

STEERING COLUMN ASSEMBLIES

WARNING: IF EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, DO NOT ATTEMPT ANY ADJUSTMENT, REPAIR OR REMOVAL OF THE STEERING COLUMN AND/OR STEERING WHEEL UNTIL THE DISCONNECTION PROCEDURE IS COMPLETED. THIS PROCEDURE MUST BE FOLLOWED TO PREVENT ACCIDENTAL DEPLOYMENT OF THE SYSTEM WHICH COULD RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE SYSTEM'S COMPONENTS.

A.C.R.S. DISCONNECTION PROCEDURE

1. Turn ignition switch to "LOCK" position. Disconnect the negative battery cable from the battery and tape end.

CONTENTS

Subject	Page No.
DESCRIPTION AND OPERATION:	
Description of Energy Absorbing Column	3G-108
Description of Tilt and Tilt Telescoping Columns	3G-109
DIAGNOSIS:	
Diagnosis	3G-109
MAINTENANCE AND ADJUSTMENTS:	
Checking Steering Column for Damage	3G-114
MAJOR REPAIR:	
Removal and Installation of Horn Lead and Driver's Cushion Module Air Cushion Restraint	3G-116
Removal and Installation of Steering Wheel - Air Cushion Restraint	3G-116
Removal and Installation of Horn Actuator Bar and Steering Wheel - Standard and Tilt Column	3G-117
Removal and Installation of Horn Actuator Bar and Steering Wheel - Telescoping Column	3G-117
Removal and Installation of Steering Column	3G-124
X Series	3G-124
A Series	3G-130
B-C-E Series with Air Cushion Restraint	3G-136
B-C-E Series Non-Air Cushion Restraint	3G-145
Disassembly and Assembly of Standard Column	3G-147
Disassembly and Assembly of Tilt Column	3G-156
Disassembly and Assembly of Tilt and Telescoping Column	3G-163
SPECIFICATIONS:	
Specifications	3G-169

DESCRIPTION AND OPERATION

DESCRIPTION OF ENERGY ABSORBING COLUMN

The Energy Absorbing Function Locking Steering Column assembly is used on all series cars. This column is designed to compress under impact. When an automobile is being driven, the forward movement of the automobile and the forward movement of the driver both constitute a form of energy or force. When an automobile is involved in a frontal collision, the primary force (forward movement of the car) is suddenly halted, while the secondary force (the driver) continues its forward direction. A severe collision generally involves these two forces - the primary and the secondary forces. The secondary impact occurs when the driver is thrust forward onto the steering wheel and column. See Figure 3G-1.

The Energy Absorbing Column is designed to absorb these primary and secondary forces to the extent that the severity of the secondary impact is reduced. During a collision, the steering column compresses and thereby reduces its tendency to move rearward into the driver's compartment. A split second later when the driver is thrown forward (the secondary impact) his energy is also partially absorbed by the compression characteristics of the column.

The Energy Absorbing Function Locking Column assembly may be easily disassembled and reassembled. It is important that only the specified screws, bolts and nuts be used as designated during reassembly, and that they are tightened to their specified torque. This precaution will insure the energy absorbing action of the assembly. Particular care should be exercised to avoid using overlength bolts as they may prevent a portion of the assembly from compressing under impact. Equally as important is correct torquing of all bolts and nuts. In particular, care should be taken to assure that the bolts or nuts securing the column mounting bracket to the instrument panel are torqued to the proper specification in order that the bracket will break away under impact.

When the Energy Absorbing Function Locking Column is installed in a car it is no more susceptible to damage through usage than an ordinary column; however, when the column is removed, special care must be taken in handling this assembly. *Only the specified wheel puller should be used.* When the column is removed from the car, such actions as a sharp blow on the end of the steering shaft or shift levers, laying things across or on top of the column assembly, leaning on the column assembly, or dropping of the assembly could shear or loosen the plastic fasteners that maintain column rigidity or possibly bend the assembly causing a binding condition. *It is*

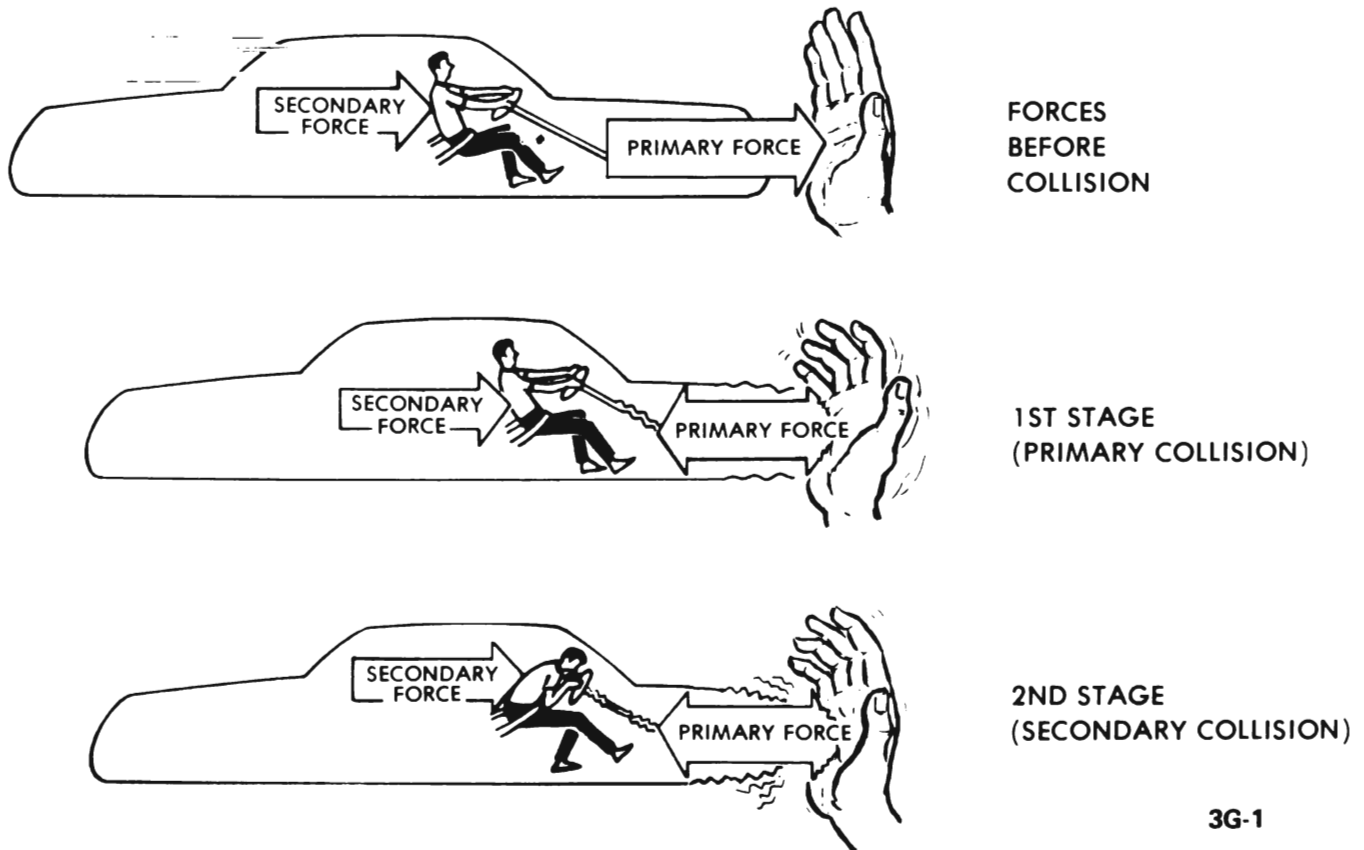


Figure 3G-1 Reaction of Forces in a Collision

therefore important that the removal and installation and the disassembly and reassembly procedures be strictly followed when servicing this assembly.

A-B-C-E Series Buicks incorporate a pot joint in the lower portion of the steering shaft. The pot joint acts as a universal joint to compensate for misalignment of the steering column. To insure proper operation of the pot joint, the capsule bracket and toe pan covers provide exact alignment of the column in the body. It is mandatory that the installation of this column be followed exactly as outlined.

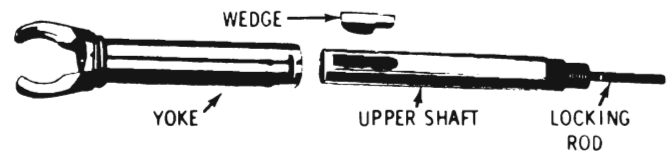
DESCRIPTION OF TILT AND TILT TELESCOPING COLUMNS

The tilt and tilt telescoping columns are designed for ease of entry and driver comfort. The tilt column has several different steering wheel angle positions. The tilt and telescope not only tilts, but also has an infinite number of distance adjustments between the driver and the wheel with in a 2 in. range.

DIAGNOSIS

DIAGNOSIS OF STEERING COLUMN

The telescoping feature is operated by a locking lever. The wheel is fastened to the upper shaft which telescopes inside the upper yoke. As the locking lever is released, pressure is released on the locking rod and wedge. This allows the shaft to move. Figure 3G-2. To adjust the steering wheel, rotate the locking lever counter-clockwise, adjust the wheel by pushing or pulling and lock into position by rotating the lever clockwise



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Figure 3G-2 Upper Steering Shaft T & T Column

Condition	Cause	Correction
Poor return of steering center.	Misaligned steering shaft.	Align steering shaft.
Excessive play or looseness in steering system.	Torn steering shaft flex coupling or worn pot joint.	Replace flex coupling or pot joint.
Hard steering effort.	Column assembly misaligned.	Realign assembly.
	Improperly installed or detained dust seal.	Install new seal.
	Malfunctioning upper or lower bearing.	Replace bearing.
	Flash on inner diameter of shift tube from plastic joint.	Replace shift tube.
	Tight steering universal joint.	Repair or replace joint.
Key sticks in start.	Actuator rod deformed.	Straighten or replace rod.

Condition	Cause	Correction
	Any high effort condition.	Check items under "Hard Steering Effort".
Key cannot be removed "off-lock".	Ignition switch is not set correctly.	Readjust switch.
	Malfunctioning lock cylinder.	Replace cylinder.
Lock cylinder can be removed without depressing retainer.	Malfunctioning retainer.	Replace cylinder.
	Cylinder without retainer.	Replace cylinder.
	Burr over retainer slot in housing.	Remove burr in housing.
Will not unlock.	Shear flange on sector shaft collapsed.	Replace sector.
	Lock bolt damaged.	Replace lock bolt.
	Malfunctioning lock cylinder.	Replace lock cylinder.
	Damaged housing.	Replace housing.
	Damaged sector.	Replace sector.
	Damaged rack.	Replace rack.
Will not lock.	Lock bolt spring broken or malfunctioning.	Replace lock bolt spring.
	Damaged sector tooth.	Replace sector.
	Malfunctioning lock cylinder.	Replace lock cylinder.
	Burr on lock bolt or housing.	Remove burr.
	Damaged housing.	Replace housing.
	Transmission linkage adjustment incorrect.	Readjust.
	Damaged rack.	Replace rack.
	Interference between bowl and rack coupling.	Replace bowl or actuator rod as required.

Condition	Cause	Correction
	Ignition switch stuck.	Replace ignition switch.
	Actuator rod restricted.	Readjust.
High effort required turn key.	Lock cylinder malfunctioning.	Replace lock cylinder.
	Ignition switch malfunctioning.	Replace ignition switch.
	Rack preload spring broken or deformed.	Replace preload switch.
	Burrs on sector, rack, housing, support or actuator rod coupling.	Remove burr.
	Bent sector shaft.	Replace shaft.
	Malfunctioning rack.	Replace rack.
	Extreme misalignment of housing to cover.	Replace either or both.
	Distorted coupling slot in rack.	Replace rack.
	Bent actuator rod.	Straighten or replace.
Ignition switch mounting bracket bent.	Straighten or replace.	
Noise in column.	Coupling bolts not tightened.	Tighten pinch bolts to 30 ft.lbs.
	Column not correctly aligned.	Realign column.
	Coupling pulled apart.	Realign column and replace coupling.
	Broken lower joint.	Repair joint, and realign column.
	Horn contact ring not lubricated.	Lubricate with lubriplate.
	Lack of grease on bearings or bearing surfaces.	Lubricate.
	Loose sight shields.	Bend to eliminate rattle.
	Lower shaft bearing worn or tight.	Replace bearing. Check shaft and replace if scored.

Condition	Cause	Correction
	Upper shaft bearing worn or tight.	Replace bearing assembly or housing assembly.
	Shaft lock plate cover loose.	Tighten three screws to 15 in.lbs., or if missing, replace. CAUTION: Use specified screws.
	Shaft lock snap ring not seated.	Replace snap ring. Check for proper seating in groove.
	One click when in "off-lock" position and the steering wheel is moved.	Normal - lock is seating.
	Lock plate retaining ring not seated.	Replace retaining ring. Check for proper seating in groove.
Housing scraping on bowl.	Bowl bent or not concentric with hub.	Replace bowl.
Steering wheel loose.	Excessive clearance between holes in support or housing and pivot pin diameters.	Replace either or both.
	Malfunctioning or missing antilash spring in spheres.	Add spring or replace both.
	Upper bearing not seating in bearing.	Replace both.
	Upper bearing inner race seat missing.	Install seat.
	Improperly adjusted T & T locking knobs.	Readjust.
	Loose support screws.	Tighten 60 in.lbs.
	Bearing preload spring missing or broken.	Replace preload spring.
Steering wheel loose - every other tilt position.	Loose fit between shoe and shoe pivot pin.	Replace both.
Steering column not locking in any tilt position.	Shoe seized on its pivot pin.	Replace both.
	Shoe grooves may have burrs or dirt.	Replace shoe.
	Shoe lock spring weak or broken.	Replace lock spring.

Condition	Cause	Correction
Steering wheel fails to return to top tilt position.	Pivot pins are bound up.	Replace pivot pins.
	Wheel tilt spring is malfunctioning.	Replace tilt spring.
	Turn signal switch wires too tight.	Readjust.
Noise when tilting column.	Upper tilt bumpers worn.	Replace tilt bumper.
	Tilt spring rubbing in housing.	Lubricate.
High shift effort.	Column not aligned correctly in car.	Realign.
	Wave washer with burrs.	Replace.
	Improperly installed dust seal.	Remove and replace.
	Lack of grease on seal or bearing.	Lubricate
	Improper screws used for ignition switch, neutral start switch or mounting bracket.	Use correct fasteners.
	Burr on upper or lower end of shift tube.	Remove burr.
	Lower bowl bearing Reasembly not aligned correctly.	embly correctly.
Improper transmission shifting.	Sheared shift tube joint.	Replace shift tube assembly.
	Improper transmission linkage adjustment.	Readjust.
	Loose lower shift lever.	Replace shift tube assembly.
	Improper gate plate.	Replace with correct part.
Lash in mounted column assembly	IP to column bracket mounting bolts loose.	Tighten to 20 ft.lbs.
	Broken weld nuts on jacket.	Replace jacket assembly.
	IP bracket capsule sheared.	Replace bracket assembly.

Condition	Cause	Correction
	Loose shoes in housing.	Replace shoes.
	Loose tilt head pivot pins.	Replace pivot pins.
	Loose shoe lock pin in support.	Replace pin.
	Loose support screws.	Tighten to 60 in.lbs.
	Column bracket to jacket bolts loose.	Tighten 15 ft.lbs.
Driver can lock steering in second gear. (Manual Transmission)	Malfunctioning upper shift.	Replace lever.
	Malfunctioning shift lever gate.	Replace shift lever gate.
	Loose relay lever on shift tube.	Replace shift tube assembly.
	Use of upper shift lever prior to 1969 model year.	Replace with current shift lever.

MAINTENANCE AND ADJUSTMENTS

steering column has been impacted may also have a damaged or misaligned steering column.

CHECKING STEERING COLUMN FOR DAMAGE

Cars involved in accidents resulting in frame damage, major body or sheet metal damage, or where the

1. Check capsules on steering column bracket assembly: They should be within 1/16" of bottom of the slots. If capsule has moved more than 1/16", some

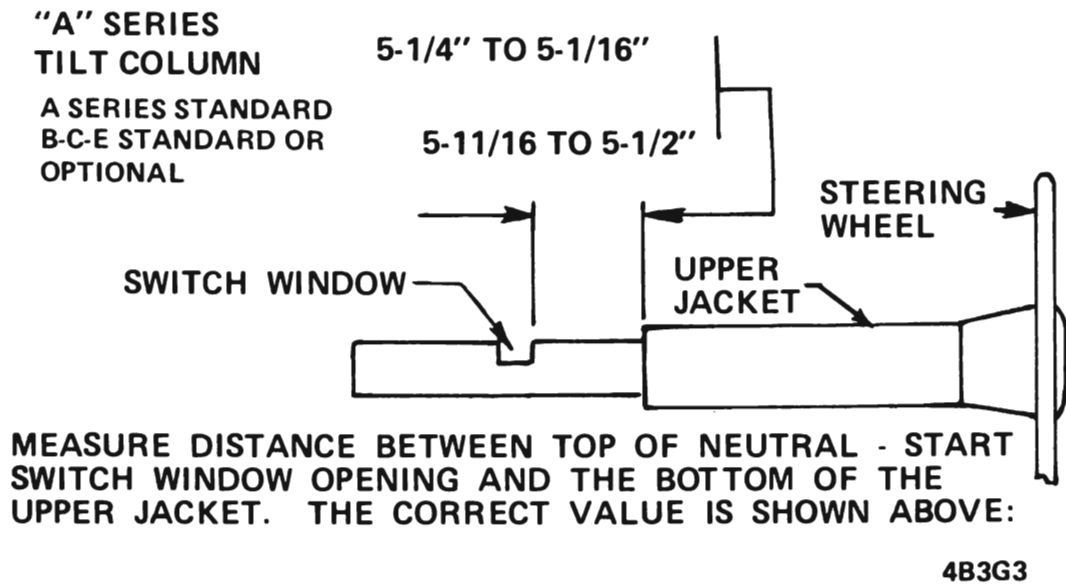
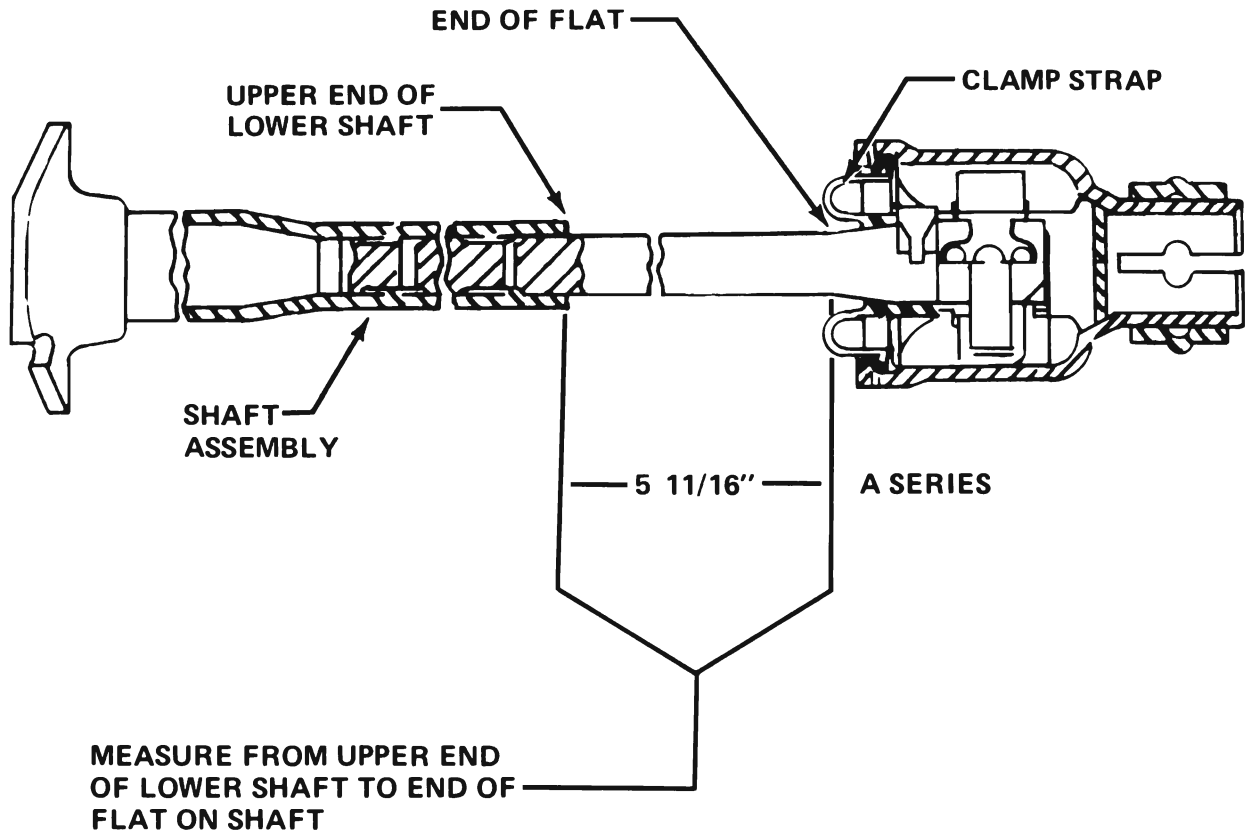


Figure 3G-3 A-B-C-E Series Checking for Column Collapse

A STEERING COLUMN



B-C-E STEERING COLUMN

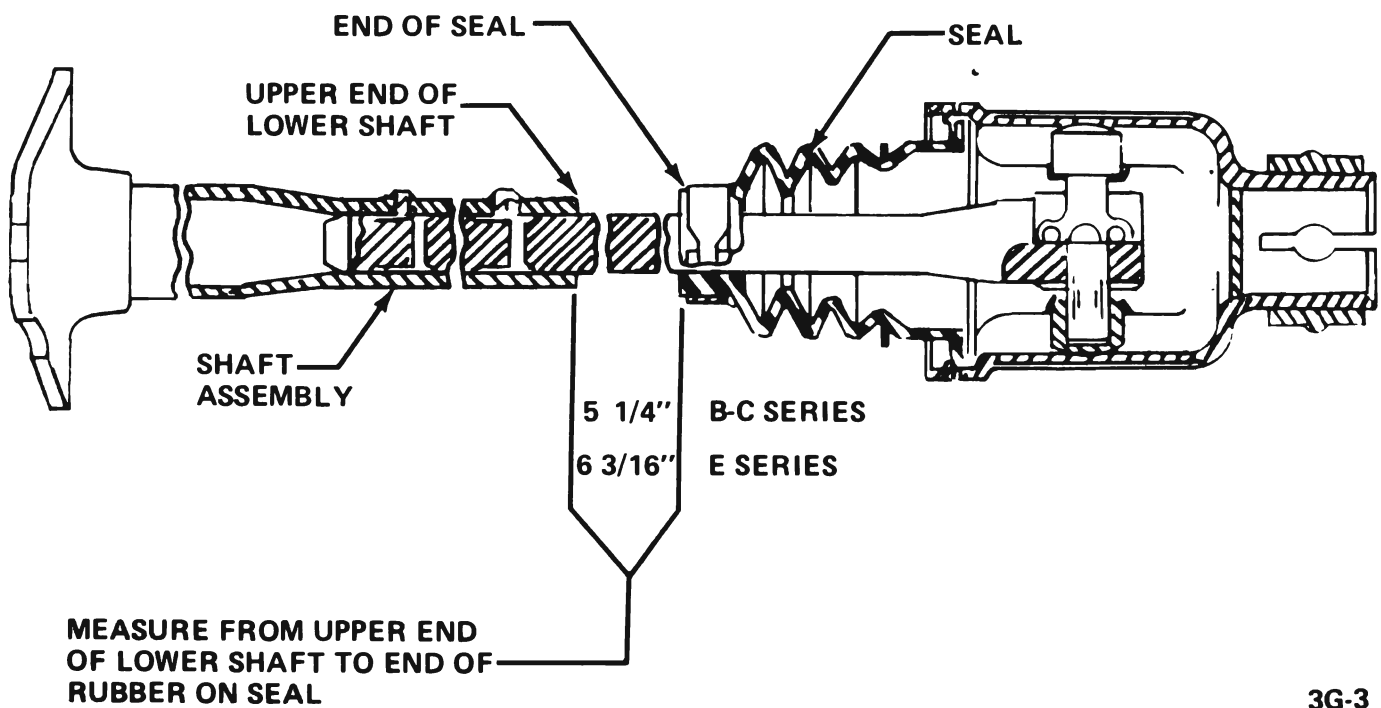


Figure 3G-4

column collapse may have occurred, and the bracket must be replaced. In this case the steering column must be checked as outlined below.

2. On cars with automatic transmission and column shift, check operation of the shift lever. If you are able to move lever to "Park" position without raising lever, it is an indication that the upper shift tube plastic bearing is broken.

3. On A-B-C-E Series check for mast jacket collapse by measuring the distance from the edge of the neutral-start switch window opening and the bottom of the upper jacket.

The correct dimensions are shown in Figure 3G-3.

4. Check for broken plastic bearing adapter at lower end of steering shaft. (All except column shift manual transmission.) If adapter is cracked or broken, it must be replaced and the column aligned.

5. Check steering gear flexible coupling for stretching, compression, tears, excessive angularity or for no pin engagement. This indicates possible misalignment or frame damage. If flexible coupling damage is evident, the coupling is to be replaced and the steering column is to be realigned.

6. On A-B-C-E Series check for lower shaft end-play clearance in pot joint by grasping shaft and pushing into pot joint. Some end-play must be present. If no end-play is present, disconnect lower shaft assembly at flexible coupling and measure the distance, as shown in Figure 3G-4.

If the above checks indicate the column has been damaged, the column must be disassembled for further inspection of internal components, such as shift tube, upper steering shaft injection molding, and turn signal switch.

After all repairs have been made or inspection completed, the column must be reinstalled according to the service procedures.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF HORN LEAD AND DRIVERS CUSHION MODULE - AIR CUSHION RESTRAINT

Removal

1. Disconnect A.C.R.S. by turning ignition switch to "Lock" position. Disconnect the negative battery cable from the battery and tape the end of the cable to insulate it.

2. Using Tool J-24628-2 remove the (4) module to steering wheel screws. Figure 3G-5. Lift up module and disconnect horn wire. Then, using Tool J-24628-3 disconnect module wire connector from shop ring.

The horn actuator is not servicable.

WARNING: DRIVER AIR CUSHION MODULE SHOULD ALWAYS BE CARRIED WITH VINYL COVER AWAY FROM ALL PARTS OF ONES BODY AND SHOULD ALWAYS BE LAID ON A FLAT SURFACE WITH VINYL SIDE UP. THIS IS NECESSARY SO THAT A FREE SPACE IS PROVIDED TO ALLOW THE AIR CUSHION TO EXPAND IN CASE OF ACCIDENTAL DEPLOYMENT.

Installation

1. Hold cushion module with emblem in the lower right hand corner.

2. Loop the air cushion harness clockwise from the 11:00 o'clock position to the 6:00 o'clock position. Install the module connector by pushing onto the column circuit firmly and check for fully seating.

3. Install horn wire.

4. Position module making sure wiring is still in place and install all (4) screws using Tool J-24628-2 torque to 40 in-lbs.

5. Reconnect battery negative wire.

6. Rotate ignition switch to any position but lock and check that the restraint indicator light operates correctly.

REMOVAL AND INSTALLATION OF STEERING WHEEL - AIR CUSHION RESTRAINT

Removal

1. Remove drivers air cushion module as outlined.

2. Loosen steering wheel retaining nut several turns but do not remove. Figure 3G-6.

3. Attach puller J-3274 to wheel and pull wheel up to nut. Do not tap or strike puller or underside of wheel as this may loosen the plastic injections. If necessary use penetrating lubricant to help loosen wheel.

Installation

1. Reverse the removal procedure for installation. Make sure to align the mark on the steering shaft with mark on wheel hub. Torque nut to 25-35 lb.ft.

CAUTION: *This steering wheel to steering shaft fastener is an important attaching part in that 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.*

REMOVAL AND INSTALLATION OF HORN ACTUATOR BAR AND STEERING WHEEL - STANDARD AND TILT COLUMN

Removal

1. Disconnect battery negative cable.
2. On rally steering wheel, pull off cap, remove three screws and take off contact, insulator eyelet and spring Figure 3G-7.

On other wheels, remove the screws from underside of wheel and partially lift off bar, pull lead connector from canceling cam, then lift of actuator bar. Figure 3G-8 and 3G-9.

3. Loosen the steering wheel retaining nut several turns, but do not remove.
4. With puller J-3274 pull wheel up to nut. Do not tap or strike puller or underside of steering wheel to jar loose as this may loosen the plastic injections in the column. The only recommendation for freeing a frozen wheel is to use penetrating lubricant.

Installation

1. Reverse the removal for installations.
2. Align location mark of steering shaft with wheel and torque nut to 25-35 lb. ft.

CAUTION: *This steering wheel to steering shaft fastener is an important attaching*

part in that it 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.

REMOVAL AND INSTALLATION OF HORN ACTUATOR BAR AND STEERING WHEEL - TELESCOPING COLUMN

Removal

1. Disconnect the negative battery cable.
2. Remove the screws from underside of wheel and partially lift off bar, pull lead connector from canceling cam, then lift of actuator bar. Figure 3G-10.
3. Remove the three bolts securing the flange and lever to the wheel hub and remove flange and lever.
4. Loosen the steering wheel retaining nut several turns, but do not remove.
5. With puller J-3274 pull wheel up to nut. Do not tap or strike puller or underside of wheel as this may loosen the plastic injection in the column. The only recommended method of removing a frozen wheel is with the aid of penetrating lubricant.

CAUTION: *This steering wheel to steering shaft fastener is an important attaching part in that it 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.*

Installation

1. Reverse the removal procedure for installation.
2. Align location mark on steering shaft with wheel and torque nut to 25-35 lb. ft.

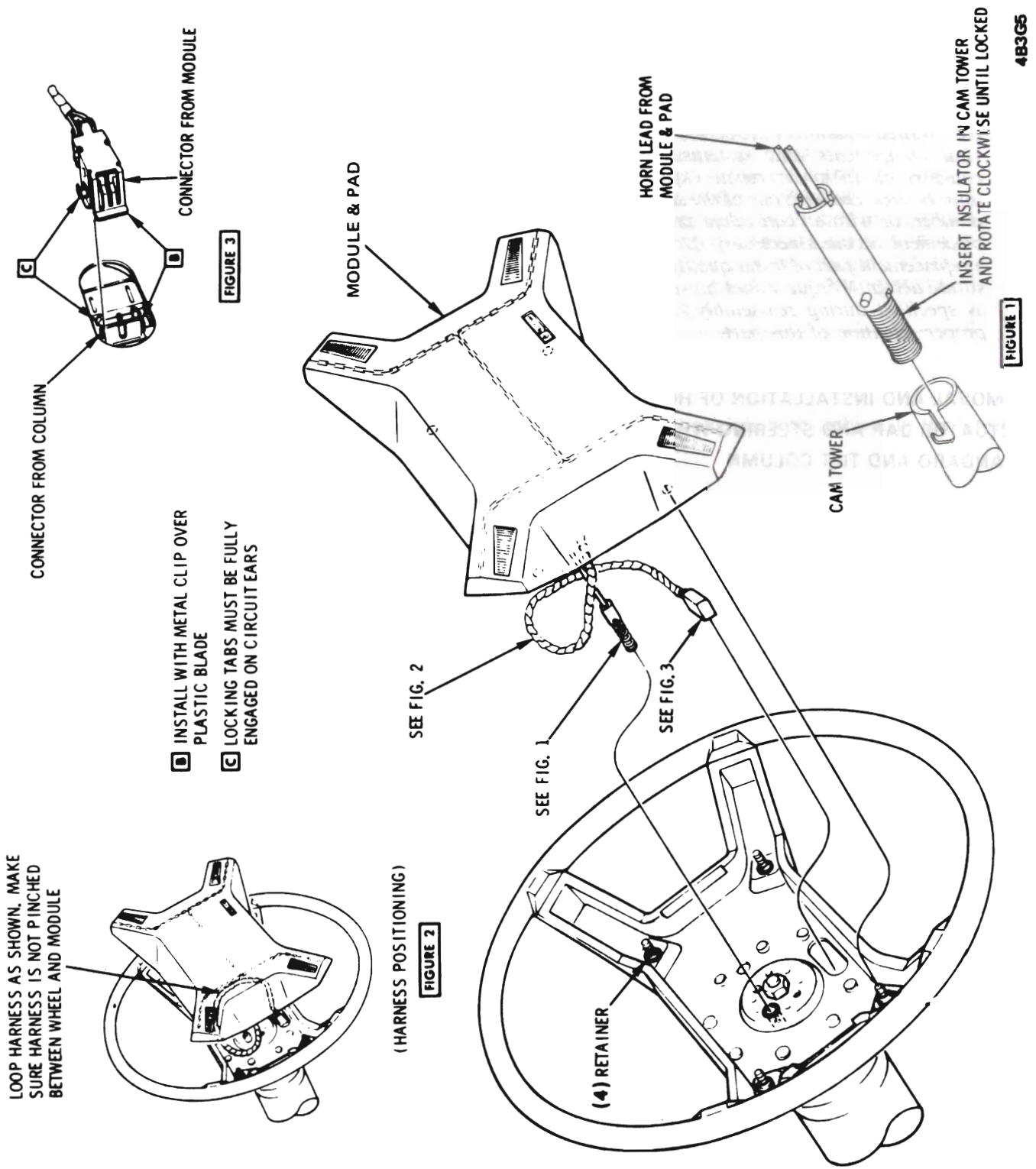
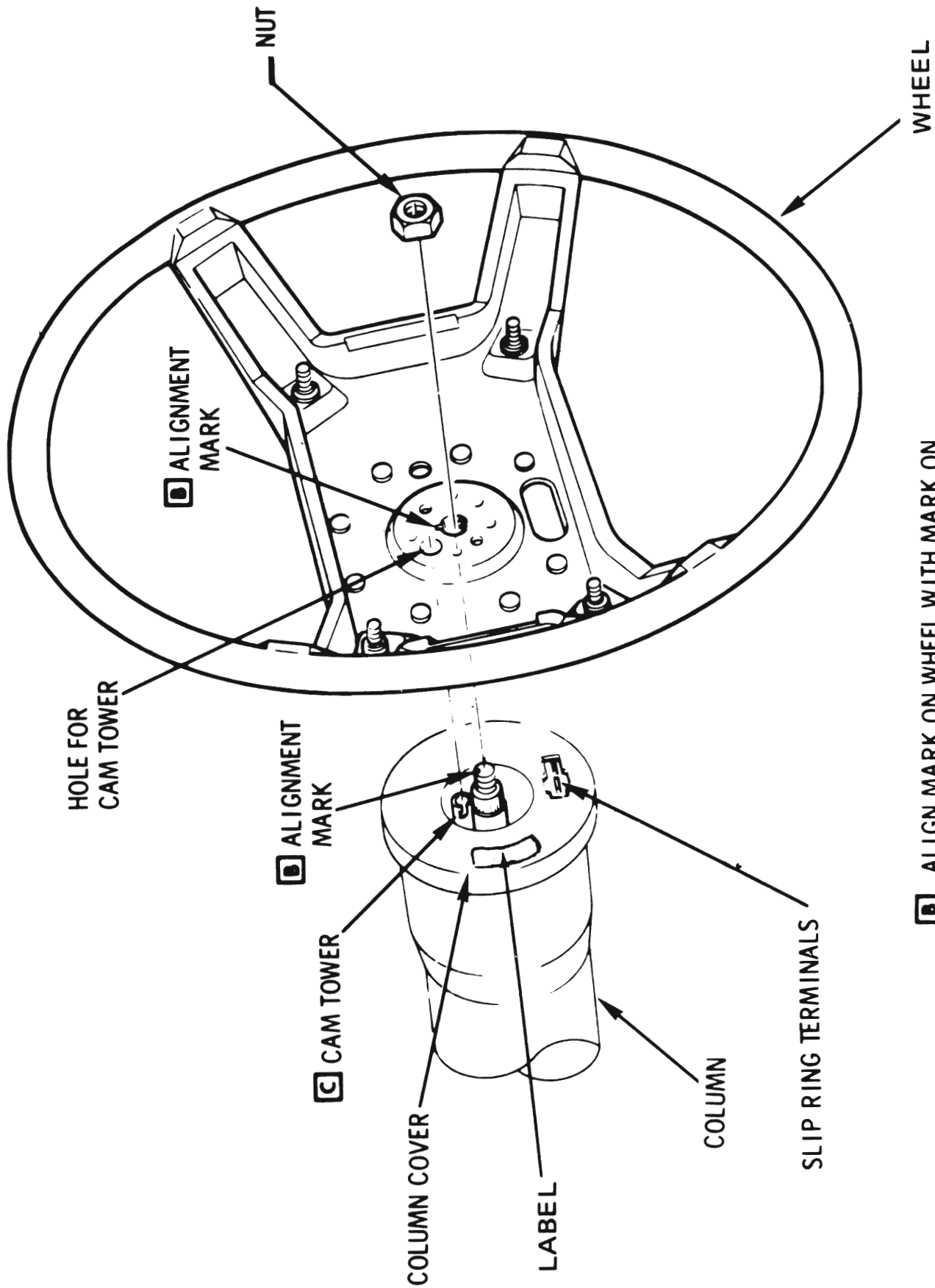


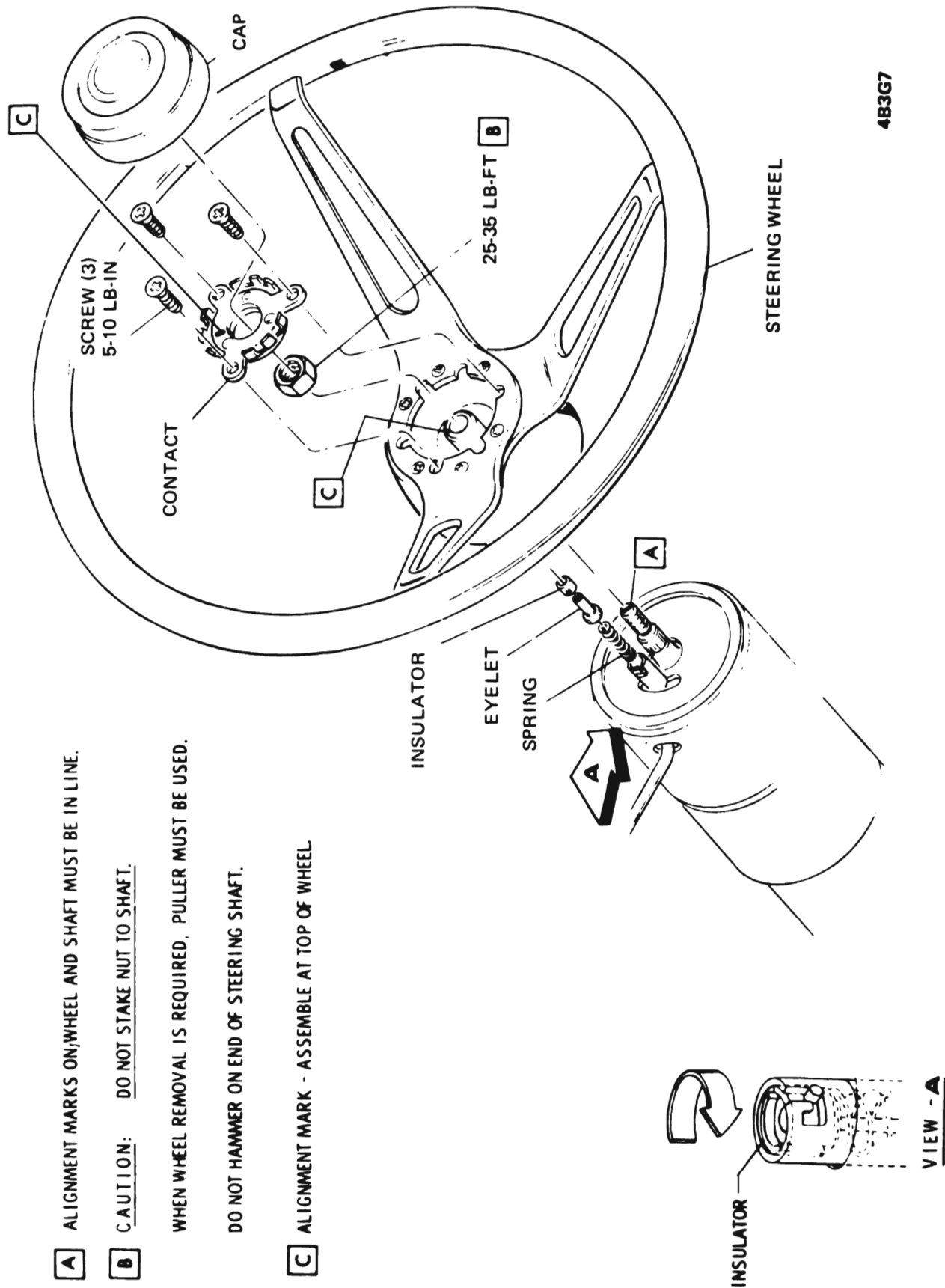
Figure 3G-5 Air Cushion Restraint Drivers Module



- B** ALIGN MARK ON WHEEL WITH MARK ON SHAFT WHEN ASSEMBLING
- C** BE SURE CAM TOWER IS ALIGNED WITH HOLE IN WHEEL ASSEMBLY

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Figure 3G-6 Air Cushion Restraint Steering Wheel



4B3G7

- A** ALIGNMENT MARKS ON WHEEL AND SHAFT MUST BE IN LINE.
- B** CAUTION: DO NOT STAKE NUT TO SHAFT.
- WHEN WHEEL REMOVAL IS REQUIRED, PULLER MUST BE USED.
DO NOT HAMMER ON END OF STEERING SHAFT.
- C** ALIGNMENT MARK - ASSEMBLE AT TOP OF WHEEL

Figure 3G-7 Ralley Steering Wheel

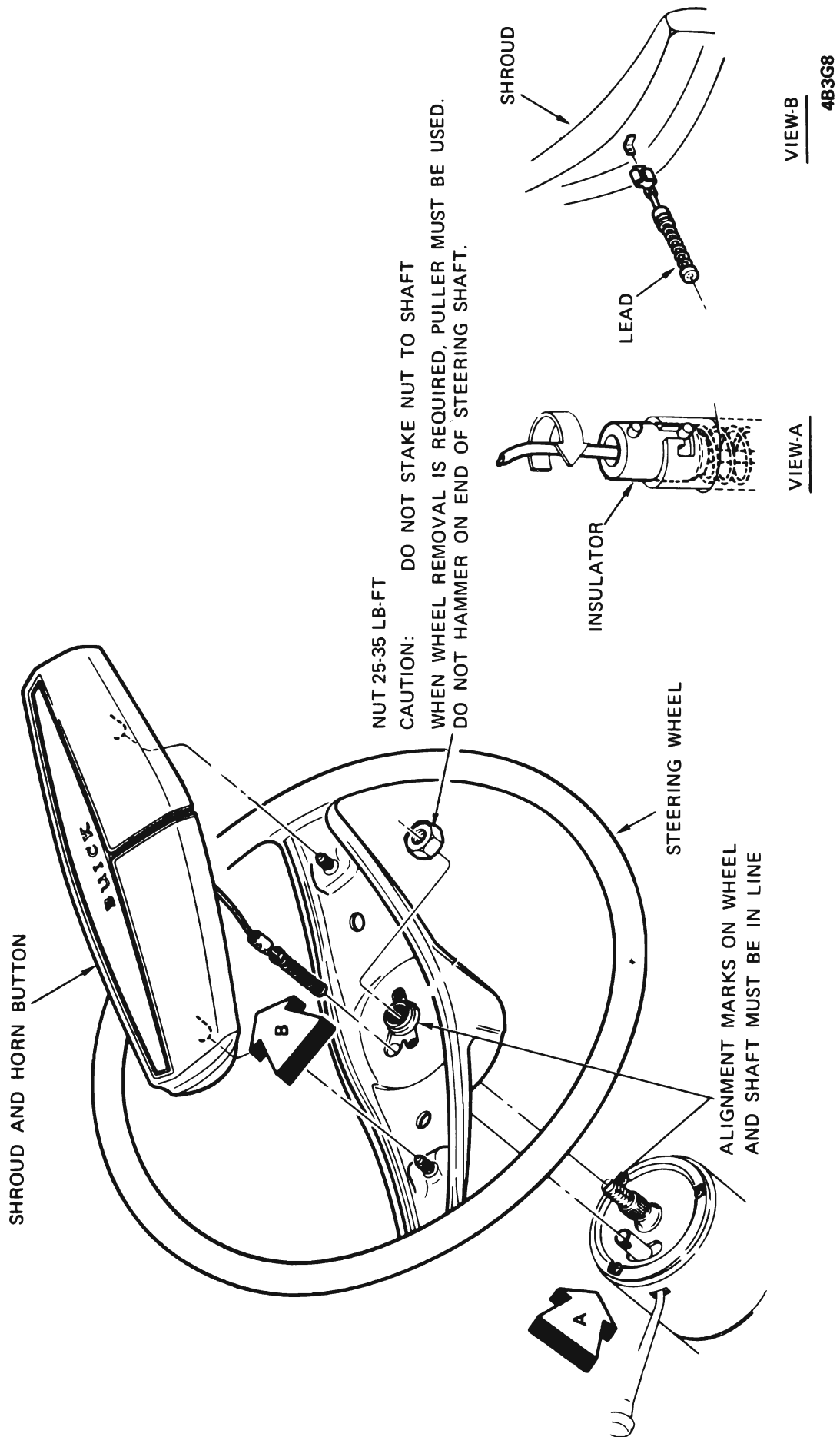


Figure 3G-8 Standard Steering Wheel

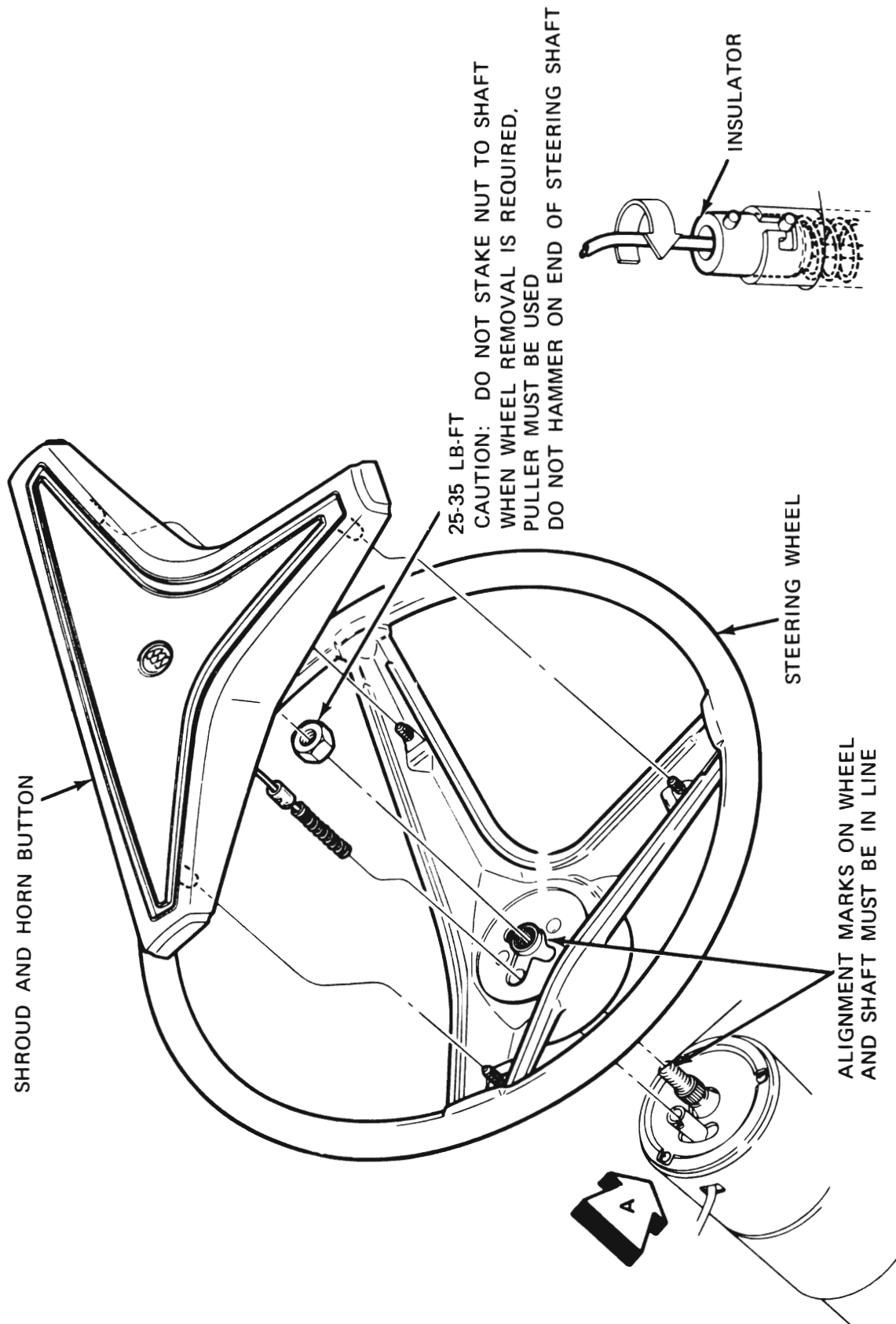
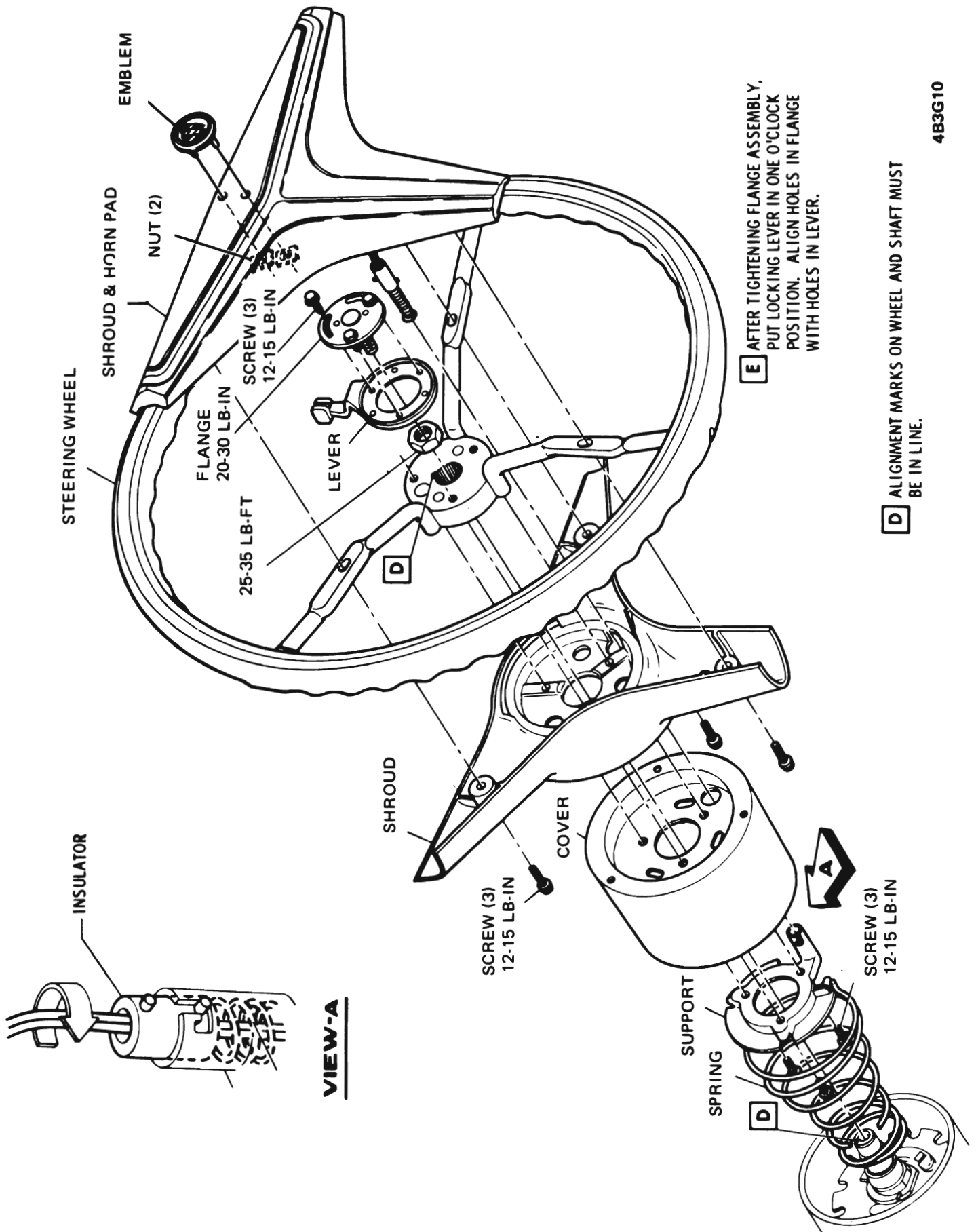


Figure 3G-9 Deluxe Steering Wheel



E AFTER TIGHTENING FLANGE ASSEMBLY, PUT LOCKING LEVER IN ONE O'CLOCK POSITION. ALIGN HOLES IN FLANGE WITH HOLES IN LEVER.

D ALIGNMENT MARKS ON WHEEL AND SHAFT MUST BE IN LINE.

4B3G10

Figure 3G-10 Telescoping Steering Wheel

REMOVAL AND INSTALLATION OF STEERING COLUMN

Once the steering column is removed from the car, the column is extremely susceptible to damage. Dropping the column assembly on its end could collapse the steering shaft or loosen the plastic injections which maintain column rigidity. Leaning on the mast jacket could cause jacket to bend or deform. Any of the above damage could impair the column's collapsible design. If it is necessary to remove the steering wheel, use the specified wheel puller. Do not hammer on end of shaft, as hammering could loosen plastic injections which maintain column rigidity.

X Series Removal

Front of dash mounting plates must be loosened whenever the steering column is to be lowered from the instrument panel.

1. Disconnect the battery ground cable.
2. Remove the steering wheel as outlined.
3. Remove the nuts and washers securing the flange end of the steering shaft to the flexible coupling.
4. Disconnect the transmission control linkage from column shift tube levers.
5. Disconnect the steering column harness at wire connector. Disconnect the neutral-start switch backup lamp switch connectors if so equipped. Figure 3G-11.
6. Remove the floor pan trim cover screws and remove the cover.
7. Remove the screws securing the two halves of the floor pan cover; then remove the screws securing the halves and seal to the floor pan and remove the covers. Figure 3G-12.
8. Remove the instrument panel trim cover screws and remove the trim cover.
9. Remove the transmission indicator cable, if so equipped. Figure 3G-13.
10. Move the front seat as far back as possible to provide maximum clearance.
11. Remove the two column bracket-to-instrument panel nuts and carefully remove from vehicle. Additional help should be obtained to guide the lower shift levers through the firewall opening. Figure 3G-14.

X Series Installation

1. Install upper (A) and lower (B) steering column to dash covers on column and tighten two screws (C) and (D) so that cover assembly is snug on column but still will move with respect to column. See Figure 3G-15.
2. Glue seal (E) (part of the column assembly) to upper (A) and lower cover (B).
3. Position rolled portion of dash panel seal (part of column assembly) at the column lower reaction tab two inches from bottom of jacket.

CAUTION: *Rolled portion of seal must be directed down column toward front of car and must remain in this position during and after column installation.*

4. Attach mast jacket bracket (F) to column and torque the four bolts (G-J-J-K) to specifications.
5. Position column in car, install all electrical connections and loosely install nuts (N).
6. Attach steering shaft flange to flex coupling and tighten nuts (M) to specified torque.

CAUTION: *Do not tighten column to instrument panel unless vehicle is setting on its wheels or suspension.*

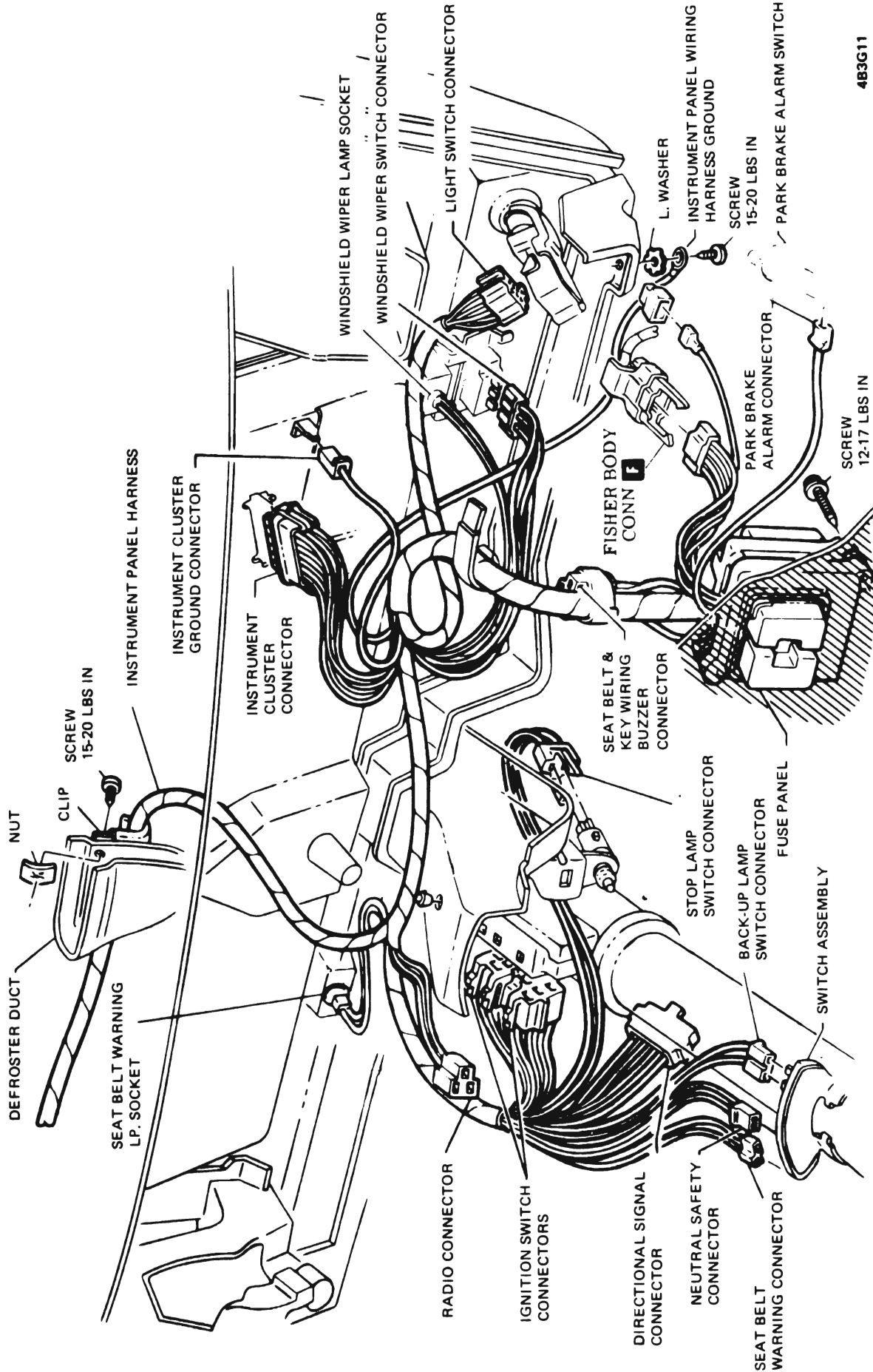
7. Tighten two rearward mast jacket bracket retaining nuts (M) to specified torque while holding rag joint to flange clearance dimension shown.

For remaining steps, upper cover (A) and lower cover (B) must move to established position of column which has been determined by rag joint and I.P. attachment.

8. Push upper (A) and lower (B) cover assembly to dash and line up all cover to dash attaching holes. Screws (P) may be loosely started.

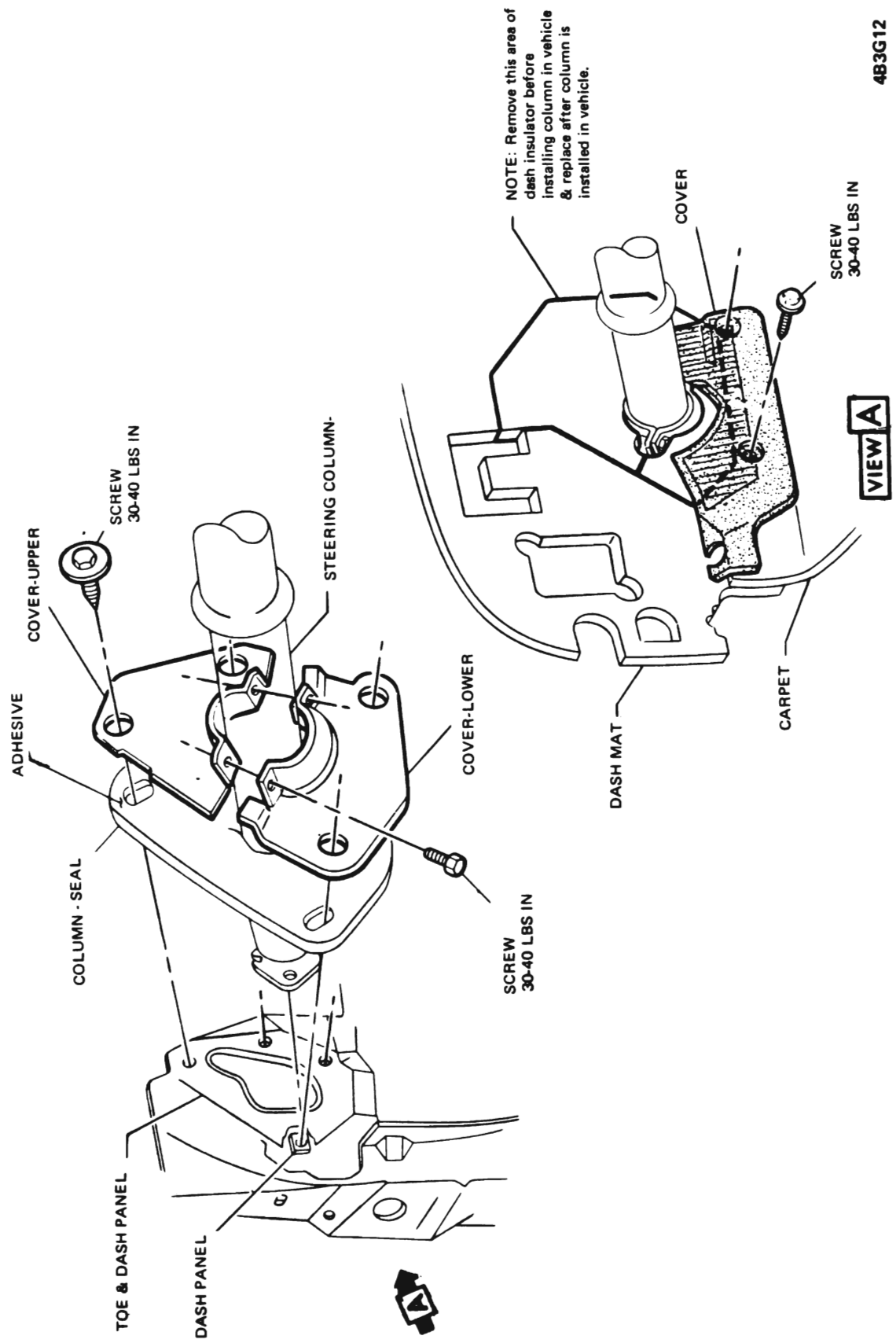
CAUTION: *Do not permit rolled section of seal to reverse itself. (View A)*

9. Holding both upper and lower cover assemblies against dash and column, install and tighten two screws (R) to the specified torque.
10. Tighten two screws (C) and (D) to specified torque.
11. Loosen two screws (R).



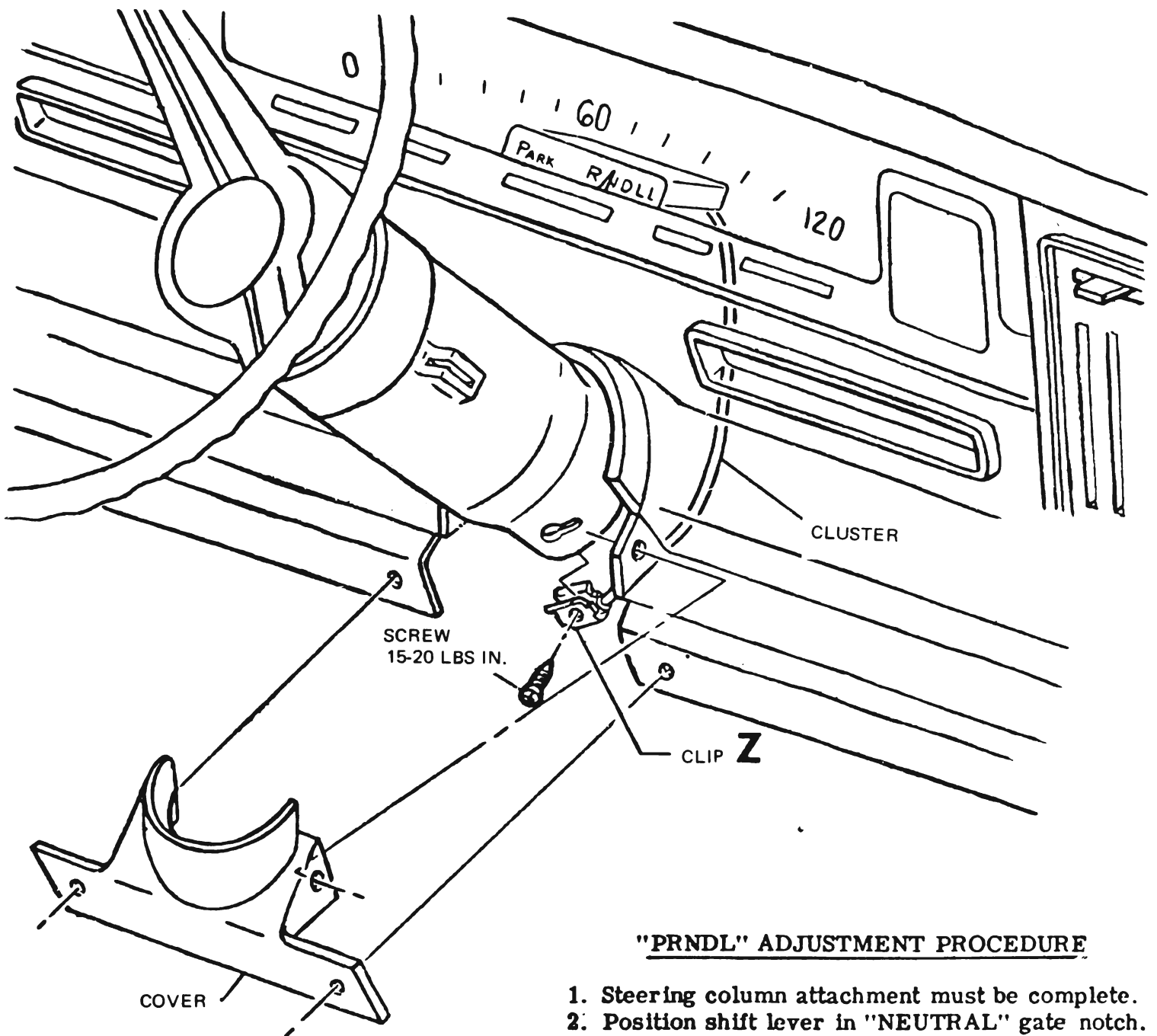
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Figure 3G-11 X Series Steering Column Wiring



4B3G12

Figure 3G-12 X Series Steering Column Mounting



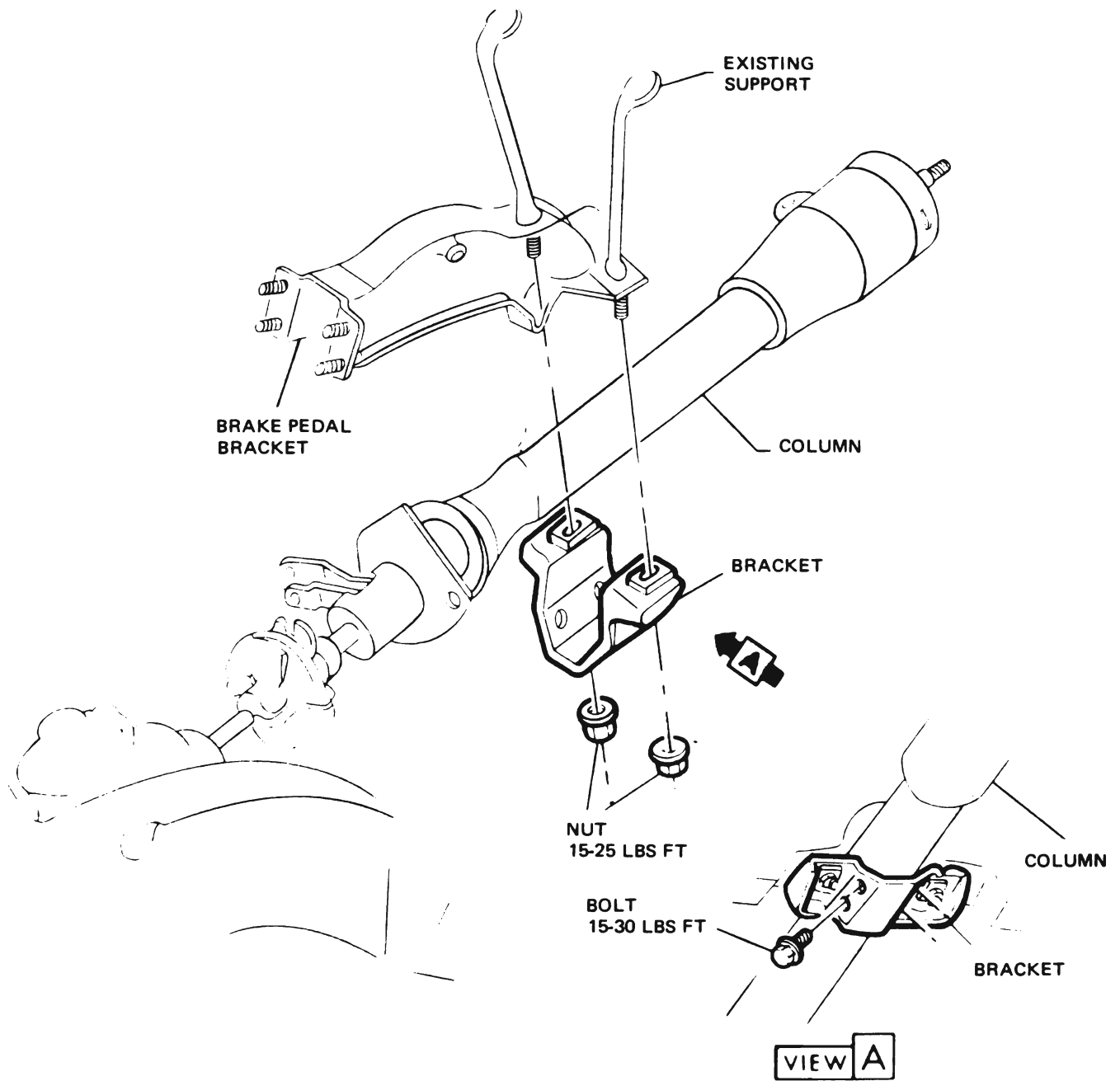
"PRNDL" ADJUSTMENT PROCEDURE

1. Steering column attachment must be complete.
2. Position shift lever in "NEUTRAL" gate notch.
3. Attach Shift Indicator Clip (Z) to shift bowl.
4. Move Clip (Z) in slot on shift bowl to centrally positioned pointer on "N" (NEUTRAL).
5. Tighten screw as specified.

Shift indicator should be adjusted prior to transmission control linkage adjustment.

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Figure 3G-13 X Series Transmission Indicator Cable



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Figure 3G-14 X Series Steering Column to Dash Mounting

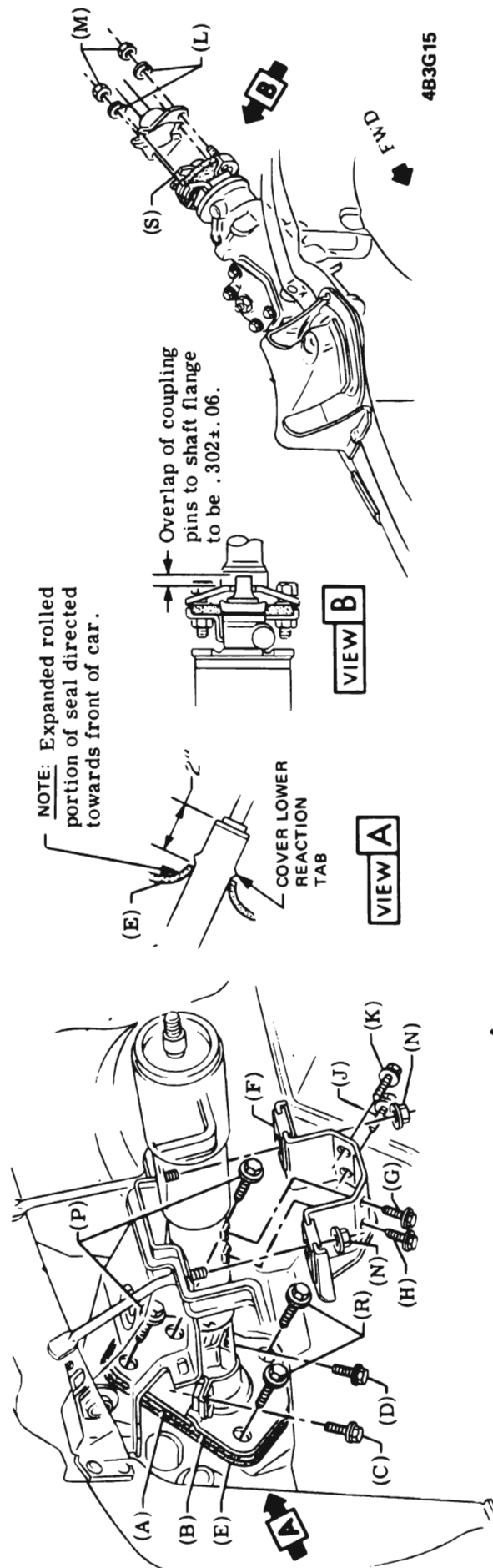


Figure 3G-15 X Series Steering Column Installation

12. Tighten two screws (F) to specified torque.
13. Tighten two screws (R) to specified torque.
14. Remove plastic spacers from flexible coupling pin. Figure 3G-15 item "S".

CAUTION: *The alignment between the steering shaft and the steering gear must be such that a .04" gap (4-ply coupling) or a .07" gap (7-ply coupling) is maintained between the coupling rivets and the steering shaft flange with the steering shaft in straight ahead position and without torque on wheel. Less than .04" gap (4-ply) or .07" gap (7-ply) indicates that column must be realigned.*

15. Install the transmission indicator cable on column automatics. Figure 3G-13.
16. Install the instrument panel trim cover.
17. Connect the transmission control linkage.
18. Install the steering wheel.
19. Connect the battery ground cable.

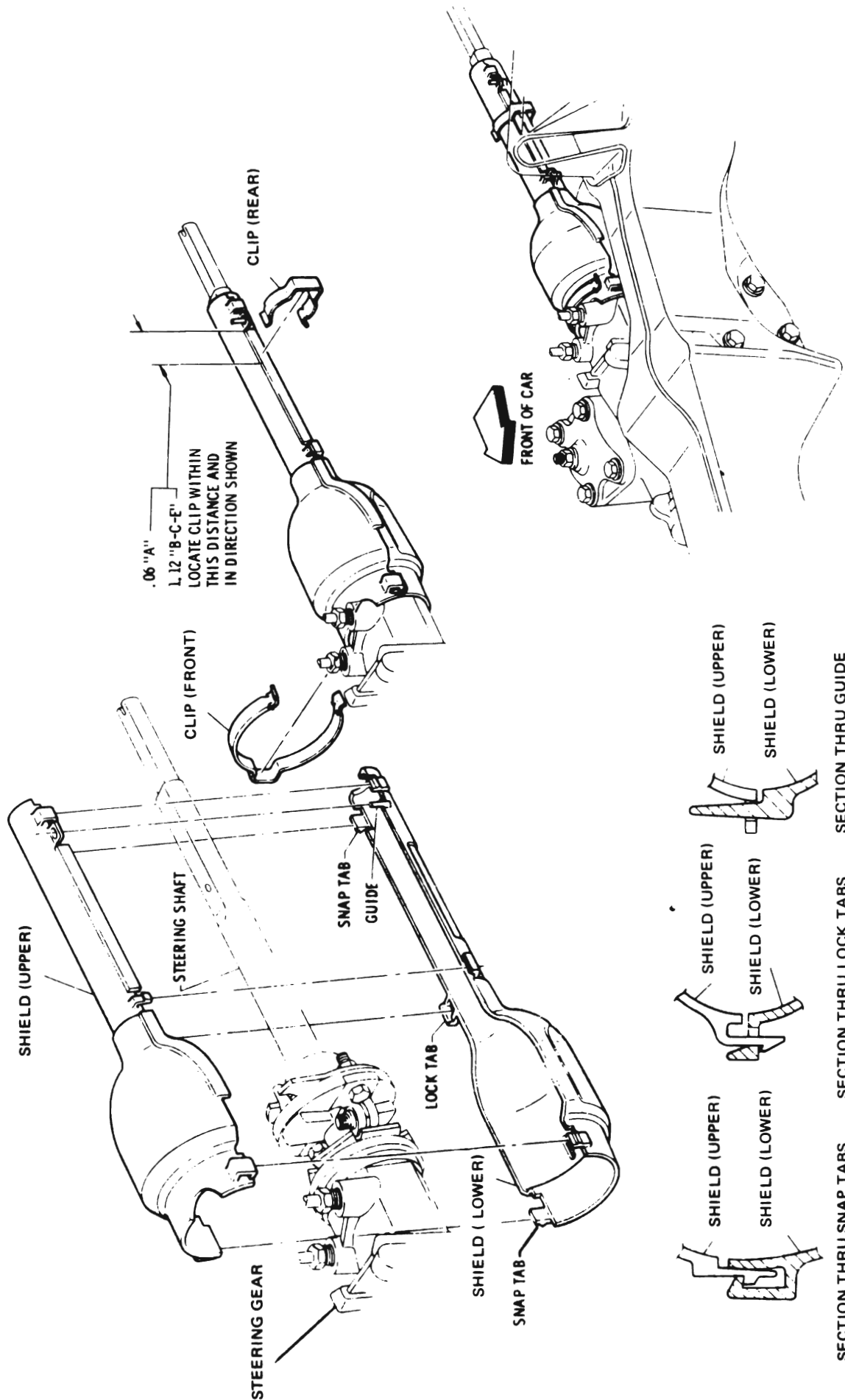
Removal A Series

1. Remove the plastic cover to reveal the flex coupling and remove the two nuts securing the halves of the flex coupling together. Figure 3G-16.
2. Disconnect shift linkage from shift lever(s).
3. Remove screws attaching the lower cover or lower cover halves to the floor and loosen the cover. See Figure 3G-17.
4. Disconnect the shift indicator linkage. See Figure 3G-18.
5. Remove the lap cooler assembly if equipped.
6. Remove the two nuts, securing the column to the upper support sprocket guide and carefully lower the column. See Figure 3G-19.

7. Disconnect all electrical connections from column and remove the column. See Figure 3G-20.

Installation A Series

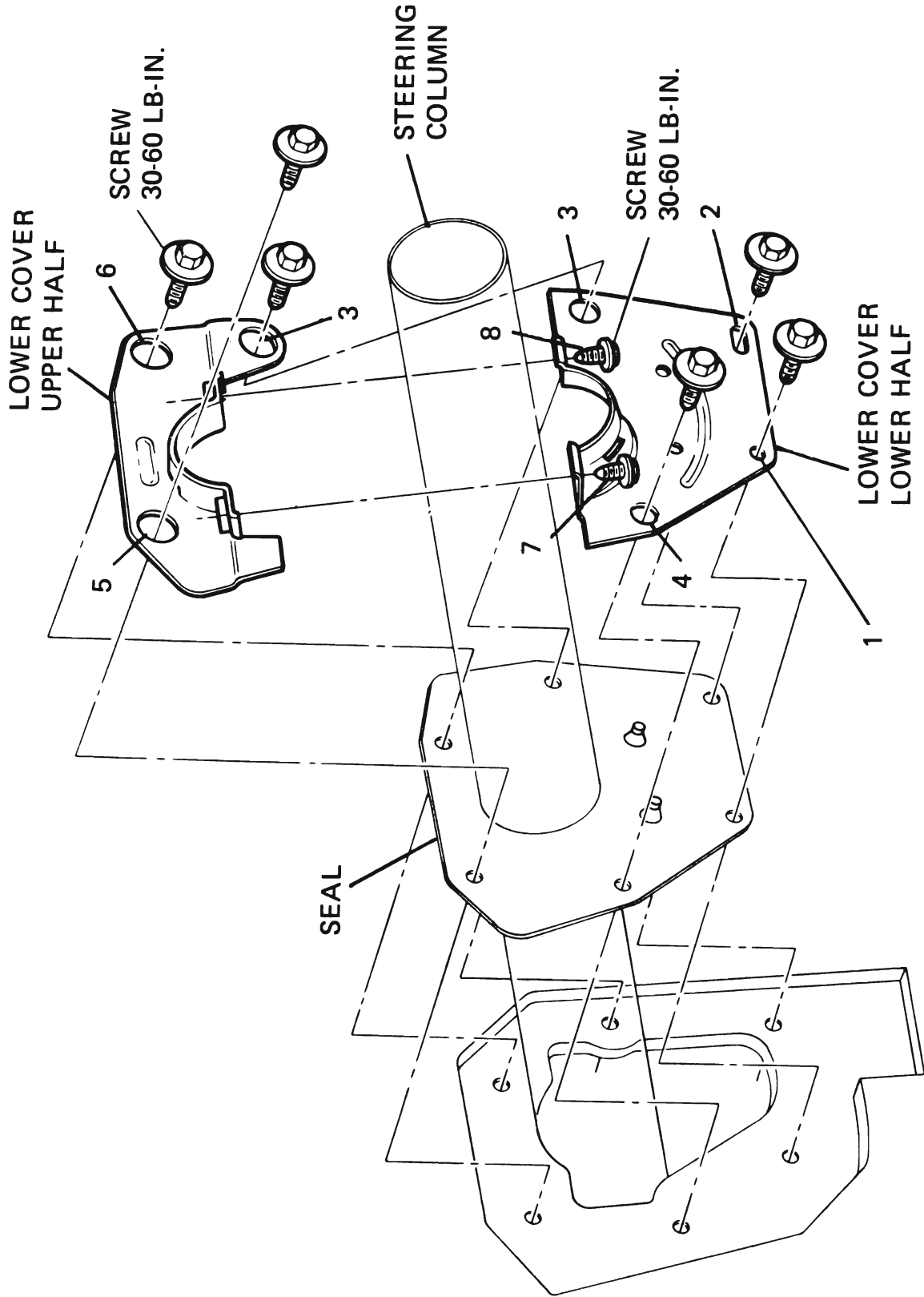
1. Assemble the lower cover to the steering column seal with the projections provided on the seal and loosely clamp the upper and lower halves of the lower cover plate to the column with the two clamp screws. See Figure 3G-17.
2. If removed from column attach the steering column support bracket to the column by first installing a bolt loosely in the No. 1 hole (Figure 3G-19) and then another bolt loosely in the No. 2 hole. Install the two remaining bolts in the slots on the opposite side and torque bolts 2 and 3 to specifications prior to tightening bolts 1 and 4.
3. Position the column in the body and line up the flexible coupling (rag joint) to install the lock washers and nuts. The nuts may be tightened to specifications at any time. **DO NOT** install the joint cover at this time.
4. Position the column to the upper support bracket and guide and retain with the two nuts A and B as shown in Figure 3G-19.
5. Position the lower cover plate assembly to the bulkhead and start No. 1 screw. See Figure 3G-17.
6. Start screw No. 2 in the lower slot. Install screws 3 and 4 in their respective locations and tighten to specifications.
7. Tighten No. 7 clamp screw to specified torque before torquing No. 8 clamp screw.
8. Install the two remaining cover screws (5 and 6) and torque to specifications.
9. Tighten the two steering column lower support brackets to guide bracket nuts (A and B in Figure 3G-19) to specified torque.
10. Connect the shift indicator linkage and install the lower dash cover and lap cooler.
11. Install the coupling shield Figure 3G-16.



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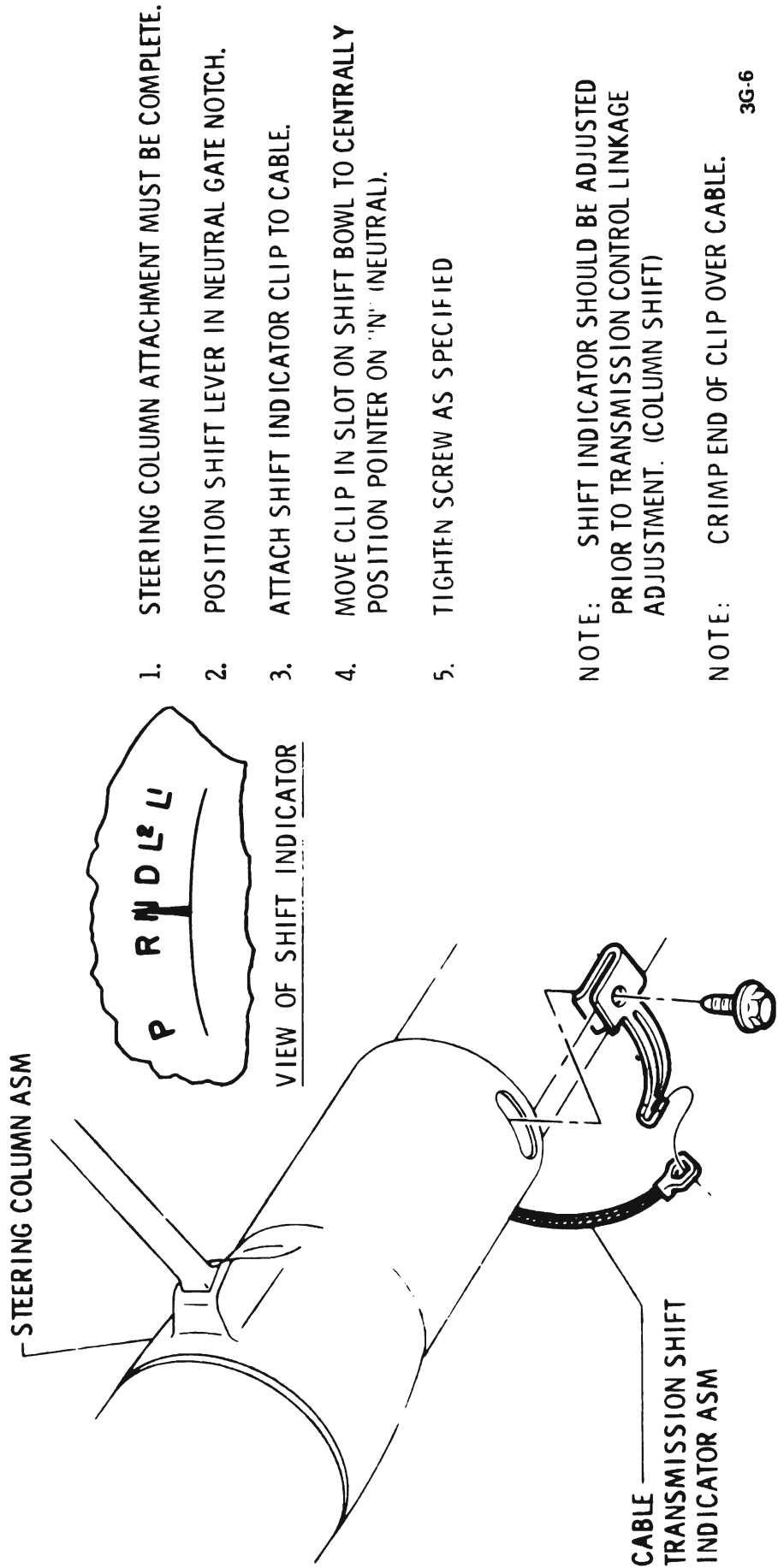
Figure 3G-16 Steering Coupling Shield A-B-C-E

ALL SECTIONS ARE IN ASSEMBLED POSITION



4B3G17

Figure 3G-17 A Series Steering Column Lower Cover



1. STEERING COLUMN ATTACHMENT MUST BE COMPLETE.
2. POSITION SHIFT LEVER IN NEUTRAL GATE NOTCH.
3. ATTACH SHIFT INDICATOR CLIP TO CABLE.
4. MOVE CLIP IN SLOT ON SHIFT BOWL TO CENTRALLY POSITION POINTER ON "N" (NEUTRAL).
5. TIGHTEN SCREW AS SPECIFIED

NOTE: SHIFT INDICATOR SHOULD BE ADJUSTED PRIOR TO TRANSMISSION CONTROL LINKAGE ADJUSTMENT. (COLUMN SHIFT)

NOTE: CRIMP END OF CLIP OVER CABLE. 3G-6

Figure 3G-18 A Series Shift Indicator

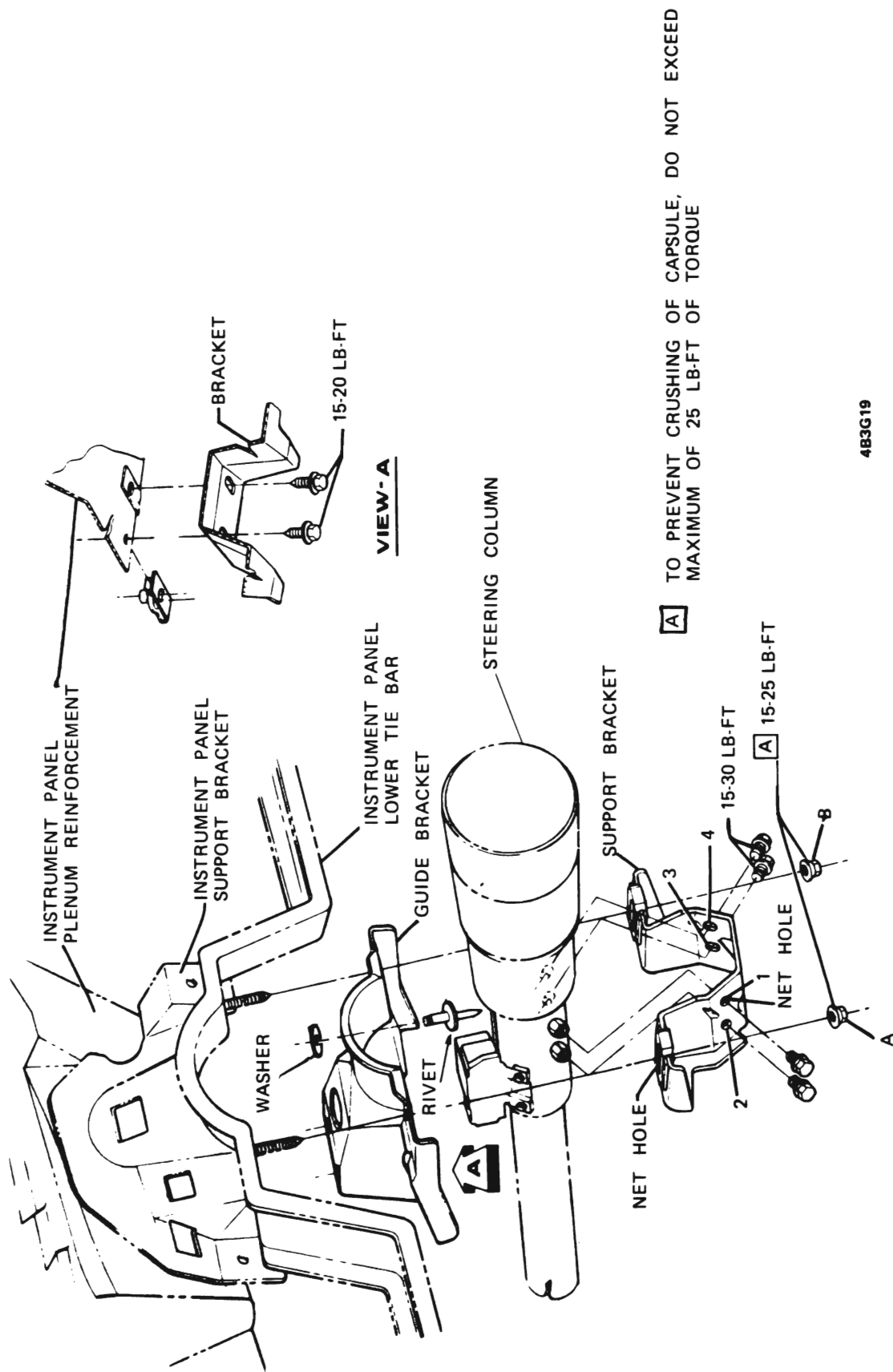


Figure 3G-19 A Series Steering Column Upper Bracket

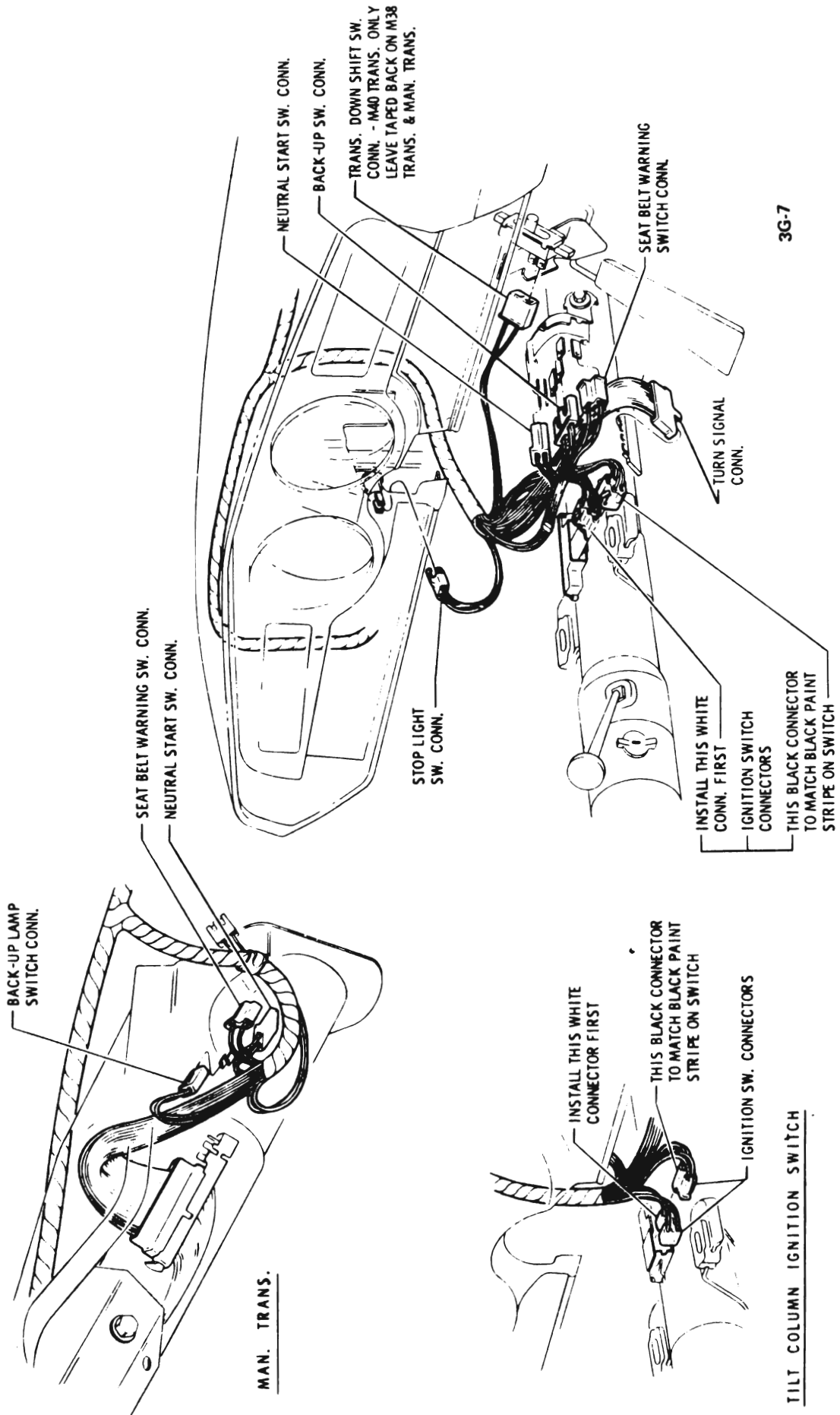


Figure 3G-20 A Weries Steering Column Wiring

Removal B-C-E Series With Air Cushion Restraint

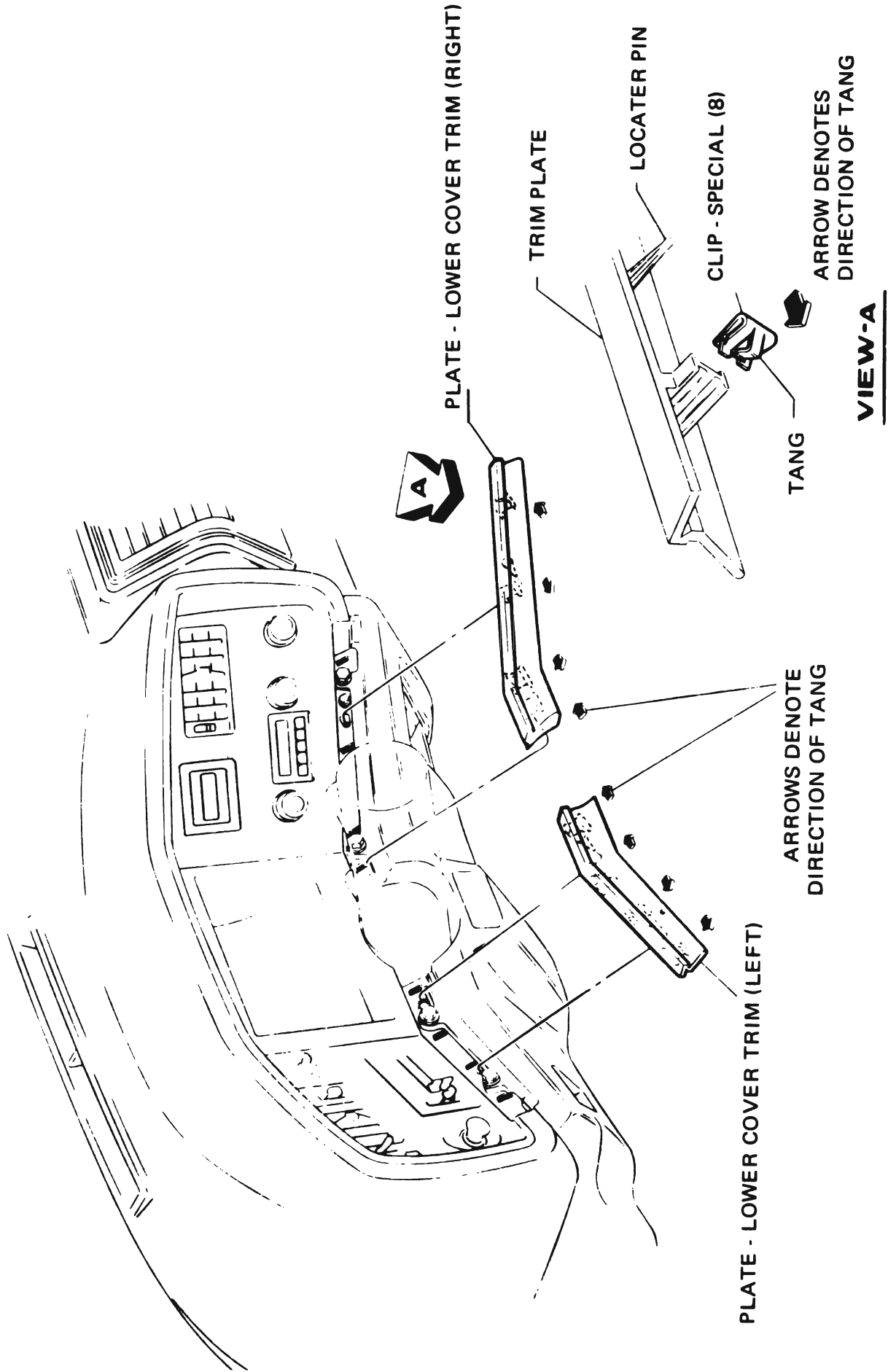
1. Disconnect A.C.R.S. by turning ignition switch to "Lock" position. Disconnect the negative battery cable from the battery and tape end of cable to insulate it.
2. Remove the flex coupling shield Figure 3G-16 and the two flex coupling to gear nuts.
3. Disconnect shift linkage from shift tube lever at lower end of column.
4. Remove the drivers module and steering wheel as outlined in this section.
5. Disconnect the parking brake release cover.
6. Remove the I.P. lower cover trim plates. Figure 3G-21.
7. Remove the 8 screws that secure the lower left I.P. cover. Figure 3G-22.
8. Disconnect the shift indicator cable. Figure 3G-23.
9. Remove toe pan trim cover, remove screws holding toe pan cover to floor and loosen cover. Figure 3G-24.
10. Remove the knee restraint brace Figure 3G-25.
11. Remove the two bolts that secure the lower clamp and remove clamp. Also remove the two bracket nuts. Figure 26. Lower column and disconnect ignition switch wiring.
12. Disconnect all column wiring. Figure 3G-27.
13. Carefully remove column from car.

Installation B-C-E Series With Air Cushion Restraint

1. If column upper support was removed (Figure 3G-26) position bracket "B" in place, install guide bracket "C" to body.
2. Shim "D" as required to fill gap between guide bracket and body.
3. Install screw "E" and torque.
4. Install screw "F" and torque.

Refer to Figure 3G-28, during the following steps:

1. Install ignition switch connector "A" to ignition switch.
2. Position column and position the flange to the steering coupling and install lock nuts and washers. Tighten to specified torque. Figure 3G-28 Also install coupling shield Figure 3G-16.
3. Loosely assemble nuts "B" at instrument panel.
4. Position floor cover "C" to dash using starting screw "D" in round net hole.
5. Install screw "E" and torque. Tighten screw "D" and torque and install remaining floor cover screws to specified torque.
6. Loosely assembly lower clamp "F" to guide bracket by starting screw "G" in guide bracket weld nut.
7. Install screw "H" and tighten to specified torque tighten screw "G" to specified torque.
8. Tighten nuts "B" to specified torque.
9. Connect harness connector to sensor and column wiring. Figure 3G-27.
10. Connect the transmission indicator cable. Figure 3G-23.
11. Install the knee restraint brace. Figure 3G-25.
12. Install the lower left I.P. cover. Figure 3G-22.
13. Install the lower cover trim plates. Figure 3G-21.
14. Connect the parking brake lever.
15. Install the drivers module and steering wheel as outlined in this section.
16. Reconnect the shift linkage at the shift tube.
17. Reconnect the battery negative cable.
18. Rotate the ignition switch to any position but lock and check that the restraint indicator light operates correctly.



4B3G21

Figure 3G-21 B-C-E Series Lower Cover Trim Plates - A.C.R.S.

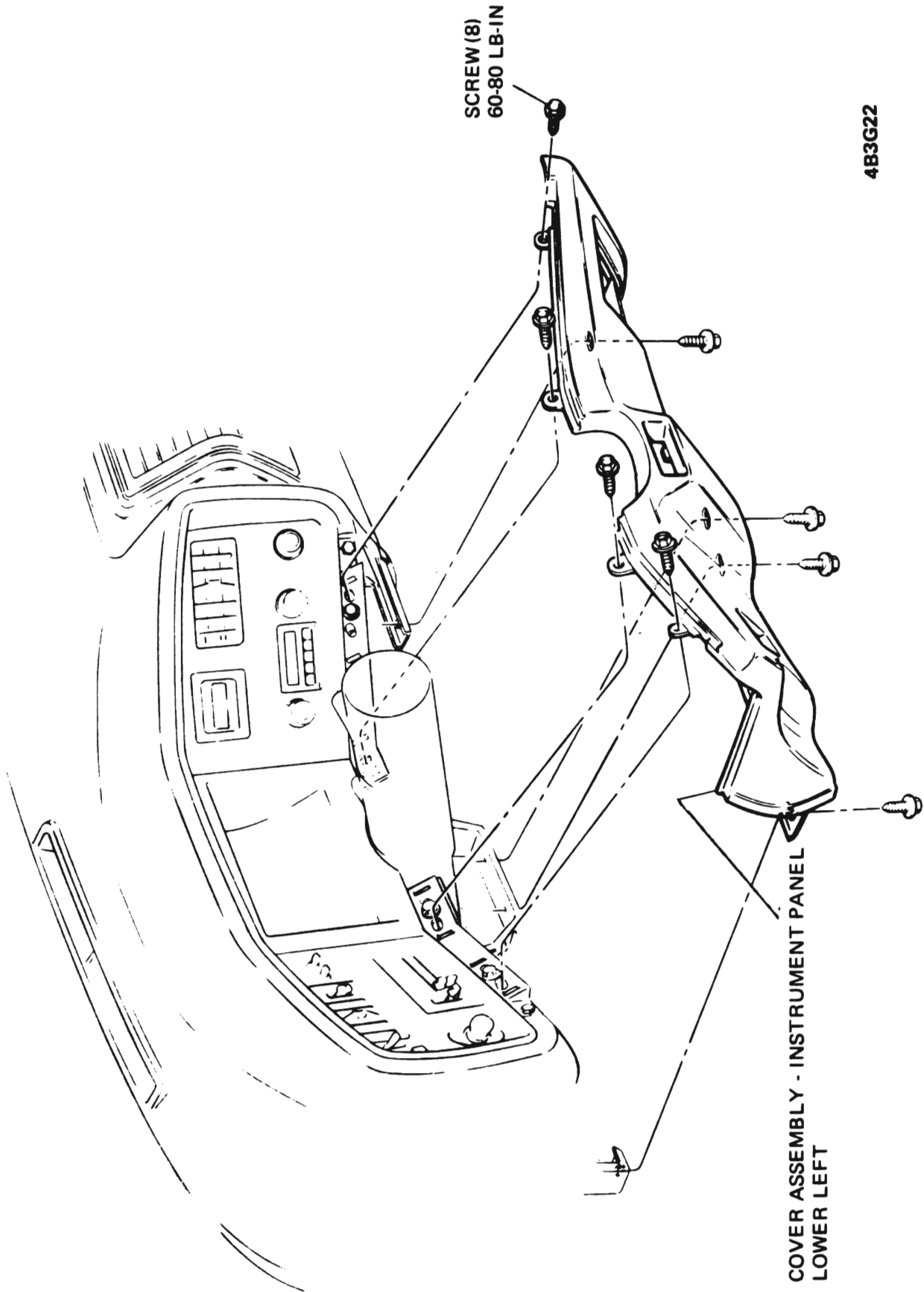
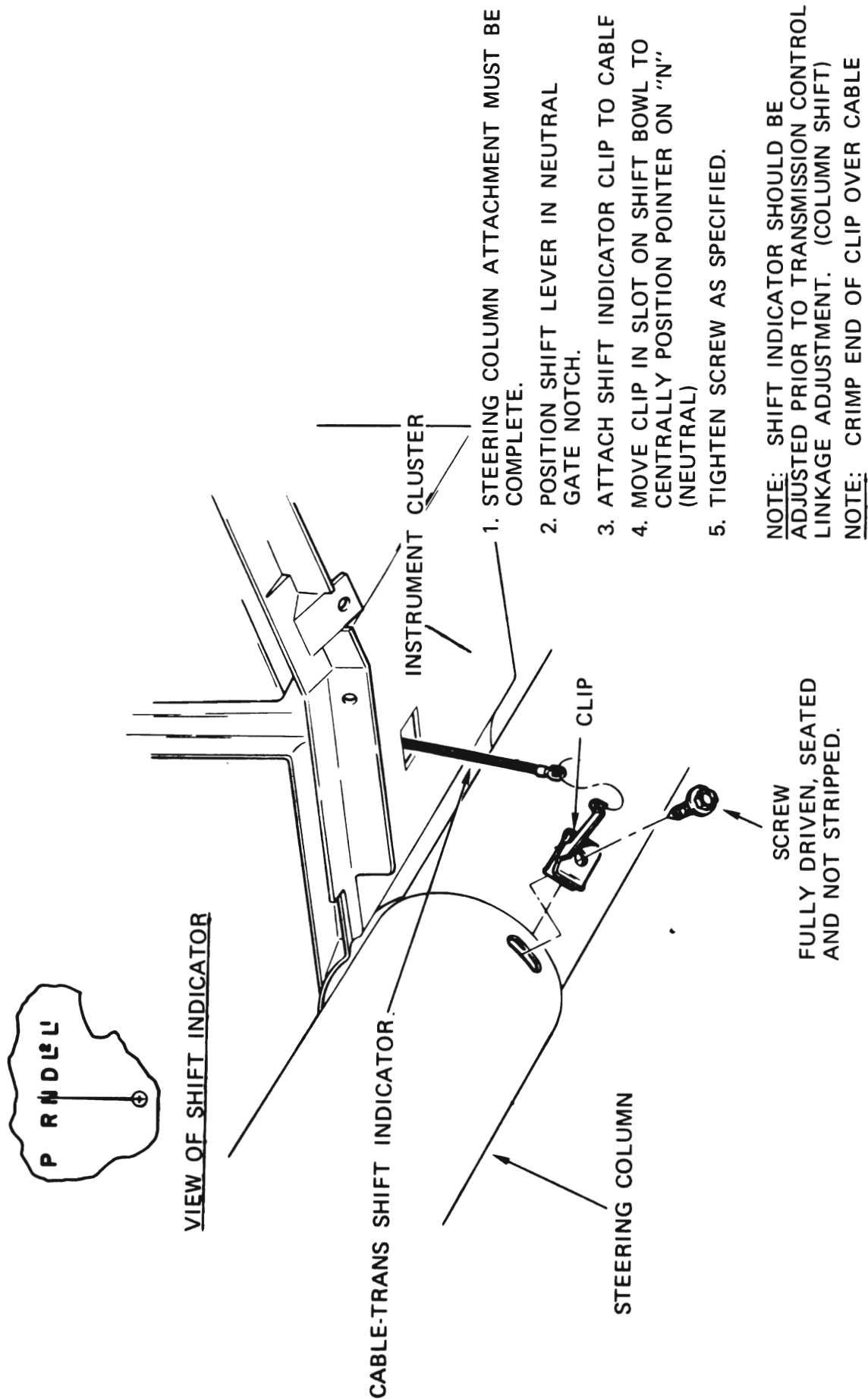
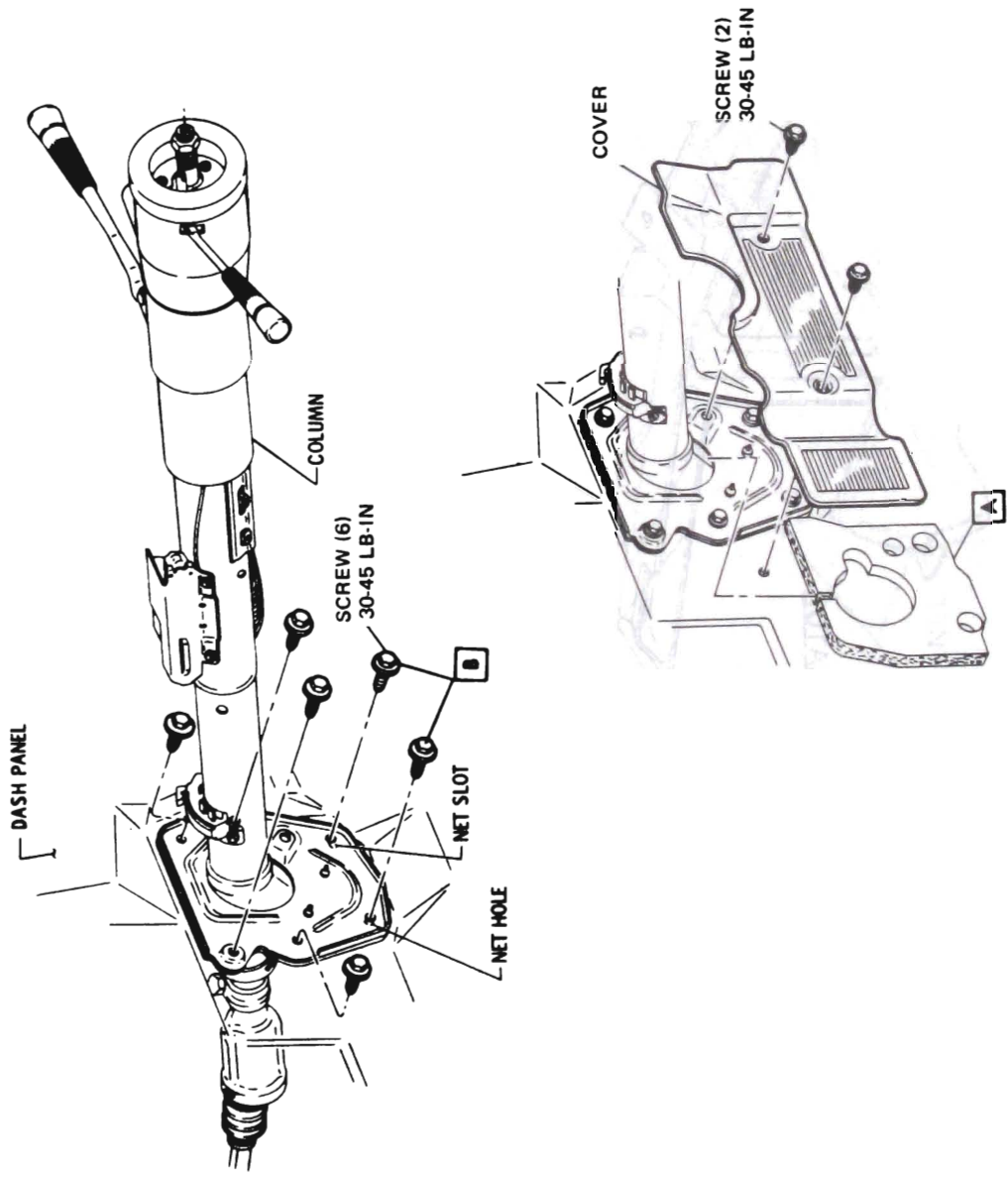


Figure 3G-22 B-C-E Series Lower Left I.P. Cover - A.C.R.S.



4B3G23

Figure 3G-23 B-C-E Series Transmission Indicator



A INSULATOR PULL-OUT REINSTALL AFTER STEERING COLUMN HAS BEEN INSTALLED.

B INSTALL SCREWS LOOSELY AT THESE LOCATIONS. AFTER REMAINING SCREWS (4) ARE INSTALLED AND TORQUED, TORQUE THESE SCREWS.

483G24

Figure 3G-24 B-C-E Series Steering Column To Dash - A.C.R.S.

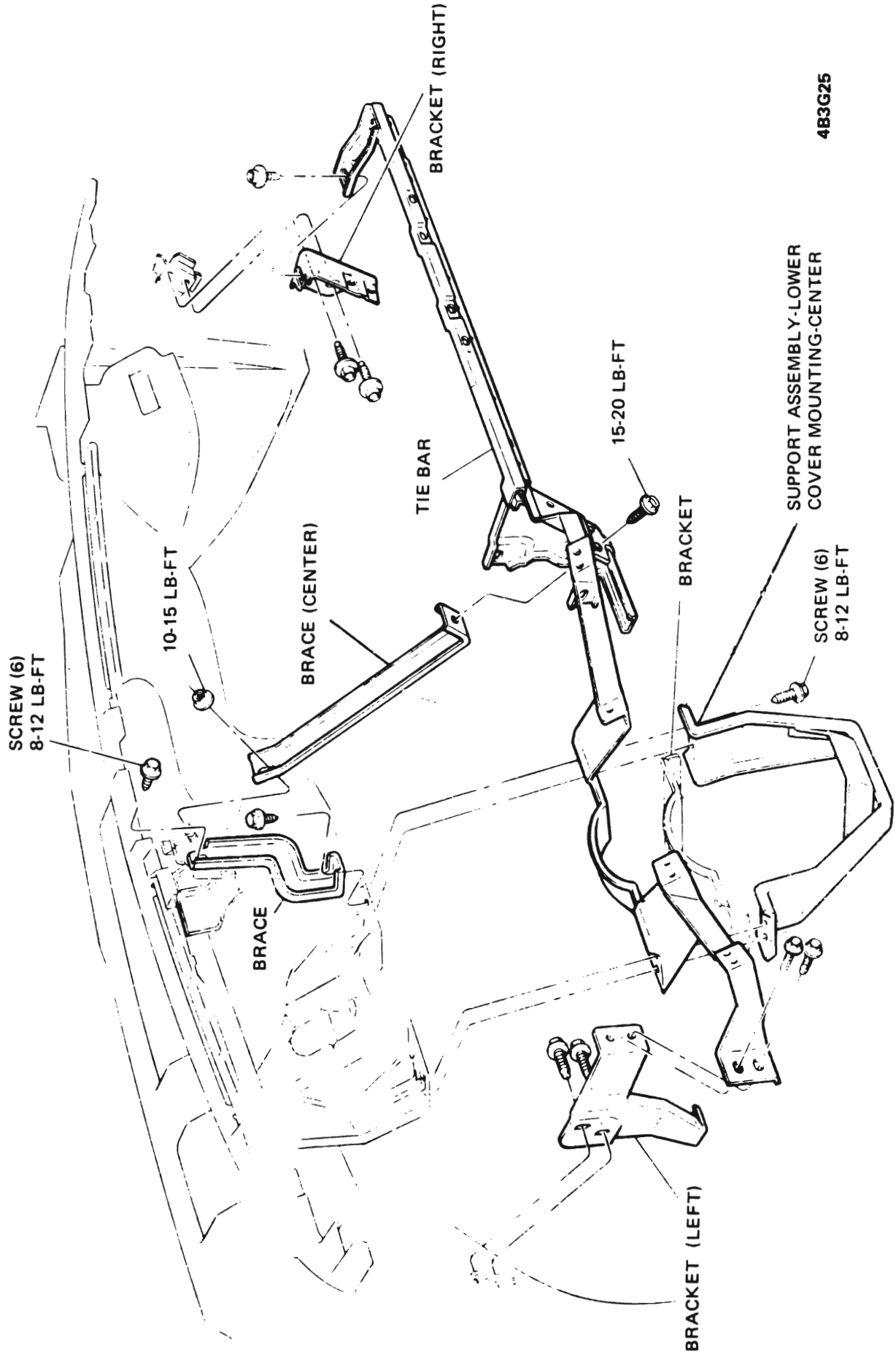
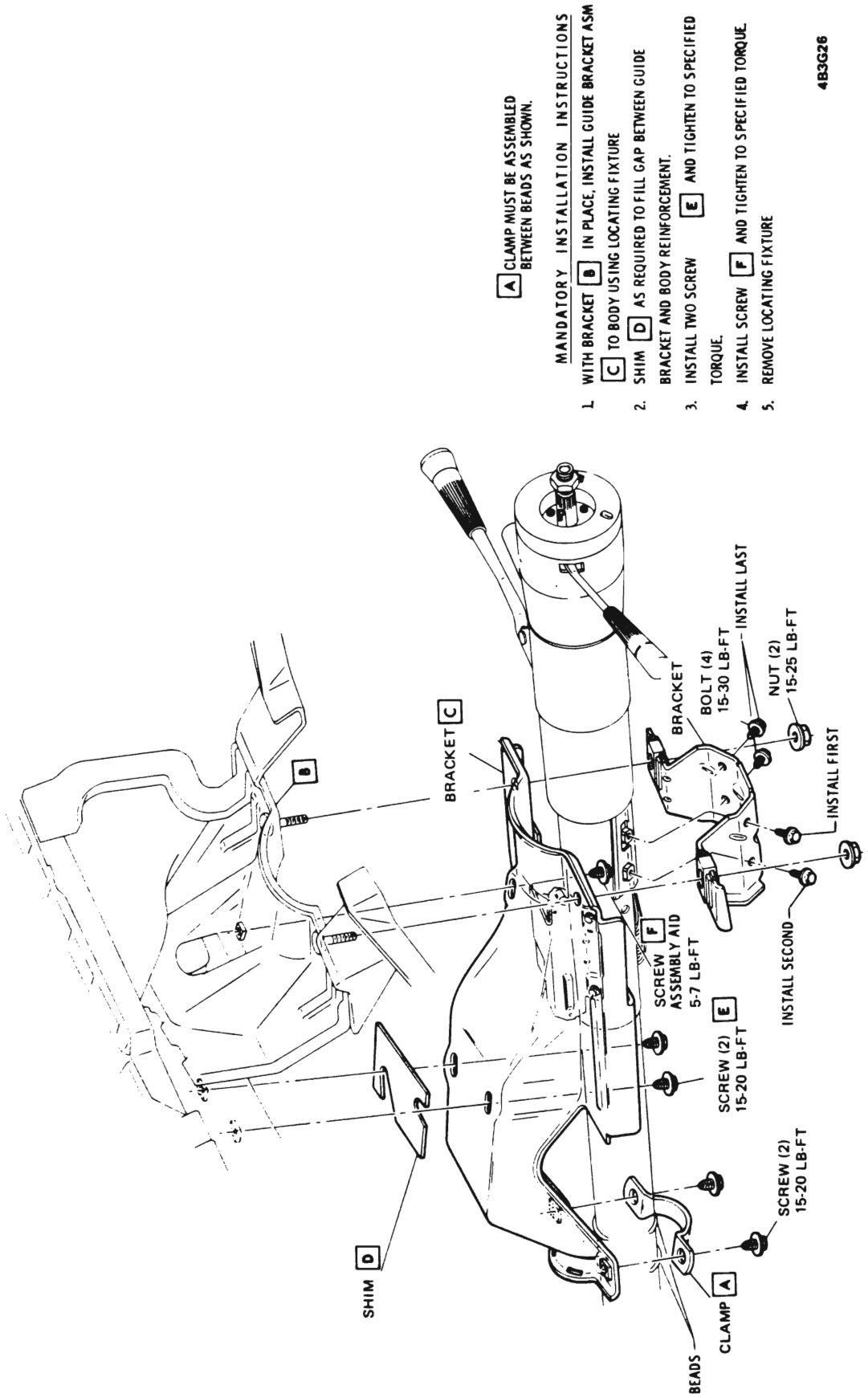


Figure 3G-25 B-C-E Series Knee Restraint Brace - A.C.R.S.



- MANDATORY INSTALLATION INSTRUCTIONS**
- [A]** CLAMP MUST BE ASSEMBLED BETWEEN BEADS AS SHOWN.
1. WITH BRACKET **[B]** IN PLACE, INSTALL GUIDE BRACKET ASM **[C]** TO BODY USING LOCATING FIXTURE
 2. SHIM **[D]** AS REQUIRED TO FILL GAP BETWEEN GUIDE BRACKET AND BODY REINFORCEMENT.
 3. INSTALL TWO SCREW **[E]** AND TIGHTEN TO SPECIFIED TORQUE.
 4. INSTALL SCREW **[F]** AND TIGHTEN TO SPECIFIED TORQUE.
 5. REMOVE LOCATING FIXTURE

4B3G28

Figure 3G-26 B-C-E Series Steering Column Mounting - A.C.R.S.

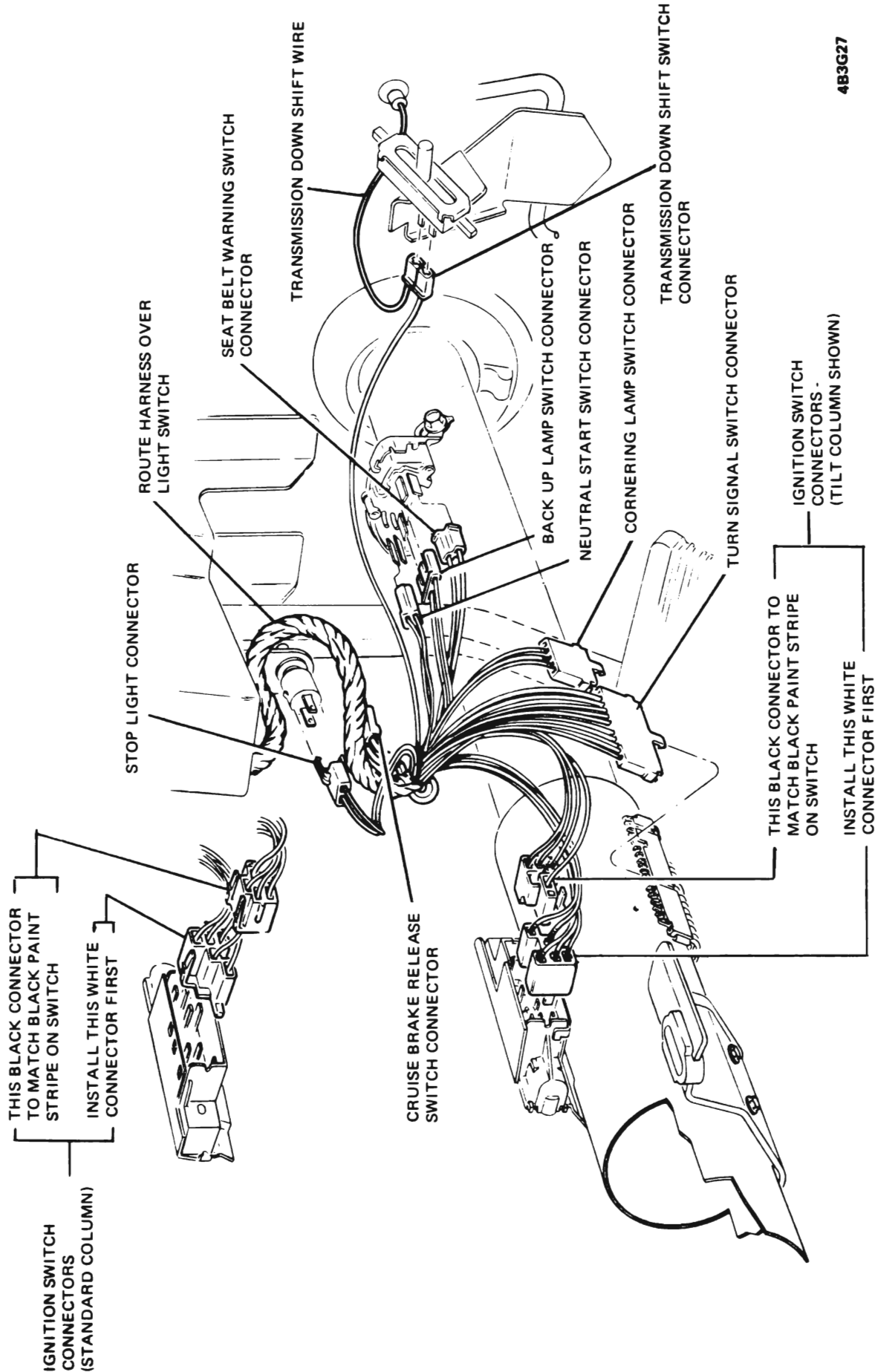
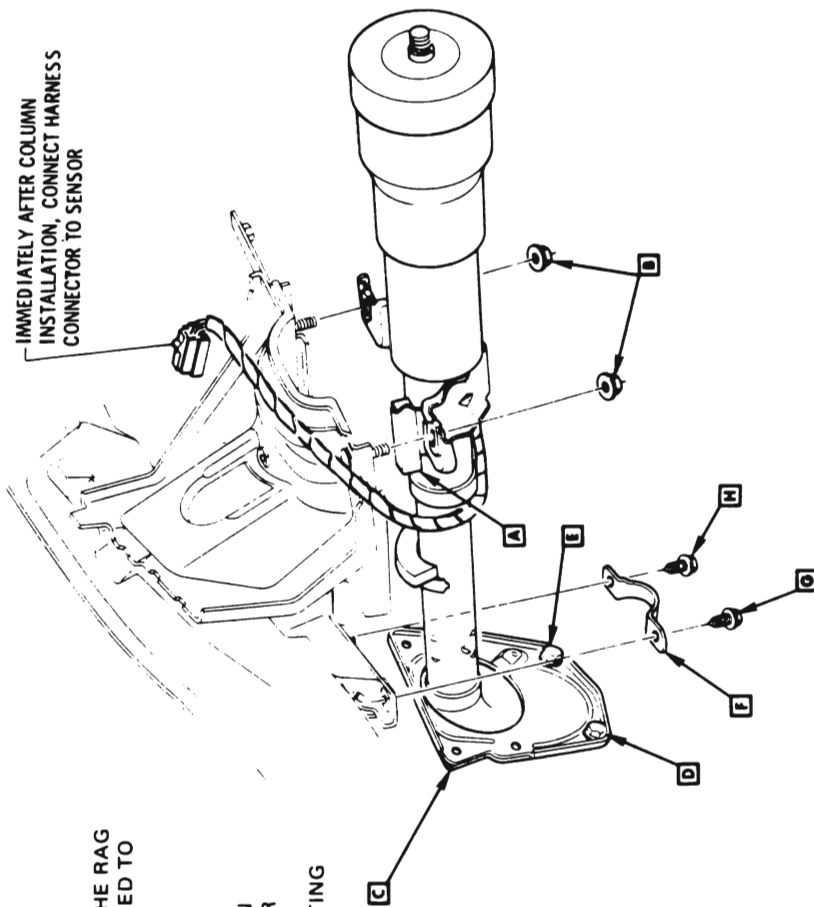
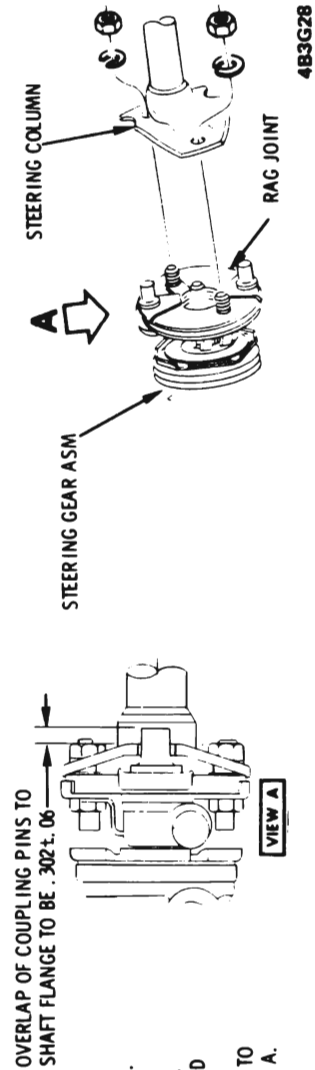


Figure 3G-27 B-C-E Series Column Wiring - All



1. INSTALL IGNITION SWITCH CONNECTOR **A** TO IGNITION SWITCH.
2. POSITION COLUMN IN THE BODY AND POSITION THE FLANGE TO THE RAG JOINT AND INSTALL LOCK WASHERS AND NUTS. (MAY BE TIGHTENED TO SPECIFIED TORQUE AT ANY TIME).
3. LOOSE ASSEMBLE NUTS **D** AT THE INSTRUMENT PANEL.
4. POSITION FLOOR COVER **C** TO DASH USING BENCH AWL OR BY STARTING SCREW **D** IN ROUND NET HOLDE.
5. INSTALL SCREW **E** AND TIGHTEN TO SPECIFIED TORQUE. TIGHTEN SCREW **D** TO SPECIFIED TORQUE AND INSTALL REMAINING FLOOR COVER SCREWS TO SPECIFIED TORQUE.
6. LOOSE ASSEMBLE LOWER CLAMP **F** TO GUIDE BRACKET BY STARTING SCREW **D** IN GUIDE BRACKET WELD NUT.
7. INSTALL SCREW **H** AND TIGHTEN TO SPECIFIED TORQUE. TIGHTEN SCREW **G** TO SPECIFIED TORQUE.
8. TIGHTEN TWO NUTS **D** TO SPECIFIED TORQUE.
9. CONNECT HARNESS CONNECTOR TO SENSOR

TORQUE VALVES ARE SHOWN IN FIGURES 3G-24 and 3G-26



MANDATORY SYSTEM REQUIREMENTS

- IF THESE REQUIREMENTS CANNOT BE MET, IT MUST BE CORRECTED.
- A. POT JOINT OPERATING ANGLE MUST NOT EXCEED 15° MAXIMUM.
 - B. TRAVEL OF THE SLIDING INTERMEDIATE SHAFT MUST NOT EXCEED +1.0 IN. FROM THE NOMINAL LOCATION.
 - C. RAG JOINT MUST NOT BE DISTORTED GREATER THAN $\pm .060$ DUE TO SLIDING SHAFT BOTTOMING IN EITHER DIRECTION. - SEE VIEW A.

Figure 3G-28 B-C-E Series Column Installation - A.C.R.S.

Removal B-C-E Series - Non Air Cushion Restraint

1. Disconnect battery negative cable and remove flex coupling shield. See Figure 3G-16. Remove two nuts securing halves of flexible coupling together. Figure 3G-29.
2. Disconnect shift linkage from shift tube.
3. Remove screws securing toe pan cover to floor and loosen cover. Figure 3G-29.
4. Disconnect shift indicator link. See Figure 3G-23.
5. Remove nuts securing bracket to instrument panel and carefully lower column. See Figure 3G-29.
6. Disconnect all electrical connectors from steering column assembly and carefully withdraw column. See Figure 3G-27.

Installation B-C-E Series - Non Air Cushion Restraint

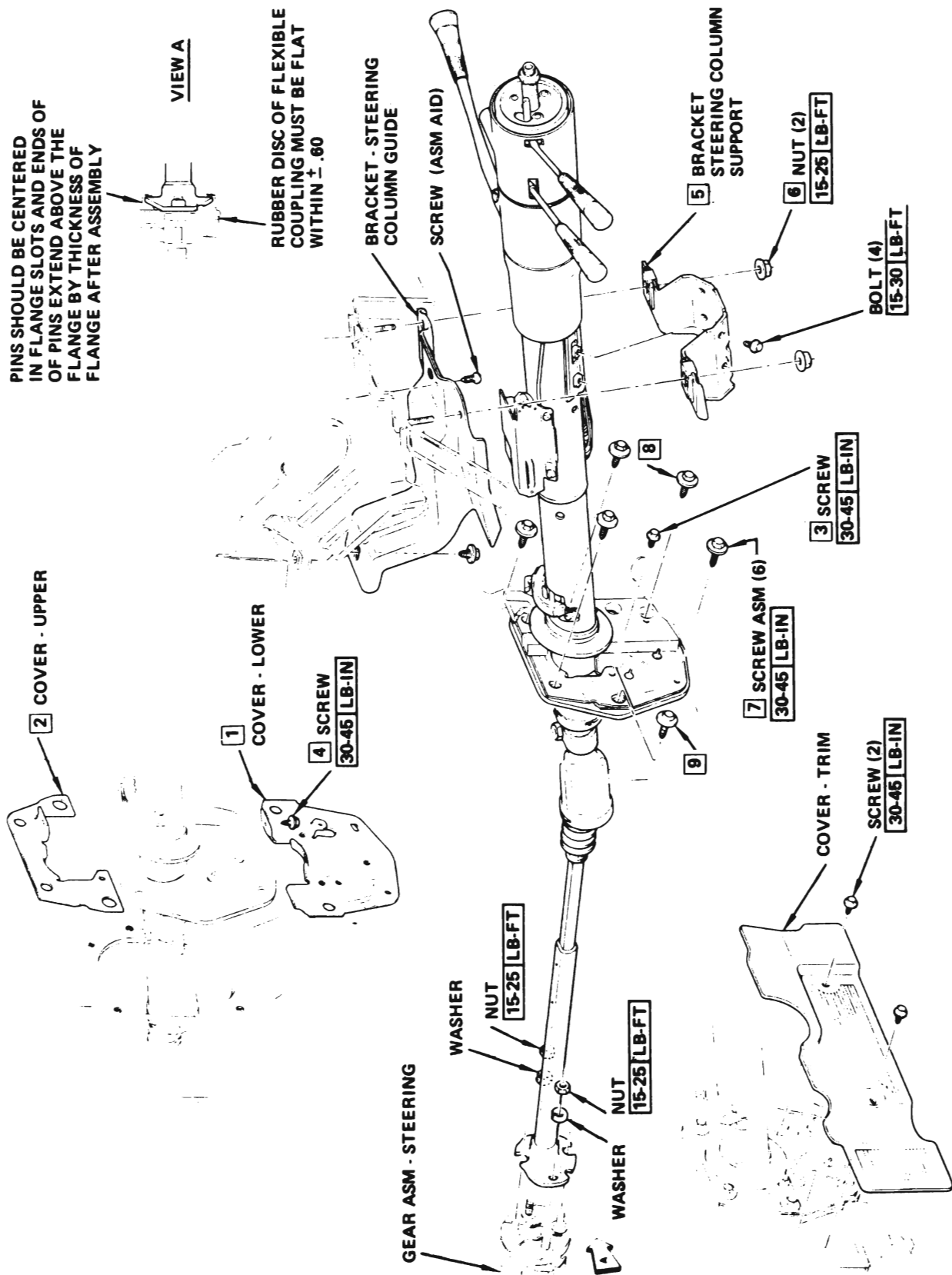
It is mandatory that the installation procedure be followed in exact sequence.

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 or lesser quality or substitute*

design. Torque values must be used as specified during reassembly to assure proper retention of this part.

When installing a new tilt and tilt telescoping column remove the Allen plug in the upper steering shaft. Plug is used only for shipping.

1. Position column in the body and position the flange to the rag joint and install lock washers and nuts and torque to 20 lb. ft.
2. Connect all electrical connectors to steering column. See Figure 3G-27.
3. Position steering column to instrument panel loose assemble nuts and connect shift indicator link.
4. Position lower cover to dash by starting screw (7) in round inlet hole. See Figure 3G-29.
5. Install screw (8) and torque to 40 lb. in. Tighten screw (7) and torque to 40 lb. in.
6. Install screw (3) and (9) and torque to 40 lb. in.
7. Install clamp screw (4) and torque to 40 lb. in.
8. Install remaining three cover screws and torque to 40 lb. in.
9. Torque steering column to instrument panel nuts to 20 lb. ft.
10. Connect shift linkage to shift lever.
11. Reconnect battery negative cable.



483G29

Figure 3G-29 B-C-E Series Column Mounting - Non A.C.R.S.

DISASSEMBLY AND ASSEMBLY OF STANDARD STEERING COLUMN

All elements of energy absorbing columns are sensitive to damage and must be handled with care.

Disassembly - Upper End Only (Column Out Of Car)

If service is required on the upper end only, steps 1 through 12 can be performed in the car. If equipped with air cushion restraint, follow the driver module and steering wheel removal and installation procedure covered in this section. **MAKE SURE COLUMN IS NOT BENT DURING REMOVAL FROM CAR.**

1. Remove steering wheel using specified wheel puller. Do not hammer end of steering shaft.

2. Remove the three cover screws and remove cover. Remove cardboard screw retainers.

3. Depress lock plate using tool J-23653 and the steering wheel nut. Pry the round wire snap ring out of the shaft groove and discard ring. Remove the snap ring and shaft lock plate. See Figure 3G-30. With ring removed, shaft could slide out bottom of column causing damage to shaft.

4. Slide upper bearing preload spring and horn contact turn signal cancelling cam off upper steering shaft.

5. Slide thrust washer off upper steering shaft.

6. Remove turn signal lever screw and lever.

7. Push hazard warning switch in and remove screw and knob.

8. Remove three turn signal switch mounting screws. Remove four mounting bracket screws and the bracket from the jacket. Pull the connector out of the bracket on the jacket. Wrap a piece of tape around

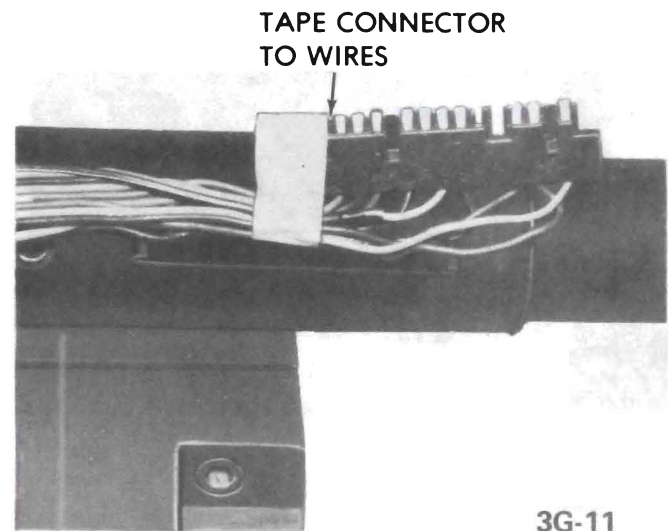


Figure 3G-31 Tape Connector to Wires

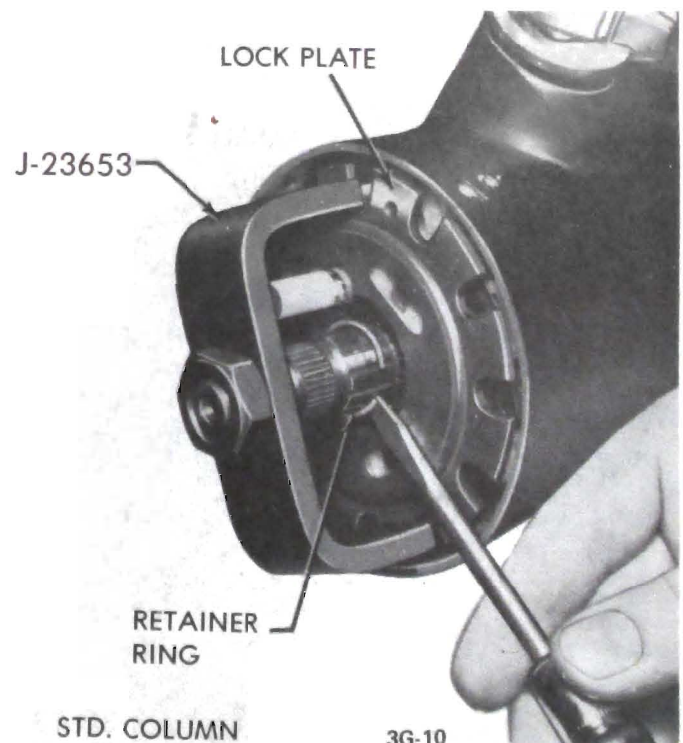
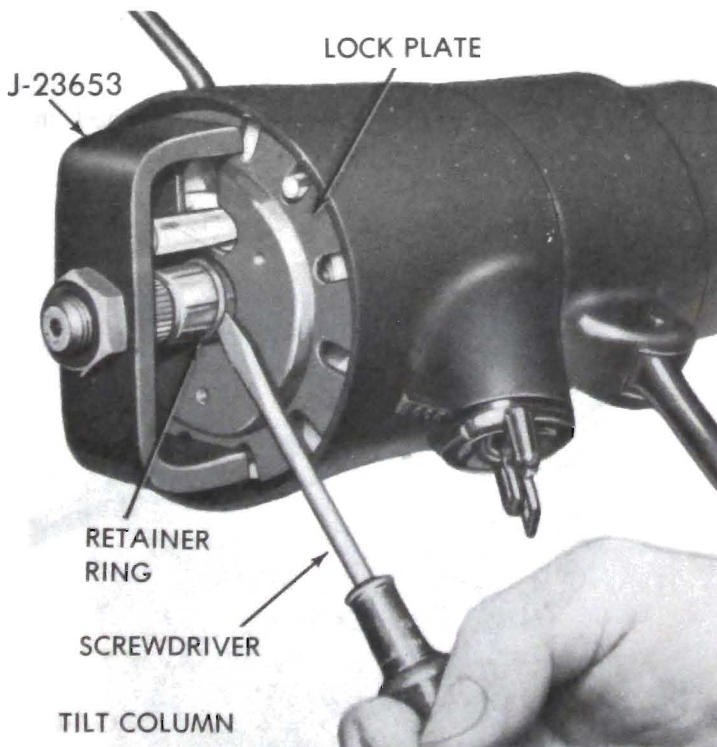


Figure 3G-30 Removing Lock Plate Retainer Ring

the upper part of the connector and wires to prevent snagging when removing switch. Also remove the wire protector. See Figure 3G-31.

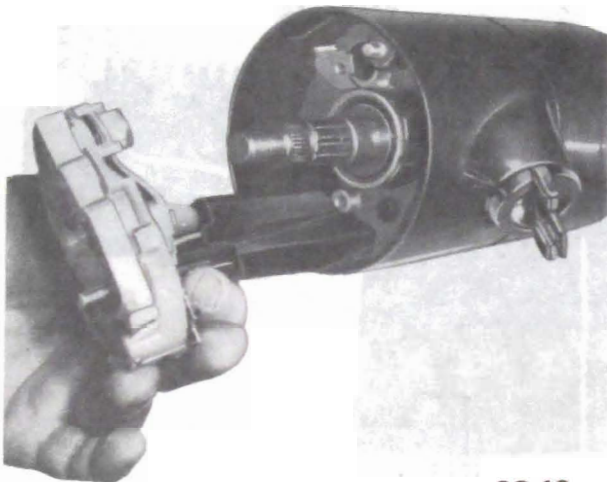
9. Pull the switch straight up with wire protector. See Figure 3G-32.

10. The lock cylinder should be removed in the "run" position.

11. Insert a thin tool (small screw driver or knife blade) into the slot next to the switch mounting

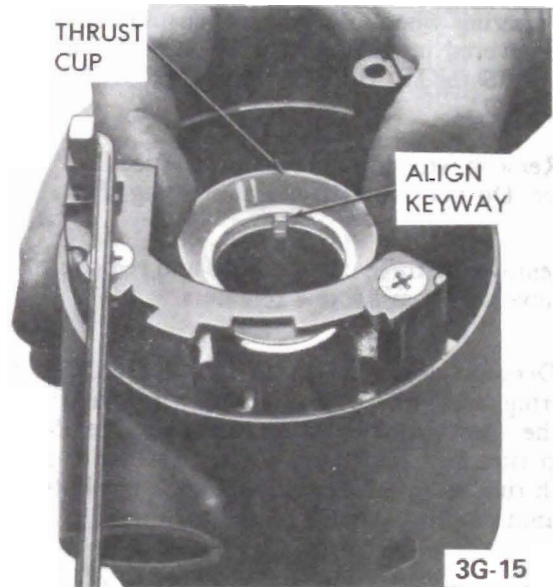
screw boss (right hand slot) and depress spring latch at bottom of slot, which releases lock. Remove lock. See Figure 3G-33.

12. The buzzer switch can be pulled straight out of the housing. (This may be done without removing the lock cylinder. However, the lock cylinder must be in the "run" position.) See Figure 3G-34. Do not pull on switch terminals. Use a bent wire or needle nose pliers to pull on switch clip.



3G-12

Figure 3G-32 Removing Turn Signal Switch and Wires



3G-15

Figure 3G-34 Removing Buzzer Switch

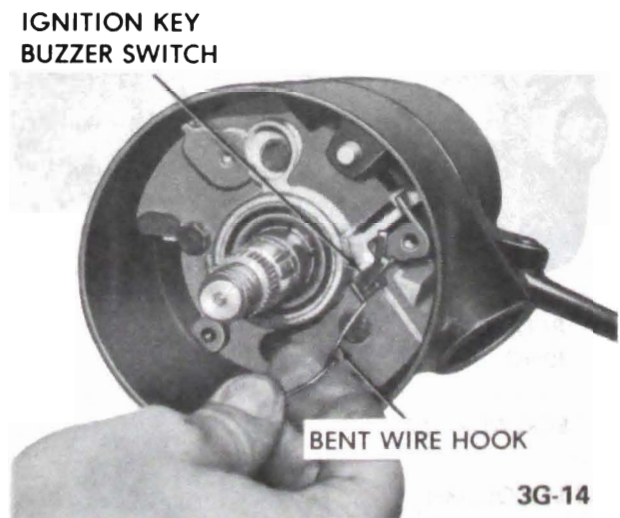
To remove any additional parts from the upper end, the ignition switch should be removed.

13. The ignition switch should be positioned in



3G-13

Figure 3G-33 Removing Ignition Lock Cylinder



3G-14

Figure 3G-35 Removing or Installing Thrust Cup

"OFF-UNLOCKED" position before removing. If the lock cylinder has already been removed, the connecting rod to the switch should be pulled up until there is a definite stop, then move down two detents which is the "OFF-UNLOCKED" position. Now remove the two attaching screws and the switch.

14. Drive out upper shift lever pivot pin and remove upper shift lever.

15. Remove the four screws attaching the upper housing to the jacket. Remove the upper housing assembly.

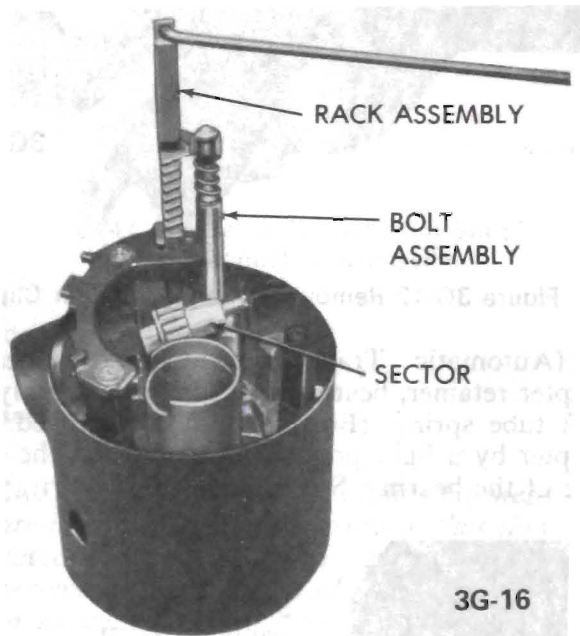


Figure 3G-36 Removing or Installing Rack and Lock Bolt

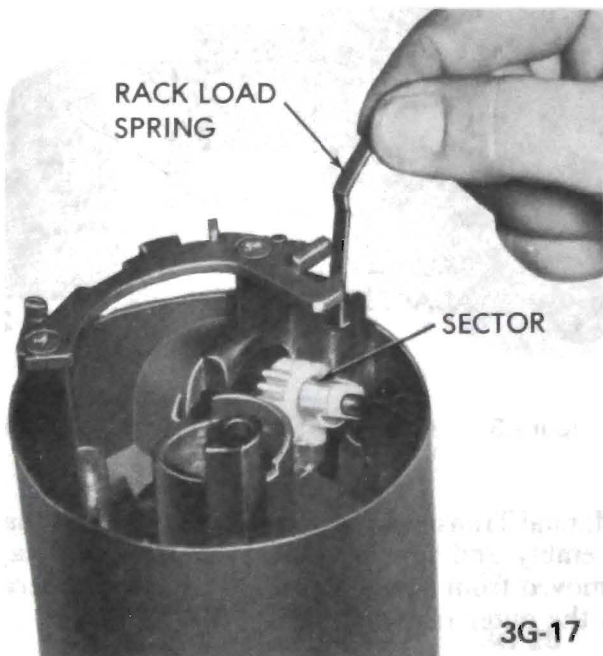


Figure 3G-37 Removing or Installing Load Spring

16. Remove thrust cup. See Figure 3G-35.

17. Remove the rack and lock bolt. See Figure 3G-36.

18. Remove the load spring. See Figure 3G-37.

19. Remove the shift gate. See Figure 3G-38.

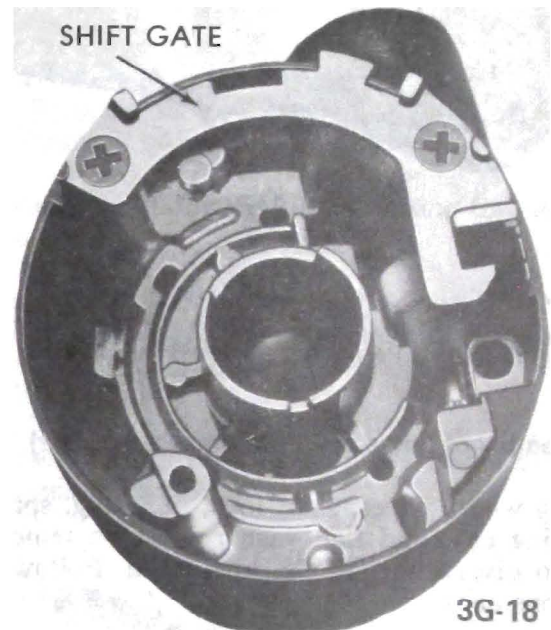


Figure 3G-38 Removing Shift Gate

20. Remove the sector through the lock cylinder hole by pushing firmly on the block tooth of the sector with a blunt punch. See Figure 3G-39.

21. Remove shift bowl and shroud from the jacket.

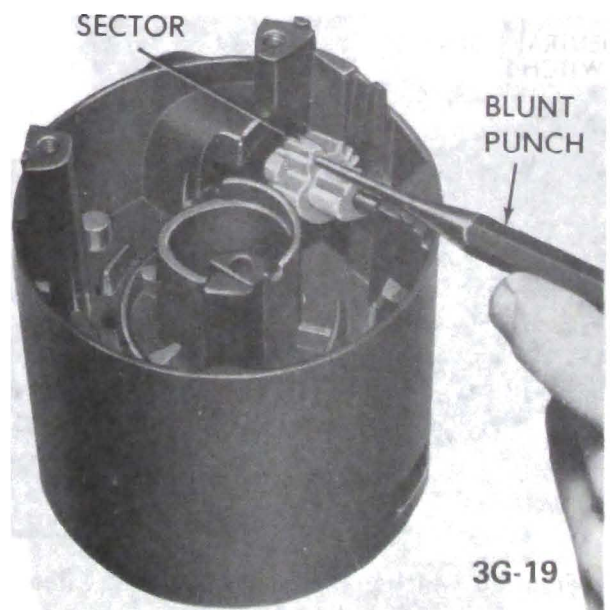
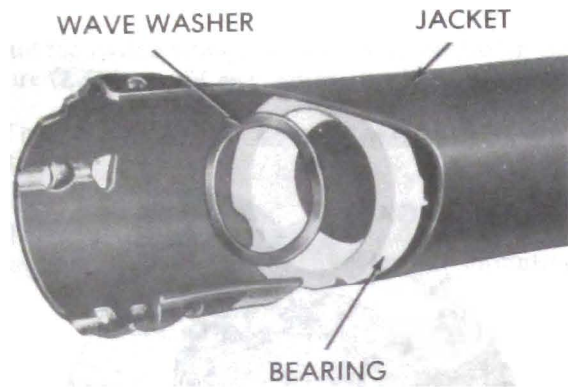


Figure 3G-39 Removing Sector

22. Remove lower bowl bearing from top of jacket. Figure 3G-40.



3G-24

Figure 3G-40 Removing Lower Bowl Bearing

Disassembly of Lower End (Column out of Car)

Steering wheel, cover, shaft lock, "C" ring, spring, cancelling cam and flat washer must be removed prior to disassembly of the lower end. Follow instructions above.

1. Pull steering shaft assembly from bottom of column.

2. (Automatic Transmission) Remove the two screws holding the neutral-start switch and remove switch. See Figure 3G-41.

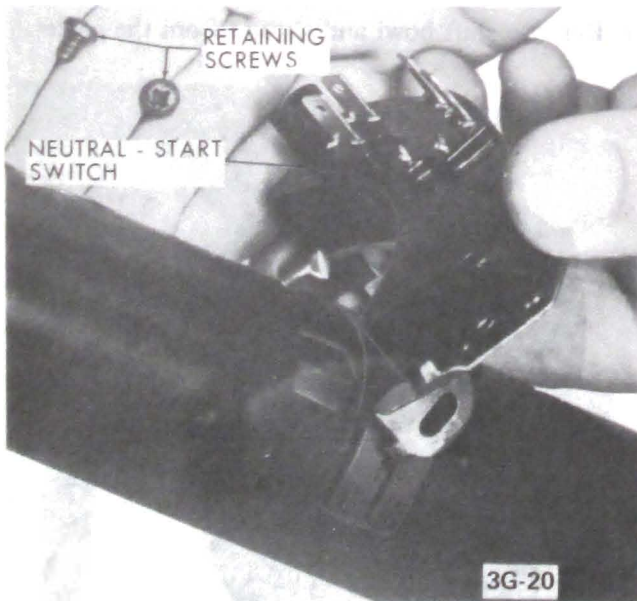
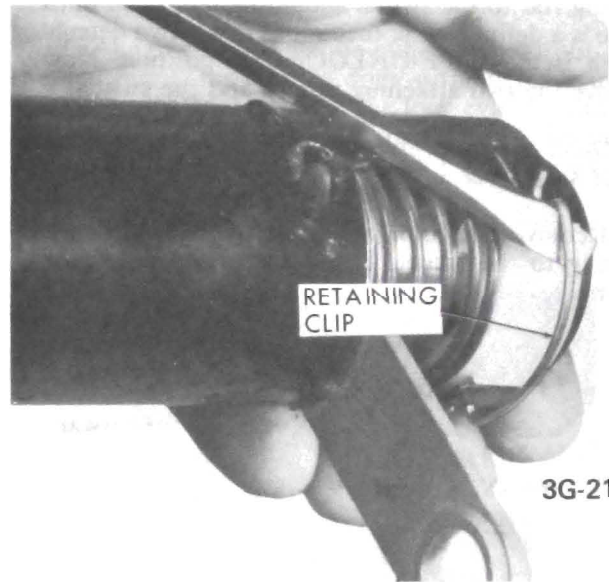


Figure 3G-41 Removing or Installing Switch

(Manual Transmission) Remove the two screws holding the back-up switch and remove switch.

3. Remove bearing adapter clip. See Figure 3G-42.



3G-21

Figure 3G-42 Removing Bearing Adapter Clip

4. (Automatic Transmission) Remove bearing adapter retainer, bearing and adapter assembly and shift tube spring. (Bearing may be removed from adapter by a light pressout operation on the outer race of the bearing. See Figure 3G-43.

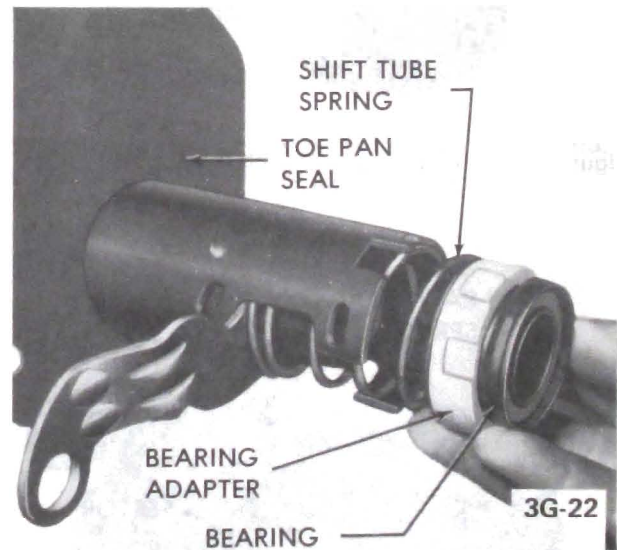


Figure 3G-43 Removing Lower Steering Column Bearing

(Manual Transmission) Remove bearing and adapter assembly and first/reverse lever. (Bearing may be removed from adapter by a light pressout operation on the outer race.)

5. (Manual Transmission Only) Remove three screws from bearing at lower end. See Figure 3G-44.

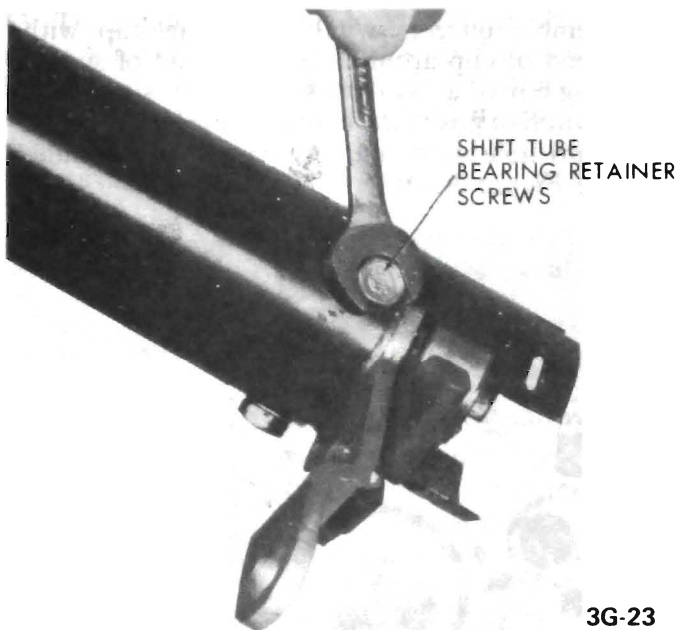


Figure 3G-44 Removing Screws from Shift Tube Bearing-Manual Transmission

6. Slide out shift tube assembly.

Reassembly of Upper End

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 or lesser quality or substitute

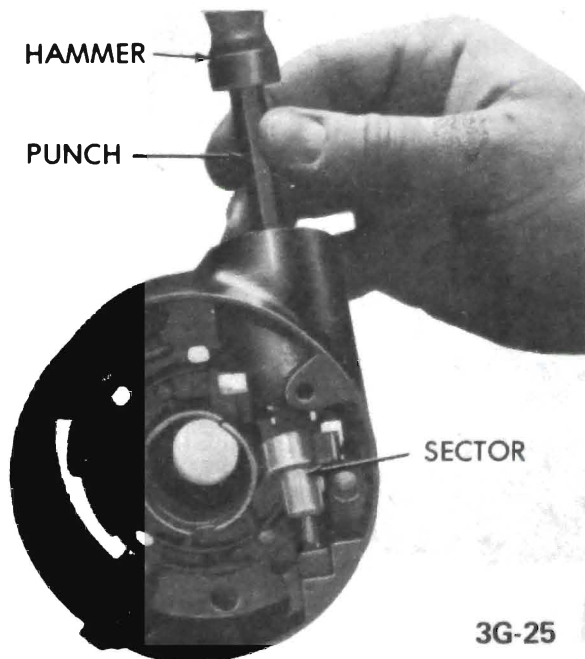


Figure 3G-45 - Installing Sector

design. Torque values must be used as specified during reassembly to assure proper retention of this part.

Apply a thin coat of Lithium Soap Grease to all friction surfaces.

Only the specified screws should be used during assembly operations.

1. Install the sector in the lock cylinder hole over the sector shaft with the tang end to the outside of the hole. Press the sector over the pin with a blunt tool. See Figure 3G-45.

2. Install the shift gate to the housing torque to 45 in-lbs.

3. Insert the rack spring in the housing from the bottom side. The long section should be toward the steering wheel and hook on the edge of the housing. See Figure 3G-37.

4. Assemble the bolt to the cross-over arm of the rack. See Figure 3G-46.

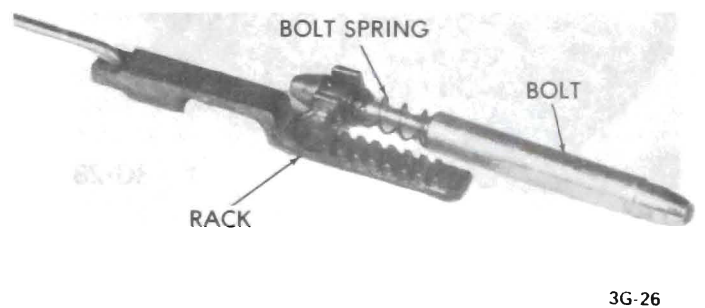


Figure 3G-46 - Assembling Bolt to Rack Cross-Over Arm

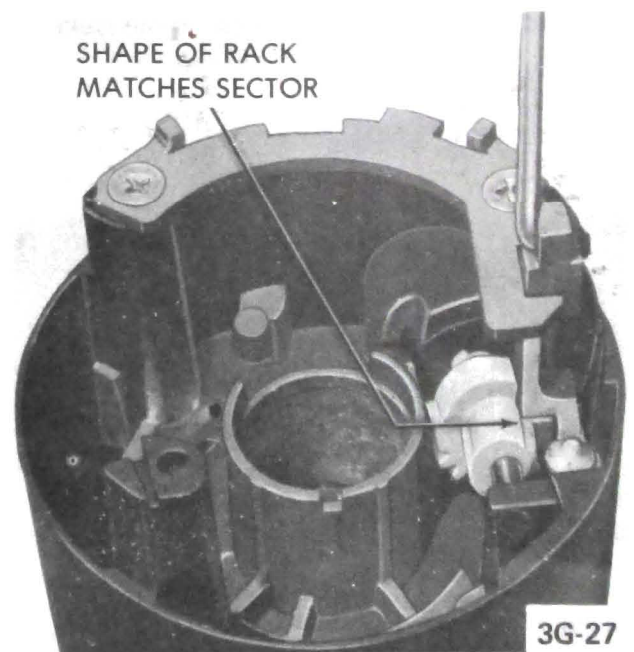


Figure 3G-47 - Rack and Lock Bolt Assembled to Sector

5. Insert the rack and lock bolt into the housing from the bottom with the teeth up (toward steering wheel) and toward the centerline of the column. See Figure 3G-47.

6. Install the thrust cup on the bottom hub of the housing. Be sure key of cup aligns with keyway in hub. See Figure 3G-35.

7. Install lower bowl bearing in jacket and place wave washer in bowl bearing. See Figure 3G-40.

8. Install bowl and rotate it to be sure it is seated in bearing. See Figure 3G-48. Shift lever must not be installed before installing bowl.



Figure 3G-48 - Installing Shift Bowl

9. With the bowl in place, install the upper bearing housing assembly on the jacket. The bowl should be in the "Park" position and the rack pulled downward. Be sure the housing is seated on the jacket and install the screws. See Figure 3G-49.

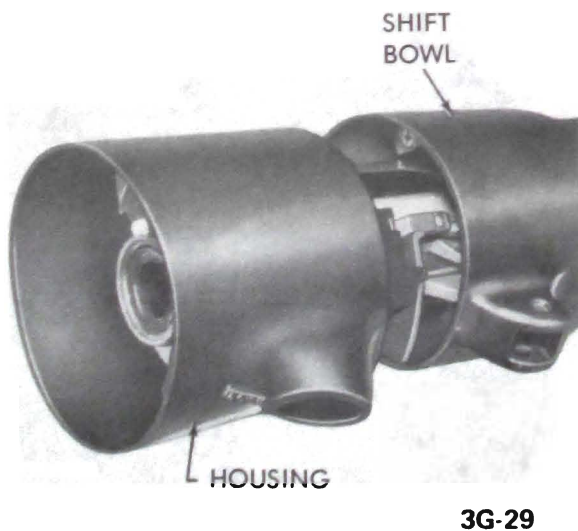


Figure 3G-49 - Installing Upper Bearing Housing

10. Assemble buzzer switch to spring clip with formed end of clip around the lower end of switch and spring bowed away from switch. This should lay on the switch opposite the contacts. Push switch and spring into hole with contacts toward the cylinder bore. See Figure 3G-50.

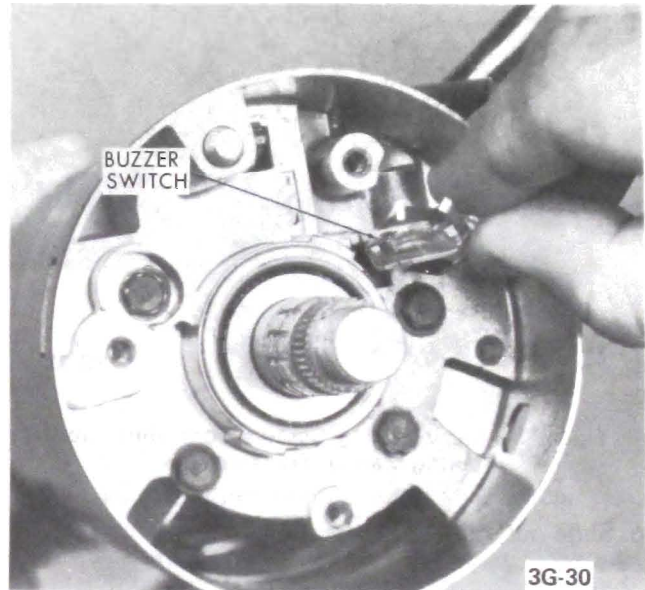


Figure 3G-50 - Installing Buzzer Switch Clip and Switch

11. To replace the turn signal switch. Feed the connector down through the housing. Assemble wires into protector and tape protector to column.

12. Drive the four mounting screws. Clip the connector to the bracket on the jacket. See Figure 3G-51.

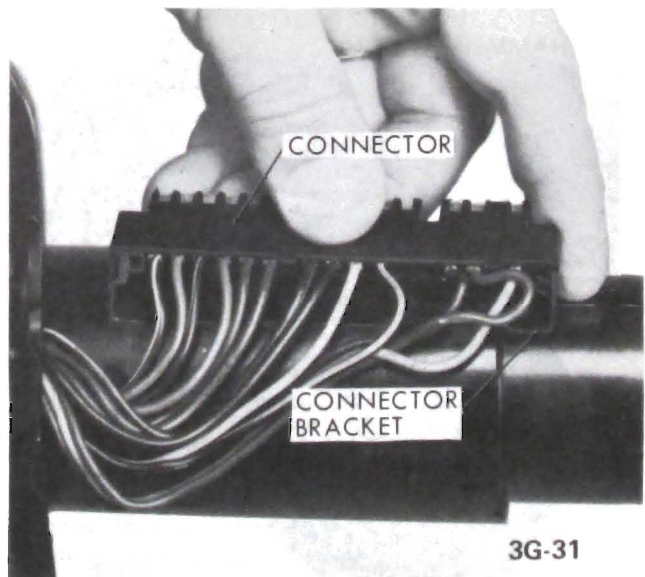


Figure 3G-51 - Installing Connector in Column Bracket

13. To install lock, hold lock cylinder sleeve and rotate knob clockwise against stop. Insert cylinder into housing bore with key on cylinder sleeve aligned to keyway in housing, push in to abutment of cylinder and sector. Rotate knob counterclockwise, maintaining a light push inward on cylinder, until drive section of cylinder mates with sector. Push in until snap ring pops into grooves and lock cylinder is secured in housing. Check freedom of rotation.

14. When installing the ignition switch, be sure the shift bowl is in any position except "Park" and rotate lock counterclockwise until the rack bottoms against the lower surface of the cast in bowl plate. Place the ignition switch in the "OFF-UNLOCK" position by moving the slide to "ACCESSORY" (extreme left) Figure 3G-52. Move two positions to "OFF-UNLOCK" right. Fit the actuator rod into the slider hole and assemble to column. Do not move switch out of detent. Tighten screws to 35 in-lbs.

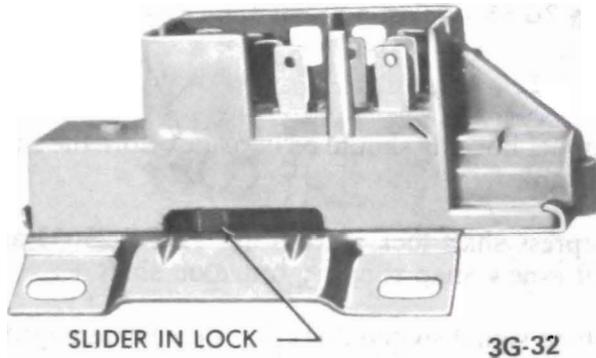


Figure 3G-52 - Ignition Switch Slider in "Lock" Position

15. Install the washer, spring and horn contact - cancelling cam on shaft, making certain that the turn signal switch is in "Neutral" and the hazard warning plunger is out. Install the shaft lock plate on the shaft. See Figure 3G-53.

The turn signal switch assembly may be damaged if the above procedure is not followed.

16. Depress shaft lock plate using Tool J-23653 and install a new snap ring in groove on shaft.

17. Place cover on shaft lock and install screws to 15 in-lbs.

18. Install steering wheel and levers. Be sure to use tongue depressor on bowl spring. Be sure bowl is in "Drive" when inserting shift lever.

19. Install steering wheel and levers.

Reassembly of Lower End

CAUTION: Fasteners in the following steps are important attaching parts in that they

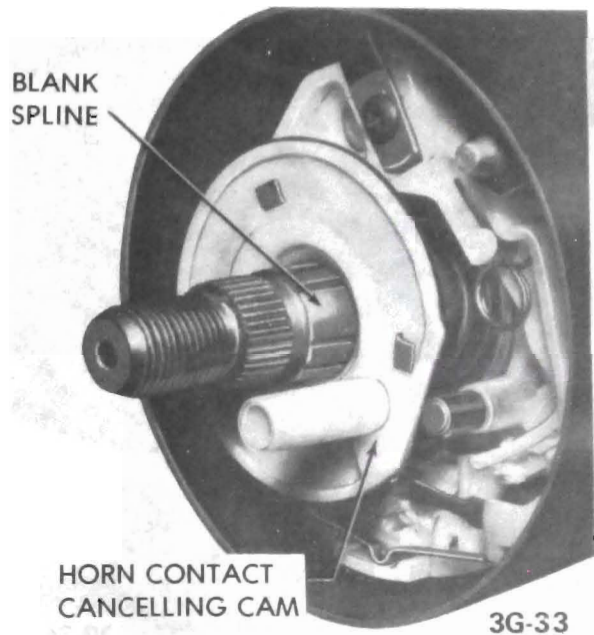


Figure 3G-53 - Horn Contact - Cancelling Cam Installed

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 or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

Apply a thin coat of Lithium Soap Grease to all friction surfaces.

Only the specified screws should be used during assembly operations.

1. Press the lower bearing assembly into adapter assembly.

2. Insert the shift tube assembly into the lower end of the jacket and rotate until the upper shift tube key slides into the bowl keyway.

3. (Manual Transmission Only) Loosely attach three screws in jacket and shift tube bearing. See Figure 3G-44.

4. (Automatic Transmission) Assemble the spring adapter assembly into the bottom of the jacket. Holding the adapter in place, insert the snap ring in the jacket slots.

(Manual Transmission) Assemble the first/reverse lever and adapter assembly into the bottom of the jacket. Holding the adapter in place, insert the snap ring in the jacket slots. See Figure 3G-54.

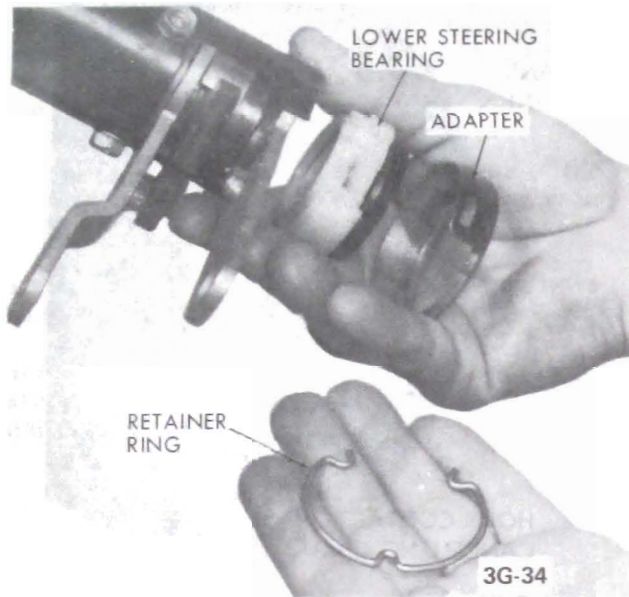


Figure 3G-54 - Installing Lower Steering Column Bearing - Manual Transmission

5. (Manual Transmission Only) Place a .005 shim between first/reverse lever and lever spacer and turn upper shift bearing down and tighten the three screws. Remove shim. See Figure 3G-55.

6. (Automatic Transmission) Install the neutral-start switch, making certain the proper screws are used torque to 15 in-lbs. See Figure 3G-41.

(Manual Transmission) Install back-up switch, make certain only the proper screws are used.

7. Slide steering shaft assembly into column.

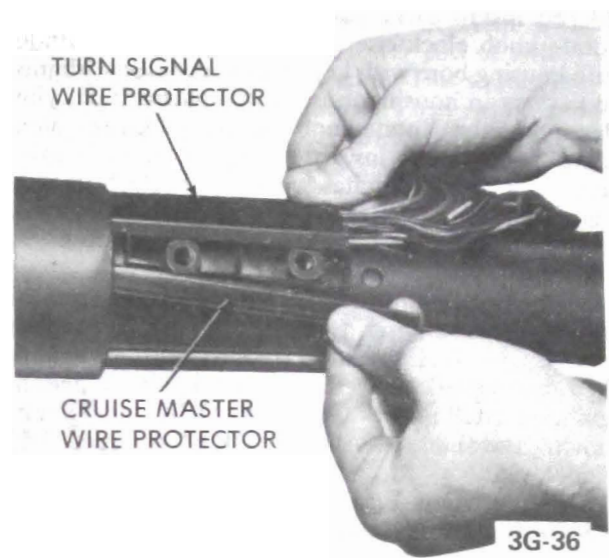


Figure 3G-55 - Adjusting Shift Tube Bearing Manual Transmission

The upper housing should be in place before the shaft is assembled.

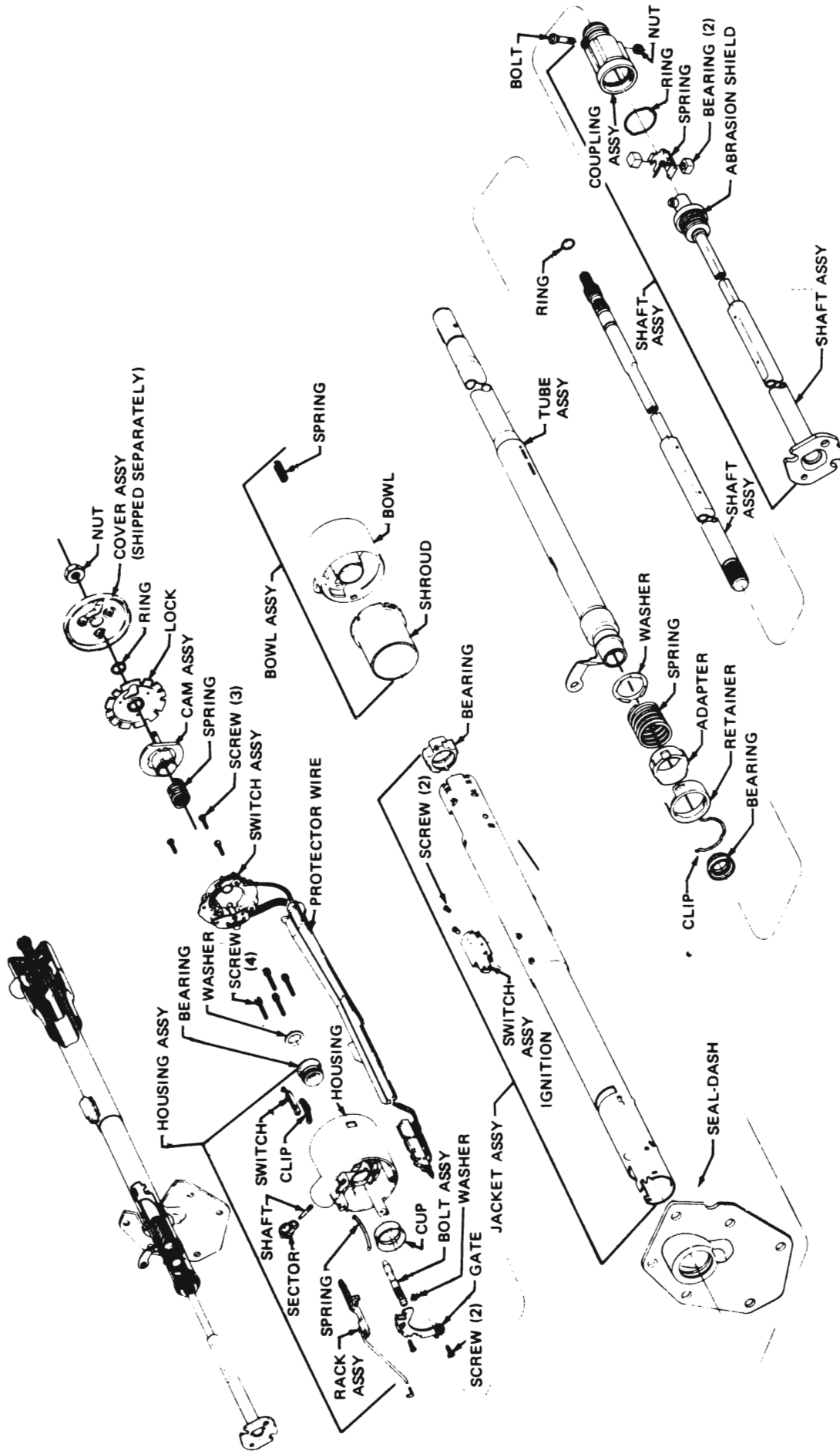
8. Depress shaft lock plate using Tool J-23653 and install a new snap ring in groove on shaft.

The turn signal switch assembly may be damaged if the above procedure is not followed.

9. Place cover on shaft lock and install screws.

10. Install steering wheel and levers. Be sure to use tongue depressor on bowl spring. Be sure bowl is in "Drive" when inserting shift lever.

11. Adjust neutral-start back-up light switch with shift lever in "Drive" position.



3G-56

Figure 3G55A Standard Steering Column

DISASSEMBLY AND ASSEMBLY OF TILT STEERING COLUMN

All elements of energy absorbing columns are sensitive to damage and **MUST BE HANDLED WITH CARE.**

Disassembly (Column Out of Car)

If service is required on the upper end only, steps 1 thru 24 may be performed in the car. It will be necessary however, to lower steering column from instrument panel so that bracket can be removed to allow removal of turn signal switch and wires.

1. Remove column mounting bracket from column and **SET ASIDE TO PROTECT BREAKAWAY CAPSULES.**
2. Mount assembly in vise by clamping weld nuts on column in vise.
3. Remove steering wheel using specified wheel puller. Do not hammer on end of steering shaft.
4. Remove signal switch wire protector. Wrap tape around upper connector and wires to prevent swagging during removal. See Figure 3G-56.
5. Remove three cover screws and remove cover.
6. Remove tilt release lever, turn signal switch lever, push hazard warning plunger in and remove hazard warning knob. Remove upper shift lever from bowl. Remove transmission indicator wire and neutral start switch.

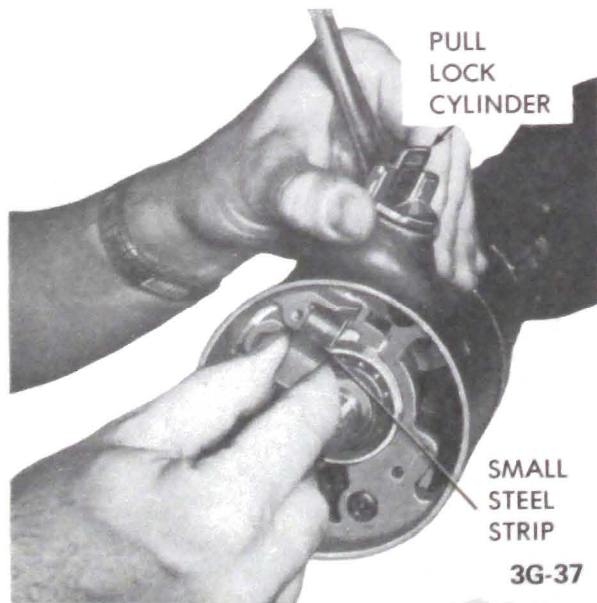


Figure 3G-56 - Signal Switch Wire Protector

7. Depress lock plate using tool J-23653 and the steering wheel nut. Pry the round wire snap ring out of the shaft groove and discard ring. Remove the shaft lock plate. See Figure 3G-30.

8. Remove cancelling cam and cancelling cam spring.

9. Remove three turn signal switch mounting screws. Wrap a piece of tape around the upper part of the connector and wires to prevent snagging when removing switch. See Figure 3G-31.

10. Position shift bowl or shroud (if floor shift column) in "Low" position. Pull the switch straight up.

11. The lock cylinder should be removed in the "Run" position.

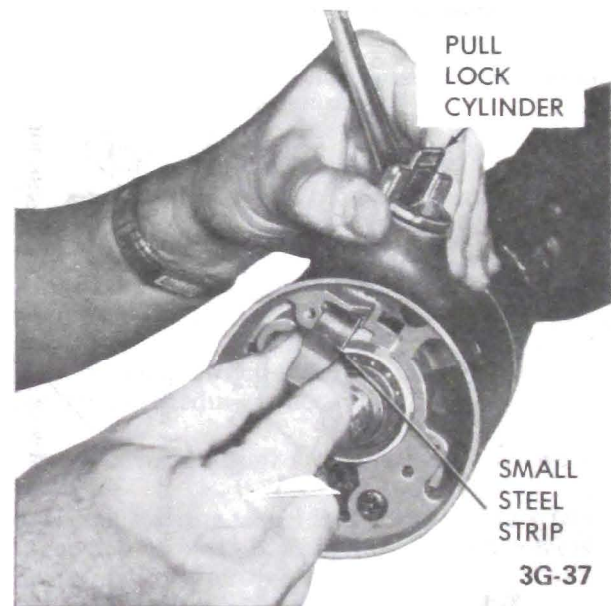


Figure 3G-57 - Removing Ignition Lock Cylinder

12. Insert a thin tool (small screwdriver or knife blade) into the slot next to the switch mounting screw boss (right-hand slot) and depress spring latch at bottom of slot, which releases lock. Remove lock. See Figure 3G-57.

13. The buzzer switch can be pulled straight out of the housing. See Figure 3G-58. Do not pull on switch terminals. Use a bent wire or needle nose pliers to pull on switch clip.

14. Remove three housing cover screws and remove housing cover.

15. Install tilt release lever and place column in full "Up" position. Remove tilt spring retainer using screwdriver blade that just fits into slot opening. Care should be observed when releasing tilt spring

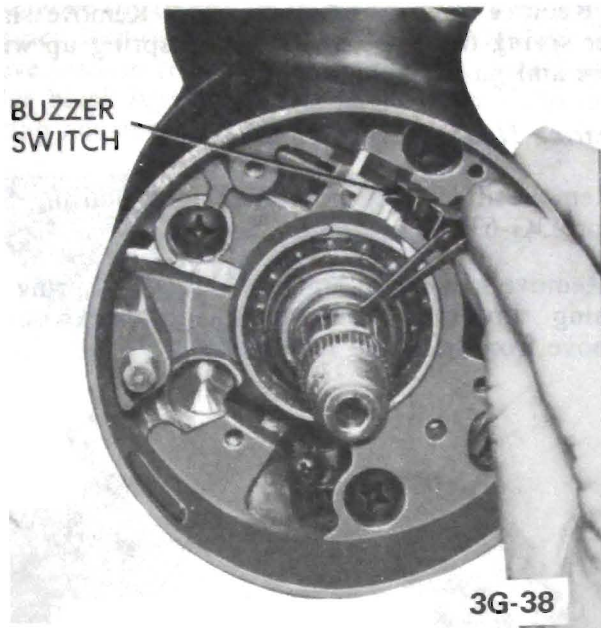


Figure 3G-58 - Removing Buzzer Switch

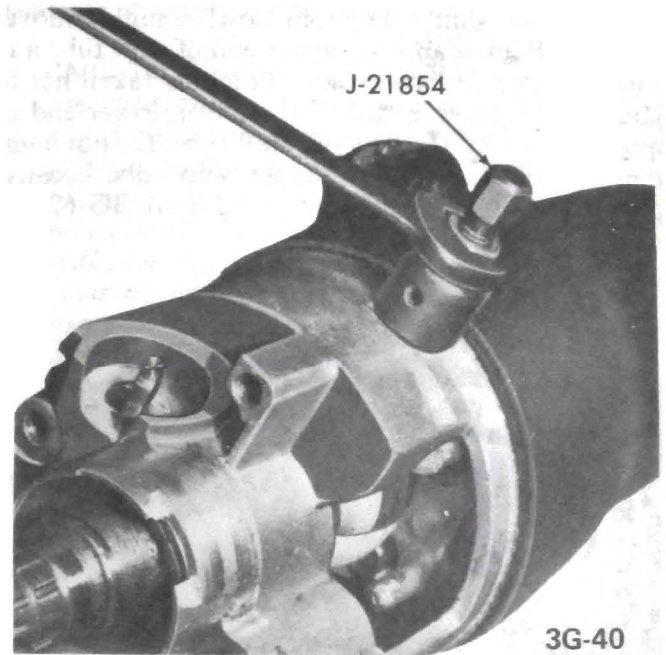
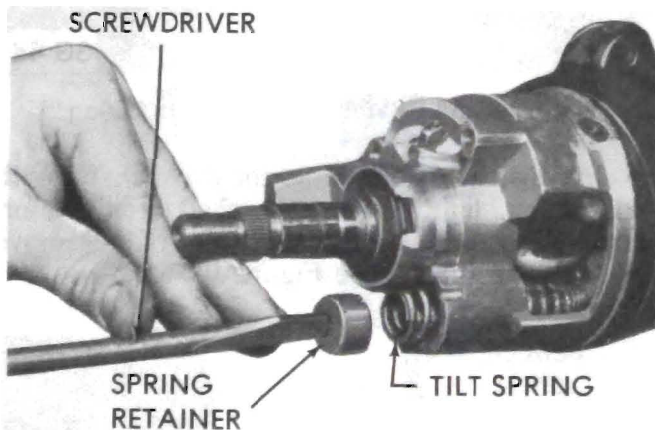


Figure 3G-60 - Removing Pivot Pin

due to high compression rate of the spring. Insert screwdriver in slot, press in approximately 3/16 inch, turn approximately 1/8 turn counterclockwise until ears align with grooves in housing and remove spring and guide. See Figure 3G-59.



3G-39

Figure 3G-59 - Removing Tilt Spring Retainer

16. With ignition switch in "Accessory" position, remove two ignition switch mounting screws and ignition switch. Remove two neutral-start switch screws and neutral-start switch.

17. Remove two pivot pins with Tool No. J-21854-1. See Figure 3G-60.

18. Install tilt release lever place in full "UP" and disengage lock shoes. Remove bearing housing assembly by pulling upward to extend rack full down and moving housing assembly to the left to disengage rack from actuator. Remove actuator rod assembly.

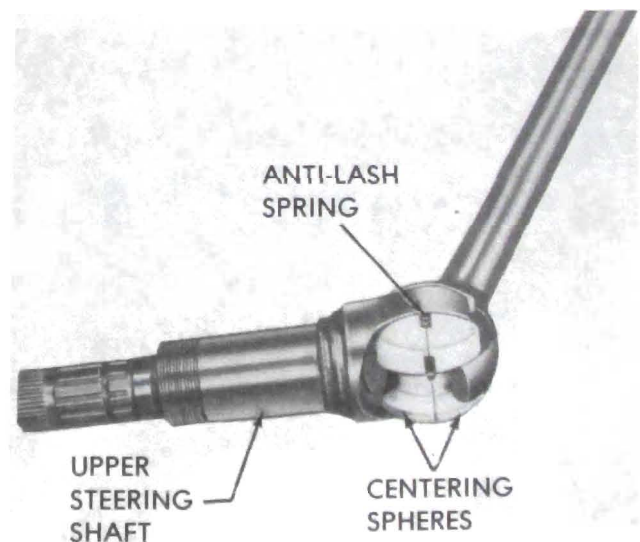
19. Remove steering shaft assembly from upper end.

20. Disassemble steering shaft assembly by removing centering spheres and anti-lash spring. See Figure 3G- 61.

21. Remove four support screws and remove support assembly.

22. Remove shift tube retaining ring with screwdriver. Remove thrust washer.

Also remove clip, bearing adapter retainer and bearing adapter from lower end of housing.



3G-41

Figure 3G-61 - Steering Shaft and Centering Spheres

23. Remove shift tube from bowl using Remover J-23072. Pilot adapter in upper end of shift tube and force tube out of bowl. Care should be taken not to jam lower shift lever into "T" slot on lower end of mast jacket while forcing out shift tube. Do not hammer or pull on lower or upper shift tube because plastic joint may be sheared. See Figure 3G-62.



Figure 3G-62 - Removing Shift Tube

24. Remove shift tube assembly from mast jacket from lower end.

25. Remove lock plate by sliding out of jacket notches and tipping down toward bowl hub at 12 o'clock position and under jacket opening. Remove wave washer.



Figure 3G-63 - Removing Tilt Lever Opening Shield

26. Remove bowl from mast jacket. Remove shift lever spring from bowl by winding spring up with pliers and pulling out.

(Bearing Housing Disassembly)

1. Remove tilt lever opening shield from housing. See Figure 3G-63.

2. Remove lock bolt spring by removing spring retaining screw and moving spring clockwise to remove from bolt. See Figure 3G-64.

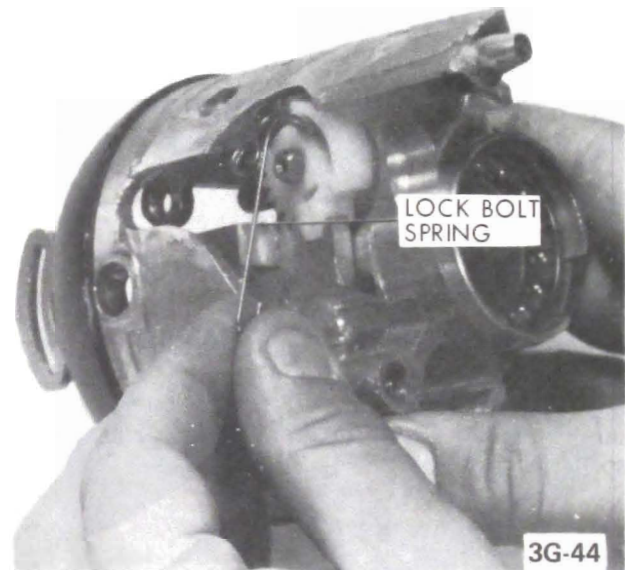


Figure 3G-64 - Removing Lock Bolt Spring

3. Remove snap ring from sector drive shaft. With small punch, lightly tap drive shaft from sector. Remove drive shaft, washer, sector and bolt. Remove rack and rack spring. See Figure 3G-65.

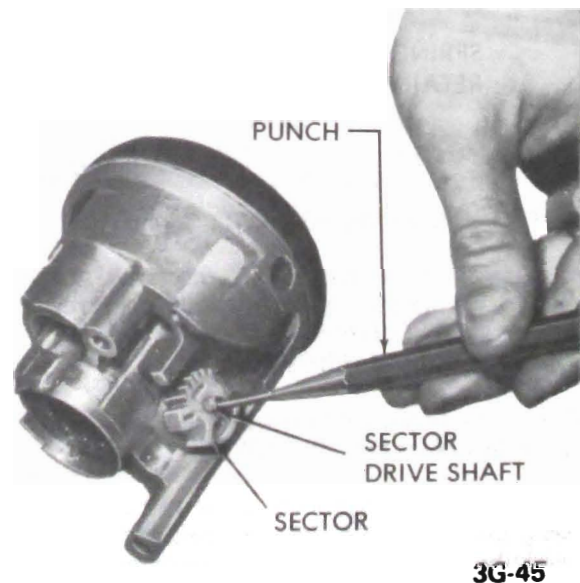


Figure 3G-65 - Removing Sector Drive Shaft.

4. Remove tilt release lever pin with pin punch and hammer. Remove lever and release lever spring. (To relieve load on release lever, hold shoes inward and wedge block between top of shoes (over slots) and bearing housing). See Figure 3G-66.

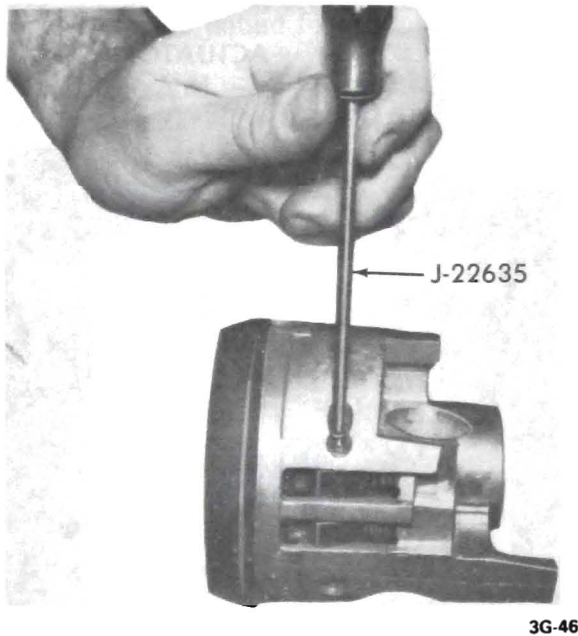


Figure 3G-66 - Removing Lock Shoe Pivot Pin

5. Remove lock shoe pin with punch and hammer. Remove lock shoes and lock shoe springs. See Figure 3G-67.



Figure 3G-67 - Removing Release Pin

6. Remove bearings from bearing housing only if they are to be replaced. Remove separator and balls from bearing. Place housing on work surface. With a pointed punch against back surface of race, carefully hammer race out of housing until bearing puller can be used. Repeat for other race.

Assembly of Steering Column

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 or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

Apply thin coat Lithium Soap Grease to all friction surfaces.

1. Install bearings in bearing housing, if removed.
2. Install lock shoe springs, lock shoe and shoe pin in bearing housing. Use .180 inch diameter rod to line up shoes for pin installation.
3. Install spring, release lever and pin in bearing housing. (Relieve load on release lever as in Step 4 of disassembly procedure.)
4. Install washer and drive shaft in housing. Lightly tap sector onto the shaft far enough to install snap ring. Replace snap ring if it was removed.
5. Install lock bolt and engage with sector cam surface. See Figure 3G-68.

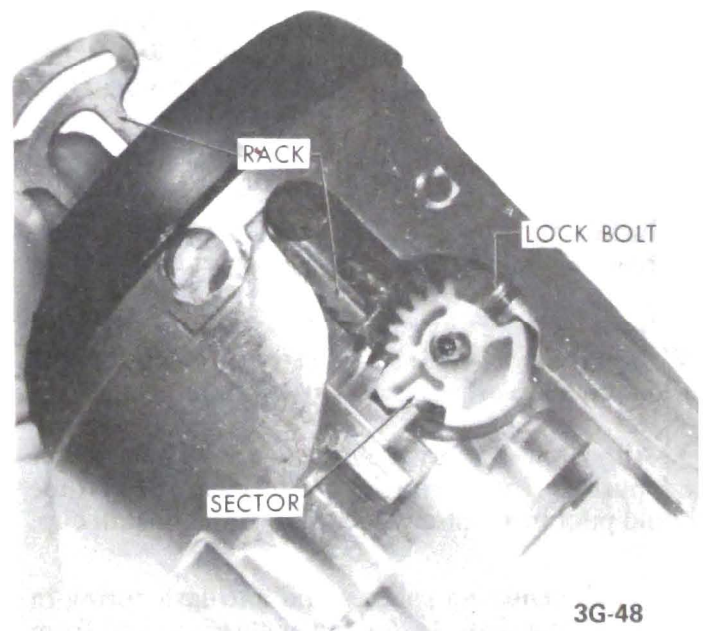


Figure 3G-68 - Engaging Block Tooth on Rack to Sector

6. Install rack and spring. Block tooth on rack to engage block tooth on sector. Install external tilt release lever.

7. Install bolt spring and spring retaining screw. Torque to 35 pound inch. See Figure 3G-64.
8. Install shift lever spring in bowl by winding up with pliers and pushing in. Slide bowl into mast jacket.
9. Install wave washer and lock plate in place. Work lock plate into notches in jacket by tipping lock plate toward hub at 12 o'clock position and under jacket opening slide lock plate into notches in jacket.
10. Carefully install shift tube in lower end of mast jacket. Align keyway in tube with key in bowl and using Installer J-23073, pull shift tube into bowl. See Figure 3G-69. Do not push or tap on end of shift tube.

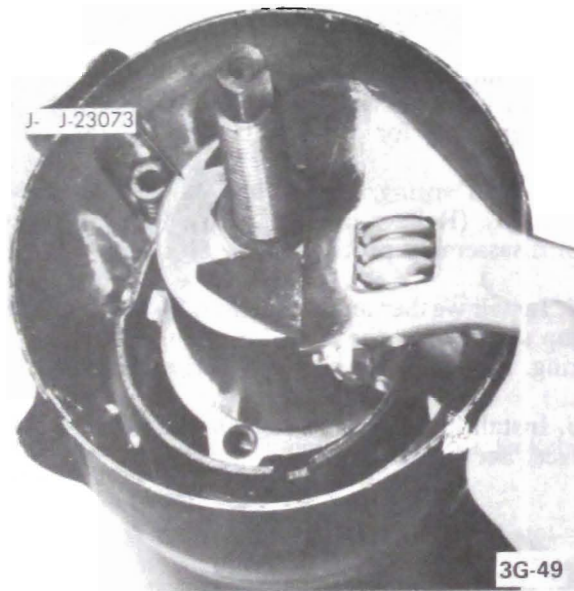


Figure 3G-69 - Installing Shift Tube

11. Install thrust washer and retaining ring by pulling bowl up to compress wave washer.
12. Install support by aligning "V" in support with "V" notch in jacket. Insert screws through support in lock plate. Torque screws to 60 pound inch.
13. Align lower bearing adapter notches in jacket and push in lower end of mast jacket. Shift tube should pilot in adapter while this is done. Install clip.
14. Install centering spheres and anti-lash spring in upper steering shaft. Install lower steering shaft from same side of spheres that spring ends protrude.
15. Install steering shaft assembly in shift tube from upper end. Carefully guide shaft through shift tube and bearing.
16. Install ignition switch actuator rod through bowl

from bottom and insert in slot in support. Extend rack downward from bearing housing.

17. Assemble bearing housing over steering shaft and engage rack over end of actuator rod. See Figure 3G-70.

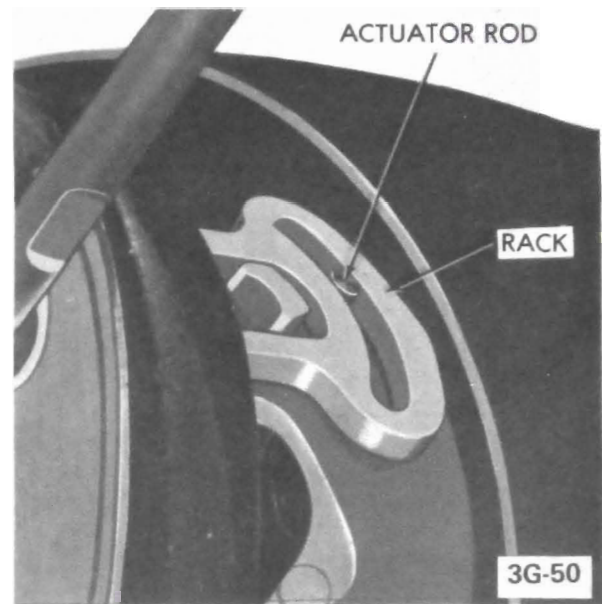


Figure 3G-70 - Installing Bearing Housing

18. Install external tilt release lever and, holding lock shoes in disengaged position, assemble bearing housing over steering shaft until the pivot pin holes line up.
19. Install pivot pins. Assemble as far as possible using palm pressure of hand. Once started tap with a small hammer and punch.
20. Place housing in full "Up" position and install guide, tilt spring and tilt spring retainer, using screwdriver in retainer slot. Turn retainer clockwise to engage. Make sure there is grease between the guide and peg on support. See Figure 3G-59.
21. Install inner race and inner race seat.
22. Install tilt lever opening shield in housing. See Figure 3G-63.
23. Remove tilt release lever, install housing cover and seat screw at 12 o'clock position first. Tighten to 100 in-lbs, 3 screws.
24. Assemble buzzer switch to spring clip with formed end of clip under end of switch and spring bowed away from switch on side opposite contact. Push switch and spring into hole in cover to the step with the contacts toward lock cylinder bore.
25. Install turn signal switch wires and connector through cover, bearing housing and bowl. Push haz-

ard warning knob in, install switch and torque screws to 25 pound inch. Short screw goes in hole nearest to lock cylinder.

26. Install spring, spacer, no-back washer (if one is used) and lower steering shaft flange. Torque flange pinch bolt to 30 pound foot.

27. Install hazard warning knob and pull knob out. Install cancelling cam spring, cancelling cam and shaft lock.

28. Depress shaft lock plate using Tool J-23653 and install a new snap ring in groove on shaft.

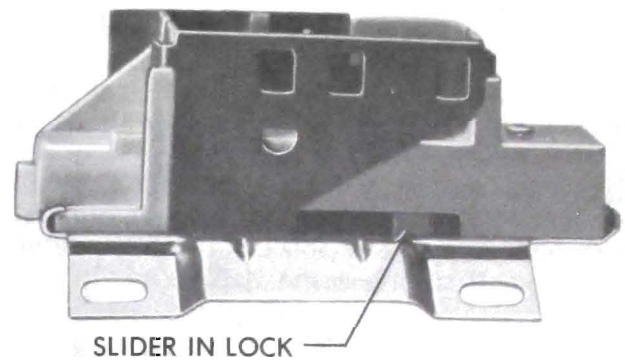
The turn signal switch assembly may be damaged if the above procedure is not followed.

29. Install tilt release lever, signal switch lever (15 in-lbs.) and hazard warning knob (5 in-lbs.). Install upper shift lever and drive in pivot pin.

30. To install lock, hold lock cylinder sleeve and rotate knob clockwise against stop. Insert cylinder into cover bore with key on cylinder sleeve aligned to keyway in housing, push in to abutment of cylinder and sector. Rotate knob counterclockwise, maintaining a light push inward on cylinder, until drive section of cylinder mates with drive shaft. Push in until snap ring pops into groove and lock cylinder is secured in cover. Check freedom of rotation.

31. Install shaft lock cover and torque three screws to 15 lb.in.

32. When installing the ignition switch, be sure the lock cylinder is in "Acc" position. Position by moving slider to extreme right. Fit the actuator rod into



3G-51

Figure 3G-71 - Ignition Switch Slider

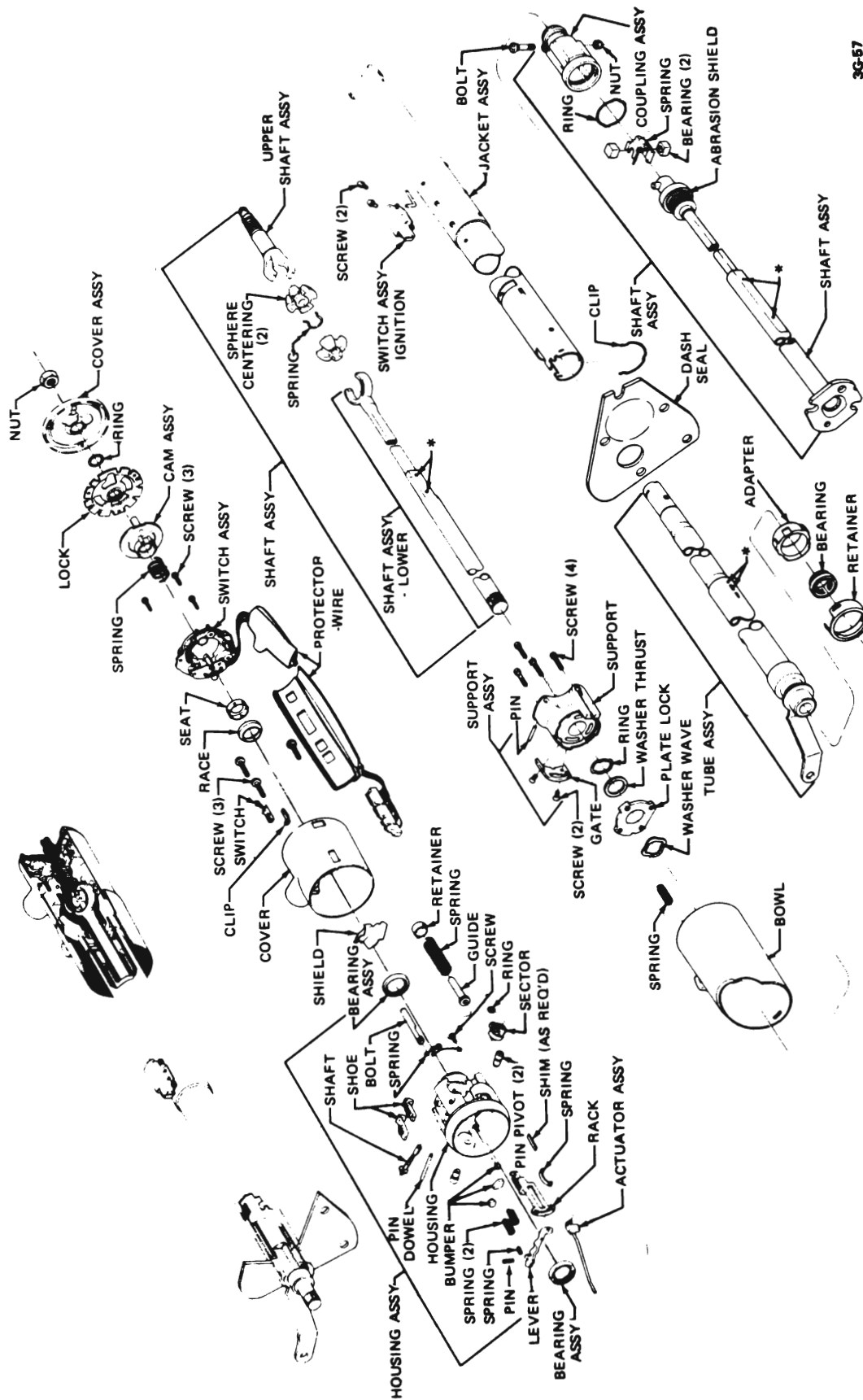
slider hole and assemble to column. Lightly push switch down the column to take out lash in rod and tighten screws. Do not move switch out of detent. Tighten to 35 in-lbs. Figure 3G-71.

33. Install neutral-start back-up light switch. Do not tighten screws. Neutral-start switch will be adjusted in the car.

34. Install wire protector over wires and on mast jacket. Install mounting bracket. See Figure 3G-56.

35. Install steering wheel. Torque steering wheel nut to specified torque. Install horn actuator parts.

36. Adjust neutral-start back-up light switch with shift lever in "Drive" position.



3G-57

Figure 3G-72 Tilt Steering Column

DISASSEMBLY AND ASSEMBLY OF TILT AND TELESCOPING COLUMN

Disassembly

1. Disconnect at flexible coupling - remove column from car.
2. Remove column mounting bracket from column and SET ASIDE TO PROTECT BREAKAWAY CAPSULES.
3. Mount assembly in vise.
4. Remove steering wheel using wheel puller. DO NOT HAMMER ON END OF STEERING SHAFT AS THIS COULD LOOSEN THE PLASTIC INJECTIONS.
5. Remove signal switch wire protector. DO NOT DAMAGE WIRES. Wrap tape around connectors and upper part of wires to prevent snagging when removing switch. Figure 3G-31.
6. Remove tilt release lever, signal switch lever and hazard warning knob. Remove indicator wire, if automatic transmission column. Depress hazard warning switch after knob removal. Remove upper shift lever from bowl. Remove bumper and "C"-ring retainer. Pry up carefully to avoid damage to retainer. Remove neutral start switch.
7. Use carrier and spring removal J-23063 and pull "C" ring, shaft lock, carrier and spring. Figure 3G-73. If there is an Allen plug in the upper shaft, remove and discard.

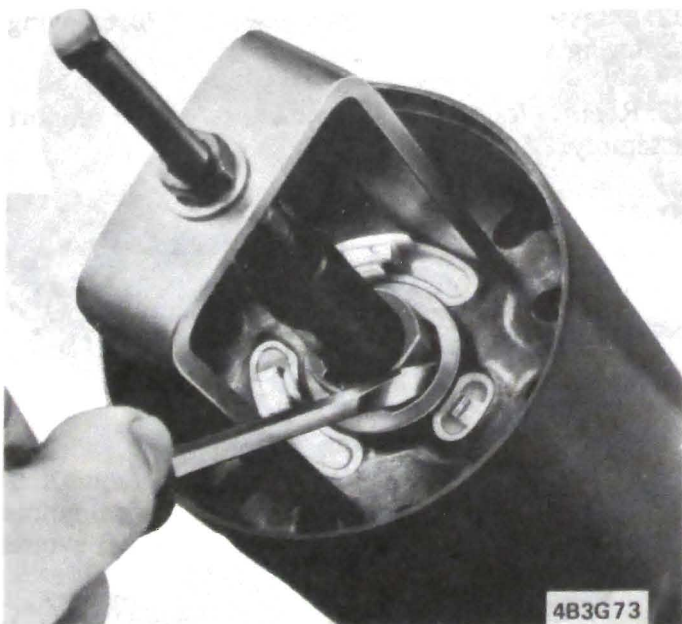


Figure 3G-73 Removing "C" Ring

8. Remove three switch mounting screws.

9. Position shift bowl or shroud (if floor shift column) in "low" position. Pull the switch straight up.

10. The lock cylinder should be removed in the "Run" position.

11. Insert a thin tool (small screw driver or knife blade) into the slot next to the switch mounting screw boss (Right-hand slot) and depress retainer at bottom of slot, which releases lock. Remove lock Figure 3G-74.

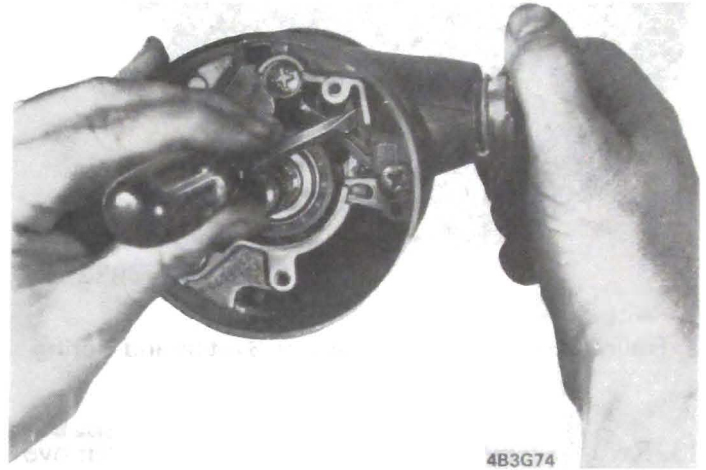


Figure 3G74 Removing Lock

12. The buzzer switch can be pulled straight out of the housing Figure 3G-75. A flat spring wedges the switch toward the lock cylinder Figure 3G-76.

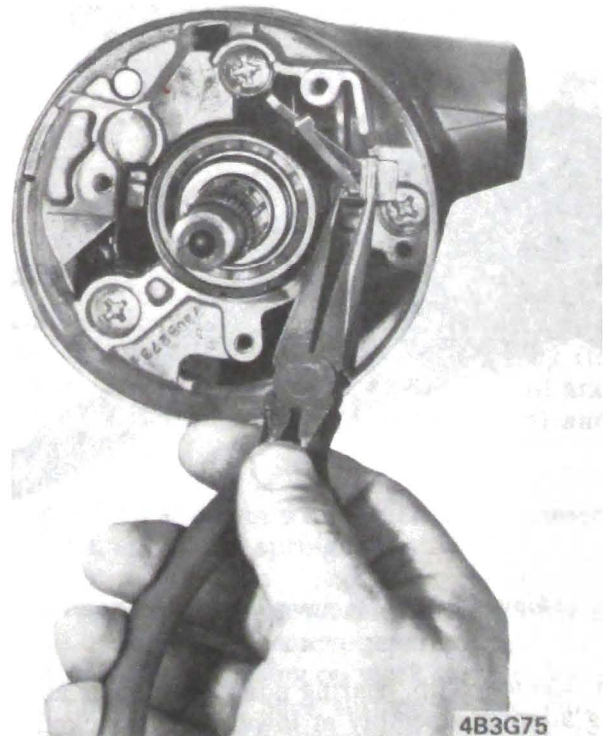
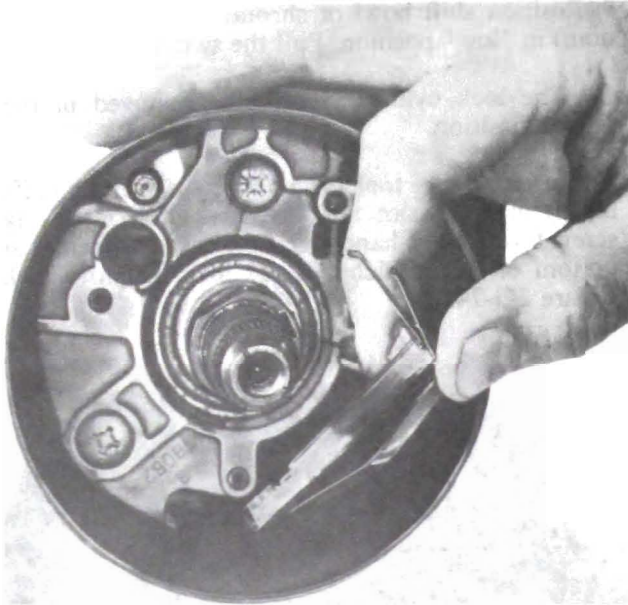


Figure 3G75 Remove Buzzer Switch

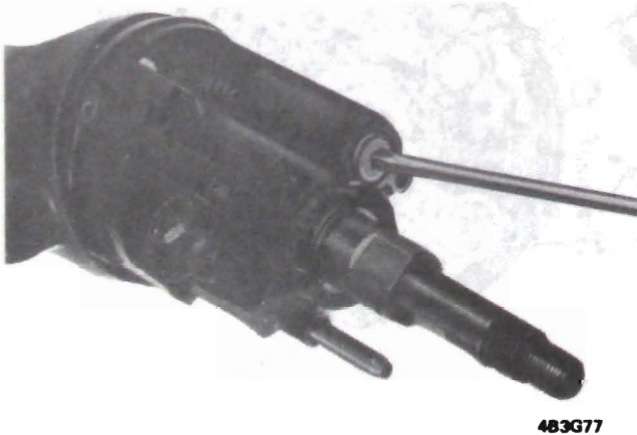


4B3G76

Figure 3G-76 Position of Buzzer Switch and Spring Retainer

13. Remove three housing cover screws and remove housing.

14. Reinstall tilt release lever and place column in full "up" position. Remove tilt spring retainer using screw driver blade that just fits into slot opening. Insert screw driver in slot, press in approximately 3/16", turn approximately 1/8 turn counterclockwise until ears align with grooves in housing, remove spring and guide (Figure 3G-77).



4B3G77

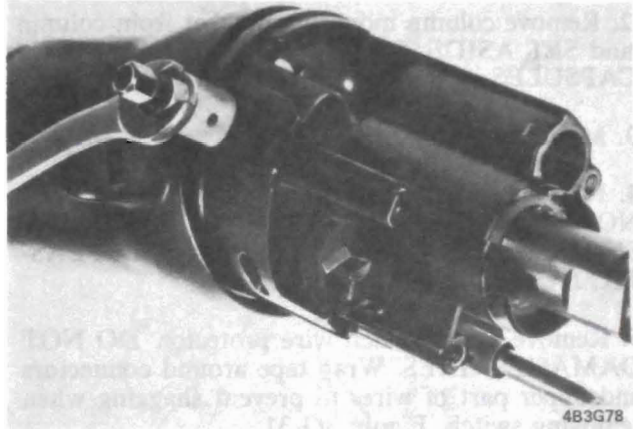
Figure 3G-77 Remove Tilt Spring Retainer

15. Remove clip, bearing adapter retainer and bearing adapter assembly at lower end of jacket.

16. Remove seat and upper bearing inner race.

17. With ignition switch in "Acc" position, remove two ignition switch mounting screws and ignition switch. Remove two neutral-start switch screws and neutral-start switch.

18. Remove two pivot pins with tool J-21854-1 (Figure 3G-78).



4B3G78

Figure 3G-78 Removing Pivot Pins

19. Disengage lock shoes by pulling on release lever. Remove bearing housing assembly by pulling upward to extend rack full down and moving housing assembly to the left to disengage rack from actuator. Remove actuator rod assembly. Remove lower flange or intermediate shaft first.

20. Remove steering shaft assembly.

21. Disassembly upper steering shaft, locking wedge and locking rod from upper yoke.

22. Disassembly steering shaft assembly by removing centering spheres and anti-lash spring.

23. Remove four support screws and remove support assembly.



4B3G79

Figure 3G-79 Removing Shift Tube

24. Remove shift tube retaining ring with screw driver. Remove thrust washer.

If service is required on upper end only, steps 1 through 24 may be performed in the car if vehicle configuration permits. It is necessary to remove the mounting bracket to service the signal switch.

25. Remove shift tube from bowl (use tool J-23072) (Figure 3G-7). Pilot sleeve in upper end of shift tube and force tube out of bowl. Care should be taken not to jam lower shift lever into lower jacket. Lever must be aligned with "T" slot to remove shift tube. **DO NOT HAMMER OR PULL ON LOWER OR UPPER SHIFT TUBE BECAUSE PLASTIC JOINT MAY BE SHEARED.**

26. Remove shift tube assembly from jacket from the lower end.

27. Remove lock plate by sliding out of jacket notches and tipping down toward bowl hub at 12 o'clock position and under jacket opening. Remove wave washer.

28. Remove bowl from jacket. Remove shift lever spring from bowl by winding spring up with pliers and pulling out.

Bearing Housing Disassembly

29. Remove tilt lever opening shield and turn signal lever opening shield from housing Figure 3G-80.

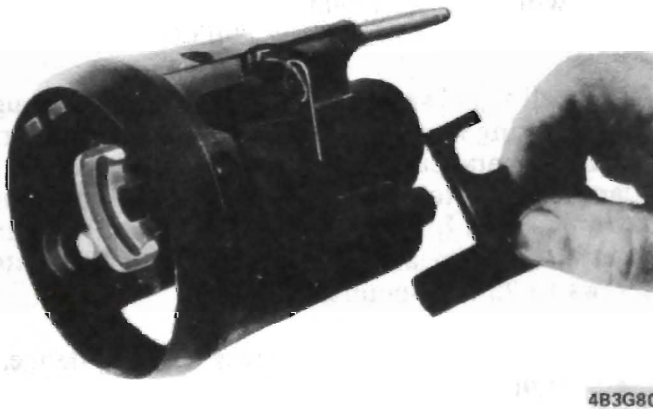


Figure 3G-80 Opening Shield

30. Remove lock bolt spring by removing spring retaining screw and removing spring clockwise to remove from bolt Figure 3G-81.

31. If there is a snap ring, remove it from sector drive shaft. With small punch, lightly tap drive shaft from sector Figure 3G-82. Remove drive shaft. Remove rack and rack spring (also shim if there is one). Remove sector and bolt.



Figure 3G-81 Lock Bolt Spring

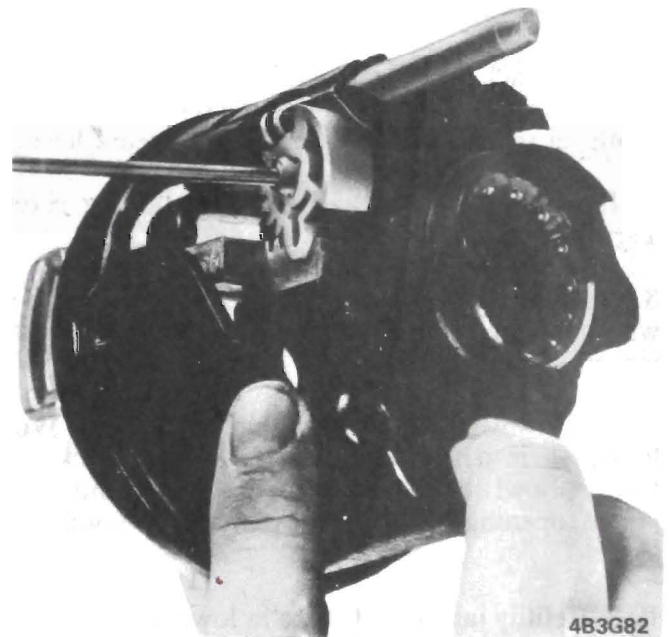


Figure 3G-82 Removing Drive Shaft

32. Remove tilt release lever and with punch and hammer, remove lever and release lever spring (to relieve load on release lever, hold shoes inward and wedge block between top of shoes (overslots) and bearing housing).

33. Remove lock shoe pin with punch and hammer. Remove lock shoes and springs.

34. Remove bearings from bearing housing only if they are to be replaced. Remove separator and balls from bearings. Place housing on work surface. With a pointed punch against back surface of race, carefully hammer race out of housing until bearing puller can be used. Repeat for other race. Do not re-use bearings.

Assembly

Apply thin coat of lithium grease to all wear surfaces except the lock bolt and lock bolt hole.

1. Install new bearings in bearing housing, if removed.
 2. Install lock shoe springs, lock shoe and shoe pin in bearing housing. Use approximately .180 rod to line shoes for pin installation.
 3. Install spring, release lever and pin in bearing housing. (Again, relieve load on release lever in Step 31 of disassembly procedure).
 4. Install drive shaft in housing. Lightly tap sector onto the shaft far enough to expose snap ring groove. Replace snap ring if one was removed.
 5. Install lock bolt and engage with sector cam surface. (Figure 3G-81)
 6. Install rack spring and rack. (Replace shim if one was removed.) Block tooth on race to engage block tooth on sector. Install external tilt release lever.
 7. Install bolt spring and spring retaining screw. Tighten to 35 inch-pounds.
 8. Install shift lever spring in bowl by winding up with pliers and pushing in. Slide bowl into mast jacket.
 9. Install wave washer and lock plate in place. Work lock plate into notches in jacket by tipping lock plate toward bowl hub at 12 o'clock position and under jacket opening. Slide lock plate into notches in jacket.
 10. Carefully install shift tube in lower end of jacket. Align key in tube with keyway in bowl and use tool No. J-23073 to pull shift tube into bowl.
- CAUTION: DO NOT PUSH OR TAP ON END OF SHIFT TUBE. Install thrust washer and retaining ring by pulling bowl up to compress wave washer.**
11. Install support by aligning "V" in support with "V" notch in jacket. Insert screws through support into lock plate. Tighten screws to 60 inch-pounds torque.
 12. Align plastic fingers with holes in jacket and push lower bearing adapter assembly in lower end of mast jacket. Shift tube should pilot in adapter while this is done. Install adapter, retainer and clip.
 13. Install centering spheres and anti-lash spring in upper steering shaft. Install lower steering shaft from same side of spheres that spring ends protrude.
 14. Install upper steering shaft, locking wedge, and locking rod in yoke.
 15. Install steering shaft assembly in shift tube from upper end. Carefully guide shaft through shift tube and bearing.
 16. Install ignition switch actuator rod through bowl from bottom and insert in slot in support. Extend rack downward from bearing housing. Assemble bearing housing over steering shaft and engage rack over end of actuator rod.
 17. Hold lock shoes in disengaged position assemble bearing housing over steering shaft until the pivot pin holes line up with the holes in the support.
 18. Install pivot pins using same procedure as outlined on tilt column section.
 19. Place housing in full "up" position and install guide, tilt spring and tilt spring retainer using screw driver in retainer slot. Turn retainer clockwise to engage.
 20. Install tilt lever opening shield and turn signal lever opening shield in housing.
 21. Remove tilt release lever, install housing cover and seat screw at 12 o'clock position first. Tighten to 100 inch-pounds - 3 screws.
 22. Assemble buzzer switch to spring clip with formed end of clip under end of switch and spring bowed away from switch on side opposite contact. Push switch and spring into hole in cover to the step with the contact toward lock cylinder bore.
 23. Install signal switch wires and connector through cover bearing housing and bowl. Push hazard warning knob in and push end of hazard warning actuator (flanged edges toward housing) into hole in hazard warning knob. Install switch while carefully guiding hazard warning actuator into cover and tighten screws to 25 inch-pounds.
 24. Install wave washer and lower steering flange, if used. Tighten pinch bolt to 30 foot-pounds. If not used, connect pot joint to steering shaft and tighten pot joint pinch bolt nut to 50 foot-pounds.
 25. Use J-23063 tool and install race, spring, carrier, shaft lock and "C" ring. Locate "C" ring to lock shaft as shown in Figure 3G-83, with the wider leg of the "C" ring on the keyway side of the yoke. Install "C" ring retainer with single tab opposite small lobe on carrier. Snap retainer over "C" ring and install bumper.
 26. To install lock, hold lock cylinder sleeve and rotate knob clockwise against stop. Insert cylinder into cover bore with key on cylinder sleeve aligned



Figure 3G-83 Installing "C" Ring

to keyway in housing, push in to abutment of cylinder and sector. Rotate knob counterclockwise, maintaining a light push inward on cylinder, until drive section of cylinder mates with drive shaft. Push in until retainer pops into groove and lock cylinder is secured in cover. Check freedom of rotation.

27. Install tilt release lever (20 inch-pounds), signal switch lever (30 inch-pounds), and hazard warning

knob (5 inch-pounds). Install upper shift lever and drive in pivot pin.

28. When replacing the ignition switch, place the lock in "Acc" position. Place the switch in "Acc" using the following procedure:

(1) Position the switch as tilt column.

(2) Move the slider to the extreme right. Fit the actuator rod into the slider hole and assemble to the column with two screws. Lightly push the switch down the column (away from the steering wheel), to take out lash in the actuator rod, and tighten mounting screws. Caution should be exercised to prevent moving the switch out of detent. Use only the correct screws and tighten to 35 inch-pounds.

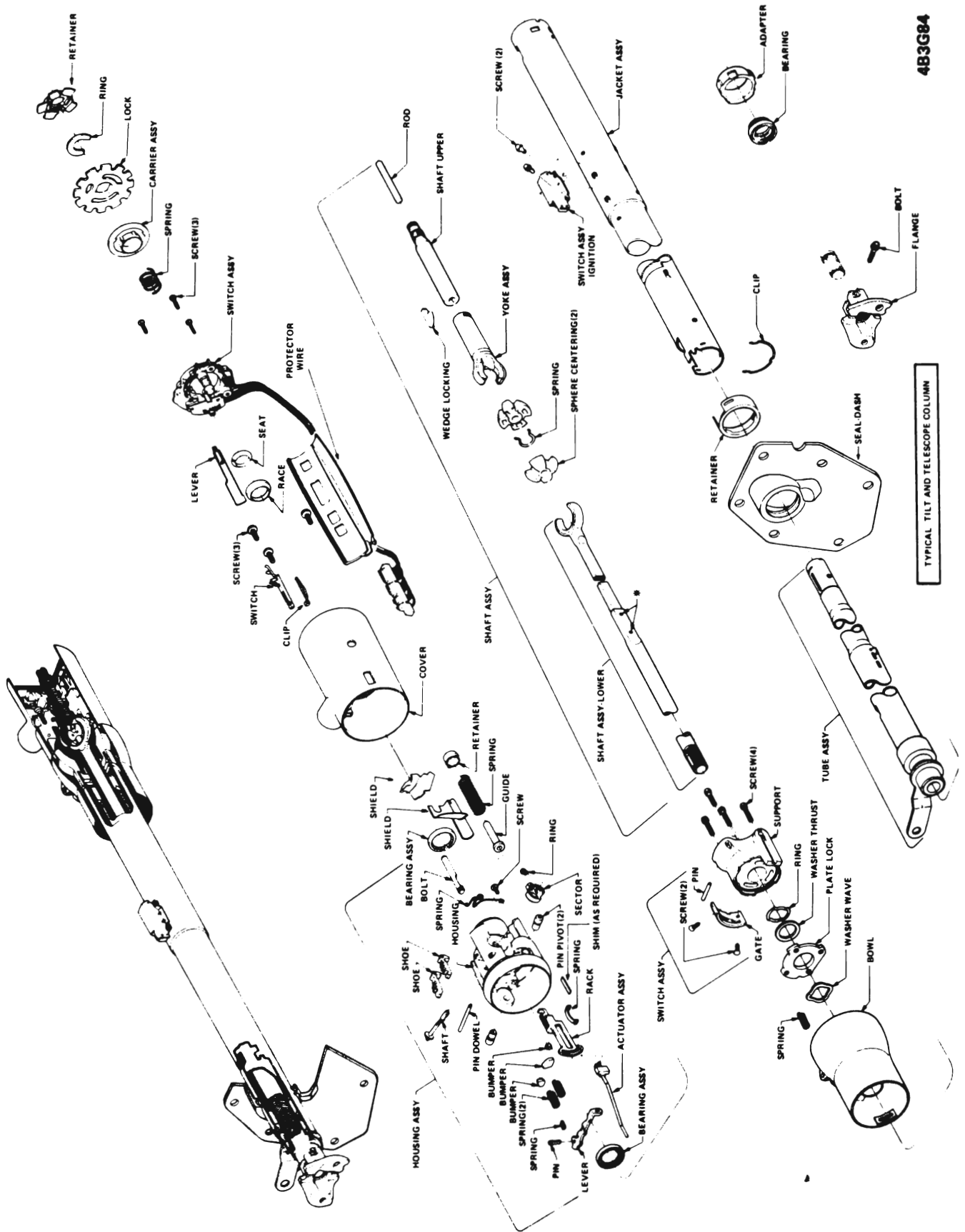
29. Install neutral-start switch and back-up light switch. Do not tighten screws. Neutral-start switch will be adjusted in the car at 20 inch-pounds torque at final assembly. **DO NOT USE SUBSTITUTE SCREWS.**

30. Install lower wire protector over wires and on jacket.

31. Install mounting bracket **DO NOT USE SUBSTITUTE BOLTS.** (Bolt torque, 15 foot-pounds).

32. Install steering wheel. Torque steering wheel nut to 30 foot-pounds.

33. Install horn parts.



483G84

TYPICAL TILT AND TELESCOPE COLUMN

Figure 3G-84 Tilt and Telescoping Column

SPECIFICATIONS**SPECIFICATIONS**

Pinch Bolt, fabric coupling to Steering Gear	30 ft-lb
Pinch Bolt, demountable flange to Steering Gear	30 ft-lb
Nuts, fabric coupling	20 ft-lb
Bolt & Nut, pot coupling clamp - 1"	50 ft-lb
Bolt & Nut, pot coupling clamp - 5/8"	35 ft-lb
Spring Retaining Screw	35 in-lb
Support Screws	60 in-lb
Housing Screws	
Optional	100 in-lb
Standard.....	60 in-lb
Signal Switch Mounting Screws.....	25 in-lb
Shaft Lock Cover Screws	15 in-lb
Ignition Switch Mounting Screws.....	35 in-lb
Neutral Start Mounting Switch Screws	
Optional	20 in-lb
Standard.....	15 in-lb
Tilt Release Lever Screw	30 in-lb
Hazard Warning Knob	5 in-lb
Steering Wheel Nut	30 ft-lb
Signal Switch Lever Screw.....	15 in-lb
Shift Gate Mounting Screws	45 in-lb
Bearing Screws (Synchro).....	90 in-lb