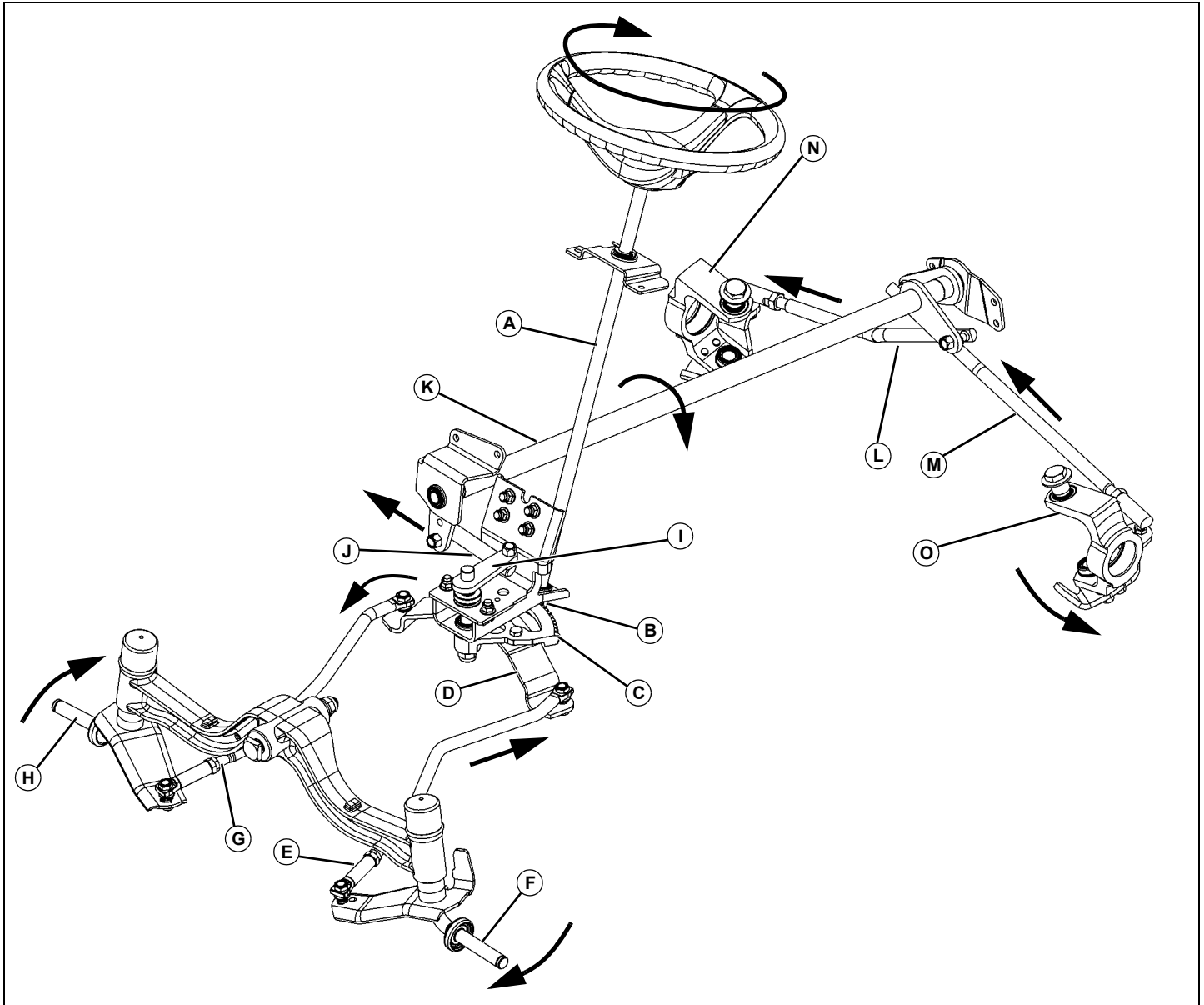


STEERING THEORY OF OPERATION

Steering System - 4WS



MX36689

rotate.

Function:

To provide directional control of the front and rear wheels in order to turn the machine in the direction desired by the operator.

Operation:

As the steering wheel is turned, the steering shaft (A) rotates pinion (B) which meshes with the sector gear (C). The sector gear is bolted to the steering arm plate (D).

As the steering arm plate rotates with the steering sector, the left drag link (E) is moved (backward - right turn, forward - left turn) causing the left front spindle (F) to rotate; and, the right drag link (G) is moved (forward - right turn, backward - left turn) causing the right front spindle (H) to

rotate. As the sector gear (C) rotates It also rotates the crank arm (I) which is connected to the front to rear shaft (K) through rod (J). The front to rear shaft transfers steering input to the rear end of the vehicle and is attached to the right tie rod (L) and left tie rod (M). The other end of the tie rods are connected to their respective right rear spindle (N) and left rear spindle (O).

When the steering wheel is turned the rear wheels turn in the opposite direction of the front wheels - example, in a right hand turn the front wheels turn to the right and the rear wheels turn to the left - and significantly decrease the turning radius of the machine.

STEERING TESTS AND ADJUSTMENTS

Tests and Adjustments

Front Wheel Alignment - Except X360

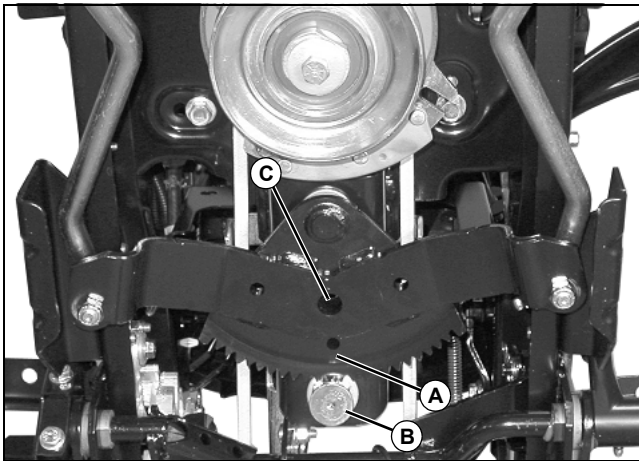
Reason:

Correct wheel alignment and toe-in adjustment prevents tire wear and steering wander.

Procedure:

1. Park machine safely on a level surface. See "Park Machine Safely" in the Safety section.
2. Check that all four tires are properly inflated. See "General Specifications" on page 559 in the Miscellaneous Section.

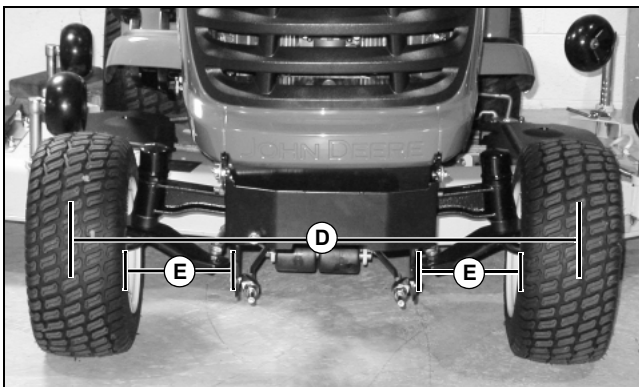
Note: Toe-in should not be adjusted with wheels off the ground or on an uneven surface.



MX38479

X300 (SN 20001-) shown

3. Place wheels in straight ahead position. Check that the sector gear (A) is centered on the steering shaft gear (B). A 16mm pin or bolt may be inserted in hole (C) in the sector gear and through the matching hole in the sector support bracket to aid in alignment.



MX36534

4. Measure the distance between the center of the tire at

front of tire, hub height (D). Record measurement.

5. Measure the distance between the center of the tire at rear of tire, hub height. Record measurement.

6. Measure the distance at hub height between the inside of each tire (sidewall) to the draft bracket (E) at the front of the tire. Record measurement.

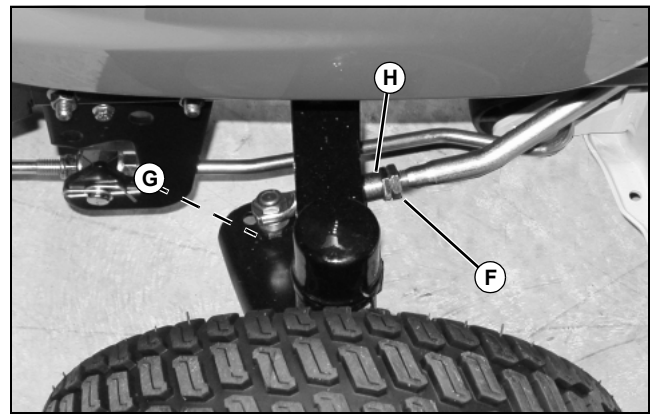
7. Compare all measurements to specifications.

Specifications:

Front Distance (D) Should Be . . . 5 - 25 mm (0.2 - 1.0 in.) less than the rear distance

Front Wheel Sidewall to Draft Bracket (E) 0 - 2 mm (0.0 - 0.08 in.) difference between sides

Results:



MX36535

- If not within specifications;
 - a. Loosen the tie rod lock nut (F).
 - b. Remove nut (G) from the bottom of the spindle. Disconnect the rod end from spindle.
 - c. Turn rod end (H) until alignment and toe-in is to specification.
 - d. Install rod end to spindle. Tighten nut (G).
 - e. Recheck dimensions after tightening nuts. Readjust if necessary.
 - f. Tighten lock nut (F).

Specifications:

Tie Rod Ball Joint Nut 48 N•m (35 lb-ft)

Ball Joint Jam Nut 48 N•m (35 lb-ft)

STEERING TESTS AND ADJUSTMENTS

Front Wheel Alignment - X360

Reason:

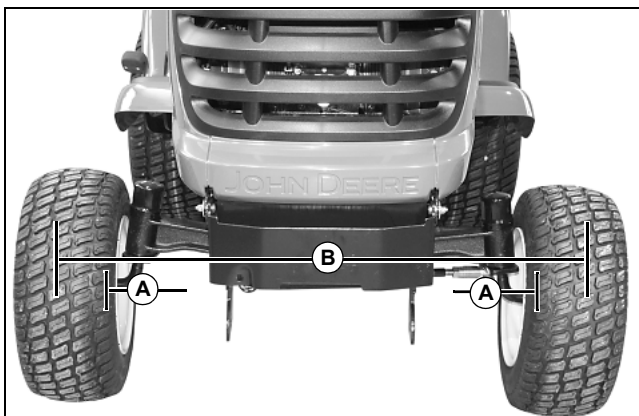
Correct wheel alignment and toe-in adjustment prevents tire wear and steering wander.

Procedure:

1. Park machine safely on a level surface. See "Park Machine Safely" in the Safety section.

Note: Toe-in should not be adjusted with wheels off the ground or on an uneven surface.

2. Check that all four tires are properly inflated. See "General Specifications" on page 559 in the Miscellaneous section.



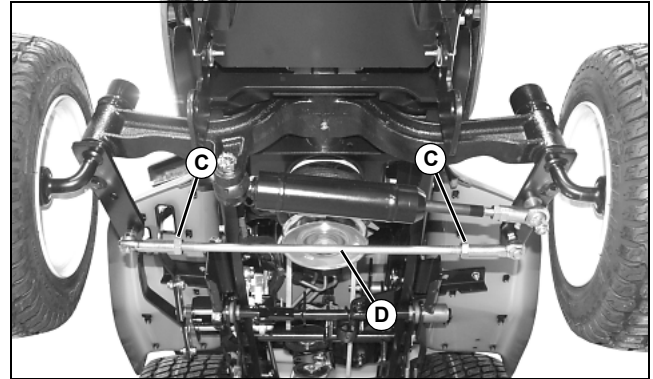
MX40434

- Place wheels in straight ahead position. Check that wheels are centered by measuring at (A). Both wheels should be the same distance from the frame.
- Measure the distance between the center of the tire at front of tire, hub height (B). Record measurement.
- Measure the distance between the center of the tire at rear of tire, hub height. Record measurement.
- Measure the distance between the inside of the tire (sidewall) at front of tire to the draft bracket, hub height (A) of each wheel. Record measurement.
- Measure the distance between the inside of the tire (sidewall) at front of tire to the draft bracket, hub height at back of each wheel. Record measurement.
- Compare all measurements to specifications.

Specifications:

**Front Distance (B) should be . . 5 - 25 mm (0.2 - 1.0 in.)
Less than the rear distance**

Results:



MX40435

Shown from bottom

- If not according to specifications;

Note: Tie rod ends are threaded in opposite directions with left and right hand threads. Check for small notches in the left hand thread jam nut on tie rod end.

- If not according to specifications, loosen the tie rod lock nuts (C).
- Turn tie rod (D) until alignment and toe-in is to specification.
- Hold tie rod (D) and ball joint in position and tighten both lock nuts (C).
- Check dimensions again after tightening nuts and readjust if necessary.

Specifications:

Tie Rod Ball Joint Nut 88 N•m (65 lb-ft)
Ball Joint Jam Nut 50 N•m (37 lb-ft)

Rear Wheel Alignment - X304 and X324

Reason:

Correct wheel alignment and toe-in adjustment prevents tire wear and steering wander.

Procedure - Rear Wheels:

- Park machine safely on a level surface. See "Park Machine Safely" in the Safety section.
- Check that all four tires are properly inflated. See "General Specifications" on page 559 in the Miscellaneous Section.
- Check and adjust the front wheel alignment as needed. See "Front Wheel Alignment - Except X360" on page 452.



Suggest:

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first, and then click the above link

to download the complete manual.

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