18SP655 – Optimized Idle® Aftermarket Installation Kits – On-Highway Truck Applications (P/N: 23538534)

KIT DESCRIPTION

The Optimized Idle Aftermarket Installation Kit provides the components necessary for the DDEC VI system to use the Optimized Idle feature. This allows for automatic stopping and restarting of the engine to maintain oil temperature and battery voltage.

The optional add-on to this kit (Thermostat Kit, P/N: 23524757) will allow the thermostat mode to keep the cab/sleeper (on-highway truck) and passenger area (coach) at a desired temperature.

To activate Optimized Idle, the following conditions must be met:

- Ignition ON with the vehicle idling
- Hood closed
- Transmission in neutral
- Park brake set
- Transmission Range Selector in “High” (with DD15 only)
- Idle shutdown timer must be enabled (DDR or DDDL)

Once the above conditions are met:

- Turn the Cruise Master Switch to the ON position (if in the ON position, turn to OFF then to ON), the Optimized Idle Active Lamp will flash.
- Turn on Thermostat Mode (if equipped and the mode is desired) by turning ON the thermostat, setting the HVAC fan controls in the bunk and cab to HIGH and enabling the vehicle heating and cooling system.

Once these conditions are met, the Optimized Idle Active Lamp will flash until the Idle Shutdown timer expires. Optimized Idle allows the operation of all DDEC features such as PTO, throttle control, and Cruise Switch PTO, while the active light is flashing. Once Optimized Idle becomes active, the engine will either shutdown if Optimized Idle parameters are satisfied or ramp to 1000 RPM. While the system is active (OI Active Lamp is steadily illuminated), the throttle, PTO, Cruise Switch PTO functions are disabled and the engine speed is controlled by DDEC VI.

The components for this feature are to be installed in the engine compartment, under the dash near the fuse panel, and in the sleeper area. In Tables 1 and 2, the hardware kits list the various components. Before installing, familiarize yourself with the parts contained in your kit. Verify that you have the items listed in Table 1. For thermostat functions, a separate kit must be ordered. The kit contains the components listed in Table 2.

NOTE:
You must ensure that your vehicle meets the installation requirements of section 5.21 Optimized Idle, of the *DDEC VI Application and Installation* manual (DDC-SVC-MAN-0054). The installation cannot be completed if the vehicle does not comply with all preliminary checks.

See Figure 1 for a schematic of the Optimized Idle System.

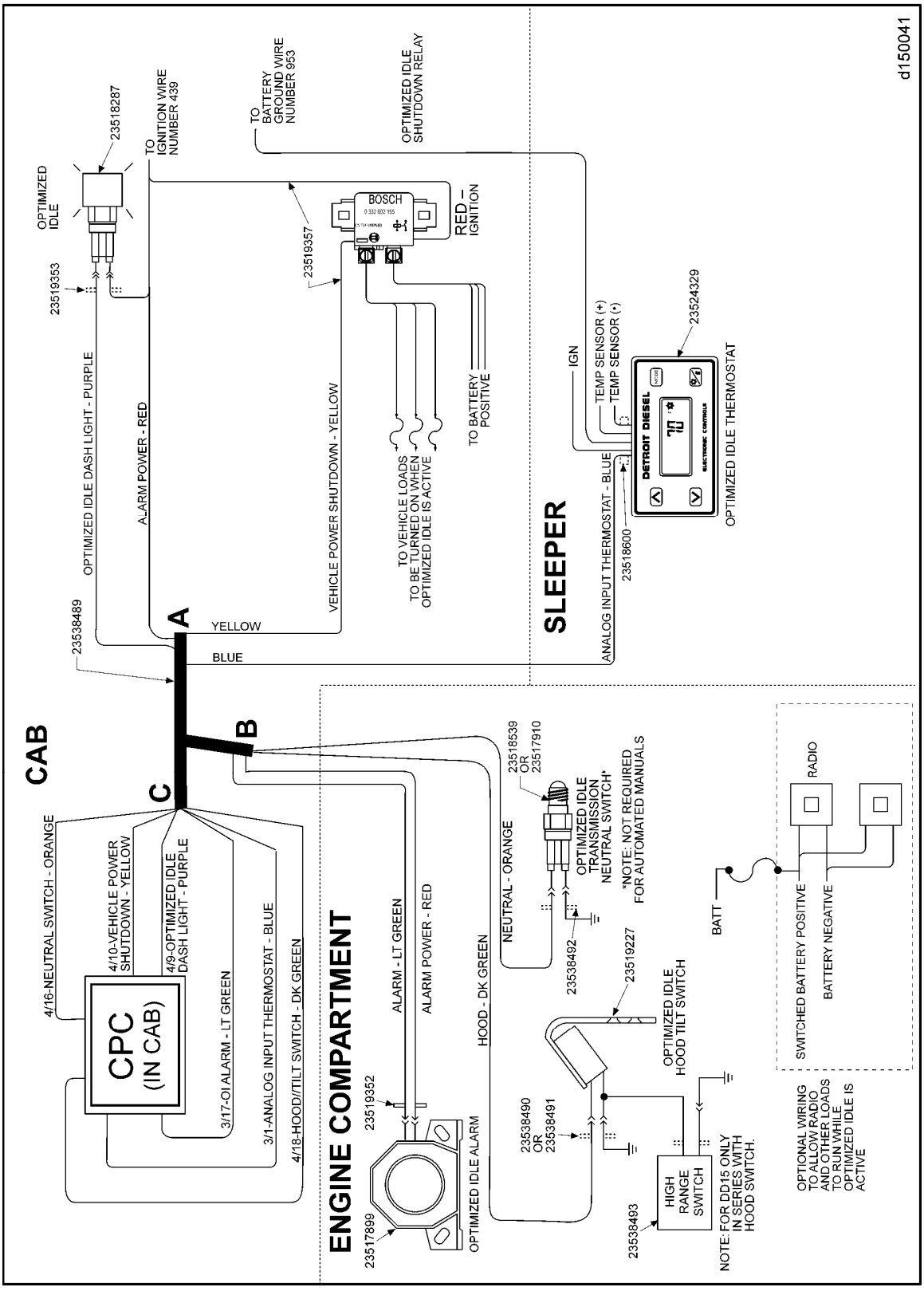

Figure 1 Optimized Idle System

KIT CONTENTS

The two new Optimized Idle kit contains the parts listed in Table 1.
The Thermostat kit is listed in Table 2.

Part Number	Description	Qty.
23519227	Hood Tilt Switch	1
23517910	Trans Neutral Switch 3/4in.	1
23518539	Trans Neutral Switch 9/16in.	1
23517899	Alarm	1
23518287	Optimized Idle Active Light	1
23538489	Harness - Optimized Idle Main Harness	1
23538490	Harness-OI Hood Switch	1
23538492	Harness – OI Transmission Neutral Switch	1
23519353	Harness – OI Active Light	1
23519352	Harness – Alarm	1
23519357	OI Power Shutdown Asm	1
23518552	Label for engine compartment	2
23518819	Label for cab	1
23518603	6mm conduit	20ft
23518736	Optimized Idle User Manual	1
23518737	Optimized Idle Quick Reference Card	1
23519918	14-16 Ga Fork Terminals	10
23519917	18-22 Ga Fork Terminals	6
23519362	14-16 Ga Splice Clips	6
23519359	18-22 Ga Splice Clips	20
018SP655	Optimized Idle Installation Procedure	1

Table 1 On-Highway Truck DDEC VI Optimized Idle Aftermarket Kit (P/N: 23538534)

Part Number	Description	Qty.
23524329	Optimized Idle Thermostat	1
23517908	Skin temperature sensor	1
23518600	Harness - Thermostat	1

Table 2 Thermostat Kit, P/N: 23524757

INSTALLATION PROCEDURE

PREPARATION

Several wires need to be identified before the installation of the Optimized Idle System. If the thermostat is to be used, a location for it and the skin temperature sensor must also be determined. Print out or write down all CPC inputs and outputs using a Detroit Diesel Reprogramming System (DDRS) or Detroit Diesel Diagnostic Link (DDDL).

INPUTS AND OUTPUTS

Some inputs and outputs are required by Optimized Idle. Using the printout of inputs and outputs, note the location of the following functions:

- Vehicle power shutdown digital output (CPC 4/10)
- Optimized Idle Active Lamp digital output (CPC 4/9)

- Optimized Idle alarm digital output (CPC 3/17)
- Hood Tilt digital input (CPC 4/18)
- Transmission Neutral digital input (CPC 4/16) (Manual transmission only)
- Thermostat analog input (CPC 3/1)

VEHICLE POWER CIRCUITS
Identify the cab power circuits and the blower/fan circuits at the fuse panel in the cab.

NOTE:
Whatever circuits are connected to the shutdown relay will be controlled by Optimized Idle. If a system is desired to work when Optimized Idle is active, do not connect to this relay (e.g. radio and television).

To identify these wires:
1. Remove fuse.
2. Turn the ignition ON.
3. Using a volt ohm meter (VOM), measure the voltage between one of the wires on one side of the fuse and a good ground.
4. If the voltage is higher than 4 VDC, the wire is the constant power side of that fuse.
5. Label the lead for use later in the installation.

THERMOSTAT (OPTIONAL) INSTALLATION
The thermostat, in conjunction with the exterior temperature sensor, indicates that DDEC needs to start the engine to heat or cool the sleeper/cab area. The thermostat module must be mounted with the connector recessed in the desired panel, near an exterior wall where the exterior temperature sensor is located. The thermostat module is not water-tight, so mounting location must be one that is not exposed to water. See Figure 3 for the thermostat dimensions for mounting purposes. The exterior temperature sensor is used by the thermostat to determine the continuous run conditions for the engine. It is attached to the inside surface of an exterior cab wall, with a 36 inch wire lead. The terminals on the end of the wires are inserted into the thermostat connector. See Figure 4 for the thermostat and exterior temperature sensor.

Locate the thermostat as follows:
- Within 36 in. of an exterior wall (for mounting the temperature sensor)
- Within the operator's reach while lying in the bunk area
- Avoid heat sources (such as lights)
- Mount away from heater and A/C vents
- Mount away from exterior vents
- Mount in an area not exposed to water or other fluids

Use the following procedure to install the thermostat and exterior temperature sensor:
1. Determine a suitable location in the sleeper area, approximately half way between the bunk and the ceiling, within 36 inches of an exterior wall.
2. Remove the panel and any insulation to expose the nearest exterior metal wall.
3. Install the exterior temperature sensor (P/N: 23517908) on the inside surface (bare metal) of the exterior wall. Remove the adhesive backing and press the sensor onto the metal wall.
4. Route the twisted leads to the thermostat location (see Figure 4).
5. Cut a hole in the desired panel for the thermostat connector using the template for the thermostat (see Figure 3).

6. Wire the thermostat (see Figure 2).
7. Connect the exterior temperature sensor.
8. Plug the temperature connector into the thermostat.
9. Route remaining wires toward the Optimized Idle main harness.
10. Replace all panels.

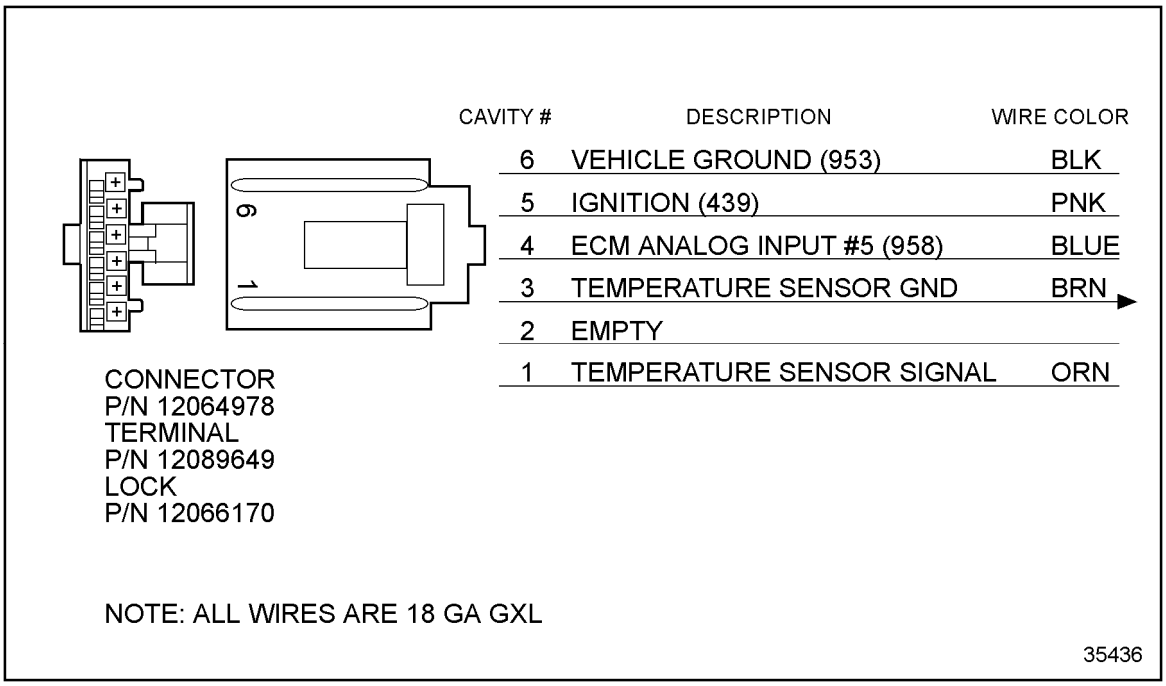

Figure 2 Optimized Idle Thermostat Wiring Diagram

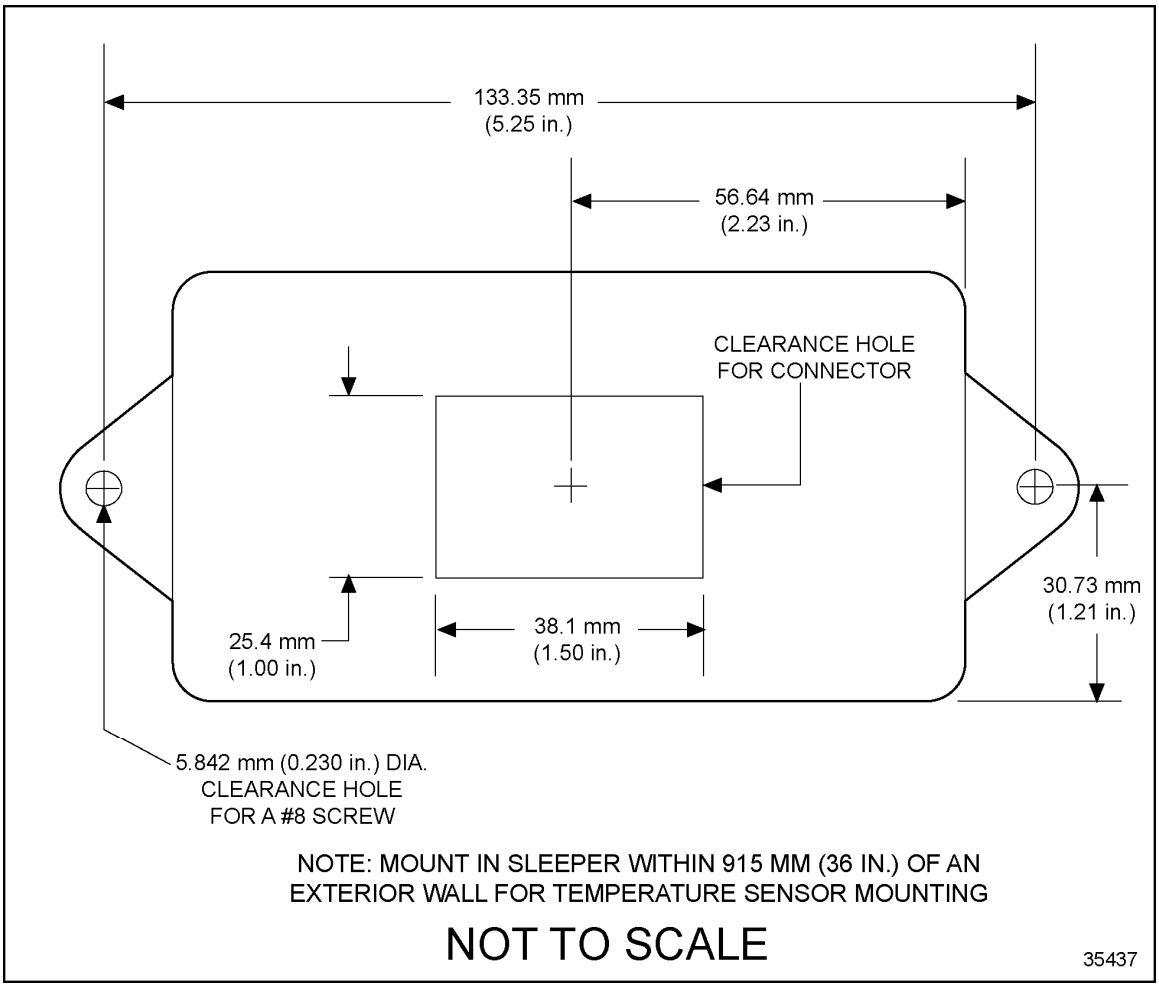

Figure 3 Thermostat Mounting Template

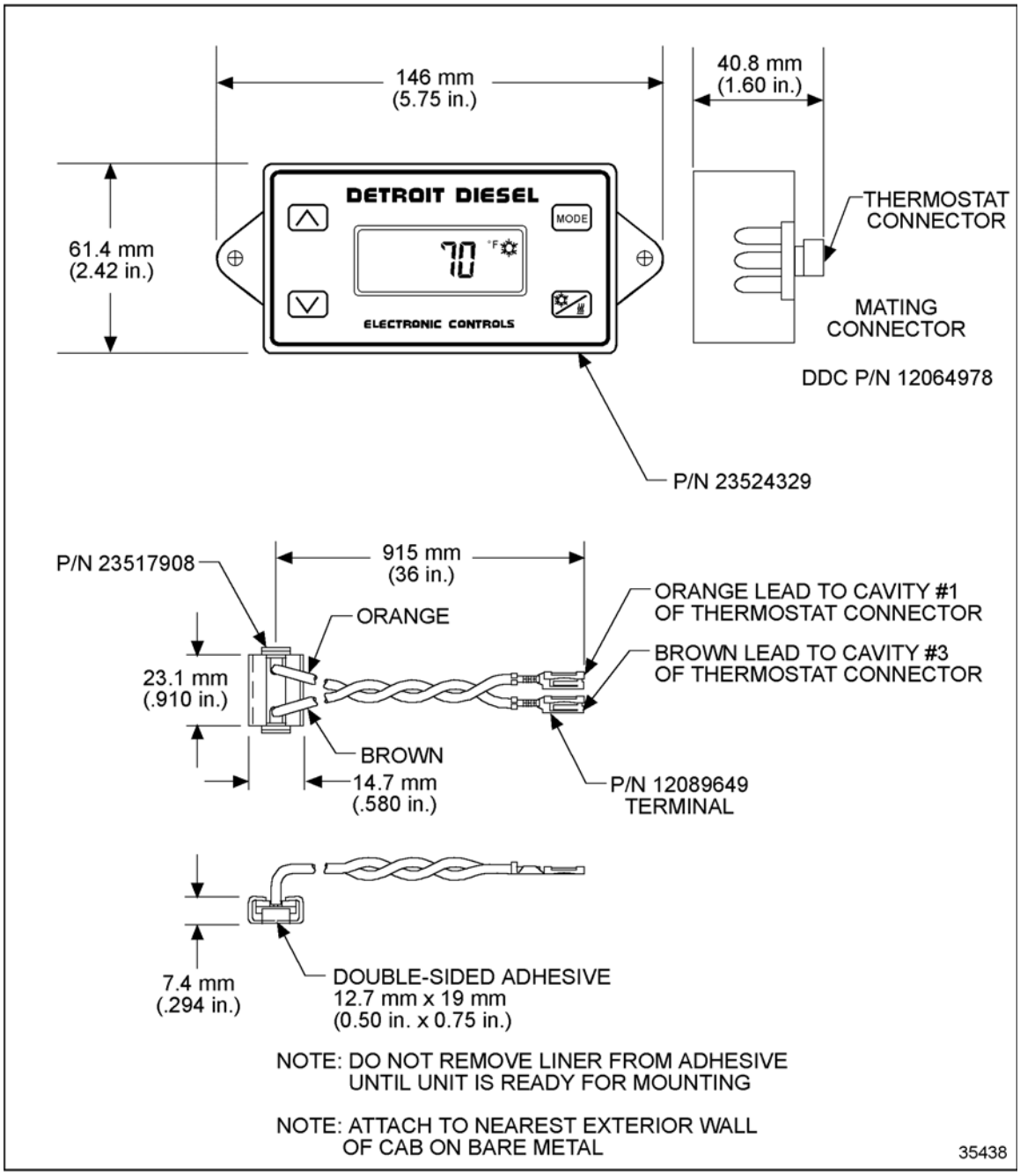

Figure 4 Cab-mounted Thermostat and Temperature Sensor

SAFETY INTERLOCK COMPONENTS

HOOD TILT SWITCH

The Hood Tilt Switch is an open circuit when the hood is open and this disables Optimized Idle. However, when the hood is closed, the switch contacts are closed, thus enabling Optimized Idle. The Hood Tilt Switch dimensions and connector information are shown in Figure 5. Use the Hood Tilt Switch listed in Table 1 or equivalent and follow the procedure below to install the Hood Tilt Switch:

1. The switch must be located so it can be mounted near the headlight or near the main hinge of the hood. The switch must be located on a surface that is parallel to the main hinge of the hood. The switch bracket must be mounted vertically.
2. Secure the switch in the desired location.
3. Use a VOM and verify that the switch is closed when the hood is closed, and the switch is open when the hood is open.

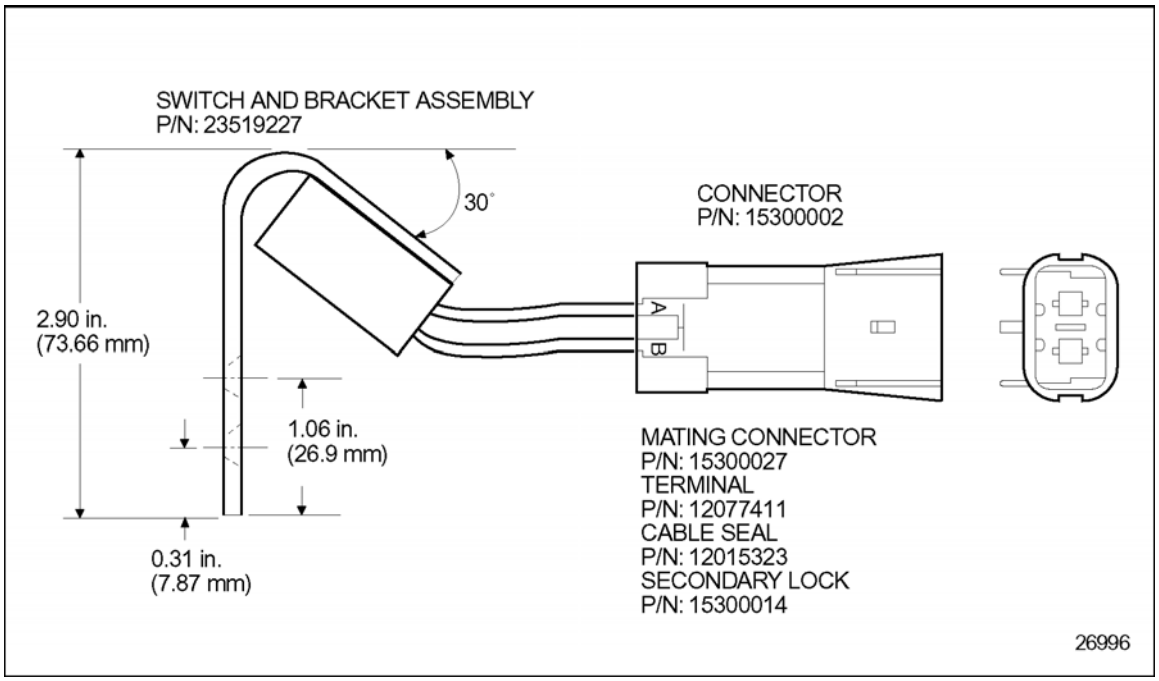

Figure 5 Hood Tilt Switch

TRANSMISSION NEUTRAL SWITCH (Manual Transmissions only)

The available neutral switches with dimensions and connector information are shown in Figure 6.

This switch is used to show when the transmission is in neutral. Switch contacts must be closed when the transmission is in neutral, open when it is in any gear. Use one of the transmission switches listed in Table 1 or equivalent. The location is typically on the top of the transmission cover plate approximately six (6) in. from the gear shift selector on the driver side of the transmission.

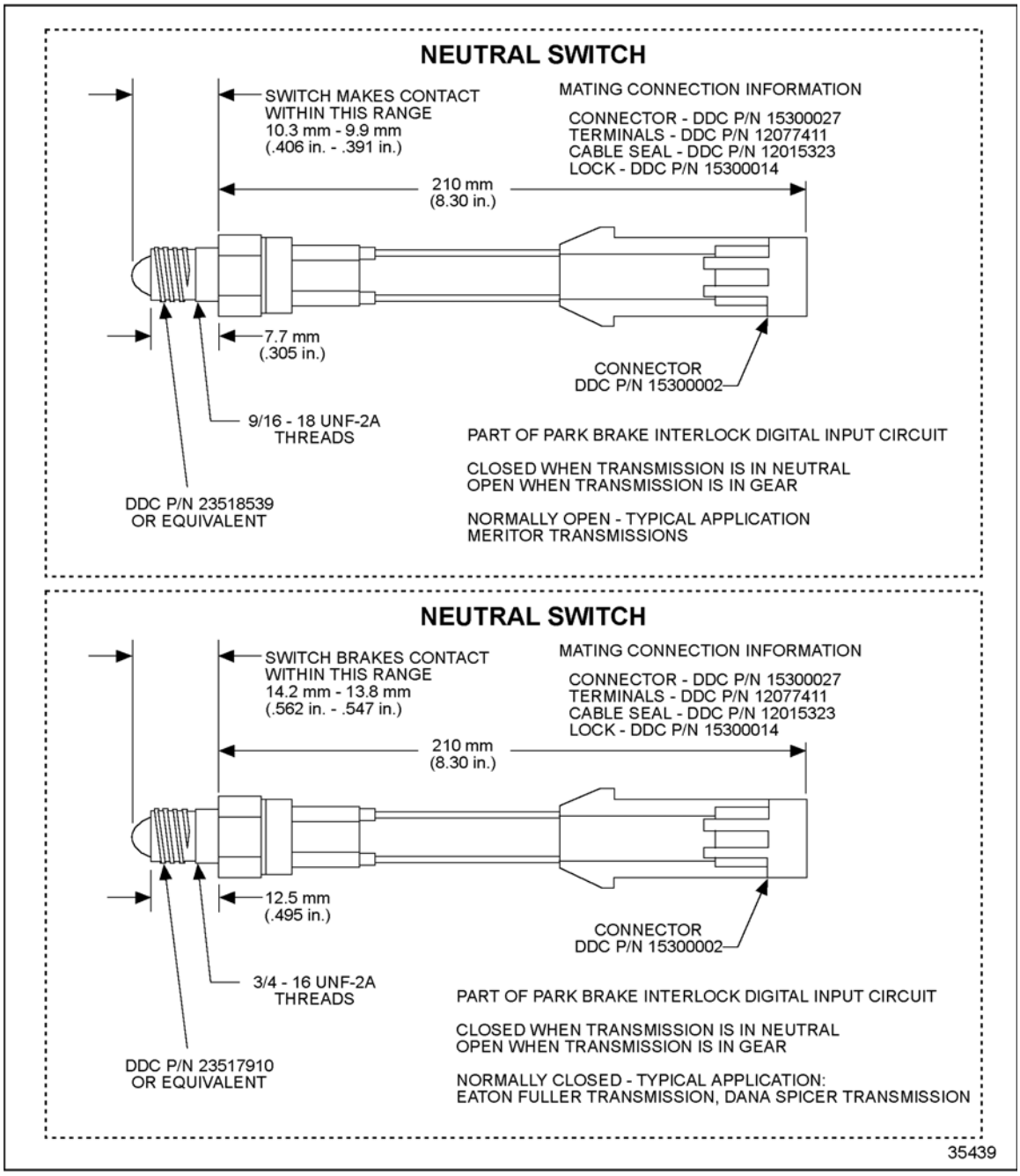

Figure 6 Neutral Switches

Use the following procedure to install the Transmission Neutral Switch:

1. Remove the factory plug and install the correct neutral switch. For typical Eaton Fuller transmissions, use switch P/N: 23517910 (listed in Table 1); for typical Meritor transmissions, use switch P/N: 23518539 (listed in Table 1). Torque fitting to 34 – 41 N·m (25 – 30 lb·ft). See Figure 6.
2. Use a VOM and verify that the switch is closed when the transmission is in neutral, and the switch is open when the transmission is in gear.

NOTICE:
The switches included in this kit are for common transmissions. If the correct switch is not included in the kit, DO NOT modify the switch nor eliminate the switch from the system. Contact the APPROPRIATE transmission dealer for the proper neutral switch.

OPTIMIZED IDLE ACTIVE LIGHT

The Optimized Idle Active Light shows when Optimized Idle is active. The light flashes to indicate that Optimized Idle will begin operation after the Idle Shutdown Timer expires. The light will stop flashing and stay on after the Idle Shutdown Timer expires to indicate that the operator can no longer use other DDEC features, including the foot pedal until Optimized Idle is turned off by means of the Cruise Control on/off switch, park brake release, hood open, or transmission is in neutral. See Figure 7 for the light dimensions and connector information. Use the Optimized Idle Active Light listed in Table 1 or equivalent.

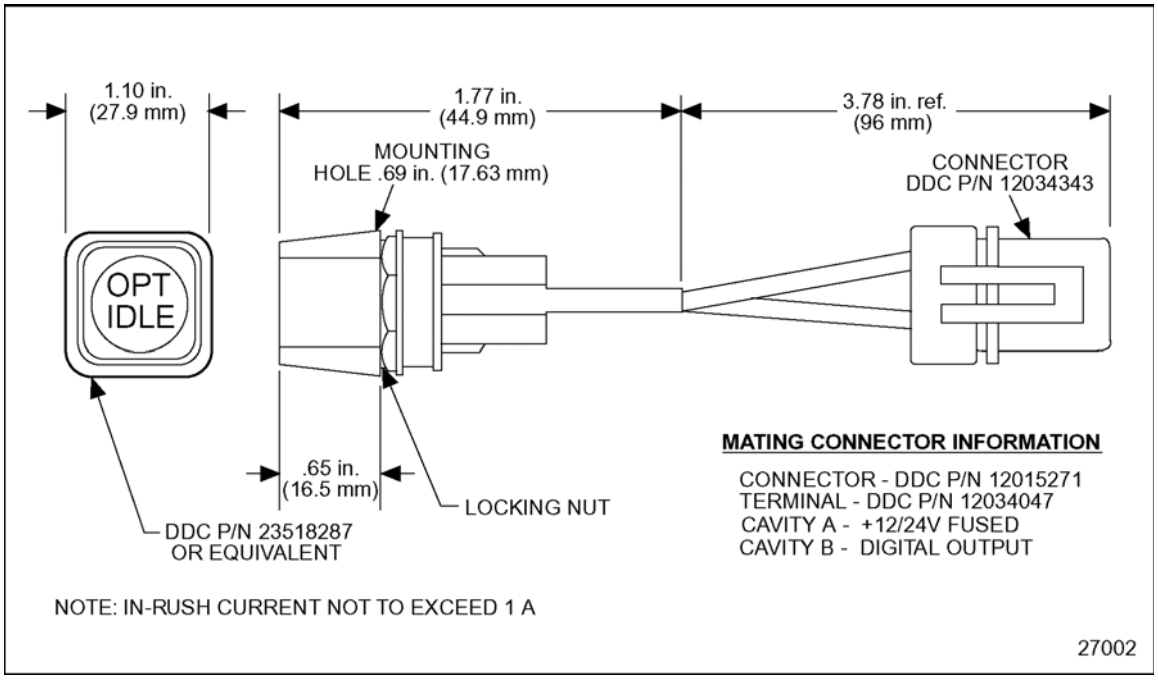

Figure 7 Optimized Idle Active Light

Use the following procedure to mount the light:

1. Locate an area on the dash board to install the light.
2. Drill an 11/16 in. hole in the dash.
3. Unscrew the face nut and remove the star washer.
4. Insert the housing into the dash and install the star washer and nut.
5. Snap the light cover onto the housing and press the light shield over the light cover.

ALARM

The alarm sounds prior to any Optimized Idle engine start. It should be mounted in the engine compartment high up on the fire wall. See Figure 8 for the alarm dimensions and connector information.

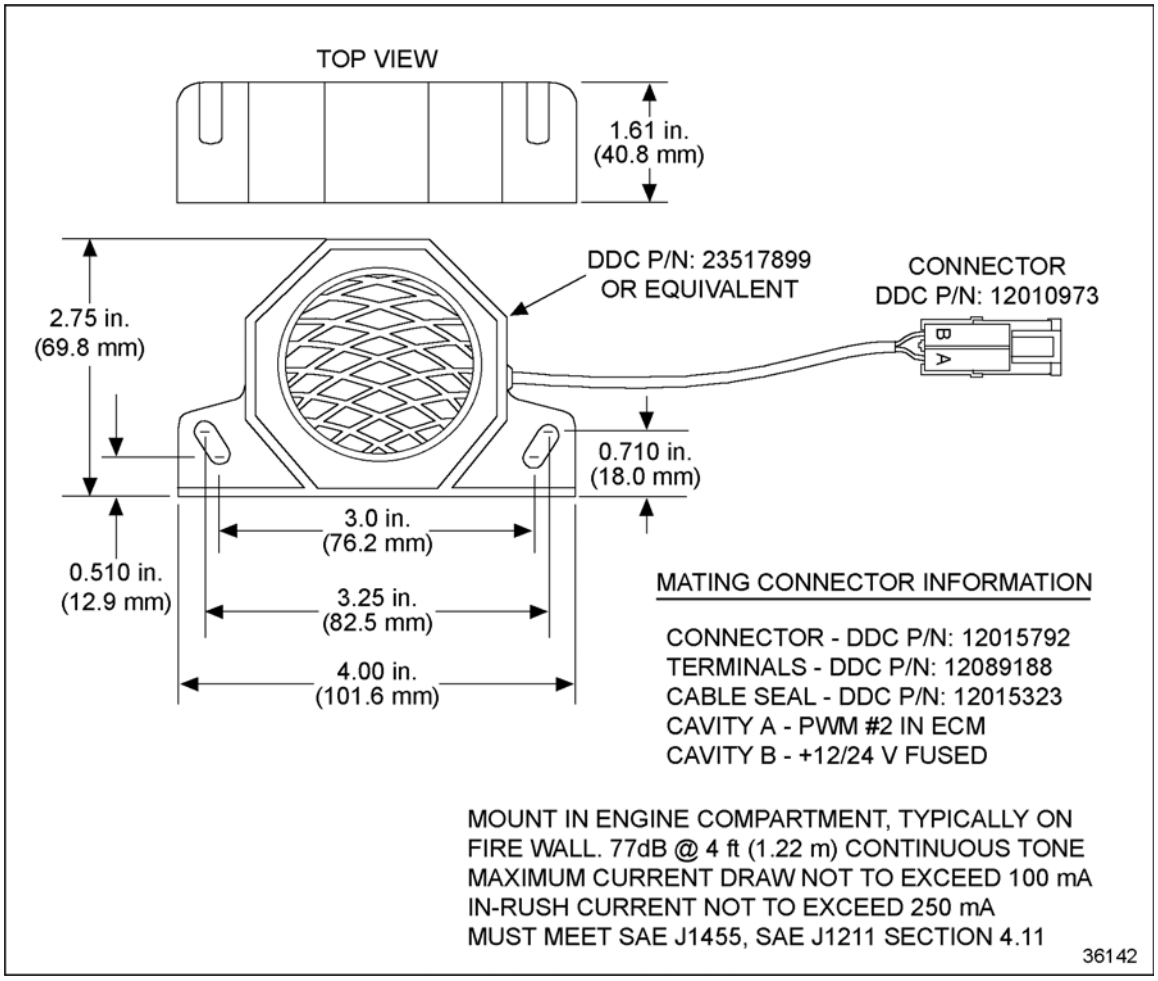

Figure 8 Optimized Idle Alarm

Attach the housing on the fire wall. Use the appropriate fastener to secure the alarm using the mounting slots. Use alarm P/N: 23517899 (listed in Table 1).

NOTICE:
Before beginning installation, disconnect the battery negative (-) cable from the battery negative terminal post to prevent the engine from starting and causing damage to the equipment.

HARNESSES, WIRING and TUBING

The wire, conduit, and pigtail harnesses contained in the kit are for wiring the various components to the CPC. Each cable must be protected with conduit. Harness and tubing must be routed on the vehicle away from moving parts and sharp edges. Any splices must be protected with waterproof heat shrink tubing.

OPTIMIZED IDLE MAIN HARNESS

The Optimized Idle Main Harness connects the components in the engine compartment to the components in the cab and to the CPC. See Figure 9 which describes the individual circuits on the Optimized Idle Main Harness.

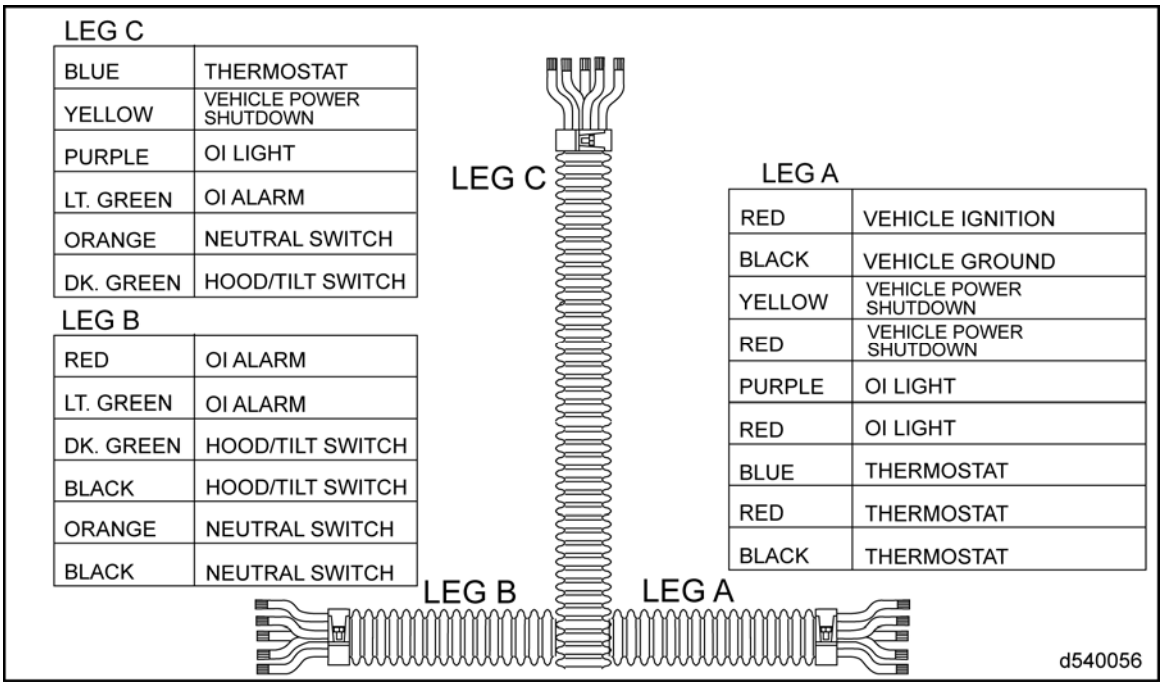

Figure 9 Optimized Idle Main Harness

Use the following procedure to install the Optimized Idle Main Harness:

1. Secure the portion of the harness labeled "A" in the cab near the fuse panel in a convenient, out of the way location. Most of the connections in the cab will be made in this location, so ensure that it is accessible.
2. Route the end of the harness labeled “B” through the fire wall into the engine compartment. Be sure that the conduit is routed away from any sharp objects, sharp corners, and moving parts.
3. Route the end labeled "C" to the CPC. The CPC is located in two areas depending on the model of your truck -- under the dash or behind the B-Pillar. If the CPC is located in the B-Pillar behind the passenger seat, the entire length of the harness is likely needed. If the CPC is located under the dash, either bind the extra length of harness out of the way or cut the unneeded length out of the harness and splice back together.

To connect the Optimized Idle Main Harness to the CPC, insert each wire in pigtail “C” that is terminated with a CPC terminal into the appropriate CPC connector cavity. Push the wire and terminal through the connector until fully seated. Pull back gently on the wire to ensure it is locked in place.

Leg	Wire Color	Wire To
C	Yellow	CPC Digital Output – Vehicle Power Shutdown
C	Purple	CPC Digital Output – Optimized Idle Active Light
C	Orange	CPC Digital Input – Neutral Switch
C	Blue	CPC Analog Input - Thermostat
C	Lt. Green	CPC Digital Output – Optimized Idle Alarm
C	Dk. Green	CPC Digital Input – Hood Switch
B	Lt. Green	Alarm Harness
B	Red	Alarm Harness
B	Dk. Green	Hood Tilt Switch Harness
B	Orange	Neutral Switch Harness
B	Blk	Neutral Switch Harness
B	Blk	Hood Tilt Switch Harness
A	Red	Vehicle Ignition Power
A	Blk	Vehicle Ground
A	Blue	Thermostat Harness
A	Red	Thermostat Harness
A	Blk	Thermostat Harness
A	Purple	Optimized Idle Light Harness
A	Red	Optimized Idle Light Harness
A	Red	Vehicle Power Shutdown Harness
A	Yellow	Vehicle Power Shutdown Harness

Table 4 Optimized Idle Main Harness Circuits

TRANSMISSION NEUTRAL SWITCH HARNESS (with Manual Transmissions)
The Transmission Neutral Switch Harness connects the Transmission Neutral Switch to the Optimized Idle Main Harness. Use one of the Transmission Neutral Switches listed in Table 1 or equivalent. Use the following procedure to wire the Transmission Neutral Switch to the Optimized Idle Main Harness:

1. Connect the Transmission Neutral Switch harness (part number listed in Table 1) to the Transmission Neutral Switch.
2. Route the Transmission Neutral Switch harness from the neutral switch to the Optimized Idle Main Harness pigtail “B” located in the engine compartment near the fire wall.
3. Cut off any excess wire and conduit and strip the insulation.
4. Splice the orange wire of the Transmission Neutral Switch harness wire to the orange wire of the Optimized Idle Main Harness Pigtail “B”.
5. Splice the black wire of the Transmission Neutral Switch harness wire to the black wire of the Optimized Idle Main Harness Pigtail “B”.

HOOD TILT SWITCH HARNESS
This wiring is for connecting the Hood Tilt Switch to the Optimized Idle Main Harness. Use the Hood Tilt Switch part number listed in Table 1 or equivalent.

Use the following procedure to wire the Hood Tilt Switch to the Optimized Idle Main Harness:

1. Connect the Hood Tilt Switch Harness (part number listed in Table 1) to the Hood Tilt Switch.
2. Route the Hood Tilt Switch Harness from the Hood Tilt Switch to the Optimized Idle Main Harness pigtail “B” which is located in the engine compartment near the firewall.

3. Cut off any excess wire and conduit and strip the insulation.
4. Splice the brown wire of the Hood Tilt Switch Harness to the dark green wire on the Optimized Idle Main Harness pigtail “B”.
5. Splice the black wire of the Hood Tilt Switch Harness to the black wire on the Optimized Idle Main Harness pigtail “B”.

ALARM HARNESS

The Alarm Harness connects the alarm to the Optimized Idle Main Harness. Use alarm listed in Table 1.

Use the following procedure to wire the alarm from the Optimized Idle Main Harness:

1. Connect the Alarm Harness (part number listed in Table 1) to the alarm.
2. Route the Alarm Harness from the alarm to the Optimized Idle Main Harness pigtail “B” located near the firewall.
1. Splice the red wire from the Alarm Harness to the red wire in the Optimized Idle Main Harness at pigtail “B”.
2. Splice the light green wire from the Alarm Harness to the light green wire in the Optimized Idle Main Harness at pigtail “B”.

OPTIMIZED IDLE ACTIVE LIGHT HARNESS

The Optimized Idle Active Light Harness connects the Optimized Idle Active Light and dash light assembly to the Optimized Idle Main Harness. Use the Optimized Idle Dash Light (part number listed in Table 1).

Use the following procedure to wire the Optimized Idle Active Light from the Optimized Idle Main Harness to the Active Light:

1. Connect the Optimized Idle Active Light harness (part number listed in Listed in Table A-2) to the light assembly.
1. Route the Optimized Idle Active Light harness from the Active Light assembly to the Optimized Idle Main Harness pigtail “A” under the dash.
2. Cut off any excess wire, and strip the insulation.
3. Splice the red lead from the Optimized Idle Active Light harness to the red ignition wire of the Optimized Idle Main Harness pigtail “A”.
6. Splice the purple lead from the Optimized Idle Active Light harness to the purple lead in the Optimized Idle Main Harness pigtail “A”.

VEHICLE POWER SHUTDOWN HARNESS & RELAY

This relay is used to control the vehicle power systems including the vehicle heater and air conditioning blower fans.

NOTE:

Some engines are equipped with non-DDEC alarms which may sound when the engine is not running. Examples are low oil pressure alarms or high engine temperature alarms. Connect these devices to the vehicle power shutdown relay so they will be off when Optimized Idle shuts off the engine.

Use the following procedure to connect the vehicle power to the vehicle power shutdown relay:

1. Mount the vehicle power shutdown relay near the fuse panel in the cab with the appropriate fasteners.
2. Route the yellow wire from the shutdown relay harness to the Optimized Idle Main Harness pigtail “A” under dash.
3. Cut off any excess wire, and strip the insulation.
4. Splice the yellow wire from the shutdown relay harness to the yellow wire in the Optimized Idle Main Harness pigtail “A”.
5. Route the red wire from the shutdown relay harness to the red wire in the Optimized Idle Main Harness pigtail “A”.
6. Cut off any excess wire, and strip the insulation.
7. Splice the red wire from the shutdown relay harness to the red wire in the Optimized Idle Main Harness pigtail “A”.
8. Connect all the leads labeled for the vehicle power systems to one of the screw terminals on the shutdown relay using the fork terminals provided.

NOTE:
The heater and air conditioning blower fans must also be connected to this relay.

THERMOSTAT HARNESS
This harness is used to connect the Optimized Idle Thermostat to the Optimized Idle Main Harness.

Use the following procedure to install the thermostat harness:

1. Route the thermostat harness behind the panel.
2. Insert the leads from the exterior temperature sensor into the thermostat connector on the thermostat harness.
    a. Put the orange lead in cavity #1, and the brown lead in cavity #3.
    b. Fold and wire tie any excess cable between the sensor and the thermostat location.
3. Insert the secondary lock (part number listed in Listed in Table A-1) into the thermostat connector.
4. Route the thermostat harness to the location of the Optimized Idle Main Harness pigtail “A” under the dash.
5. Cut off any excess wire and conduit, and strip insulation.
6. Splice the blue wire in the thermostat harness to the blue wire from the Optimized Idle Main Harness pigtail “A”.
7. Splice the pink wire from the thermostat harness to the red wire of the Optimized Idle main harness pigtail “A”.
8. Splice the black wire from the thermostat harness to the black wire of the Optimized Idle main harness pigtail “A”.

LABELS
Two different labels are required for Optimized Idle installations, one for each side of the radiator fan shroud, and one for the dashboard. Use the following procedure to place the caution labels on each side of the radiator fan shroud, and one for the dashboard:

1. Decide on the location on the radiator fan shroud for the caution labels. The caution must be easy to see from all access points when the hood is open.

2. Clean area on each side of the radiator fan shroud with water or degreaser. Dry the area.
3. Remove the backing and place one label (see Figure 10, P/N: 23518552) on each side of the radiator fan shroud.
4. Clean and dry the desired area.
5. Remove the backing and place in desired location.

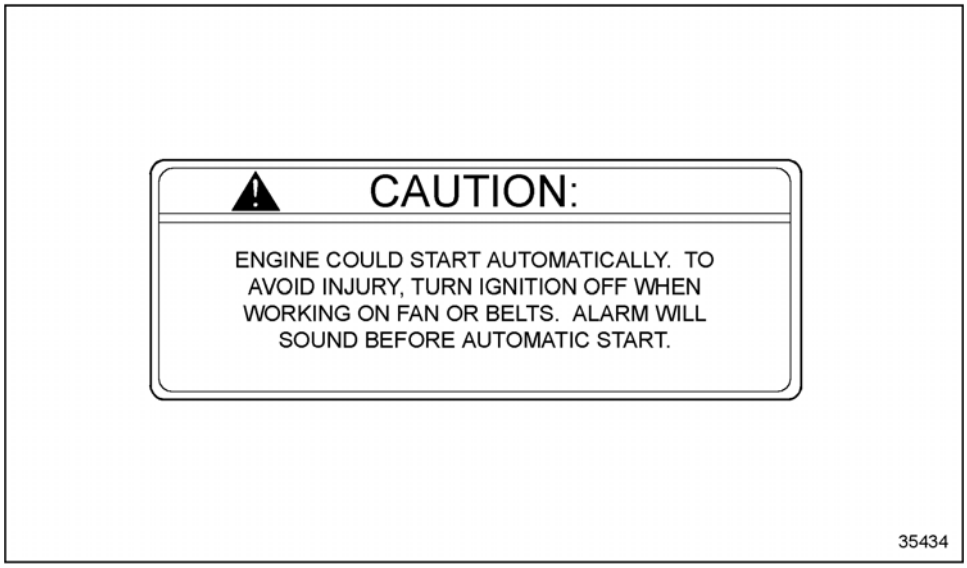

Figure 10 Radiator Fan Shroud Label (Qty. 2)

Determine the location in the cab for the product label (see Figure 11, P/N: 23518819). It must be in plain unobstructed view of the driver while sitting in the driver's seat.

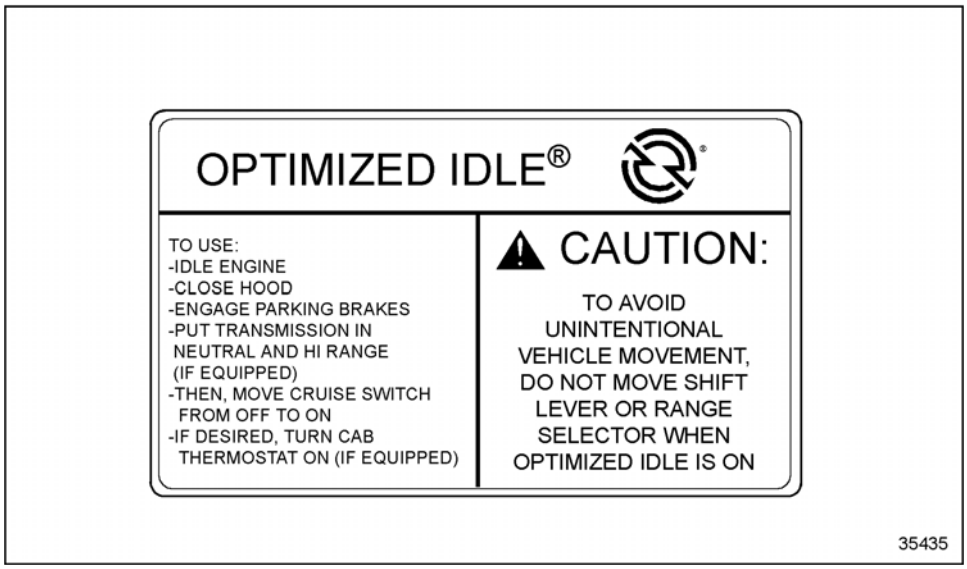

Figure 11 Product Label

PROGRAMMING & FLEXIBILITY

Once the hardware installation is completed, the CPC must be reprogrammed and the system tested. The digital inputs and outputs listed in Table 5 must be programmed.

Parameter Group	Description	Setting
12	Optimized Idle Enable	1 = Enable
8	Vehicle Speed Sensor	4 = Magnetic Pickup
13	3 01 AI Selection	0 = No Sensor 2 = OI Thermostat
13	Trans Neutral Input Config	0 = Hardwired (man8al trans) 1 = J1939 (J1939 trans)
13	Park Brake Switch Config	0
13	4 18 DI Selection	2 = Enable Engine Hood
35	4 09 DO Selection	10 = OI Active Lamp
35	4 10 DO Selection	3 = Vehicle Power Shutdown
35	3 17 DO Selection	4 = OI Alarm
17	Enable Idle Shutdown	1 = Enable with Park Brake
17	Enable PTO Shutdown	1 = Enable with Park Brake
MCM	Starter Type Control	1 = Starter Activated via MCM
13	1 02 DI Selection	1 = Enable
35	3 17 DO Fault Detection	1 = Enable
35	4 09 DO Fault Detection	1 = Enable
35	4 10 DO Fault Detection	1 = Enable
17	Enable Idle PTO Shtn Override	0 = Disable

Table 5 Optimized Idle Digital Inputs and Digital Outputs Settings

VERIFY INSTALLATION AND OPERATION

IDLE SHUTDOWN TIMER

The Idle Shutdown Timer must be enabled in order for Optimized Idle to function. Using the Detroit Diesel Reprogramming System (DDRS) or Detroit Diesel Diagnostic Link (DDDL), verify that the timer is enabled. If it is not, enable the timer with the DDR and set the amount of time desired for the Idle Shutdown Timer. Then, set ENABLED ON VSG to YES and OVERRIDE to NO. This ensures that the engine will shut down in all situations.

PARK BRAKE CIRCUIT

Using a DDR/DDDL, with the engine OFF and the ignition ON, monitor the Park Brake circuit.

1. Release the Park Brake, verify that the Park Brake Status is OFF (PARK BRKOFF).
2. Set the Park Brake and verify that the Park Brake Status is ON (PARK BRKON).

HOOD CIRCUIT

Using a DDR/DDDL, with the engine OFF and the ignition ON, monitor the hood circuit.

1. Open the hood and verify that the Hood Status is open.
2. Close the hood and verify that the Hood Status is closed.

When using a DD15 engine, perform the same verification with the High Range Select Switch.

3. Select low range and verify that the Hood Status is open.
4. Select high range and verify that the Hood Status is closed.

OPTIMIZED IDLE DASH LIGHT

Using a DDR (activate outputs menu), activate the Optimized Idle Active Light. Verify that the light is working properly when the output is turned on.

VEHICLE POWER SHUTDOWN RELAY

Turn the vehicle heater and A/C fans in the cab and sleeper (where applicable) to high. Using a DDR/DDDL (Activate Outputs menu), activate the Vehicle Power Shutdown (VEH PWR DOWN) output. Verify that *all* heater and A/C fans are turned on when this output is turned on.

ALARM

Using a DDR/DDDL (Activate Outputs menu), activate the alarm output. Verify that the alarm is working properly when the output is turned on.

SYSTEM CHECK - ON-HIGHWAY TRUCK

Use the following procedure to verify that Optimized Idle properly stops and restarts the engine:

1. Start the engine with the hood closed, Park Brake set, transmission in neutral.
3. Turn the Cruise Master Switch to the ON position. If it is ON before the vehicle was started, turn it to the OFF position, and then to the ON position.
4. Wait for the engine to shutdown. After the idle timer expires, the engine will either shutdown, or continue to run if the engine oil temperature is below 60°F (16°C).
5. Turn on the thermostat by pressing any button on the thermostat.
6. Set the temperature so the vehicle requires heating or cooling. This is accomplished by changing the set point and Heat/Cool mode until the icon is flashing. Refer to the *Optimized Idle User Manual* (DDC-SVC-MAN-0019) or the "Optimized Idle Reference Card" (DDC-SVC-OTH-0001), for additional information.
7. Check the thermostat input (T-STAT) to the CPC using a DDR/DDDL. With the thermostat requesting heating or cooling, the DDR/DDDL should show that the thermostat is on.
8. The alarm will sound and the engine will start.

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