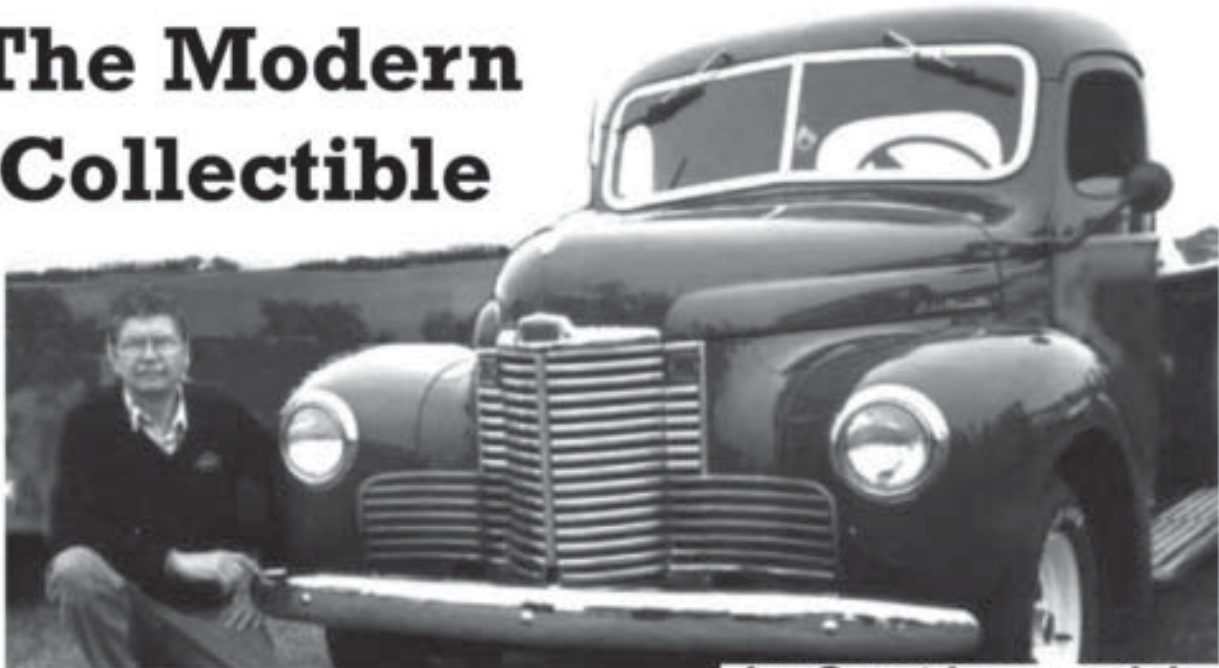




**LIMITED LIFETIME
WARRANTY**



The Modern Collectible



by Orest Lazarowich

*A DETAILED TECHNICAL COLUMN INTENDED TO TARGET MANY
MAKES AND MODELS OF POST-WAR CARS AND PICK-UP TRUCKS*

Truck Suspension and Steering

The truck frame carries the cab, the axles and their suspensions and the engine/transmission. The frame side rails, crossmembers and gussets are usually formed from high-tensile steel and riveted or welded together. Suspension mounts are cast or made out of steel. The frame must be rigid enough to carry the load and flexible enough to handle shock loads, bends, sway and sag that is encountered under different road and load conditions. The solid front axle has been preferred for any type of heavy duty road driving. The suspension includes the springs, shock absorbers, linkages and wheels that carry the weight of the truck and its payload. Suspension system components like leaf springs and shocks help absorb bounce and shock from the surface of the road. To operate properly, the spring bushings and shackles must be able to move freely without binding. All suspension system components weaken over time. Leaf springs sag and may require extra leaves to correct ride height.

Road test the truck. Shaky, unsteady, loose or stiff steering are all cause for servicing the steering system. Excessive bouncing or swaying during bumps are a cause for suspension system service. Loose steering can be caused by loose/worn front wheel bearings, worn steering gears or steering linkage including the kingpins. Hard steering can be caused by lack of lubrication, bent front end parts and/or improper front end alignment. Swaying can be caused by incorrect tire pressure, faulty shocks or loose or bent front end components. Vibration at the steering wheel can be caused by any of the above causes, and if they are corrected and the vibration continues, check the tires for balance. Uneven tire wear can be caused by improper front end alignment and/or wheel balance. Power wash the entire frame, rear suspension, front suspension and steering. Wear safety goggles to prevent road dirt from flying back to your eyes.

Slide under the truck, and with a good light inspect the frame rails for cracks, and loose



LIMITED LIFETIME WARRANTY



or missing rivets at the crossmembers. Look for rust damage where the frame rail is boxed. Check for broken spring leaves, broken center bolt and/or loose U-bolts at front and rear suspensions. A spring that is broken at the center hole is caused by loose U-bolts not fatigue. Repair the spring, if the cost is less than half the cost of a new spring. If more than two or three leaves are broken, replace the entire spring. Also check for loose or cracked spring hangers. Slide a bar - not a screwdriver - in between the spring shackles to check for bushing and pin wear. At curb height the shackle bars should generally be vertical. Check for leaking shock absorbers. Check the steering system for bent parts and worn tie rods. Have the frame repaired at a frame shop. The cracks can be welded and reinforcing plates (fishplating) can be installed, if state/provincial rules allow it. With the frame repaired start on the repair of the front suspension, if the steering has been the main problem.

Steering Linkage

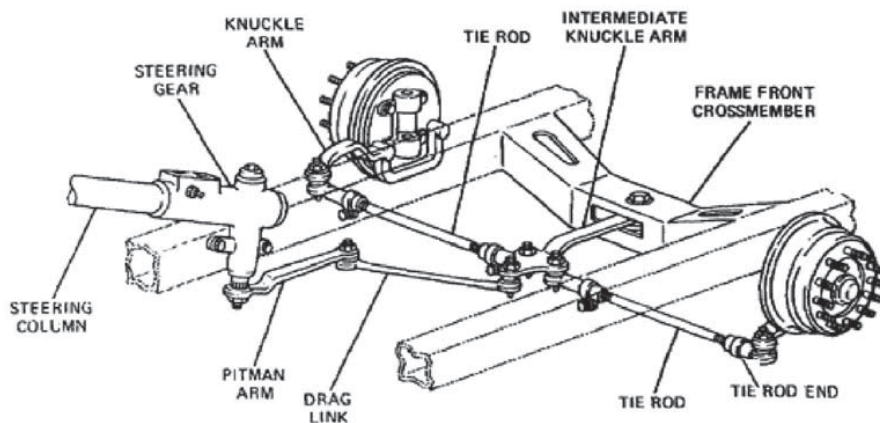
The steering linkage allows the truck driver to direct the truck to where he wants it to go. It connects the steering box and pitman arm to the steering knuckles and the wheels. The pitman arm swings right or left and moves the steering linkage. The kingpin is the main component in the steering system. The kingpin attaches the spindle (steering knuckle) to the steering axle I-beam. The I-beam is manufactured from alloy forged steel for rigidity and

strength. The steering knuckle is mounted on top of the axle. A tie rod with swivel ends connects the two steering knuckles. Worn or loose steering components can damage tires and be a safety issue. Tire wear to one side or the other can be caused by worn tie rod ends. Check the tie rods and drag link for wear. To check the kingpins for wear raise the front end to a comfortable height and support the axle on heavy duty safety stands. You need a 2-3 ton jack to lift the front of the truck.

Remove the dust cap. Remove the cotter pin and tighten the nut. Grab the tire at 6 and 12 o'clock positions. Rock the tire back and forth. Anything more than 1/8 inch movement, replace the kingpins. Check the other side the same way. Some older trucks may also have a worn axle. This will involve machine shop service and the removal of the axle. If the previous inspection noted springs or shackle pins and bushing need replacement, do it now. To remove/repair the springs the U-bolts have to be removed. To replace a broken center bolt the spring should be removed. Bushings and pins can be removed/replaced with the spring in place.

Kingpin Removal and Replacement

This procedure is for any truck with longitudinal front springs, drum brakes and no power steering. Now, you see the reason for the large diameter steering wheel. Remove the front wheels and hubs. Remove the tie rod at both ends. Disconnect the drag link at both ends, and remove it. Remove the brake backing plate and brake shoe assembly as a unit. Do not disconnect the hydraulic hose. Tie the backing plate out of the way. Examine how the kingpin is held in place. There should be a horizontal tapered lock pin in the axle. Drive this pin out after removing the nut. On some models there will be a dust cap that is bolted on or swaged in the steering knuckle. Remove the dust caps or plugs. If there are





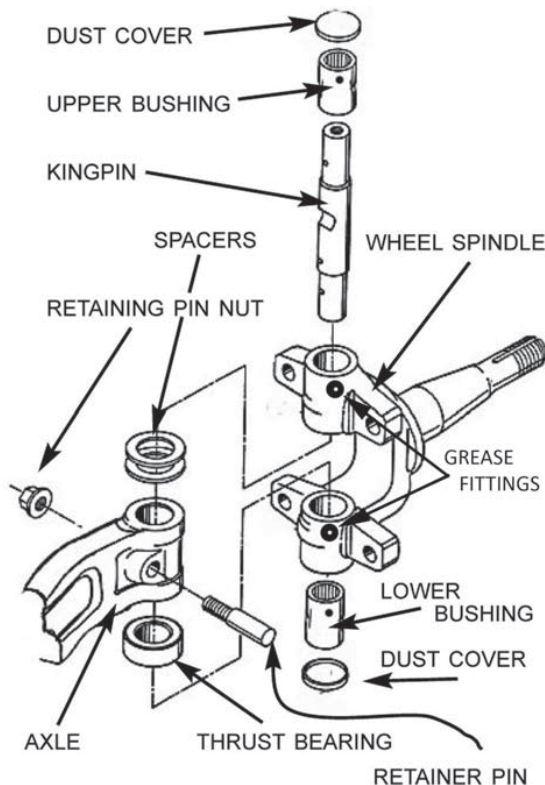
no dust caps, the kingpin may have a cap and must be driven out from the bottom. Prepare both sides for kingpin removal. Spray plenty of rust buster around the axle where the kingpin is held, and let it soak down. Pray. If the kingpin does not have a cap, drive the kingpin out from the top. The work space is limited on older models when you are under the fender. On newer models you can tilt the hood assembly to give you more room to swing the hammer. Wear safety glasses. Use a soft steel drift and a BFH. Note the position of the thrust bearing, shims and seal, if there is one. If the kingpin has a cap and there is no movement of the kingpin as you try to drive it up, grind off the cap so you can hammer from the top where there is more room.

Removing a seized/rusted kingpin is easier said than done. If you can get a bit of movement, try to move the kingpin up/down. Use plenty of rust buster, and repeat the up/down movement until the kingpin comes out. Use an air chisel with the round punch insert to hammer the kingpin. It is not recommended to use heat to free the kingpin. Excessive heat can damage the axle. How-

ever, if the kingpin does not move, applying heat judiciously will generally free the kingpin. If you cannot move the kingpin(s), the axle has to be removed and delivered to a truck shop that has a heavy duty hydraulic press. Remove the spindle assembly, and wash it and the axle boss. Remove the grease fittings. Inspect the spindle and axle for signs of damage, scoring or cracks. Inspect the axle bore for corrosion, nicks or burrs. Clean up the axle bore with a brake hone, if necessary. Order a set of kingpins, bushings and bearings. The new kingpin should be a snug fit in the axle bore with no side play. If there is excessive movement, the axle has to be removed and reamed for oversize kingpins and bushings.

Remove the old bushings, and use air to blow the grease holes clean. Align the grease hole of the new bushings, and press them in using a press or a bushing driver and hammer. Hone the bushings to fit the pins. Wash out any cuttings. The kingpin should drop through both bushings with its own weight. Install new grease fittings. If the kingpin does not fall through the second bushing, the spindle is bent and must be replaced. Pack the new thrust bearings with high quality grease. Lightly grease the bore. Position the spindle on the axle with the thrust bearing in proper location with lip flange facing down. Install the seal, if one is used. Install the thrust washers in the proper location. Carefully fit the kingpin with the notch facing the lock pin hole, and tap the kingpin in place. Measure the space between the axle and the spindle at the top of the axle. Install extra shims to remove all play. Install the lock pin, and drive it all the way in. Torque the nut 40-50 ft.lbs. Install the plugs. Repeat for the other side. Lubricate the kingpins.

Inspect the shock absorber mounts for worn grommets, loose mounting bolts/nuts or missing bump stops. Check the shock absorbers for leakage. A slight trace of fluid is normal to lubricate the seals. A leaking shock absorber must be replaced. Replace both shock absorbers as they need to work together. The other one can't be much better so save time and replace it now. Install steering components and brakes. Service the front wheel bearings and replace the seals. Adjust the bearings. Replace the hub cap or cover.





LIMITED LIFETIME WARRANTY



Replace the tie rod ends, if they are worn or damaged. Examine the drag link for wear. If it is of the style that uses end plugs for adjustment, disassemble it, and check the plugs and springs for wear. If it has ball joints, examine for wear and damage. Repair/replace as necessary. Check pitman arm nut for torque (up to 180 ft.lbs.) Adjust the steering gear box. At steering wheel midpoint you can have 2 inches of freeplay before the pitman arm moves. Follow the service manual procedures depending on the type of steering gear. Some older trucks use a Ross cam and lever steering gear. To fine tune the steering adjustment refer to *Skinned Knuckles* ad for TightSteer (page 17). This is a spring loaded adjustment screw and may help to reduce steering wheel freeplay, if the problem is at the steering gear. Install the wheels, and lower the truck on its wheels. Torque the wheel nuts with the weight of the truck on the tires. Check the toe-in by measuring the distance between the front and back of the front tires. Specifications may vary from 0-1/16-1/8 inches. Check the service manual. Adjust at the tie rod ends. Center the steering wheel. Install the drag link and adjust to fit. Lubricate the tie rod ball joints and drag link. Road test.

Front Spring Repair/Replace

The constant rate semi-elliptic leaf spring has several leaves, and adding more leaves increases the load carrying capacity of the suspension. The top (main) leaf is typically the longest, and each end is rolled to form an eye. A bushing is installed in each eye. One end of the main leaf is attached to the frame, and the other end is attached to a shackle that can move. This allows the spring's overall length to vary as it flexes carrying a load or travelling over bumps. If the spring leaves are flat or saggy, replace the spring. Chock the rear tires. Raise the front axle, and place heavy duty safety stands under the frame behind the rear spring bracket. Remove the wheels. Lower the jack until the spring hangs free. Slide a pair of safety stands under the axle, do not trust the jack to hold the axle up. Wear gloves to prevent bruising your hands/fingers.

Examine the spring leaves for breakage, cracks or misalignment. Misalignment of the

leaves indicates a broken center bolt caused by loose U-bolts. Broken leaves can be caused by overloading and/or loose U-bolts. Overloading will also cause the springs to sag and lower the chassis height of the truck. If the bushings and pins show minimal wear, you can replace the center bolt or a broken leaf with the main leaf in place. Remove the shock absorber where used. Mark the spring leaves with some spray paint to help orientation on assembly. To keep the spring leaves together clamp a C-clamp on either side of the center bolt. Undo the rebound clamps. Remove the U-bolts. It is recommended that the U-bolts not be reused. Cut them off to save time. If you are planning to reuse the U-bolts, clean up the ends from any rock damage, and use plenty of rust buster. Adding an extra leaf may find the U-bolts too short. Check this out before straining yourself to remove the U-bolt nuts.

Remove the front axle rubber bumper or top plate, if used. Remove the center bolt nut or the broken center bolt. Undo the C-clamps, and the spring leaves will come apart. Remove the spring leaves one at a time. There might be caster shims for alignment under the springs. Identify which spring they fit under. Measure the length, width and thickness of the main leaf, if you are adding an extra leaf to increase load capacity or raise curb height on the driver's side. You need this measurement so the spring shop knows what length of spring is needed. If you are replacing a broken leaf bring it along as a sample. Purchase the leaves, clips, U-bolts and a center bolt about two inches longer than spring height. Ask the spring shop about torque specifications on the U-bolts.

Clean the surface rust off the leaf springs, and examine each one for stress cracks and corrosion. If the rust has started to corrode two or more leaves, the entire spring should be replaced. If the old leaf springs are suitable for reassembly, position the extra leaf under the main or second leaf. Do not oil or paint the spring leaves. If you are only replacing the broken leaf, position it in the spring. Use the C-clamps to hold the top four or five leaves in place. Use a pin punch to align the center holes. Put the remaining leaves on the center bolt, and fit the center bolt into the top leaves.



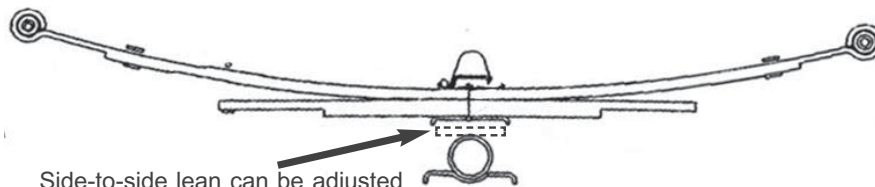
LIMITED LIFETIME WARRANTY



Start the nut on the center bolt. Reposition the C-clamps close to the center bolt, and compress all the leaves. Tighten the C-clamps as tight as possible. **DO NOT** use the center bolt to pull the leaves together. Hold the center bolt head with vise grips, if necessary. Torque the nut to specifications. (7/16 bolt 27 foot pounds; 1/2 bolt 41 foot pounds). Install any spring clips. Place any caster shims on the axle. Raise the front axle, and fit the head of the center bolt through the shim and into the hole in the axle. Use oil or anti-seize compound on the threads to reduce nut friction. Install the U-bolts, and tighten the nuts in a cross tightening order until the nuts are snug. Torque to about 1/3 of recommended torque. Gradually increase torque through second and third tightening until final torque specifications are reached. Recheck the center bolt torque. Saw off any extended length, and peen the end of the bolt. Reinstall the shock absorber. Service the other side. Install the wheels, and remove the safety stands. Check U-bolt torque when the weight of the truck is on the wheels.

Replacing Front Spring Bushings and Pins

Measure the curb height on a flat level surface at both front and rear with the tires at normal pressure. Side-to-side lean can be adjusted by installing a shim between the axle and the spring on the low side or installing an extra leaf. Order a set of bushings and pins and have them in hand before you start any disassembly. A kit may contain new shackle bars. Depending on the tools and equipment you have this job can take up to 8 hours. Removing the old bushings takes a considerable amount of time. Contact a mobile shop mechanic who has a bushing press to press the old bushings out and press the new bushings in. This will save you hours of time and misery. Work safely. These parts are heavy. Get help if you need it. Loosen the front wheel nuts. Raise the truck, and place heavy duty truck stands



Side-to-side lean can be adjusted by installing a shim between the axle and the spring.

under the frame behind the rear spring bracket. Let the spring hang free, and place safety stands under the front axle. Remove the wheels.

Disconnect the spring from the frame bracket. Disconnect the spring shackle. Lower the axle jack to expose the other spring bushing. If the spring is in good condition, do not remove it. You can replace the bushings and pins with the spring in place. Do not hammer on the spring. Contact the mobile mechanic, and have the old bushings pressed out and the new bushings pressed in. Some bushings are rubber mounted. Use lithium grease to help get them started. With the spring positioned on the axle raise the axle and guide the greased pins (bolts) through the bracket and bushing away from the shackle pins. Then hook up the shackle end. Torque the nuts to specifications. If you are installing a complete new spring, follow the same installation procedure as above. Connect the shackle end last. Position the axle and the shims, if any to the spring. Raise the axle and align the spring's center bolt with the hole on top of the axle. Install the U-bolts and nuts. Torque the nuts evenly in gradual increments and in a criss-cross pattern. Torque to 220-300 ft.lbs. or as per the service manual when the truck weight is on the front wheels. Connect the shock absorbers. Grease the fittings when the safety stands are under the frame. Install the wheels, and torque the nuts. Raise the front axle and remove the safety stands. Check the toe-in and road test.

Rear Springs and Bushing/pins

Medium duty trucks with a single axle and dual wheels have an upper spring pack (overload) that sits on top of the main spring and is clamped together with long U-bolts. The ends of this spring have their own support brackets attached to the frame side rails. When the truck is under load the overload spring assumes part of the load when its ends touch the support brackets. If the rear springs are weak and need replacement or the bushings and pins are worn, proceed as for the front springs. Consider the



LIMITED LIFETIME WARRANTY



range of this job before you start. If you are not comfortable, do not start. Work safely, and get help as the rear springs are a lot heavier than the front. Loosen the wheel nuts. Raise the truck frame until the weight is off the tires, and support the frame with heavy duty truck stands. Support the rear axle tubes with safety stands. Remove the wheels on the side that has the damaged spring. Insert a pry bar between the rear of the spring and the frame. Push down on the bar and observe any movement at the bushing and shackle pin. Do the same at the shackle bar end. If there is excessive movement, the bushings and pins have to be removed/replaced. Remove the shackle pins, and have a mobile mechanic press out the old bushings and press in the new ones. Connect the spring to the hangers. If the rear of the truck is sagging, the springs should be replaced. The spring shop will press new bushings into the main leaf. You will have to press the old bushing out of the shackle end, and replace it with a new bushing. If the overload spring has lost its arc, it should be replaced.

The rear suspension on heavy duty trucks with tandem axles uses four spring packs attached to the axles with U-bolts. On both sides of the truck the forward end of the forward spring and the rear end of the rear spring ride in brackets mounted on the frame rails. At the center between the forward and rear spring the springs ride on an equalizer, which pivots on a sleeve in the equalizer bracket. Each axle is held in alignment by a pair of radius rods. Power wash the rear suspension. With the wheels in place inspect the shackle brackets for cracks and missing bolts or rivets. Inspect the spring shackles for wear. Check the spring packs for cracked or broken leaves. Replace or repair the spring pack. This repair is physically demanding and needs proper tools and lifting equipment. Unless you have experience with this type of repair and have the proper tools and equipment, leave this suspension repair to the spring shop. Happy motoring.

S.K.

Next month: Linkage Type Power Steering on Trucks

LARES
CORPORATION

**SKINNED
KNUCKLES
ARTICLE**



**LIMITED LIFETIME
WARRANTY**

ONLINE CHAT



Originally printed in *Skinned Knuckles* magazine, and copyrighted by SK Publishing/Skinned Knuckles Magazine. Reprinting of any portion prohibited without written permission of SK Publishing, PO Box 6983, Huntington Beach, CA 92615.

Subscriptions to *Skinned Knuckles* magazine is \$28.00 for twelve monthly issues (within the U.S.). Contact *Skinned Knuckles* by mail at PO Box 6983, Huntington Beach, CA 92615; Website skinnedknuckles.net and click on Subscribe or PayPal. E-mail sk.publishing@yahoo.com, phone: 714-963-1558.

Article content provided by *Skinned Knuckles Magazine*.