

# SECTION D

## STEERING LINKAGES

### ALL SERIES

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## DIVISION I

### TROUBLE DIAGNOSIS

#### 90-27 TROUBLE DIAGNOSIS

##### TROUBLE DIAGNOSIS – STEERING LINKAGE

COMPLAINT AND CAUSE	CORRECTION
<p>A. Excessive Play or Looseness in Steering System</p>	<ol style="list-style-type: none"> <li>1. Front wheel bearings loosely adjusted.</li> <li>2. Worn couplings or steering shaft U-joints.</li> <li>3. Worn upper ball joints.</li> <li>4. Steering wheel loose on shaft, loose pitman arm, tie rods, steering arms or steering linkage ball studs.</li> <li>5. Excessive pitman shaft to ball nut lash.</li> <li>6. Worm bearings loosely adjusted.</li> </ol>
<p>B. Hard Steering – Excessive Effort Required at Steering Wheel</p>	<ol style="list-style-type: none"> <li>1. Low or uneven tire pressure.</li> <li>2. Insufficient or improper lubricant in steering gear or front suspension.</li> <li>3. Steering shaft flexible coupling misaligned.</li> <li>4. Steering gear adjusted too tightly.</li> <li>5. Front wheel alignment incorrect.</li> </ol>
<p>C. Poor Returnability</p>	<ol style="list-style-type: none"> <li>1. Steering gear adjusted too tightly.</li> <li>2. Front wheel alignment incorrect.</li> <li>3. Insufficient or improper lubricant in steering gear or front suspension.</li> <li>4. Steering column misaligned.</li> </ol>

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## DIVISION II

### DESCRIPTION AND OPERATION

#### 90-28 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

#### 90-29 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 43-44000 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 45-46-48-49000 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.

**NOTE:** *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.*

**IMPORTANT:** *If the idler arm support is dismantled 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.

#### 90-30 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.

##### b. Installation

**NOTE:** *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.

**NOTE:** *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.

**NOTE:** *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.

#### 90-31 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

**NOTE:** *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.

### 90-32 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.

### 90-33 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.

**CAUTION:** *Do not hammer on puller.*

#### b. Installation

**NOTE:** *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

### 90-30 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. 43-44000 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 Lb. Ft.
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 Lb. Ft.
Nut	Idler Arm to Intermediate Rod. . . . .	30-50 Lb. Ft. With 55 Lbs. Max.
Nut	Idler Arm to Frame. . . . .	30-40 Lb. Ft.
Bolt	Idler Arm to Frame. . . . .	40-50 Lb. Ft.

#### b. 45-46-48-49000 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 Lb. Ft.
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 Lb. Ft.
Nut	Idler Arm to Intermediate Rod. . . . .	35-45 Lb. Ft. With 50 Lbs. Max.
Nut	Idler Arm to Frame. . . . .	40-55 Lb. Ft.
Bolt	Idler Arm to Frame. . . . .	55-70 Lb. Ft.

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