



**Steering and Axle
Compact Tractors
Service Manual 9-50391**

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JI Case
A Tenneco Company



FRONT AXLE AND STEERING GEAR SERVICE MANUAL

GENERAL

All case compact tractors have a pinion and sector type of steering gear to transfer the operators steering effort through the drag link, upper spindle arm and tie rod to the spindles and wheels.

I. Disassembly

A. Steering Wheel

1. Pry steering wheel cap out being careful not to break off anchor tab.
2. Remove hold down nut with proper socket wrench.
3. Pull steering wheel off and take out washer (s).

B. Steering Shaft

1. Remove woodruff key from top of shaft.
2. Remove steering shaft from bottom of tractor except on loaders where it is necessary to loosen the two set screws which hold the shaft to the "U" joint, and then pull the shaft out the top. Then remove snap ring from "U" joint mounting pin and remove washers and "U" joint.

C. Sector Gear

1. Remove drag link ball joint from sector gear.
2. Remove Sector Gear:
 - a. On the 107, 117, 108 and 118 remove the two bolts which hold the sector gear pivot pin to the frame and remove gear.
 - b. On the 200 and 400 series remove the gear retaining bolt from the end of the gear mounting pin, and remove gear.
 - c. On the loaders remove the snap ring which holds the gear

to the mounting pin and remove the gear.

- #### D. Steering gear mounting brackets can be removed from all models by removing the respective retaining bolts. The sector gear mounting pin is threaded into the mounting bracket on the 200 and 400 series models and can be removed.

E. Spindles (Block tractor up at frame)

1. Remove the rod
2. Remove drag link ball joint from spindle steering arm.
3. Remove steering arm retaining bolt and remove steering arm. (On 200 and 400 series the steering arm is part of the spindle and is removed with the spindle.)
4. Remove key from spindle.
5. After removing the steering arm, that spindle is ready to remove. Remove roll pin from remaining spindle (snap ring on loader) and remove spindles.

F. Axle (Block tractor up at frame)

1. Support axle on blocks.
2. 107, 117, 108 and 118
 - a. Remove roll pin from axle pin (107 and 117 has no roll pin in hole) put drift pin in axle pin hole to keep pin from turning, and remove nut from pin.
 - b. Tap pin out of axle from front with drift.
3. 200, 400 series and loaders
 - a. Remove retaining bolt from tab weld on axle pin.
 - b. Pull pin out or tap from behind with drift.
 - c. Remove axle.

INSPECTION

Thoroughly clean all parts before inspection.

Inspect bushings, washers, pins, gears, ball joints, and spindles, and replace all damaged or badly worn parts.

ASSEMBLY AND INSTALLATION

A. Axle

1. On 107, 117, 108 and 118, position axle install pin and secure with nut. On 108 and 118 install roll pin in rear end of pin.
2. On 200, 400 series and loaders, position axle, install the axle pivot pin and secure with bolt.

B. Spindles

1. Place one shim washer on each spindle then place spindle into axle and secure.
2. Spindles should be shimmed to remove end play. This is done by adding shims between the axle

and roll pin or snap ring, and between the axle and the steering arm on models with removable steering arm. Add washers until you have a minimum amount of end play.

3. Install tie rod between spindles.

C. Steering Gear

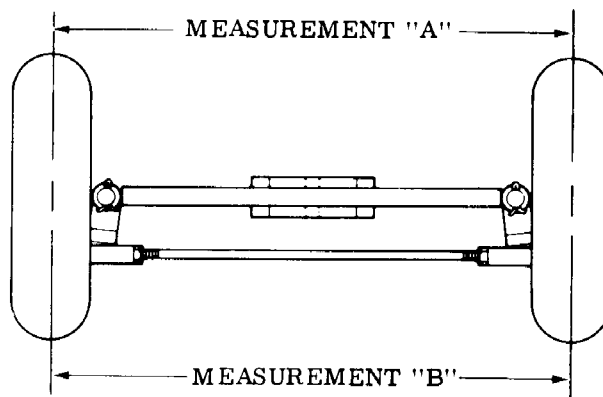
1. Install mounting bracket in reverse of removal procedure.
2. Install respective sector gears in reverse of removal procedure.
3. Install steering shafts and steering wheels in reverse of removal procedure.
4. Connect drag link.

ADJUSTMENTS

A. Measuring Toe-In All Models

1. Locate the tractor on a hard level surface preferably concrete. Place the front wheels in a straight ahead position.
2. Make sure the front tire pressures are equal.
3. Starting at the front of leading edge of the front wheels, place a chalk mark on each tire center line in line with the spindle. Do the same at the rear or trailing edge of each front wheel.
4. Measure the distance between the tire center lines at the chalk marks.

MEASUREMENTS - FRONT AND REAR MUST BE TAKEN FROM THE SAME HEIGHT ABOVE THE FLOOR.



THE DISTANCE BETWEEN MEASUREMENT "A" MUST BE 1/8 TO 3/8 INCH LESS THAN MEASUREMENT "B" ON 200, 400 AND LOADER MODELS, AND 1/8 TO 1/4 INCH ON 100 SERIES MODELS. BOTH

This is a diagram of the 100 series and the loader setup. The tie rod is in front of the axle on the 200 and 400 series models.

B. TOE-IN ADJUSTMENT

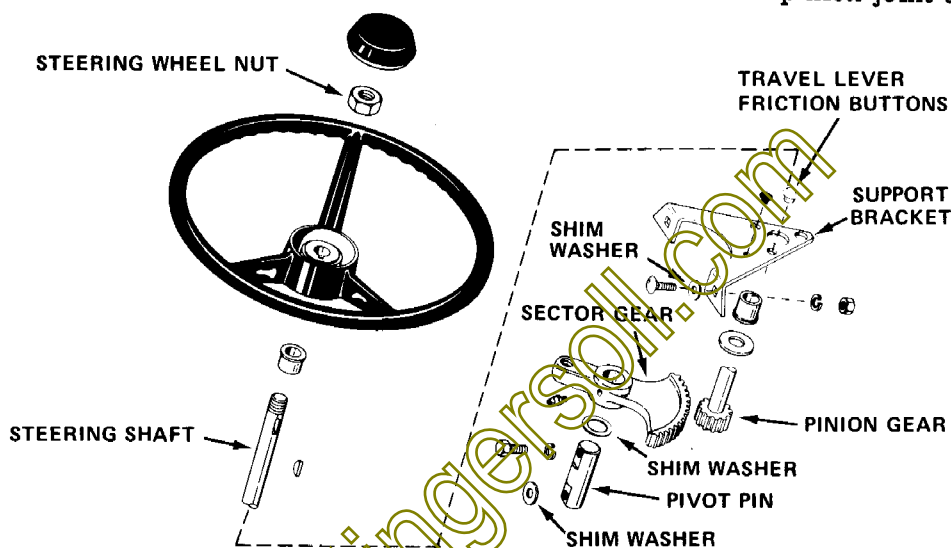
Loosen both tie rod ball joints.

Turn both ball joints on or off the tie rod an equal amount. Retighten the ball joints when correct toe-in is obtained.

TURNING RADIUS

The turning radius should be approximately the same in both the right and left directions. To adjust the turning radius, loosen

both jam nuts on the drag link and turn the drag link in or out of the ball joints as required. One ball joint has left hand threads and the other right hand so it is not necessary to disconnect them from the steering arm and gear. Tighten the jam nuts when correct turning radius is obtained. Properly adjusted the pinion joint will be centered in the sector gear when the wheels are pointed straight ahead. This can be checked by counting the number of sector gear teeth on each side of the center meshed pinion joint tooth.

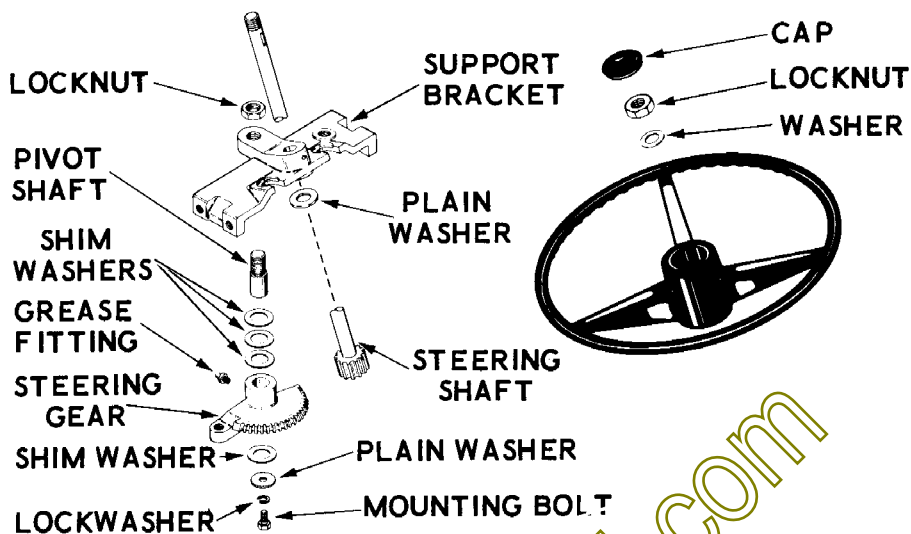


C. STEERING GEAR ADJUSTMENT (Models 107, 117, 108, and 118)

1. **STEERING WHEEL NUT.** The steering wheel nut is properly adjusted when there is no end play on the steering shaft and the pinion gear is in full alignment with the sector gear. Overtightening the nut can cause the pinion gear to bind against and distort the support bracket causing hard steering and travel lever operation.
2. **SECTOR GEAR VERTICAL END PLAY.** Vertical end play between the sector gear and the frame cutout should not exceed $1/16$ ". If adjustment is necessary, shims can be added between the sector gear and the frame cutout. Check the alignment between the sector

and pinion gears to determine whether the shims should be placed above or below the sector gear.

3. **STEERING WHEEL FREE PLAY.** Steering wheel free play should not exceed $2-1/2$ ". Excessive free play can be caused by loose or worn ball joints on the drag link and tie rod or excessive clearance between the sector and pinion gears. The sector and pinion gears should mesh snugly without binding. To tighten the mesh between these gears, either equally remove shim washers between the support bracket and frame or equally add shim washers between the pivot pin and the frame.



D. STEERING ADJUSTMENT (200 and 400 series)

The tractor is designed with two or more shim washers between the steering gear and support bracket as illustrated. As the gear teeth wear in, additional steering wheel free play may occur. If the free play becomes excessive, one (more if necessary) of the shims can be relocated to the bottom side of the steering gear.

NOTE First make certain there is not excessive end play on the steering shaft. Tighten steering wheel locknut to remove excessive end play without causing binding. If nut contacts key before play is out of shaft add shims between steering wheel and nut.

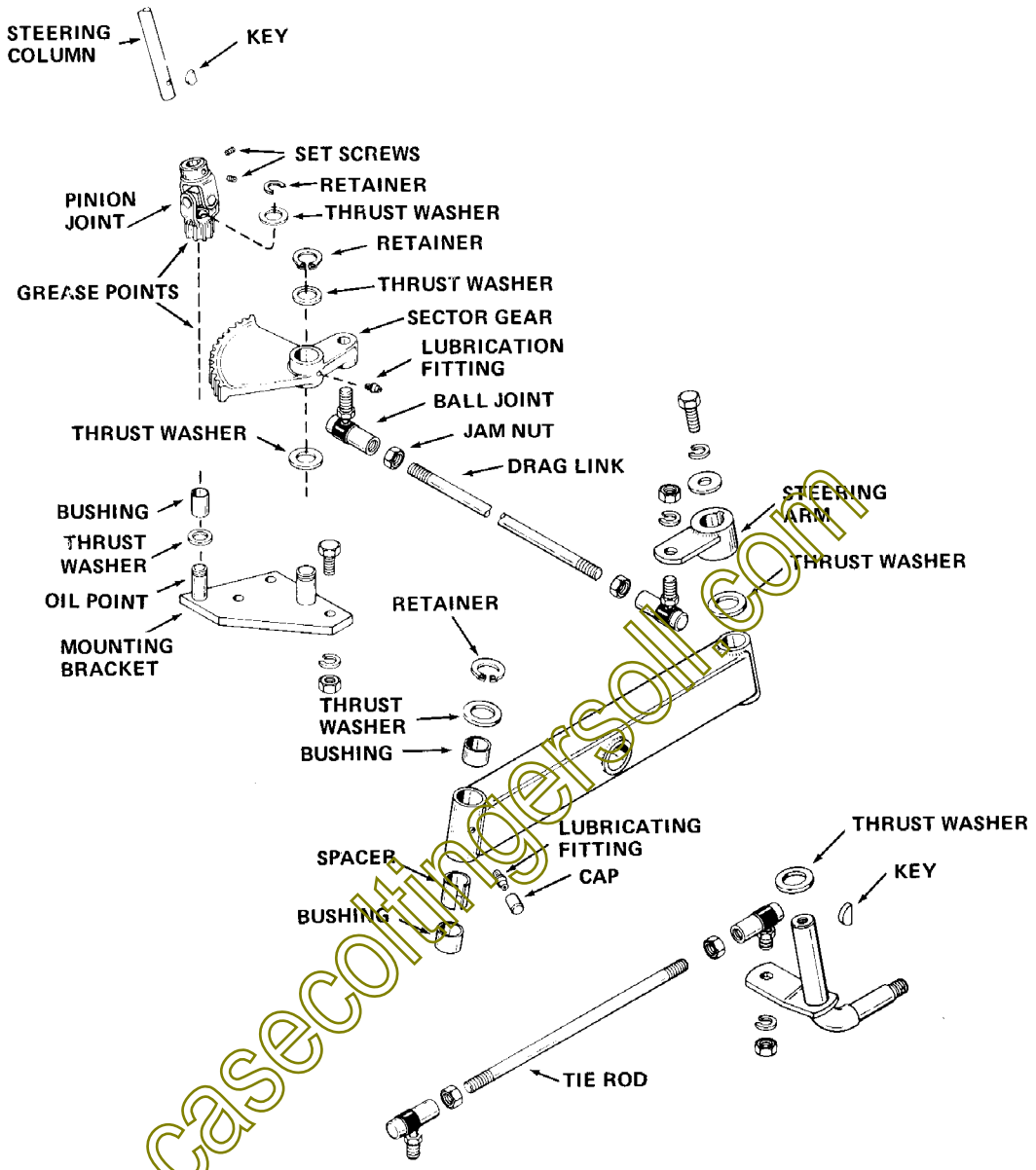
Disconnect the drag link from the steering gear. Remove the mounting bolt, lockwasher and plain washer (shims also if present) from the base of the pivot shaft. Slip the steering gear and one of the shim washers off the pivot shaft. Place the gear

back on the pivot shaft and secure with the original mounting bolt, lockwasher, plain washer, shim(s) plus the shim removed from the upper side. The total number of shim washers must remain the same.

CAUTION Make certain that some free play remains since a tight fit with no clearance between the two gears may cause binding and possible tooth failure.

NOTE Always coat all gear teeth with grease each time the two steering fittings are lubricated or at least each 50 hours operation.

IMPORTANT Excessive steering wheel free play may not require gear adjustment as covered above. First check to make certain all ball joints on the drag link and tie rods are tight.



E. STEERING ADJUSTMENT (644 and 646 loaders)

STEERING SHAFT

Check steering wheel and shaft for proper installation according to parts diagram. There should be a bearing, a washer and a snap ring holding the "U" joint to its mounting pin. The steering wheel should be adjusted so that when the pinion gear is resting on the bearing the lower side of the steering wheel hub just barely contacts the nylon bushing on the top of steering column. Adjust as follows:

1. Push down on steering wheel shaft to be sure it is seated on bearing between pinion gear and mounting bracket.
2. Install woodruff key in steering wheel shaft.
3. Place steering wheel on shaft, line up key way with key, and push steering wheel down until it contacts nylon bushing on top of steering column.
4. Install washers over shaft and key to top of key or higher.
5. Install locknut and tighten until it just contacts washer.
6. Install cap.

STEERING WHEEL FREE PLAY -- Free play should not exceed two inches at the outside diameter of the steering wheel. If free play is excessive, first check to make certain all ball joints are properly tightened to the king pins, tie rod, steering arm, sector gear and drag link. Visually check each pivot point in the steering system to determine the source of free play. Thrust washers and bushings are located at the front axle, pinion joint and sector gear as shown in illustration.

IMPORTANT If the bushings in the front axle are replaced, make certain the spacers are reinstalled with the "split" in line with the lubrication holes.

LUBRICATION -- Fittings are provided for the front axle king pins and the sector gear pivot pin. Lubricate the king pins every 8 hours and the sector gear pin at least every 100 hours. Also coat the sector gear and pinion joint teeth with grease at least every 100 hours. At the same time apply a few drops of oil to the pinion joint pivot pin.

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