belltech SPORT TRUCKS

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INSTALLATION INSTRUCTIONS

2505
Lowering Spindle Assembly Installation Instructions
½ TON SILVERADO / SIERRA (GMT 800 / 880)

Congratulations! You were selective enough to choose a BELLTECH PRODUCT. We have spent many hours developing our line of products so that you will receive maximum performance with minimum difficulty during installation.

Note: Confirm that all of the hardware listed in the parts list is in the kit. **Do not** begin installation if any part is missing. Read the instructions thoroughly before beginning this installation.

Warning: **DO NOT** work under a vehicle supported by only a jack. Place support stands securely under the vehicle in the manufacturer's specified locations unless otherwise instructed.

Warning: **DO NOT** drive vehicle until all work has been completed and checked. Torque all hardware to values specified.

Reminder: Proper use of safety equipment and eye/face/hand protection is absolutely necessary when using these tools to perform procedures!

Note: It is very helpful to have an assistant available during installation.

RECOMMENDED TOOLS:

- Properly rated Floor Jack, Support Stands and Wheel Chocks
- Internal Spring Compressor
- Metric Socket Set, including: 10, 13, 15, 16, 18mm
- Metric Hex Key Set, including: 6mm
- Felt Tipped Pen
- Standard Wrench Set, including: ½", ¾"
- Die Grinder with abrasive cut-off wheel
- Metal File
- Spray Lubrication
- ½" square drive 12mm Hex Bit Socket
- Air Hammer with Chisel and Punch Attachments
- Metric Wrench Set, including: 8, 10, 15, 18, 24mm
- Flat Blade Screwdriver (small)
- Standard Socket Set, including: ½", ¾"
- ½" drive Torque Wrench
- Medium weight ball-pen hammer
- Punch or Drift
- 15" inches of Heavy Gage Wire

KIT INSTALLATION

As this is a relatively complex installation, we recommend that qualified mechanic at a properly equipped repair facility perform it. We also recommend that the installation be performed on a firm, flat, and level surface, such as seasoned asphalt or concrete. **The use of safe and properly maintained equipment is very important**! In order to document any possible irregularities in the factory ride height of your vehicle, please take a few moments to fill out the initial portion of the Belltech Vehicle Inspection Record included with these instructions.

1. Jacking, Supporting, and Preparing the Vehicle

a. Block the rear wheels of the vehicle with appropriate wooden blocks or wheel chocks. Make sure the vehicle's transmission is in "Park" (Automatic) or 1st gear (Manual). Activate the parking brake. Loosen, but DO NOT REMOVE, the front wheel lug nuts.

b. Properly lift and support the front of the vehicle as described in the vehicle Owner's or Shop Manual.

c. Position a set of jack stands, rated for the vehicle's weight, so that they contact the forward frame rails of the vehicle, just behind the front wheels. Slowly lower the vehicle onto the stands and, before placing the vehicle's entire weight on them, check that they properly and securely contact the frame rails.

NOTE: Check for safe vehicle stability before proceeding under the vehicle to begin the following procedures.

NEVER work under a vehicle supported only by a jack. Always use properly rated jack stands to support the vehicle.

2. Front Anti-Roll Bar Removal

a) Remove front wheels.

b) Using a 16mm socket and 15mm open-end wrench, remove front anti-roll bar end-links from both left and right lower control arms.

c) Using floor jacks, support center portion of front anti-roll bar.

d) Using a 10mm socket, remove the four bolts attaching two (2) anti-roll bar pivot-bushing brackets to frame. Remove anti-roll bar from vehicle and store for later reinstallation. **Important**: Note the factory orientation of the front anti-roll bar, as this will be important during subsequent steps.

3. Front Suspension and Brake Disassembly

a) Remove front wheels

b) Working from the Driver's side of the vehicle, remove factory bump stop (Photo1).

c) Using a 18mm open-end wrench, remove nut attaching tie-rod end to steering arm of factory spindle. Using medium weight hammer, gently tap unthreaded portion of tie-rod end, protruding from underside of steering rack output shaft up and away from spindle, towards the front of vehicle. Inspect tie-rod end for wear or damage, and replace if necessary.

d) Using small, flat-bladed screwdriver (or small tool), unplug ABS sensor wire from wiring harness. The plug is located above the upper spring frame pocket. Remove sensor wire from plastic clips on frame bracket and upper control arm (Photo 2). Remove integral sensor wire clip from metal brake hose bracket located on top surface of spindle (Photo 3).

e) Using 10mm socket, remove small screw attaching brake hose-to-upper control arm mounting bracket to forward section of upper control arm (Photo 4). Remove metal brake hose bracket from control arm.

f) Using 10mm socket, remove small screw attaching brake hose bracket to top surface of spindle (Photo5).

g) Using heavy gauge wire, fabricate a "J" hook, approximately 10" inches in length, to hang front brake caliper from frame rail in following steps.

h) Using an 18mm socket, remove two brake caliper bolts attaching caliper to spindle. Remove caliper from spindle by sliding it away from brake rotor, being careful not to stretch rubber brake hose. If brake rotor spring clips were not present, remove brake rotor now.

i) Move the brake caliper and hose assembly towards the front of wheel opening, just forward of the front suspension. Using "J" hook fabricated in Step #4, safely support the caliper from an accessible hole or slot in frame rail (Photo 6). Note: **BE CAREFUL** not to stretch or damage rubber brake hose.

j) If equipped, remove brake rotor retaining spring clips and then brake-rotor from spindle-hub assembly.

k) Using 13mm socket, remove two (2) lower shock absorber attachment-bolt from underside of lower control arm (Photo 7). Remove top shock absorber attachment nut and bushing from upper spring pocket. Remove shock absorber, from inside of coil spring, by sliding it through the opening in the underside of lower control arm.

NOTE: Check wheel studs to verify that the vehicle is equipped with brake rotor retaining spring clips. If clips are not present, use caution when removing brake caliper in following steps, so that brake rotor is not dropped and damaged during disassembly.

5. OEM Spring and Spindle-Hub Assembly Removal

a) Using the floor jack, support underside of lower control arm.

b) Using an 18mm open-end wrench, loosen two turns, but DO NOT completely remove, the lock nut attaching upper control arm ball-joint to spindle (Photo 8). Use a 6mm hex key, fitted into end of stud, to prevent rotation if necessary.

c) Using a medium weight hammer, gently tap the spindle upper ball-joint tab until the ball-joint disengages from its tapered bore (Photo 9).

d) Using a strong chain, secure the spring to the lower control arm to prevent damage and injury in the event of a spring compressor failure.

WARNING! Use extreme caution when working with coil springs as they store a large amount of energy and can do great harm to both people and property

IMPORTANT NOTE:

Coil spring tension will force the ball-joint from its tapered bore when the upper ball-joint tab is struck with the hammer. The loosened locknut will prevent the spindle from completely separating from the upper control arm. **DO NOT** attempt this procedure without the upper ball-joint locknut loosened and in place!

e) Install the spring compressor inside the coil spring and, following the tool manufacturer's instructions, compress the spring.

f) Lower the floor jack slightly and remove the coil spring, noting its orientation. Remove the spring compressor from the coil spring immediately.

NOTE: When using the Belltech lowering coils, remove the factory spring (rubber) isolator from the top end of OEM coil spring for later use.

g) With the floor jack still supporting the lower control arm and the coil spring removed, remove the upper ball-joint locknut loosened in Step 4 (b). Raise the upper control arm and separate the OEM spindle from the upper control arm ball-joint (Photo 10).

h) Using a 15mm wrench, remove the three (3) bolts attaching the central hub assembly to the spindle body (Photo11). Retain two (2) of these three (3) bolts for use in later steps.

i) Carefully remove the hub assembly and the small backing plate from the spindle body (Photo 12). Note the orientation of the ABS sensor and sensor wire. Be careful to avoid damaging the ABS sensor wire. Store these parts in a safe place for later reinstallation.

5. Lower Ball-joint Removal

IMPORTANT NOTE: The following steps require an above average amount of patience, and mechanical skill. Also, the skillful use of the proper tools and safety equipment is absolutely necessary. We recommend that you **DO NOT ATTEMPT** these steps unless you have the time, patience, knowledge, tools, and mechanical ability to perform them in a reasonable amount of time. A very sound option is to remove the OEM lower control arms and spindle from the vehicle and have a qualified professional installation facility perform the lower ball-joint removal for you.

With the lower control arm still supported with the floor jack, separate the OEM lower ball-joint from the lower control arm as follows:

a) Using a die grinder (or similar tool) equipped with a cut-off wheel, carefully grind 1/8" slots in the top heads of the four (4) rivets attaching the ball-joint to the control arm (Photo 13). Note: Proper use of safety equipment and eye / face / hand protection is absolutely necessary when performing these procedures!

b) Using an air hammer equipped with a chisel tool bit (Photo14), shear the rivet heads from their shanks. **Note**: Be very careful to avoid damaging lower control arm with the chisel tool bit.

c) Using an air hammer equipped with a punching tool bit, remove the rivet shanks attaching the ball joint to the lower control arm. **Note**: Be very careful to avoid damaging lower control arm with the punching tool bit.

d) Remove any burrs, from around holes in the lower control arm using a file or similar tool.

e) Using a hammer as required, remove the factory lower ball-joint assembly from the lower control arm pocket. **Note**: Be very careful to avoid damaging the lower control arm. Remove the factory spindle and the lower ball-joint from the lower control arm

NOTE: Another option is to remove the OEM lower control arm and spindle assembly from the vehicle and use an hydraulic press to separate rivet shanks from the control arm (after heads are removed).

6. Belltech Lower Ball-joint Installation

a) Working with the kit supplied Belltech lower ball-joint, install grease fitting into threaded hole (Photo 15). Hand-tighten with 8mm open-end wrench.

b) Using a grease gun lube the ball joint at the grease fitting.

c) Install the Belltech lower ball-joint assembly into the control arm. Important Note: The ball-joint stud must be installed pointing up, opposite from factory orientation. Align holes in lower control arm with holes in ball-joint housing using punch or similar tool.

IMPORTANT NOTE: It may be necessary to grind a small amount of material from the curved edge of the lower control arm (Photo 16) in order for the holes in the ball-joint to properly align with holes in lower control arm.

d) Insert four (4) ½ - 20 x 2 hex head bolts, from the underside of the lower control arm, through holes aligned in Step 6 (b), making sure that the heads seat flush with the flat underside area of the lower control arm. Note: DO NOT use washers between the bolt heads and control arm, as there is not enough clearance.

e) Fasten the inner two bolts (farthest from ball-joint) first; prior to installing steering stop Step 6 (e) below, using washers and locknuts (Photo 17). Using a ¾" socket and open-end wrench, tighten and torque the bolts to 110ft-lbs using torque wrench.

f) Install the steering stop as shown in (Photo 18), with the long end pointed toward front of vehicle, over the outer most bolts (closest to ball-joint). Fasten the two bolts and steering stop to control arm using washers and locknuts. Using a ¾" socket and open-end wrench, tighten and torque bolts to 110ft-lbs using torque wrench.

IMPORTANT NOTE: Fasten the inner two bolts prior to installing the steering stop, so that the nuts can be easily accessed with a ¾" open-end wrench

g) Install grease boot over upward-facing ball-joint stud as indicated on boot. Note: The grease boot has a small raised bump, located on the outside portion of the largest diameter (Photo 19). The grease boot should be installed so that this raised bump is oriented towards the inside of the vehicle.

7. <u>Reversing the Orientation of Upper Control Arm</u>

a) Using 21mm socket and open-end wrench, remove the two (2) nuts attaching the upper control arm pivot bolts to the frame mounts. Remove the pivot bolts.

- Using a felt-tipped pen, mark the factory alignment position on upper control arm wheel alignment guide plates (Photo 20).

b) Note orientation of the factory wheel alignment adjustment guide-plates. Remove the guide plates from the frame mounts. Remove the upper control arm from the frame mounts.

c) Remove the plastic ABS sensor wire clip from its location in the upper control arm. Re-install the clip in opposite hole, but from the opposite side (Photo 21).

d) Check condition of the OEM upper ball-joint. If excessive wear is detected, replace as necessary, following instructions in the vehicle Shop Manual.

e) Turn (flip) the upper control arm over. Re-install the upper control arm, into frame mounts, with the ball-joint stud now facing up.

<u>IMPORTANT NOTE</u>: The upper control arm must be flipped and installed with the ball-joint stud pointing up.

f) Re-install the wheel alignment guide plates, pivot bolts and nuts as removed in Step 7 (b). Be sure to align the slots in the guide-plates with the pins located on the frame mounts.

g) Tighten and torque nuts to 140 ft-lbs. Note: When tightening nuts, be sure to align marks made in Step 7 (a). This <u>temporary</u> wheel alignment should allow vehicle to be driven to a competent wheel alignment facility after completing installation.

PART LIST FOR 2505-DROP SPINDLE KIT

PART#	DESCRIPTION	QTY
2505-350	Spindle casting L.H.	1
2505-450	Spindle casting R.H.	1
2505-005	Ball Joint Lower A-Arm	2
111-115	Sckt Cap Screw 14mm-1.5x50mm	2
111-097	Flange Nut w/Nylon Insert	4
110-412	Cap Screw ½"-20 x 2"	8
110-403	Nylon Insert Lock Nut ½"-20	8
110-660	Flat Washer ½"	8
112-134	Cap Screw 3/8"-16 x 6"	2
110-255	Nylon Insert Lock Nut 3/8"-16	2
112-502	Washer Cup Large	2


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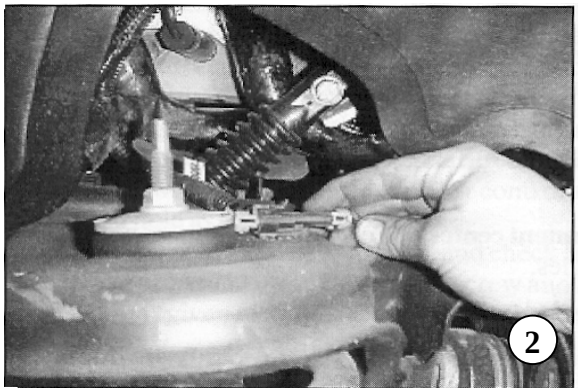
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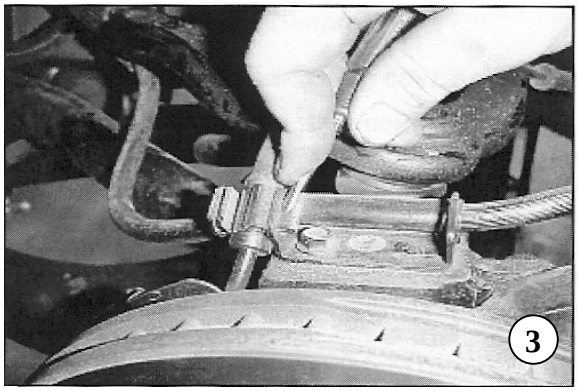
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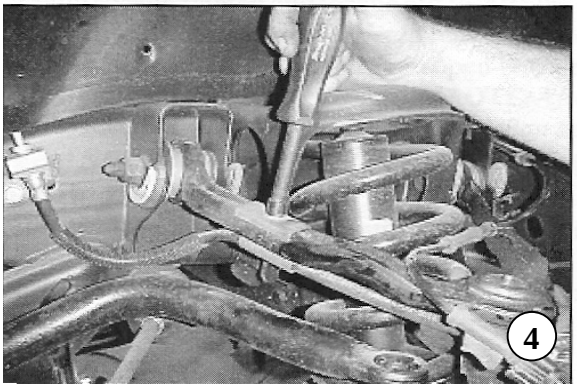
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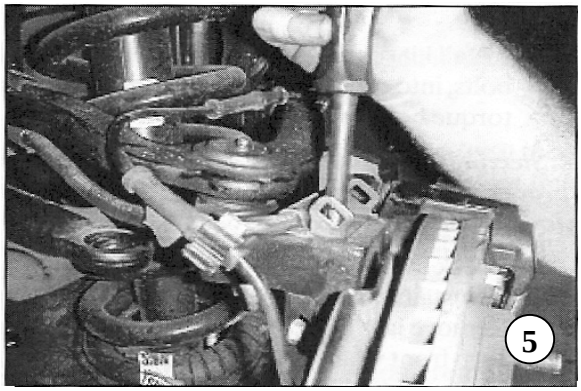
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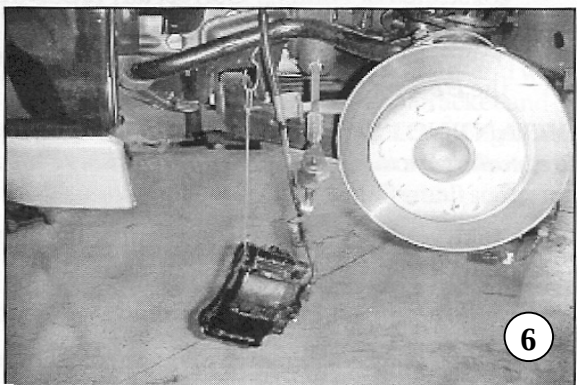
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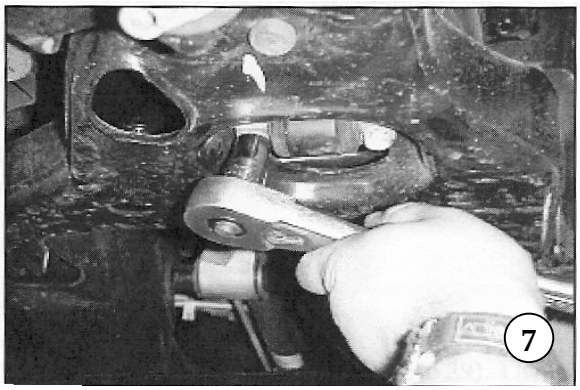
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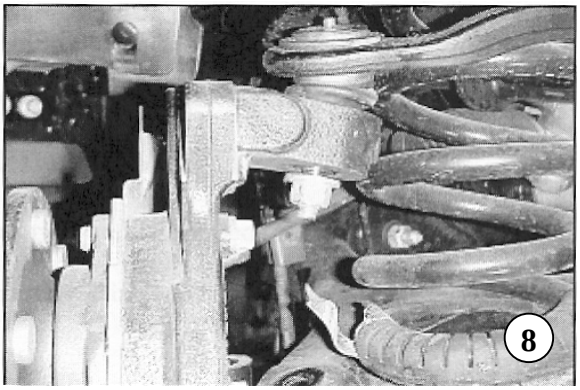
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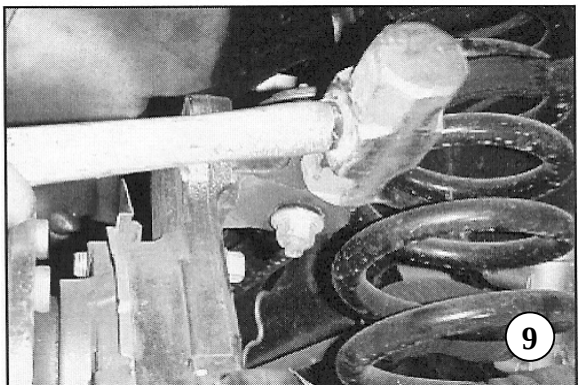
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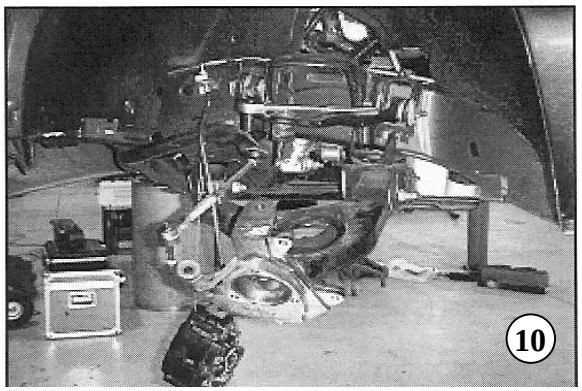
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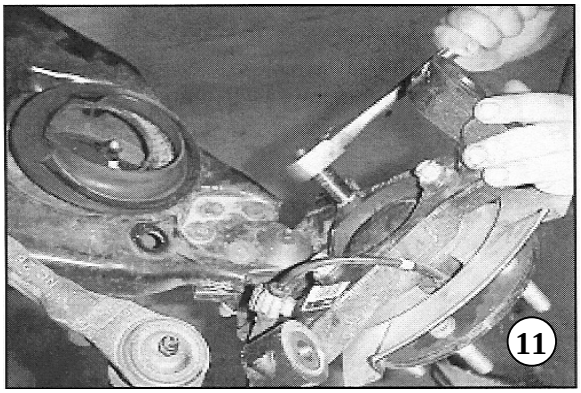
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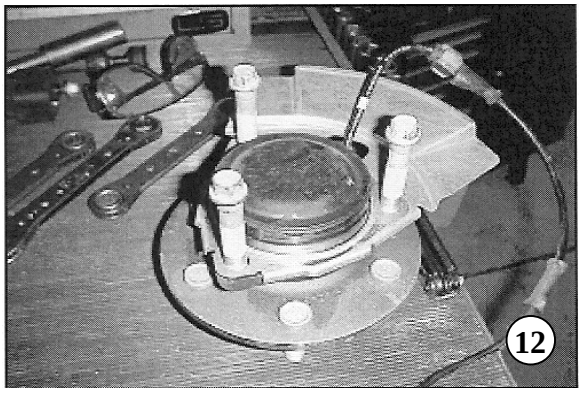
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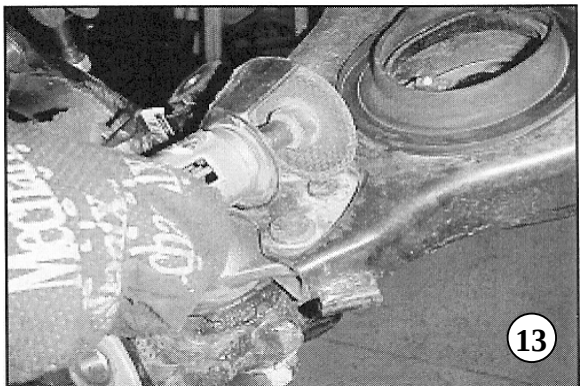
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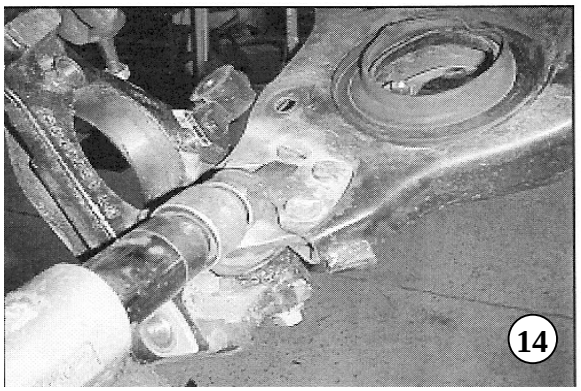
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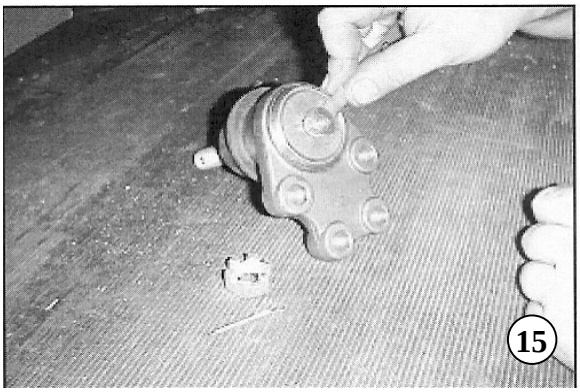
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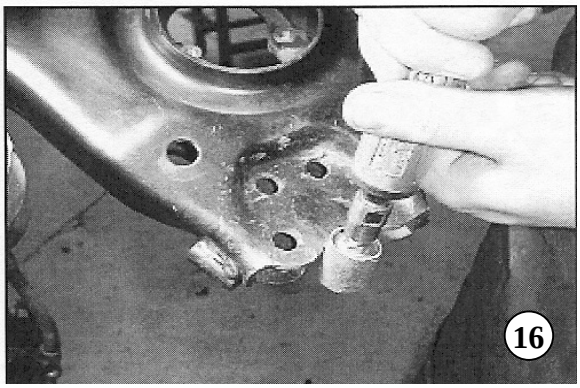
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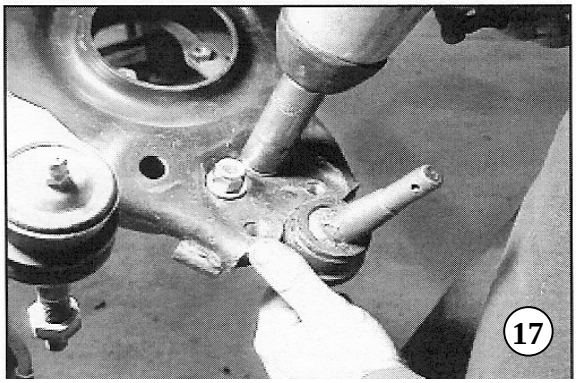
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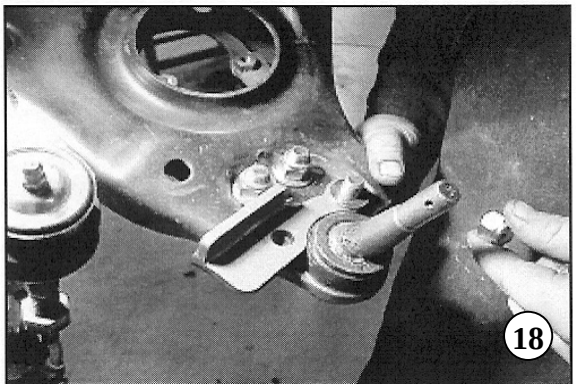
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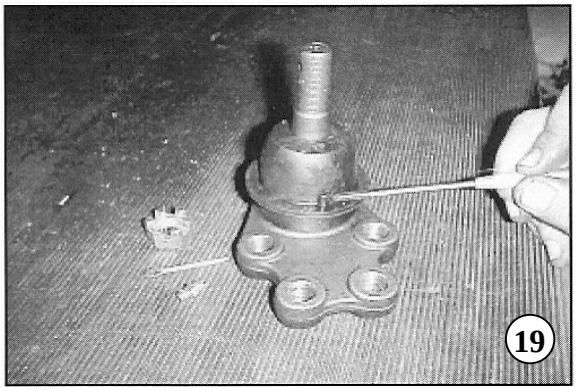
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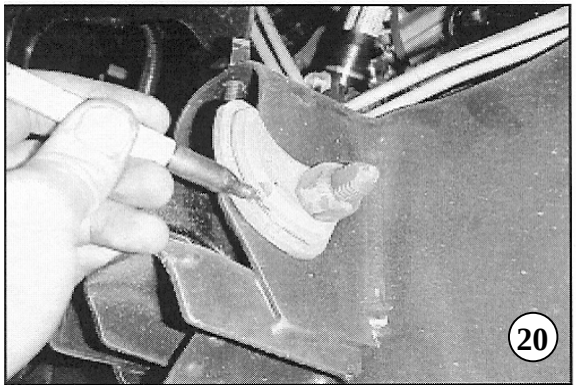
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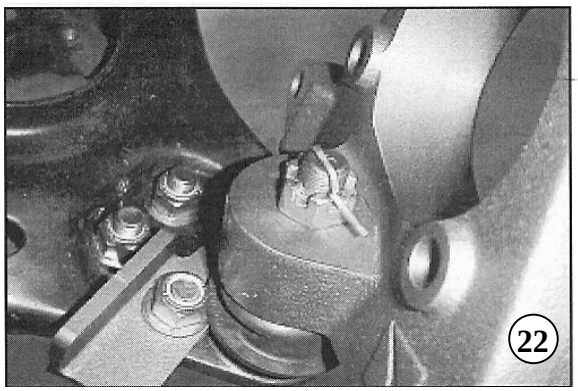
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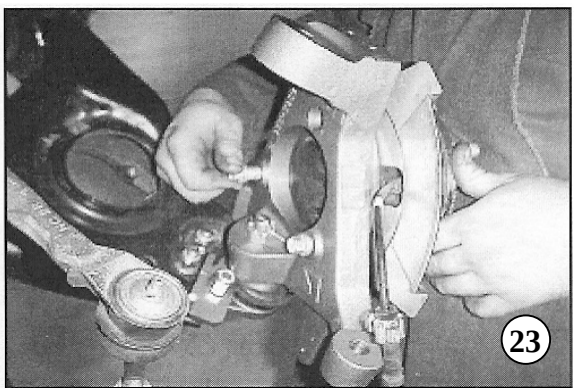
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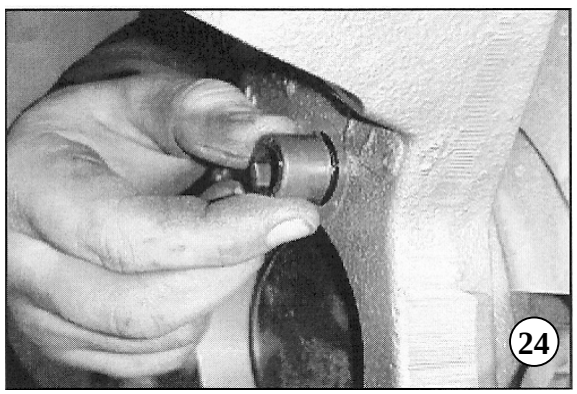
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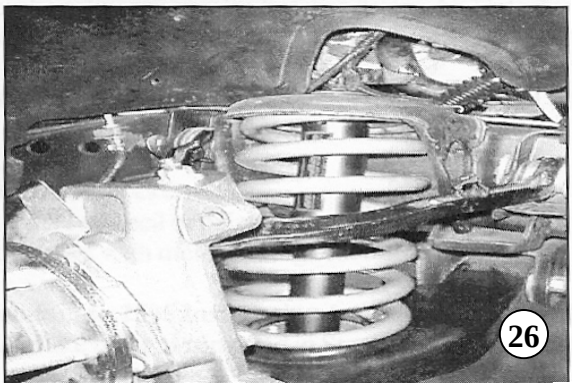
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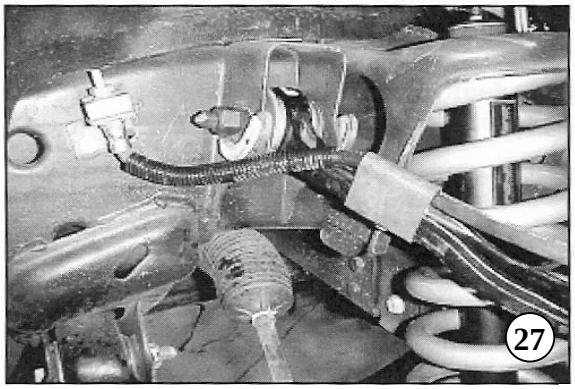
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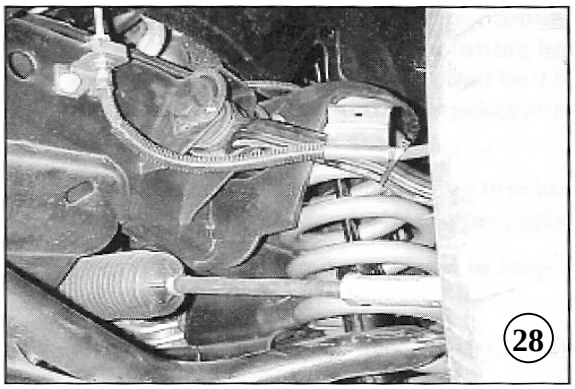
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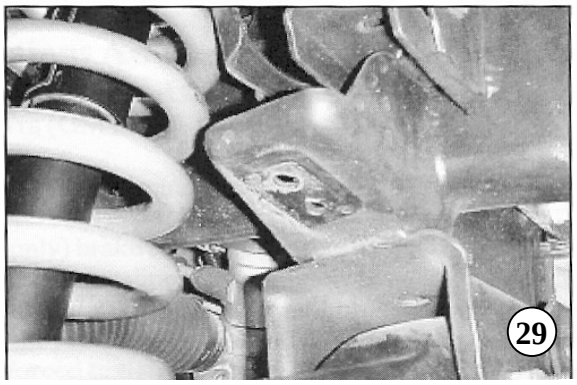
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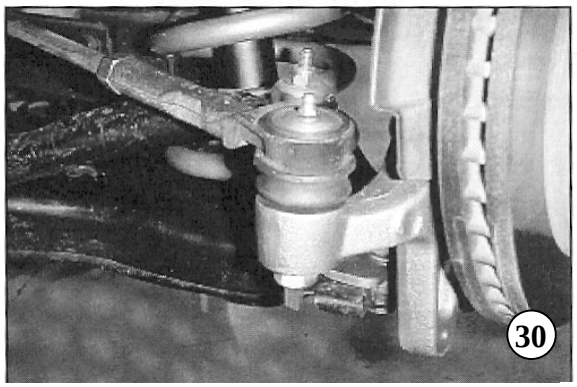
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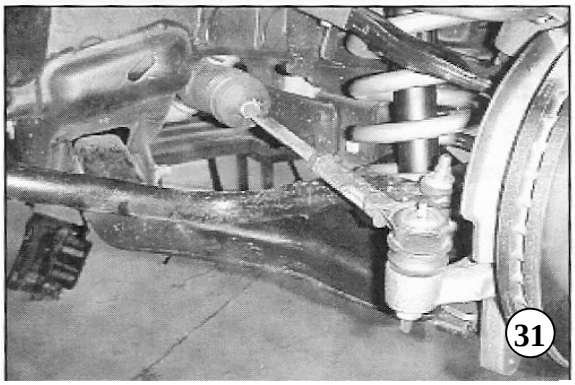
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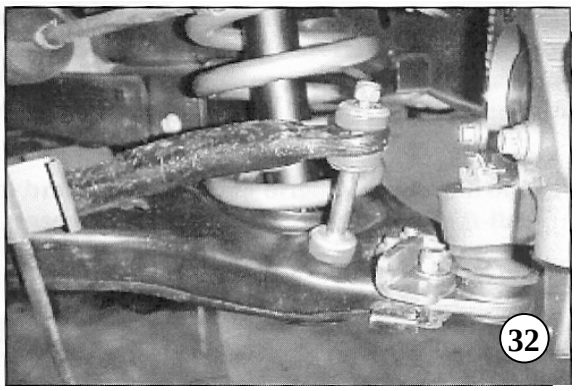
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Installation Instructions Addendum

Belltech #2505 Lowering Spindle Assembly

1/2 Ton Silverado/Sierra (GMT 800/880)

Topic: LH (Driver's side ONLY) brake caliper-mounting bracket to spindle interference.

Details: A slight interference may exist between the LH (only) brake caliper-mounting bracket and the LH 2505 lowering spindle. This interference may not allow the brake caliper to completely fit over brake rotor. A good indicator is that the gap between the brake caliper and the brake rotor's central-hub is substantially greater on the LH side than the RH side of vehicle. Bolt holes in the lowering spindle and the brake caliper do align, but slightly off center. Guide-pin bolt fitment may seem forced or tight. Because of built-in clearance in the RH brake caliper-mounting bracket design, NO interference has been detected on the RH (Passenger's side) of the vehicles.

Solution: Remove and grind a small relief in the LH brake caliper-mounting bracket as shown in the Figures.

Tool Requirements:
T55 Torx® bit socket
White grease pencil or paint marker
Hand grinder with metal cutting tool bit

Addendum to 2505 Installation Instructions, Step 10: Front Suspension and Brake Assembly
Install brake rotor as removed in Steps 3i. Replace brake rotor retaining spring clips if removed.

Addendum Text:
(LH Side Only)

With caliper hanging from "J" hook (Step 3h), use a T55 Torx® bit socket to remove the 2 guide-pin bolts attaching the brake caliper to the spindle-mounting bracket.

Referring to Figure 1, locate surface indicated, referencing edge profile to identify correct portion of mounting bracket.

Using grease pencil or white paint marker, mark area of bracket to be removed, as shown in Figure 2.

Using hand held grinder equipped with metal cutting tool bit, grind relief in bracket, approximately 1/8" deep, as shown (Figure 3).

Temporarily holding brake caliper mounting bracket against outer edge of LH spindle brake caliper mounting tabs, align mounting holes. Check that enough material has been removed as to provide proper clearance so that bolt holes properly align. Remove additional material from brake caliper mounting bracket as necessary (Note: Remove NO MORE material than is required for proper clearance).

Reattach brake caliper-mounting bracket to brake caliper using original guide-pin bolts (making sure that guide-pin bolts are properly greased). Torque guide-pin bolts to 75 ft-lbs.

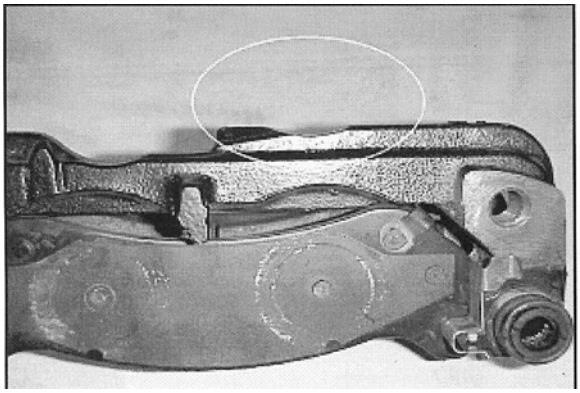
Install brake caliper as removed in Step 3g. Tighten and torque brake caliper bolts to 150 ft-lbs.

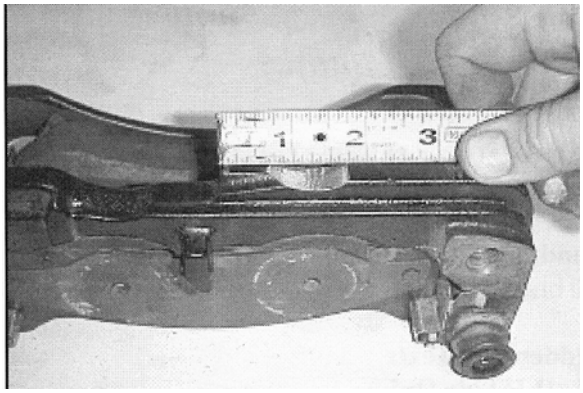
The remaining instructions are UNCHANGED.

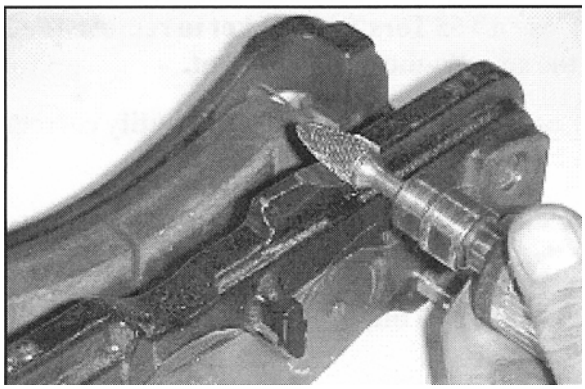
Patent Pending

INSTALLATION INSTRUCTIONS ADDENDUM

Belltech #2505 Lowering Spindle Assembly
½ Ton Silverado/Sierra (GMT 800/880)







Installation Instructions Addendum

Belltech #2505 Lowering Spindle Assembly

1/2 Ton Silverado/Sierra (GMT 800/880)

Topic: Interference between 2505 spindle assembly, control arms, and optional 16" cast aluminum wheels. These optional wheels are approximately 1/2" wider and have approximately 1/4" less backspacing.

Details: Interference may occur between factory optional 16" cast aluminum wheels, 2505 spindle cast steering arm, OEM tie-rod end, and OEM lower control arms **at full steering lock**, especially while the suspension is active (in motion). A majority of this interference is due to inner-rim flange mounted (clip-on style) wheel weights.

Solution: 1.) Remove inner-rim flange mounted wheel weights; rebalance wheels with stick-on style weights attached to inside rim diameter 2.) Remove small amount from 2505 spindle ends of cast steering arms with grinder 3.) Remove approximately 1/4" from hexagonal threaded end of tie-rod ends with cut-off wheel 4.) Flatten areas of lower control arm with ball-peen hammer and 5.) Remove inner-corners of OEM control arm mounted steering stop features with grinder.

Tool Requirements:

- Wheel weight removal and wheel balancing capabilities
- Ball-peen hammer, medium weight
- Hand grinder (or similar) equipped with cut-off wheel and grinding wheel

Addendum to 2505 Installation Instructions, Step 12e: Finalizing the Installation

e. Reinstall front wheels and torque to factory specifications. Note: Follow the instructions below ONLY IF vehicle IS equipped with the **factory optional 16" cast aluminum wheels**.

Addendum Text:

AA Remove inner-rim flange mounted, clip-on style wheel weights from inside edges of front wheel rims, near tires.

AB Rebalance wheels with stick-on style weights attached to inside rim diameters, near brake rotors. ***Note: To avoid future interference problems when tires are rotated, it may be desirable to rebalance all five (5) (+spare) wheels and tires with stick-on style wheel weights***

Note: The following steps apply to both the RH and LH sides of the vehicle.

AC Referring to Figure 1, from area marked "A" remove a small amount of material from front lower edge of cast steering arm ends of spindles using grinder. ***Note: Remove only enough material to allow approximately 1/4" of clearance between steering arm and inner wheel rim.***

AD Referring to Figure 1, from area marked "B" remove approximately 1/4" from hexagonal shaped, threaded ends of tie-rod ends, below attachment nuts, using grinder equipped with cut-off wheel. ***Note: Be sure to remove only enough material to allow approximately 1/4" of clearance between tie-rod end and inner wheel rim. Leave enough of the hexagonal shaped end so that a wrench may be used to remove tie-rod end for future adjustments or replacement.***

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AE Using ball-end of medium weight ball-peen hammer, slightly flatten <u>forward</u> areas of control arms just inside ball-joints, above shock absorber lower attachment access holes as shown in Figure 2, area marked "A".

AF Remove forward inner-corners of OEM control arm mounted steering stop features with grinder, as shown in Figure 2, area marked "B".

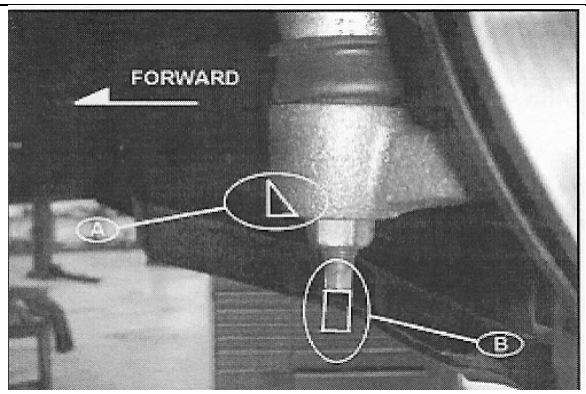
AG Remove rearward inner-corners of OEM control arm mounted steering stop features with grinder, as shown in Figure 3, area marked "A".

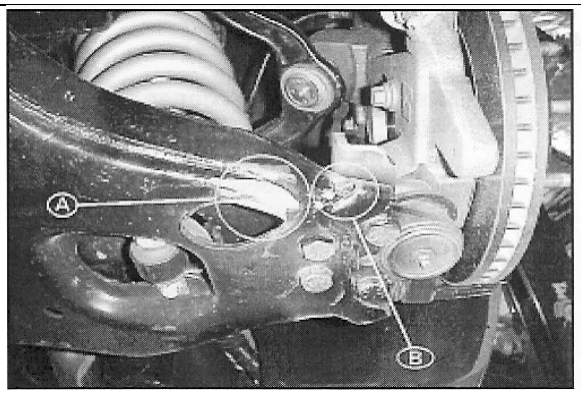
AH As in Step AE, flatten <u>rearward</u> areas of control arms just inside ball joints, as shown in Figure 3, area marked "B".

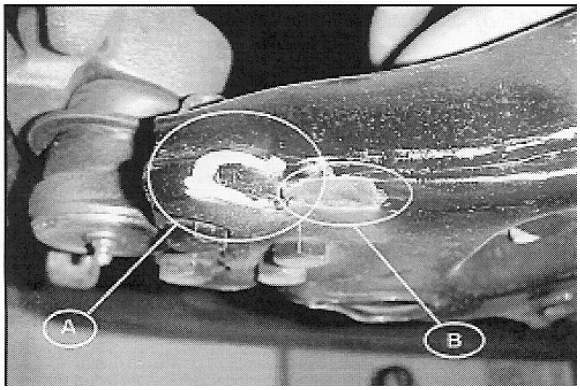
AI Paint all exposed metal surfaces to prevent corrosion.

AJ Reinstall front wheels, and torque to specifications.

AK Carefully test drive vehicle and turn front wheels lock-to-lock several times at slow speeds. Listen for any noises that might indicate spindle/control arm to wheel interference. If noises are detected, remove front wheels and check for scratching/scraping of freshly painted surfaces. If scratching/scraping is noted, then not enough material/areas was/were removed/flattened in the preceding steps. Remove/flatten material/areas as necessary and re-test drive vehicle to ensure interference has been eliminated. *Note: Do not remove any more material than is absolutely necessary or that is not recommended in these instructions.*







Installation Instructions Addendum

Belltech #2505 Lowering Spindle Assembly

1/2 Ton Silverado/Sierra (GMT 800/880)

Topic: Steering toe-in adjustment

Details: It has been observed that, on some vehicles, there may not be enough toe-in adjustment to achieve factory alignment specifications when the 2505 spindle assembly

Solution: Separate tie-rod ends from spindle steering arms. Remove tie-rod ends from steering rack-and-pinion unit output shafts. To allow increased toe-in adjustment, trim approximately 1/4" from end of rack-and-pinion unit output shafts and reinstall tie-rod ends.

Tool Requirements:

- Hand grinder equipped with cut-off wheel
- Metal file
- M14-1.5 die

Addendum to 2505 Installation Instructions, Step 12j: ***Finalizing the Installation***

j. Take vehicle immediately to a **qualified alignment center** for four-wheel alignment. *Note: It has been observed that, on some vehicles, there may not be enough toe-in adjustment to achieve factory alignment specifications when the 2505 spindle assembly is used in conjunction with 3" springs (#4408/4458) to achieve a 5" drop. If a problem is experienced when attempting to achieve factory toe-in specifications during front wheel alignment, refer to the following instructions.*

Addendum Text:

AA Working from the LH (driver's side) of vehicle, separate tie-rod end from steering arm of 2505 spindle assembly as described in Step 3(b).

AB Loosen locking jam-nut securing tie-rod end body to threaded output shaft of rack-and-pinion steering assembly. Remove tie-rod end from threaded output shaft.

AC Using grinder equipped with cut-off wheel, trim approximately 1/4" from end of threaded output shaft. This will allow increased toe-in adjustments to be obtained. ***Note: In some extreme cases, it may be necessary to trim approximately 1/4" from threaded female end of tie-rod end body as well.***

AD Chamfer cut edge of output shaft with metal file. Remove any burs from cut end.

AE Chase threads of output shaft using M14-1.5 die.

AF Reinstall tie-rod end to output shaft. Reinstall tie-rod end to steering arm of 2505 spindle assembly as described in Step 10(l).

AG Repeat above steps for RH (Passenger's side) of vehicle.

AH Make necessary adjustments to achieve factory toe-in alignment specifications. Tighten tie-rod end locking jam-nut when alignment is complete.

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