

## Tractor Start-up and Operation



### WARNING



**DO NOT** start the engine by shorting across starter terminals. The engine can start and the machine can move causing possible injury and death to the operator and bystanders if the starting safety switch is bypassed.



### CAUTION



Sudden tractor or implement movement can cause possible machine damage and or serious injury to the operator or bystanders.

- **BEFORE** starting the tractor ensure all hydraulic control levers are in neutral and the 3-pt hitch is set to the lowest position prior to starting the tractor when attached to an implement.
- **ENSURE** all personnel are clear of the tractor before starting. The tractor can move as soon as the engine is started by turning the steering wheel, even with the park brake engaged and the transmission in neutral.
- **ENSURE** the tractor is parked on a level surface, engage the parking brake and turn the engine off when parking the tractor.

The 435, 485, 535 and 575 model tractors are large machines that, if misused, can cause serious injury and or death to the operator and bystanders. Safe tractor operation starts every day and continues everyday throughout the life of the tractor.

### Pre Start Maintenance

A robust daily routine maintenance schedule, pro-actively repairing equipment failures, will extend the service life of the tractor and reduce tractor repair costs. The following routine maintenance schedule is design to take the operator around the tractor, checking vital components in a orderly and efficient manner.

- **INSPECT** and engage the parking brake. Open all engine access panels. Walk around the tractor and perform a visual inspection looking for possible signs of equipment failure.
  - **INSPECT** and clean the front grille and radiator area for dirt or any debris that may have accumulated.
  - **INSPECT** the condition of all belts, hoses and other engine accessories. Replace, tighten or repair as necessary.
  - **CHECK** engine oil level. Ensure oil is full and of the correct type. **INSPECT** oil for contamination and quality. Replace as necessary.
- NOTE: On tractors equipped with Powershift transmissions engine oil is checked with the engine running. See Section 5: Lubrication and Maintenance for more information.**
- **CHECK** engine coolant level. Ensure coolant level is full and of the correct type. **INSPECT** for contamination and quality. Replace as necessary.
  - **CHECK** hydraulic oil level. Ensure hydraulic oil is full and of the correct type. **INSPECT** for contamination and quality. Replace as necessary.
  - **CHECK** transmission oil level. Ensure the transmission oil level is full and of the correct type. **INSPECT** for contamination and quality. Replace as necessary.
  - **CHECK** differential oil levels. **CHECK** sight glass to ensure the differential oil levels are full. Look for leaks around the wheel hubs. Replace as necessary.
  - **INSPECT** brake pads and rotors for excess wear. Replace as necessary.
  - **INSPECT** the drawbar and 3-pt hitch for wear, especially around metal-to-metal contact parts.
  - **CHECK** wheel bolts for correct torques.

**Starter Motor Protection Switch**

The tractor has a built in starter protection feature. This feature prevents accidental engagement of the engine starter motor when the engine is running.

**IMPORTANT:** *When the switch has been rotated to the start position and then released to the run position, but the engine did not start, it is necessary to rotate the switch back to the off position in order to make another attempt at starting the tractor.*

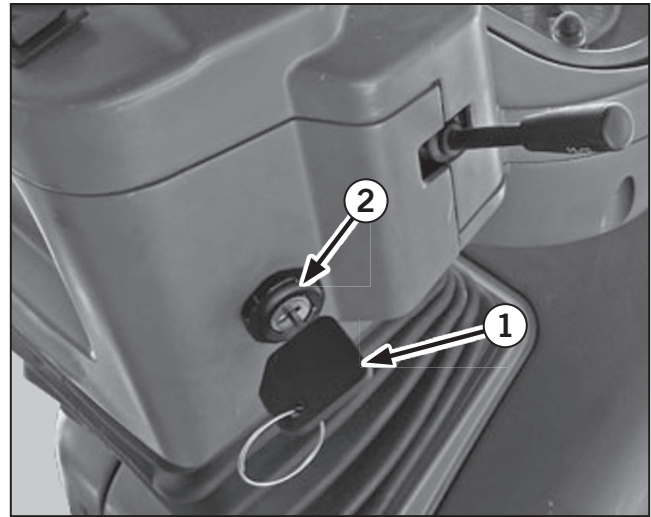
**Pre Start Considerations**

Before starting the tractor take the following steps into consideration.

- **DO NOT** pull loads immediately after starting. Always allow the engine to warm up prior to pulling heavy loads.
- **DO NOT** apply excessive rpm. To extend engine life avoid excessive idle speeds during warm up.
- **DO NOT** open the throttle or accelerate above 1000 rpm until the engine oil bar graph reads in the normal range. This will protect the turbo-charger.
- **DO NOT** depress the inching pedal for at least 20 seconds after engine startup. On tractors equipped with powershift transmissions this enables the transmission to purge air from the transmission clutches which will provide smoother gear shifting.
- **DO NOT** crank the engine over for more than 30 seconds if the engine does not start. If the engine does not start, wait 2 minutes to cool the starter motor before re-cranking.
- **DO NOT** ignore warning lamps. Pay attention to the warning light bar and electronic monitor for any indication of a problem. Stop the tractor immediately and investigate the problem.

**Starting the Tractor**

1. Fasten the seat belt and ensure the parking brake is engaged.
2. Place the transmission in neutral.
  - Ensure the PTO switch is in the “Off” position. A safety switch on PTO equipped models only permits the engine to start only when the PTO is switched to “Off”.



- Ensure all remote hydraulic levers are in the neutral position.
  - Ensure all hitch controls are set to the low idle position on tractors equipped with a 3-pt hitch. Set the hand throttle to the lowest position.
3. Insert the ignition key (1) in the ignition (2). Turn the ignition key clockwise 1/4 turn to supply power to electronics.
    - Visually check for warning lamps and listen for audio alarms to ensure they are functioning. Carry out repairs if required. See Section 2: Controls and Instruments “**Electronic Instrument Cluster**”.
    - Depress the clutch pedal. This step is only required with synchromesh transmissions.
  4. Turn and hold the ignition key fully clockwise to crank the engine. Release when the engine starts. Allow tractor to idle and warm up before adding a working load.

## Engine Block Heater



### WARNING



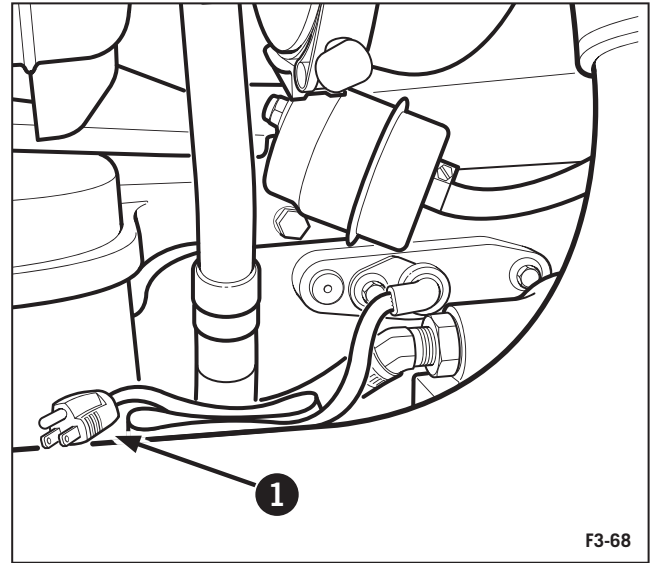
- **DO NOT** use ungrounded extension cords. Use a grounded 3 wire extension cord rated for at least a 15 amp load, protected by a suitable fuse or circuit breaker.
- **DO NOT** handle block heater cords if wet.
- **DO NOT** plug in the block heater with low coolant levels. The block heater can overheat and burst causing injury.

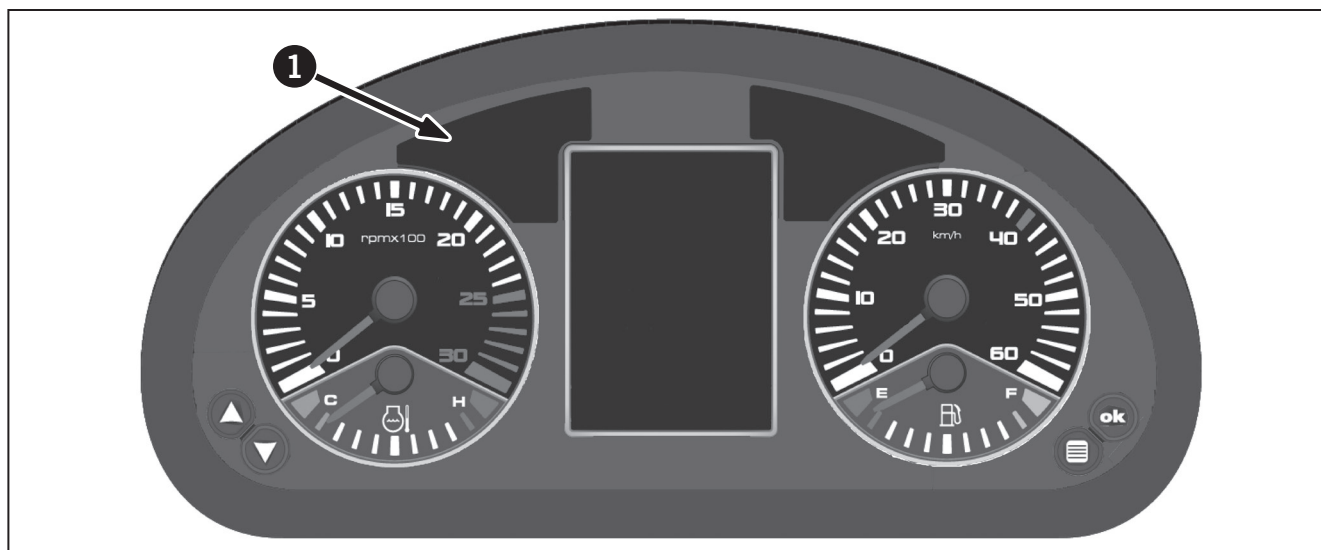
Block heaters are shipped as standard equipment on Versatile tractors. The block heater is located on the right side of the engine beneath the turbocharger. A 15 amp extension cord is required to plug the block heater to a grounded electrical outlet.

1. Attach the extension cord (1) to the block heater and plug the extension cord into an electrical outlet.
2. Wait four hours, this should be sufficient time for the coolant and block to warm.
3. Start the engine. Never crank the engine for more than 30 seconds. If the engine does not start within 30 seconds, wait two minutes between attempts to cool the starter motor.

Dependent on the region in which you operate the tractor the voltage is different.

<b>North America</b>	<b>115 Volts</b>
<b>Europe</b>	<b>220 Volts</b>
<b>Asia</b>	<b>220 Volts</b>





### Cold Weather Starting



#### WARNING



**DO NOT** use starter fluid of any type to start a Cummins QSX15 engine. The use of highly flammable starter fluids is extremely dangerous and can lead to serious injury. Using a starter fluid **WILL** void your engine warranty.

At temperatures at or below 0 °C (32 °F) cold weather starting aids can be required to assist engine start up.

1. Review and complete steps 1 to 8 under “**Starting a Tractor**” in this section before proceeding with these steps.

**IMPORTANT:** To prevent damage to the starting motor, do not engage the starting motor for more than 30 seconds. Wait 2 minutes between each attempt to start

2. If warning lights appear at any time during the cold weather start process stop immediately and investigate the cause of the problem.
3. Once the engine has started, allow it to warm up before putting it under load.



#### CAUTION



#### EXPLOSIVE HAZARD!

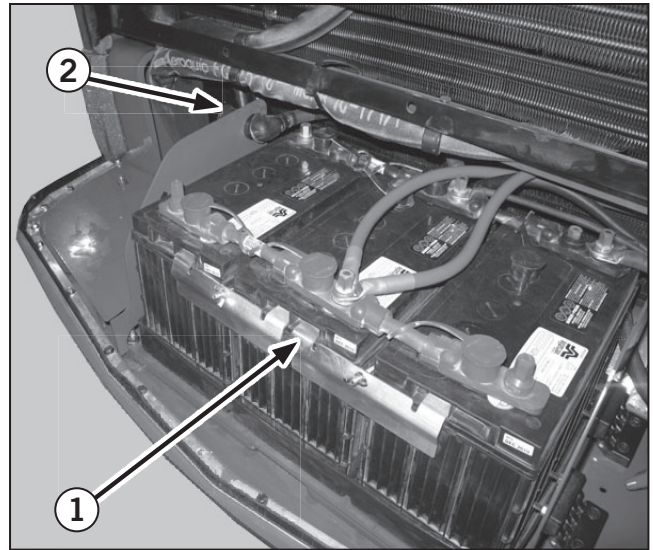
Batteries generate hydrogen gas which is highly flammable. If ignited by a spark or flame the gas may explode causing a spray of battery acid and fragments causing severe personal injury!

- **ALWAYS** follow the proper connect and disconnect procedures! Always disconnect the negative (-) black cables before the positive (+) red cables. Always connect the positive (+) red cables before the negative (-) black cables to reduce the possibility of sparking and an explosion!
- **ALWAYS** wear goggles to protect your eyes and protective clothing when working with batteries.
- **DO NOT** smoke or expose the battery to open flame.

## Tractor Boosting

Check battery and starter connections before proceeding with the following steps.

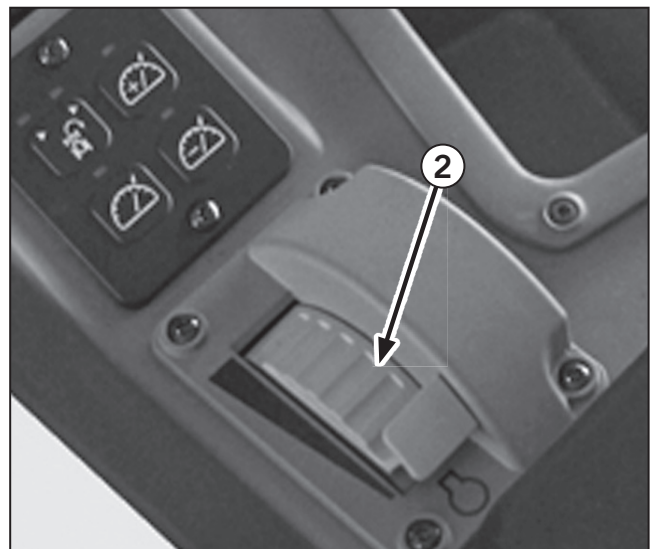
1. Set the park brake, put the transmission in neutral, turn off the PTO clutch control and all accessories.
2. Attach one end of the booster cable (red) to the positive terminal of the booster batteries and the other end of the same cable (red) to the positive terminal of the center battery (1) on the tractor.
3. Attach one end of the negative cable (black) (2) to the negative terminal of the booster battery, and the other end of the same cable (black) to a ground on the tractor frame at least 305 mm (12") from the discharged batteries. **DO NOT CONNECT TO THE NEGATIVE POST OF THE DISCHARGED BATTERIES.**
4. Ensure that the clamps from one cable do not touch the clamps of the other cable. Do not lean over the battery when making connections.
5. Start the tractor following normal engine starting procedures. When the tractor starts, remove the booster cables. Disconnect the negative cable (black), then the positive cable (red). If the tractor fails to start, charge batteries.



## Hand Throttle Operation

The tractor is equipped with a hand throttle, located on the right console. Rated operating speed is 2100 rpm. Idle speed is 1000 rpm. High idle no load speed is 2225 rpm.

1. To increase engine speed, move the control lever gently forward(2).
2. To reduce engine speed, pull control lever gently backward. Fuel consumption can be reduced by operating at lower engine speeds under light load.





**Cruise Control Testing and Operation**

1. Ensure the tractor is in a safe area, away from people and structures.
2. Start the engine. Check for warning lights and/or audio warning signals. If present stop the tractor and correct faults before proceeding.
3. Place the tractor in neutral.
4. Move the hand throttle to the maximum rearward (idle) position (1) (1000 rpm).
5. Move the hand throttle to its maximum forward position (2) (2250 rpm).
6. Move the hand throttle slowly back to the rearward idle position (10). Engine speed should slowly decrease to low idle (875 rpm).
7. Set the handle throttle to the desired rpm.
8. Press the cruise control button (3) on the cruise control panel to activate. A green light (4) will appear above the button to indicate active status.
9. Move the hand throttle to the rear low idle position.
10. Move the hand throttle to the maximum forward position. Engine speed should only increase to the desired setting in step 7. If the engine speed goes over this setting start again.
11. Press the decrease speed button (5) to reduce engine speed by 10 rpm.
12. Press the increase speed button (6) to increase engine speed by 10 rpm.
13. Disengage cruise control by pressing on the on / off button to deactivate. The cruise control light will disappear on the panel.
14. Move the hand throttle to the maximum rearward (low idle) position.
15. Wait five seconds before turning off engine.

