Ballasting Maintenance

General Ballast Information

CAUTION: Do not exceed permissible axle load or tire carrying capacities when adding ballast to the machine.

IMPORTANT: As front weight and tread width increase, steering capacity of machine is reduced.

Basic Ballasting Definitions

Ballast is mass added to machine chassis and/or wheels to:

• Increase total weight and/or

• Increase the influence of weight distribution between the front axle and rear axle (static balance). Static means that front and rear axle loads are determined when machine is parked.

Weight split is the static weight distribution between front and rear axles. It is expressed as percentages of total machine static weight supported by front and rear axles. For example, if the front axle supports 40% of total static machine weight, machine has a 40/60 weight split. Percentage of front axle weight is always stated first in this form.

A properly ballasted machine for a given type of implement (towed, integral, or semi-integral) has both correct total weight and static balance for that implement type.

Major Considerations

Required ballast amount and mounting location depend on type of implement being used and operating speed.

Ballasting is required to:

- Ensure front axle carries sufficient weight for steering security and stability with a field draft load, as well as transport in field and on road.
- Provide sufficient traction to pull high draft loads efficiently.
- Provide proper fore/aft balance to minimize occurrence of power hop in MFWD machines.
- Ensure rear axle carries sufficient weight for traction, braking, and stability when a loader or other front implement is attached to front of machine.

Reconfigure ballast on machine when changing from one implement or attachment to another.

MFWD:

Implement Type	Rear % of Machine Weight	Front % of Machine Weight
Towed	65	35
Semi-Integral	60	40
Integral	60[a]	40

[a]Front weight requirements are determined by weight of hitch-mounted implements. Add enough front weights to maintain steering control.

2WD:

Implement Type	Rear % of Machine Weight	Front % of Machine Weight
Towed	75	25
Semi-Integral	65	35
Integral	65[a]	35

[a]Front weight requirements are determined by weight of hitch-mounted implements. Add enough front weights to maintain steering control.

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Select Ballast Carefully

CAUTION: When determining axle ballast, ensure permissible axle loads and the permissible weight are not exceeded. (See Specifications section.)

Comply with local regulations regarding installation and maximum permissible number of weights. To maintain steering capability, at least 20% of total weight must be on the front axle.

CAUTION: Use suitable lifting tools when handling weights.

Safety and performance of your machine depend on ballasting of the front axle (front weights) and rear axle (wheel weights, filling tires with liquid ballast).

Match amount of ballast needed for each job. Changing implements or attaching a loader requires changing ballast for best performance.

Factors determining amount of ballast:

- Soil surface—loose or firm
- Type of implement—integral/semi-integral or towed
- Travel speed—slow or fast
- Machine power output—partial or full load
- Tire size

Ballasting MFWD Machines

Ideal tire slippage for MFWD is 8—12%. To reduce wheel slip, more weight is needed on the front. The ideal weight is 40% front and 60% rear of total machine weight. In some cases, liquid ballast is needed in tires to obtain this weight split.

The best way to check for correct ballast is to measure amount of travel reduction (% slip) of the drive wheels.

Add more weight to drive wheels if slip is above 12%. If there is less than 8% slip, remove wheel weights.

If a loader is attached, provide adequate ballast to rear.

Matching Ballast to Work Load

Use no more ballast than necessary, and remove ballast when it is no longer needed.

Rather than weighing machine down to pull heavy loads, try to reduce load. Pulling a lighter load at a higher speed is more economical and more efficient.

Too Little Ballast		Too Much Ballast	
1.	Excessive wheel slip	1.	Increased load
2.	Power loss due to churning soil	2.	Power loss due to carrying extra weight
3.	Tire wear	3.	Tire strain
4.	Fuel waste	4.	Soil compaction
5.	Lower productivity	5.	Fuel waste
		6.	Lower productivity

Ballast Limitations

Ballast is limited by tire capacity or machine capacity. Each tire has a recommended carrying capacity, see Wheels and Tires Maintenance section. If a greater amount of weight is needed for traction, consider a larger single tire.

When determining axle ballast, ensure permissible axle loads and the permissible weight are not exceeded. (See Specifications section.)

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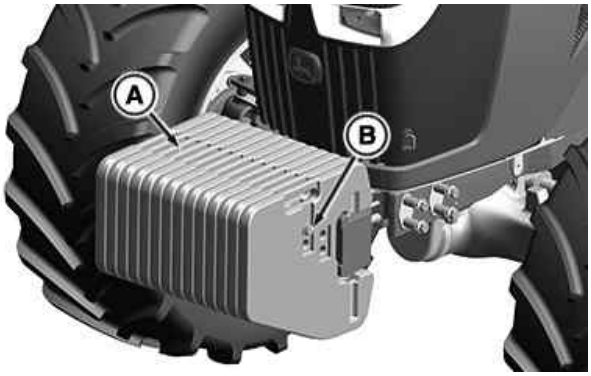
Front-End Ballast



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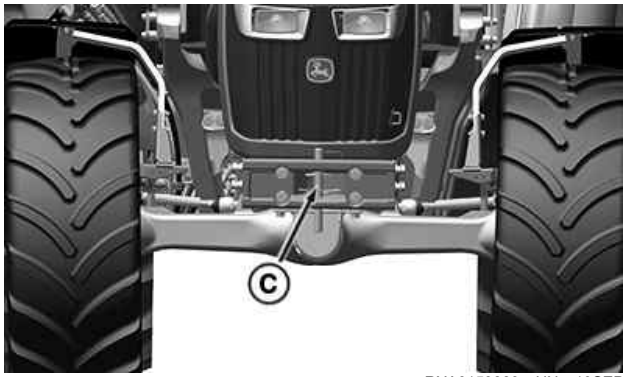

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A—Center Ballast
B—Ballast Retaining Bolt
C—Ballast Retaining Pin

CAUTION: Additional front ballast may be needed for rear-mounted implements. Heavy pulling and heavy rear-mounted implements tend to lift front wheels. Use proper lifting equipment for weights.

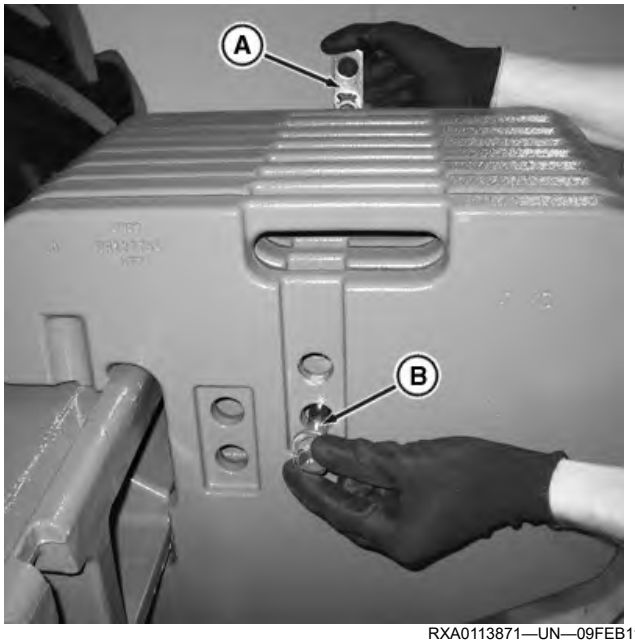
Determine the minimum number of front weights required from implement code in the implement Operator's Manual.

NOTE: Quik-Tatch™ weights can be installed on the front of the machine up to the width of the weight bracket. Do not exceed the maximum permissible axle load (See Specifications section.)

1. Install weights in pairs, one on each side of the ballast retaining pin (C). Place weights evenly on left and right sides of the retaining pin.
2. To hold six weights or fewer in position, insert retaining bolts (B) through holes and secure with a nut. Tighten to specification.

Specification	
Ballast Weight Retaining Bolt—Torque	215 N·m (159 lb·ft)

3. When eight or more weights are installed, insert retainers (A) between weights, one with the threaded hole upward and the other with the threaded hole downward. Insert retaining bolts (B) through holes and secure with a nut. Tighten to specification.



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A—Retainer
B—Retaining Bolt

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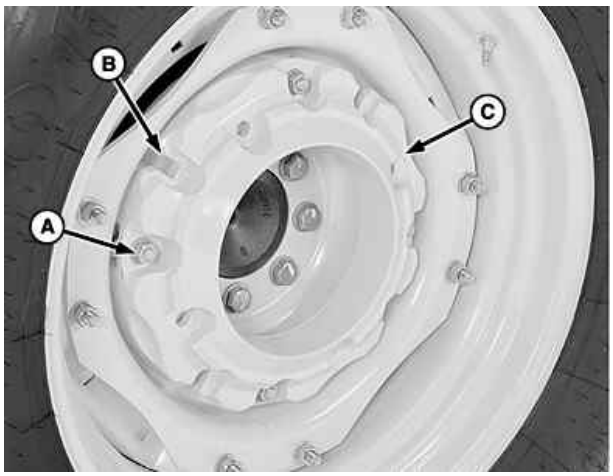
Rear Wheel Ballast



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Install Bolt in Slot (additional weight)

A—Nut, 5/8-11 (4 used)
B—Slot (four locations)
C—Wheel Weight
D—Round-Head Bolt (4 used)

CAUTION: When installing weights, use appropriate lifting equipment or have the job performed by your John Deere Dealer.

1. Remove wheel.
2. Attach weight (C) to wheel disks using four special round-head bolts, washers, and nuts (A). Tighten nuts to specifications.

Specification	
Wheel Weight-to-Disk Nuts—Torque	215 N·m (159 lb·ft)

3. Install additional weights:
   a. Insert round-head bolts (D) through slots (B) of first weight. Install bolts with the square neck in slot (as shown).
   b. Align mounting holes of second weight with the round-head bolts and install weight. Fasten with washers and nuts. Tighten nuts to specifications.

Specification	
Wheel Weight-to-Weight Nuts—Torque	215 N·m (159 lb·ft)

4. Install wheel and tighten mounting hardware. (See Wheels and Tires Maintenance section.)
5. Retighten bolts after 3 hours, 10 hours, and every 250 hours of operation thereafter.

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Control Power Hop—MFWD

Power hop is a condition where an MFWD machine without suspension exhibits severe bounce and/or pitch motions at field working speeds when pulling a towed implement. It can occur when pulling medium to high draft loads in loose, dry soil on top of a firm base and/or when climbing hills. As a result, machine cannot maintain pull due to either loss of traction, rough ride, or both. Adjust only after ensuring guidelines for optimum performance with towed implements have been followed. They are:

- No more than 40% of weight can be on the front axle.
- If liquid ballast is used in rear tires, do not exceed 40% fill (4 o'clock valve stem position).
- Front and rear inflation pressures are set correctly based on static axle loads.

Then if power hop occurs:

1. Increase front inflation pressures by 40 kPa (0.4 bar) (6 psi) and operate machine.
2. If power hop still occurs:

   Increase front inflation pressures by another 40 kPa (0.4 bar) (6 psi) and operate machine. Increase front inflation pressure as needed, up to a maximum of 40 kPa (0.4 bar) (6 psi) **above** the maximum pressure rating for tires. Usually 40—80 kPa (0.4—0.8 bar) (6—12 psi) above rated pressure for front axle load suffices to control power hop.
3. If power hop still occurs:

   Remove all front ballast weights. Leave same front maximum inflation pressure from previous step and operate machine.
4. If power hop still occurs:

   Install 75% liquid in front tires. Re-inflate front tires to the maximum pressure rating for tires and operate machine.

NOTE: In most cases, step 4 is not required to control power hop.

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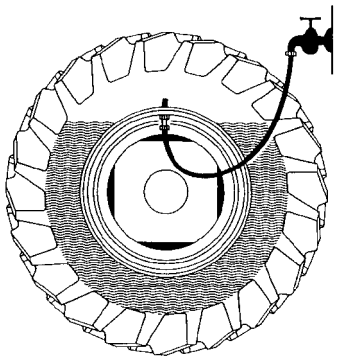
Add Liquid Ballast to Tires



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To fill a tire:

1. Jack up machine and turn wheel so that the tire valve is at the top.
2. Remove valve insert and screw water valve onto the valve stem. While water is entering, air escapes through a lateral bore in the water valve.
3. Stop filling tire when water drains from the vent hole of valve. Depending on tire size, filling a tire takes 15—30 minutes. The quantity of liquid ballast required varies, depending on tire size and type. If in doubt, consult your John Deere dealer or tire manufacturer.
4. After adding liquid, screw in the air valve and pump up tire to normal inflation pressure.

For low temperature climates:

NOTE: Add calcium chloride to the water, NOT water to calcium chloride.

Do not use this antifreeze solution in radiator.

1. There are several types of liquid ballast available. Tire manufacturers recommend a mixture of water and calcium chloride. To provide protection down to -25°C (-13°F), dissolve 34 kg (75 lb) of calcium chloride in 86 L (22.7 gal) of water. This mixture makes 100 L (26.4 gal) of antifreeze solution. This solution produces an increase in weight of 120 kg (269 lb).
2. Draw antifreeze solution from an elevated tank. To speed up filling operation, use a pump (flush pump with clear water afterwards).

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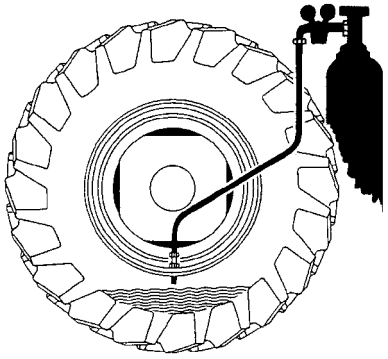
Remove Liquid Ballast from Tires



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1. Jack up machine.
2. Remove air valve from the tire and allow liquid to drain out.
3. Clear remainder of liquid from tire by inserting drain tube with hose extension and pump air into tire. The air pressure pushes remaining liquid out of tire.

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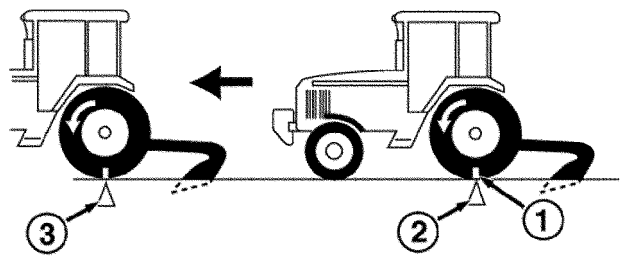
Measure Wheel Slip



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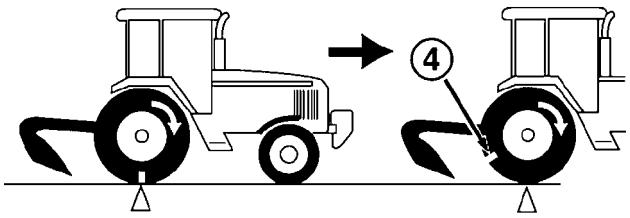

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1—Mark on Tire
2—Mark Starting Point
3—Mark Ending Point after Ten Revolutions
4—Revolution Count with Implement Raised

IMPORTANT: Make sure that tire pressures are set for axle loads before measuring wheel slip.

1. Mark a rear tire.
2. Mark a starting point on ground with machine moving and implement lowered on ground.
3. Follow machine and mark ground again where marked tire completes ten full revolutions.
4. Repeat procedure with implement raised at same working speed. Count revolutions between same two marks.
5. Use second count and chart to determine slippage.

NOTE: Ideal slippage is 8—12% (machines with MFWD).

6. Adjust ballast or load to give correct slippage.

NOTE: Available horsepower is greatly reduced when wheel slip drops below minimum percent.

Wheel Slippage Chart		
Wheel Revolutions (Step 4)	**% Slip**	**Result**
10	0	Remove Ballast
9-1/2	5	
9	10	Correct Ballast
8-1/2	15	Add Ballast
8	20	
7-1/2	25	
7	30	

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