

SECTION 6

STARTING THE ENGINE	2
STARTING FROM THE DRIVER'S SEAT	2
STARTING FROM THE ENGINE COMPARTMENT	3
COLD WEATHER STARTING	4
JUMP STARTING	4
ENGINE PROTECTION SYSTEM	5
AUTOMATIC ENGINE SHUTDOWN	6
IDLE SHUTDOWN TIMER	6
ENGINE BLOCK HEATER	6
ENGINE WARM-UP	7
ALLISON TRANSMISSION WARM-UP	7
STARTING THE VEHICLE AFTER A FIRE ALARM	7

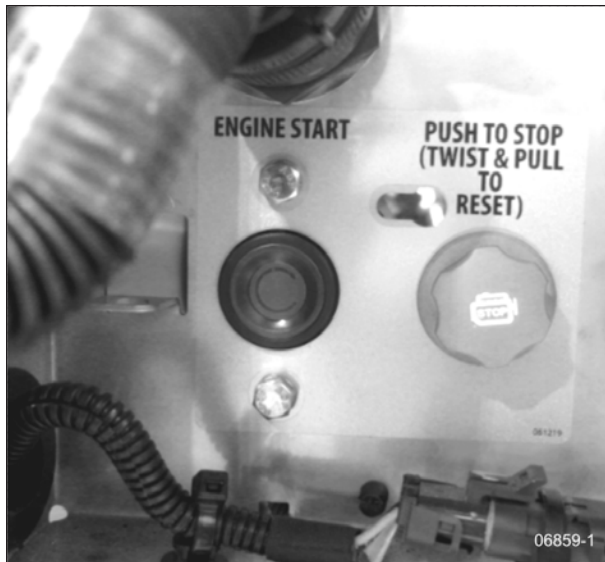
6-2 Starting and Stopping Procedures

STARTING THE ENGINE

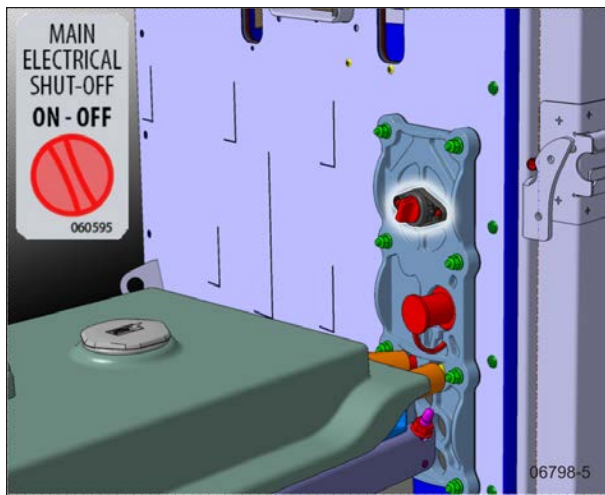
In normal circumstances, the engine should be started from the driver's seat. However, a rear-start panel in the engine compartment allows starting the engine from that location, typically for maintenance operations. See "[STARTING FROM THE ENGINE COMPARTMENT](#)" on the facing page

STARTING FROM THE DRIVER'S SEAT

- Make sure the engine STOP interlock button located in the engine compartment is reset (twist and pull) to enable starting from the front and that the battery master switch (master cut-out) located on the rear electrical panel is set to the ON position;



TYPICAL ENGINE STOP/IGNITION INTERLOCK BUTTON



MAIN ELECTRICAL SHUT-OFF SWITCH

- Apply the spring-loaded parking brake by pulling the parking brake control button all the way up;
- Place transmission in neutral;
- Turn ignition key to START position (refer to "[IGNITION SWITCH](#)" on page 6 in Controls and Instruments chapter), release the key after the engine starts;

NOTE

When the ignition is turned to ON, the M32QR ABS Pressure Modulator Valve solenoids are briefly energized. This can be audibly detected by a rapid cycling of the PMVs. If the air system is fully charged and the service brake pedal is depressed when ignition is turned to ON, the modulator valves create a sharp audible "chuff" of air pressure.

- Brake pedal must be applied when selecting Drive (D) otherwise the transmission will stay in neutral (N);

CAUTION

Do not engage starter for more than 15 seconds at a time. If engine does not start within 15 seconds, release ignition key and let starter cool for one minute before attempting to restart.

CAUTION

Do not press the accelerator pedal before starting. This could result in an electronic control unit fault and degrade the fuel system control.

CAUTION

Special precautions are necessary with turbocharged engines to avoid possible turbine damage. After starting, run the engine at normal idle for two minutes to allow lubricating oil to reach the turbocharger. Then run the engine at fast idle. Let oil pressure reach normal operating range before driving.

NOTE

If engine does not start, return key to OFF position before attempting to restart.

Starting and Stopping Procedures 6-3

NOTE

If the accelerator pedal is depressed before starting, release and wait 30 seconds before attempting to restart.



WARNING

Do not use ether or other combustible starting aid fluid on any engine equipped with an intake air preheater. If the engine is equipped with a preheater, introduction of ether or similar starting aids could cause a fire or explosion resulting in severe property damage, serious personal injury or death.

Stopping The Engine

- Apply parking brake and place transmission in neutral (N);
- Allow engine to idle for at least two minutes before shutting down the engine. This ensures that the turbine speed drops and allows time for the engine exhaust gas temperature to drop to about 300°F (150°C);
- Shut off all electrical loads;
- Turn the ignition key to the OFF position.



CAUTION

Do not shut off the engine when running above normal idle.



CAUTION

Set the Safety switch to the OFF position after parking and when left unattended for an extended period of time.

STARTING FROM THE ENGINE COMPARTMENT

Push buttons to start and stop the engine from inside the engine compartment are located on the R.H. side of engine compartment.



DANGER

Apply parking brake and place transmission in neutral (N) before starting engine from inside the engine compartment.

1. Set the main electrical shut-off switch and ignition to the ON position.
2. Press the rear start button to start engine from engine compartment.

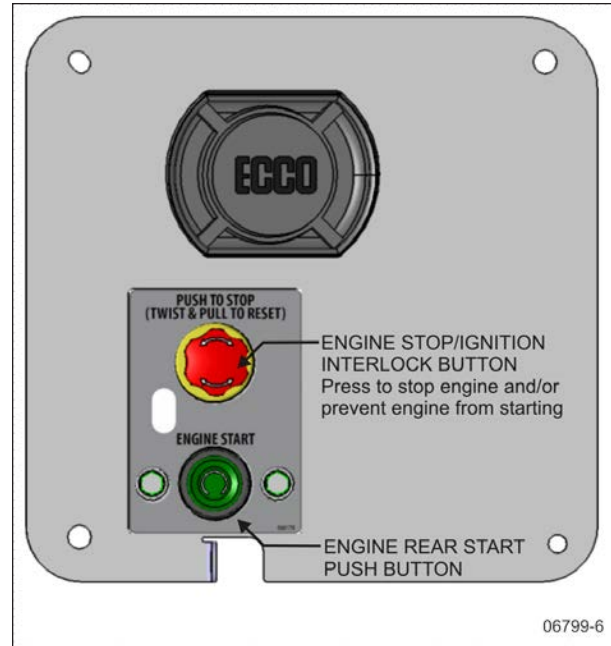
When servicing the engine, push the engine stop/ignition interlock button to prevent the engine from being started from the dashboard ignition key or the rear start push button.

Once servicing is done, twist and pull the button to allow normal engine start.



CAUTION

Refer to cautions in "[STARTING FROM THE DRIVER'S SEAT](#)" on the [previous page](#) in this chapter



REAR START PANEL



DANGER

Do not wear loose clothing when working near engine. Stand clear of rotating components.

Stopping The Engine

Press the red engine STOP/ignition interlock button while the engine is running to stop the engine from the engine compartment.

6-4 Starting and Stopping Procedures

COLD WEATHER STARTING

When starting a cold engine, the intake air will be warmed up with the intake air preheater. Turn the ignition switch to the ON position. The intake air preheater will not engage at coolant temperature above 54°F (12°C). If the coolant temperature is below 54°F (12°C), the intake air preheater will engage and will light the preheater telltale between 0 and 50 seconds, depending on the engine coolant temperature. Wait before the preheater telltale has turned off before starting the engine.



Intake Air Preheater Telltale

If necessary, once the engine has started, the preheater will re-engage (post heating) for the same length of time as the preheat time.



WARNING

Volvo D13 Engine

This engine is equipped with an intake air preheater. Never use ether or other combustible starting aid fluid. Introduction of ether or similar starting aids could cause a fire or explosion resulting in severe property damage, serious personal injury or death.



WARNING

Do not use ether or other combustible starting aid fluid on any engine equipped with an intake air preheater. If the engine is equipped with a preheater, introduction of ether or similar starting aids could cause a fire or explosion resulting in severe property damage, serious personal injury or death.

Engines not equipped with an intake air preheater may, depending on coolant temperature, take longer to start. If this should happen, DO NOT release the ignition key until the engine has started (while still observing the 15 second maximum cranking time).

JUMP STARTING

In order to avoid damage to solid-state electrical components, it is important that jumper (booster)

cables are used correctly and only in emergencies. To jump start, use another 24 volt DC, negative grounded, power source. Use only jumper cables rated at 500 cranking amperes.



DANGER

Injury, explosion, battery acid damage or charging system overload may result if these jump starting procedures are not precisely followed.



WARNING

Wear eye protection and remove rings, metal jewelry and watches with metal bands.



DANGER

The battery could rupture or explode if jump started when the run-down battery fluid is frozen or if the battery fluid level is low. Check condition of run-down battery before attempting to jump start.



DANGER

The gases given off by batteries while jump starting are explosive. Do not smoke near batteries.



CAUTION

Do not let the two vehicles touch. Keep a walk-through distance between the two vehicles. Make sure positive (red) and negative (black) jumper cable clamps do not touch.



CAUTION

Never connect the jumper cable to the negative terminal post of the run-down battery.



CAUTION

Do not jump start if a maintenance-free battery has a yellow test indicator. Have the battery replaced.

Starting and Stopping Procedures 6-5

WARNING

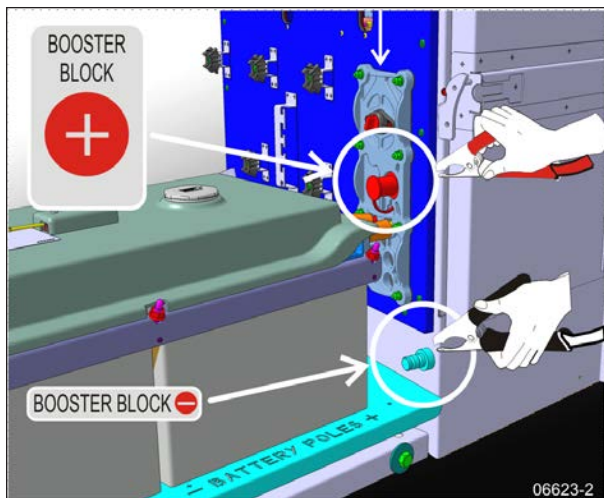
Before attempting to jump start, make sure the parking brake is applied and the transmission is in neutral (N). Turn off all lights, heaters and other electrical accessories.

CAUTION

Choose a booster vehicle which produces comparable amperage as your vehicle.

CAUTION

Off-board battery charger with a start boost facility must not be used to jump start the vehicle. This could damage the electrical system.



BOOSTER BLOCK TERMINALS LOCATION (X3 SERIES)

To jump start, proceed as follows:

1. Remove the protective cap from the booster block terminal located in the R.H. side engine compartment;
2. If the good battery is in another vehicle, that donor vehicle's engine must be shut off before connecting. Shut off all electrical equipment on both vehicles.
3. Connect one end of the red jumper cable to the positive (+) post of the donor vehicle battery (or booster power source).

4. Connect the other end of the red jumper cable to the positive (+) terminal on the booster block;
5. Connect one end of the black jumper cable to the negative (-) post on the donor vehicle battery (or booster power source);
6. Connect the other end of the black jumper cable to the negative (-) terminal on the booster block;
7. Start the engine of the donor vehicle and increase the engine rpm speed slightly and maintain at that level for approximately 5 minutes to recharge dead batteries and then, shut the engine off;
8. Start the vehicle with the dead battery;
9. Disconnect the jumper cables in reverse order given in steps 2 through 5;
10. Install protective cap on the booster block terminal.

NOTE

Jumper cables must be rated at 500 cranking amperes. If jumper cable length is 20 feet (6 m) or less, use 2/0 (AWG) gauge wires. If cable length is between 20 and 30 feet (6 to 9 m), use 3/0 (AWG) gauge wires.

ENGINE PROTECTION SYSTEM

The engine protection will automatically derate or stop the engine when certain engine conditions reach a critical stage.

In the event of a serious fault, the red STOP telltale light comes on and an audible alarm will sound if the engine is running.



An illuminated STOP telltale light indicates a serious problem has been detected, and the driver must respond immediately to the problem. The vehicle must be safely pulled off the road and stopped. In some instances, the engine must be switched off immediately.

6-6 Starting and Stopping Procedures

AUTOMATIC ENGINE SHUTDOWN

Prior to an actual automatic shutdown, the engine will automatically derate, go to idle, and then stop as the vehicle speed gets below 2 mph (3 km/h).

The engine shutdown protection will automatically derate and stop the engine when one or more of the conditions listed below reaches a critical point:

- High engine coolant temperature
- High engine oil temperature
- Low engine oil pressure
- High crankcase pressure

After the automatic engine shutdown sequence, the engine may be restarted. To do so, turn the ignition switch to the OFF position for 7 seconds and then turn it back to ON. However, it will only operate for 30 seconds unless the problem is resolved.

Use this function sparingly and in order to move the vehicle to a safe parking place only. Excessive use may result in severe engine damage.



WARNING

Failure to take necessary action when the STOP telltale light is on can ultimately result in automatic engine derate and shutdown.

IDLE SHUTDOWN TIMER

The idle shutdown timer (optional) is programmed to shut down the engine after a specific engine idling time. The idling time cannot be changed by the driver but can be changed with the use of a laptop computer and Premium Tech Tool. In this case, the engine idling time can be set from 30 seconds up to 1 hour.

The engine will shut down at the set time under the following conditions:

- Vehicle speed is 0;
- Engine is running at normal idle speed;
- Engine coolant temperature above 120°F (49°C);
- Temperature inside vehicle is between 59°F (15°C) and 81°F (27°C);
- Parking brake applied;
- Transmission into neutral (N);
- Wheelchair lift system not in use;

Pressing the fuel pedal will prevent engine shutdown and restart countdown.

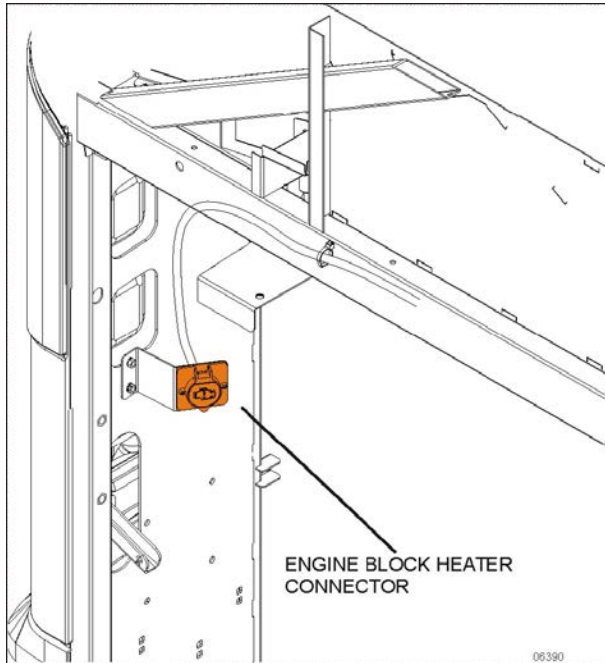
ENGINE BLOCK HEATER

The vehicle may be equipped with an engine immersion-type electric block heater to assist cold weather starting. A connector is on the rear pillar of the curbside engine compartment door frame. Using an extension cord, connect to a 110 - 120 VAC outlet.



CAUTION

Connect only to a 120 VAC power source. Use only grounded (three prongs) extension cords with a minimum rated capacity of 15 A. Disconnect the extension cord before starting. Before driving, make sure the extension cord is disconnected.



ENGINE BLOCK HEATER CONNECTOR (TYPICAL)

ENGINE WARM-UP

After starting the engine, keep the parking brake applied and let the engine run at normal idle for two minutes to allow lubricating oil to reach the turbocharger. Increase engine speed to fast idle, using the fast idle switch located on the dashboard for five minutes, without loading the engine. Monitor the gauges and indicator lights to make sure all conditions are normal. If an abnormal condition is observed, stop the engine immediately and have the condition corrected.

NOTE

The engine will reach normal operating temperature shortly after driving. Avoid driving at full throttle until engine coolant temperature reaches 140°F (60°C).



DANGER

Never let the engine run in an enclosed, non-ventilated area. Engine exhaust fumes contain dangerous gases which can be fatal if inhaled. Before warming up the engine, open the door(s) or move the vehicle outside.

ALLISON TRANSMISSION WARM-UP

With an automatic transmission, when the temperature falls below -20°F (-29°C), the CHECK telltale light illuminates after the engine is started, and a reminder tone will sound. In this case, the transmission will be locked in neutral (N) until the transmission temperature rises above -20°F (-29°C) and the CHECK telltale light goes out. The transmission will only operate in first or reverse gears until it reaches normal operating temperature.

STARTING THE VEHICLE AFTER A FIRE ALARM

The vehicle may be started after a fire alarm without resetting the system. Refer to section 7 SAFETY FEATURES AND EQUIPMENT under "[Starting The Vehicle After A Fire Alarm](#)" on [page 4](#) for the complete procedure.

