Hazard Warning Definitions

⚠ DANGER	**Immediate hazards which WILL result in severe personal injury or death.**
⚠ WARNING	**Hazards or unsafe practices which COULD result in severe personal injury or death.**
⚠ CAUTION	**Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.**
NOTE	A note gives key information to make following a procedure easier or quicker.

Disclaimer

This Service Manual has been prepared by TRW Commercial Steering Systems for reference and use by mechanics who have been trained to repair and service steering components and systems on heavy commercial vehicles. TRW Commercial Steering Systems has exercised reasonable care and diligence to present accurate, clear and complete information and instructions regarding TRW Commercial Steering linkage components. Since this is a general service manual, the photographs and illustrations may not look exactly like the components being serviced. The procedures, therefore , must be carefully read and understood before servicing.

If inspection or testing reveals evidence of abnormal wear or damage to TRW linkage components or if you encounter circumstances not covered in the manual, STOP - CONSULT THE VEHICLE MANUFACTURER'S SERVICE MANUAL AND WARRANTY. DO NOT TRY TO REPAIR OR SERVICE ANY LINKAGE COMPONENT WHICH HAS BEEN DAMAGED OR INCLUDES ANY PART THAT SHOWS EXCESSIVE WEAR UNLESS THE DAMAGED AND WORN PARTS ARE REPLACED WITH ORIGINAL TRW REPLACEMENT AND SERVICE PARTS AND THE UNIT IS RESTORED TO TRW'S SPECIFICATIONS FOR THAT SPECIFIC COMPONENT.

It is the responsibility of the mechanic performing the maintenance, repairs or service on a particular TRW linkage component to (a) inspect components for abnormal wear and damage, (b) choose a repair procedure which will not endanger his/her safety, the safety of others, the vehicle, or the safe operation of the vehicle, and (c) fully inspect and test the linkage components and the vehicle steering system to ensure that the repair or service of the component has been properly performed and that the component and system will function properly.

Patents

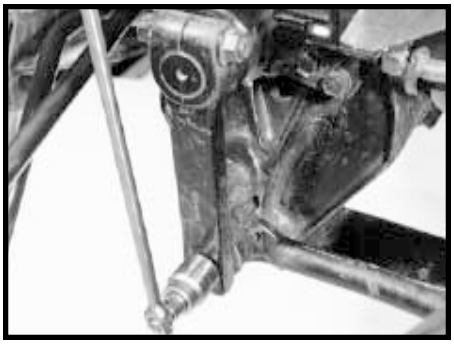
TRW Commercial Steering Systems linkage components are covered by several United States and foreign patents, either issued or pending.

Section 3 On-Vehicle Adjustments

Draglink Adjustment and Centering: One End Adjustable

Position road wheels

1. Position the road wheels straight ahead.



Disconnect drag link

2. Disconnect the drag link at the pitman arm using the appropriate tool.

Center steering gear

3. Make sure the steering gear is on center by aligning the timing marks (housing to output shaft.)

Loosen clamp

4. Loosen the clamp on the drag link.

Adjust length

5. Adjust drag link length to fit the holes in the pitman arm and axle arm.

Reconnect drag link

6. Torque pitman arm and nut to vehicle manufacturer's specifications, and replace the cotter pin.

Center drag link tube

7. Grasp the long side of the drag link with both hands. Rotate the drag link away from you as far as it will go, then toward you as far as it will go. Center the drag link between these two points.

Center drag link socket

8. Hold the long side in place. Grasp the short end of the drag link (socket only) and rotate it as far toward you and away from you as it will go. Center the short end between these two points.

Torque clamp

9. With both ends centered, tighten the clamp, and torque to vehicle manufacturer's specifications.

⚠ WARNING

If the clamp is tack-welded, do not remove the tack weld. If the tack weld is removed, clamping force will not be enough to keep the socket threads stationery. Loss of steering control will result.

NOTE

If the clamp is not tack welded, and is a free-to-rotate design, it can be tightened in any position properly.

Lubricate sockets

10. Lubricate sockets through a grease zerk (unless they are "greased for life" sockets) until you can see clean grease purging out of the seal.

NOTE

This purge is necessary to ensure contaminants are removed from socket assemblies.

Draglink Adjustment and Centering: Two End Adjustable

Position wheels

1. Position the road wheels straight ahead

Loosen clamps

2. Loosen the clamps on both ends of the drag link.

Center drag link

3. Rotate the center tube of the drag link until the steering gear is on center (align housing timing mark with output shaft timing mark.)

⚠ CAUTION

Do not adjust the drag link to a position where you can see the end of the socket thread through the slot in the tube. If the socket thread is visible, corrosion may occur in the tube weakening the components.

Tighten clamps

4. Tighten the clamps and torque to manufacturer's specifications.

⚠ WARNING

If the clamp is tack-welded, do not remove the tack weld. If the tack weld is removed, clamping force will not be enough to keep the socket threads stationery. Loss of steering control will result.

NOTE

If the clamp is not tack welded, and is a free-to-rotate design, it can be tightened in any position properly.

Lubricate sockets

5. Lubricate sockets through a grease zerk (unless they are "greased for life" sockets) until you can see clean grease purging out of the seal.

NOTE

This purge is necessary to ensure contaminants are removed from socket assemblies.

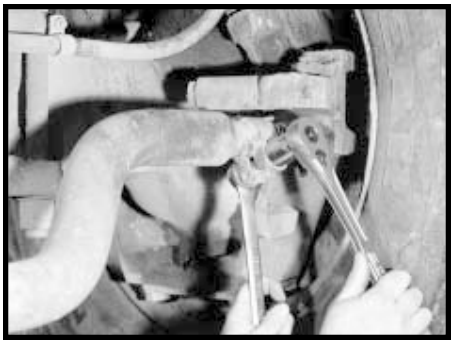
Tie Rod Adjustment and Centering: One End Adjustable, Drop-Center

Position wheels

1. Position the road wheels straight ahead.

Jack up vehicle

2. Place a jack under the center of the front axle and jack up the front end of the vehicle so the steer axle tires are off the ground.



Loosen clamp

3. Loosen the clamp on the tie rod tube.

Disconnect tie rod

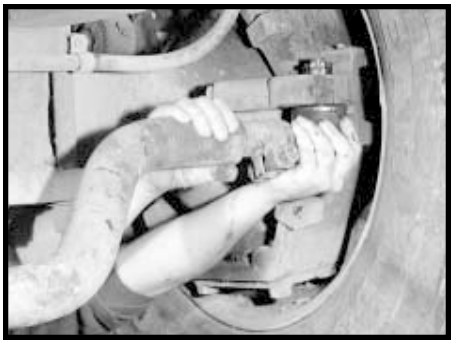
4. Disconnect the tie rod from the tie rod arm at the adjustable end.

Adjust toe

5. Adjust the socket in one full turn increments. Reinstall the socket end, tighten (don't torque), and check toe in measurement after each full turn adjustment. Repeat as necessary until toe is correct.

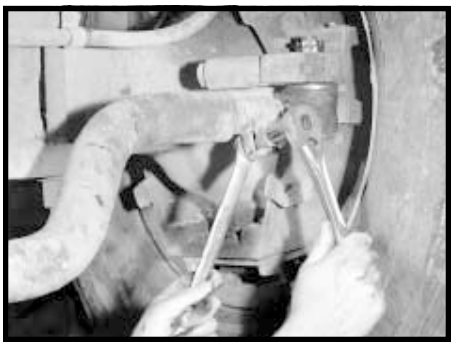
Center tie rod

6. Grasp the long side of the tie rod with both hands. Rotate the tie rod away from you as far as it will go, then toward you as far as it will go. Center the tie rod between these two points.



Center tie rod socket

7. Hold the long side in place. Grasp the short end of the tie rod (socket only) and rotate it as far toward you and away from you as it will go. Center the short end between these two points.



Torque clamp

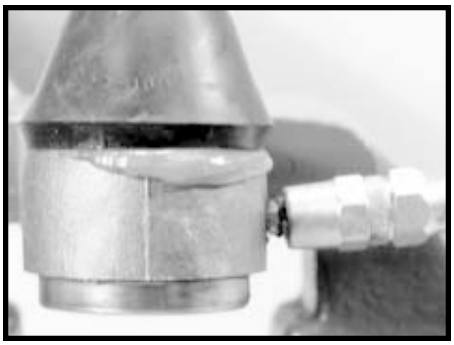
8. With both ends centered, tighten the clamp, and torque to vehicle manufacturer's specifications.

⚠ WARNING

If the clamp is tack-welded, do not remove the tack weld. If the tack weld is removed, clamping force will not be enough to keep the socket threads stationery. Loss of steering control will result.

NOTE

If the clamp is free-to-rotate, it can be tightened in any position properly.



Lubricate sockets

9. Lubricate sockets through a grease zerk (unless they are "greased for life" sockets) until you can see clean grease purging out of the seal.

NOTE

This purge is necessary to ensure contaminants are removed from socket assemblies.

Tie Rod Adjustment and Centering: One End Adjustable with Threaded Sleeve

Position wheels

1. Position the road wheels straight ahead.

Jack up vehicle

2. Raise the front end of the vehicle so the steer axle tires are off the ground.

Loosen clamp

3. Loosen the clamp on the tie rod tube.

Adjust toe

4. Turn the hex adjuster until the toe is correct.

⚠ WARNING

Do not adjust the tie rod to a position where you can see the end of the socket thread through the slot in the tube. If the socket thread is visible, corrosion may occur in the tube weakening the components.

Center tie rod

5. Grasp the long side of the tie rod with both hands. Rotate the tie rod away from you as far as it will go, then toward you as far as it will go. Center the tie rod between these two points.

Center tie rod socket

6. Hold the long side in place. Grasp the short end of the tie rod (socket only) and rotate it as far toward you and away from you as it will go. Center the short end between these two points.

Torque clamp

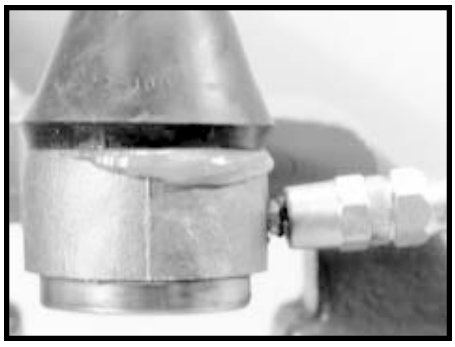
7. With both ends centered, tighten the clamp, and torque to vehicle manufacturer's specifications.

⚠ WARNING

If the clamp is tack-welded, do not remove the tack weld. If the tack weld is removed, clamping force will not be enough to keep the socket threads stationery. Loss of steering control will result.

NOTE

If the clamp is not tack welded, and is a free-to-rotate design, it can be tightened in any position properly.



Lubricate sockets

8. Lubricate sockets through a grease zerk (unless they are "greased for life" sockets) until you can see clean grease purging out of the seal.

NOTE

This purge is necessary to ensure contaminants are removed from socket assemblies.

Tie Rod Adjustment and Centering: Two End Adjustable

Position wheels

1. Position the road wheels straight ahead

Loosen clamps

2. Loosen the clamps on both ends of the tie rod.

Center tie rod

3. Rotate the center tube of the tie rod until you achieve proper toe-in measurements on the front wheels. (Check vehicle manufacturer's specs.)

⚠ WARNING

Do not adjust the tie rod to a position where you can see the end of the socket thread through the slot in the tube. If the socket thread is visible, corrosion may occur in the tube weakening the components.

Tighten clamps

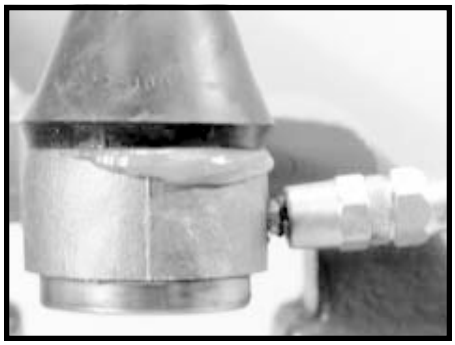
4. Tighten the clamps and torque to manufacturer's specifications.

⚠ WARNING

If the clamp is tack-welded, do not remove the tack weld. If the tack weld is removed, clamping force will not be enough to keep the socket threads stationery. Loss of steering control will result.

NOTE

If the clamp is not tack welded, and is a free-to-rotate design, it can be tightened in any position properly.



Lubricate sockets

5. Lubricate sockets through a grease zerk (unless they are "greased for life" sockets) until you can see clean grease purging out of the seal.

NOTE

This purge is necessary to ensure contaminants are removed from socket assemblies.

Pitman Arm Timing

⚠ WARNING

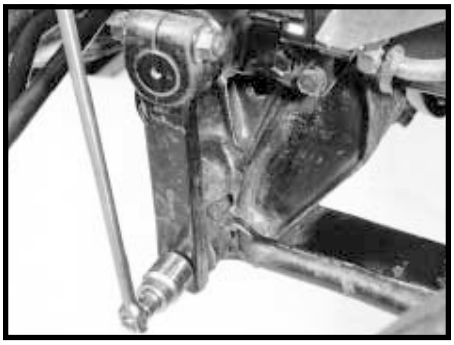
Don't remove the drag link connection after the pitman arm pinch bolt is removed. Doing so will deform the drag link and cause steering problems.

⚠ WARNING

When using a chisel to spread a pinch bolt-type pitman arm boss for assembly or removal from the shaft, maintain a firm grip on the chisel at all times. Failure to do this may result in the chisel flying loose which could cause an injury. Never leave the chisel wedged in the pitman arm boss. If you cannot remove the pitman arm from the shaft with a chisel and your hands, remove the chisel from the arm boss and use a puller only to remove the pitman arm.

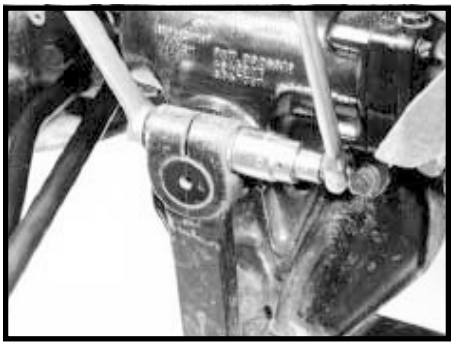
⚠ CAUTION

Do not use a hammer on the pitman arm to remove it from the output shaft as internal damage to the steering gear could result. Be sure there is no spreading wedge left in the pitman arm boss before tightening the pitman arm clamp bolt after assembly on the output shaft.



Disconnect drag link

1. Disconnect the drag link from the pitman arm using the appropriate tool.



Remove pinch bolt

2. Loosen and remove the pitman arm pinch bolt.

Remove pitman arm

3. Remove the pitman arm using a pitman arm puller.

Inspect splines

4. Check pitman arm internal splines for:

   - severe wear, corrosion and fretting
   - twisted splines
   - missing splines

⚠ WARNING

If twisted or missing splines are found, be sure to inspect all internal steering gear components carefully for signs of impact damage. Follow the procedure in the appropriate steering gear service manual.

Align timing marks

5. Align the timing marks on the new pitman arm and steering gear output shaft. Make sure you use the correct timing mark; consult your manufacturer's specifications if in doubt.

Install pitman arm

6. Spread open the split end of the arm just enough to allow the arm to slide onto the output shaft. Push the arm on with hand pressure.

Torque pinch bolt

7. Install the pinch bolt and torque to manufacturer's specifications.

Connect drag link

8. Reconnect the drag link. Torque the nut and replace the cotter pin.