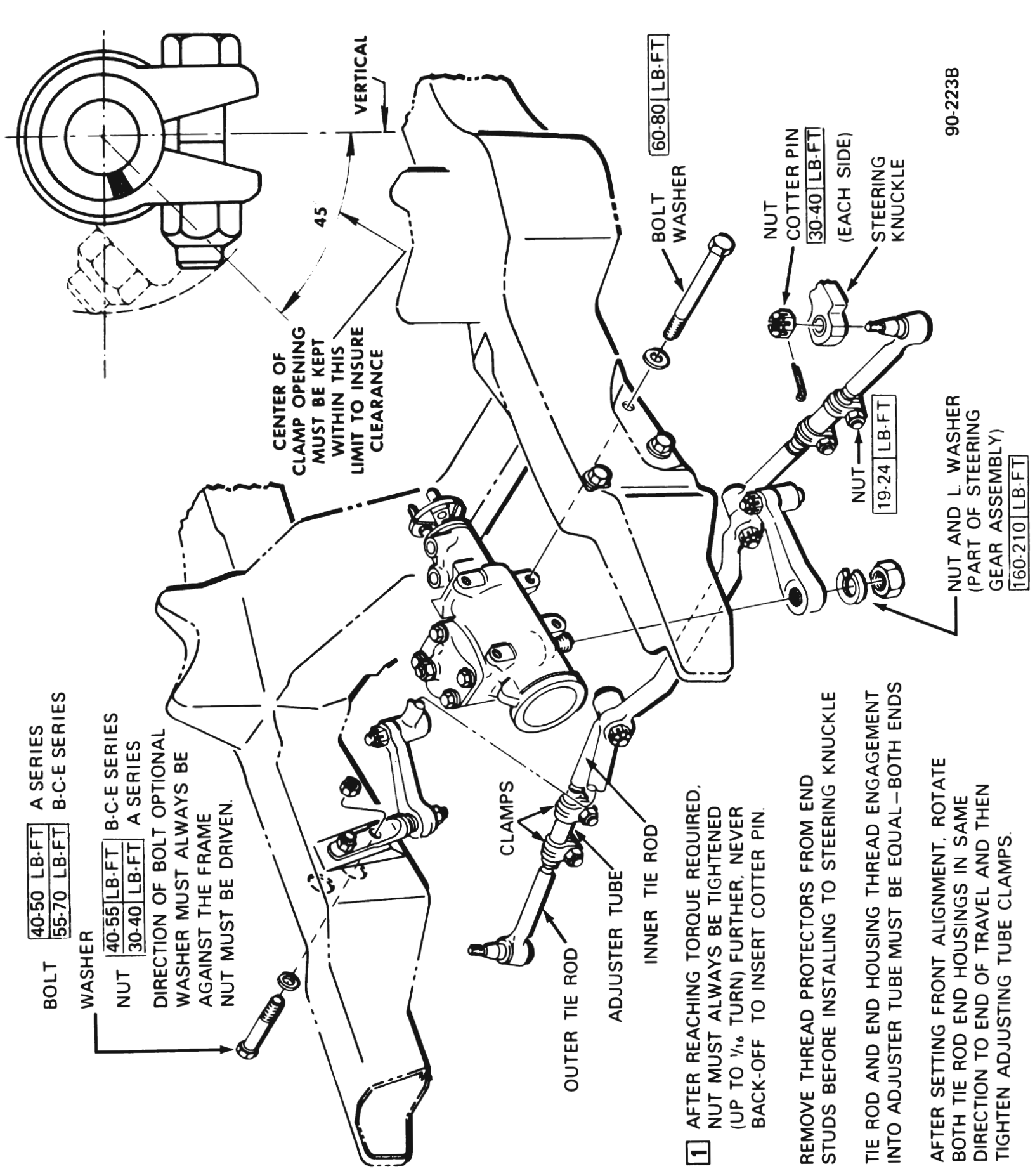
Part	Location	Torque Lb.Ft.
Nut	Steering Arm to Tie Rod End	30-40 Lb.Ft. With 45 Lbs. Max.
Nut	Tie Rod Clamp Nuts	19-24
Nut	Tie Rod to Intermediate Rod	30-50 Lb.Ft. With 55 Lbs. Max.
Nut	Pitman Arm to Intermediate Rod	30-40 Lb.Ft. With 45 Lbs. Max.
Nut	Pitman Arm to Steering Gear	160-210
Nut	Idler Arm to Intermediate Rod	30-50 Lb.Ft. With 55 Lbs. Max.
Nut	Idler Arm to Frame	30-40
Bolt	Idler Arm to Frame	40-50

B. 4L-4N-4R-4P-4U-4V-4Y Series

Part	Location	Torque Lb.Ft.
Nut	Steering Arm to Tie Rod End	40-60 Lb.Ft. With 75 Lbs. Max.
Nut	Tie Rod Clamp Nuts	19-24
Nut	Tie Rod to Intermediate Rod	50-70 Lb.Ft. With 85 Lbs. Max.
Nut	Pitman Arm to Intermediate Rod	40-50 Lb.Ft. With 55 Lbs. Max.
Nut	Pitman Arm to Steering Gear	160-210
Nut	Idler Arm to Intermediate Rod	35-45 Lb.Ft. With 50 Lbs. Max.
Nut	Idler Arm to Frame	40-55
Bolt	Idler Arm to Frame	55-70

Where torques shown are, for example 50 to 70 lb.ft., torque with 85 lb.ft. maximum to insert cotter pin. Do not back off nuts to achieve cotter pin insertion.

TYPICAL L LINKAGE



1 AFTER REACHING TORQUE REQUIRED, NUT MUST ALWAYS BE TIGHTENED (UP TO 1/16 TURN) FURTHER. NEVER BACK-OFF TO INSERT COTTER PIN.

REMOVE THREAD PROTECTORS FROM END STUDS BEFORE INSTALLING TO STEERING KNUCKLE

TIE ROD AND END HOUSING THREAD ENGAGEMENT INTO ADJUSTER TUBE MUST BE EQUAL—BOTH ENDS

AFTER SETTING FRONT ALIGNMENT, ROTATE BOTH TIE ROD END HOUSINGS IN SAME DIRECTION TO END OF TRAVEL AND THEN TIGHTEN ADJUSTING TUBE CLAMPS.