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Eco-Star model ECO501-AT

(Transit Applications)
2009-2012 F250-550 all engines
2009-2012 Ford E-Series all engines
Contact InterMotive for additional vehicle applications.

System Operation

The ECO501-AT module is an automatic engine stop/start system that provides lower vehicle emissions and improved fuel economy by forcing an idling engine to shutoff. The system monitors user inputs, as well as vehicle conditions, to determine when to turn off an idling engine. An anti-idle timer shuts off the engine if safety conditions are met. Engine restarts are triggered automatically by low battery voltages or applying the Service Brake. Refer to the Eco-Star Application Note at www.intermotive.net for additional operation details.

Installation Instructions

Disconnect the vehicle's battery before proceeding with the installation.

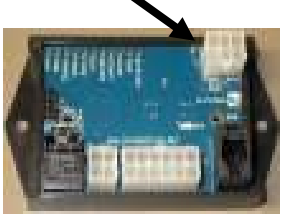
It is the installer's responsibility to route and secure all wiring harnesses where they cannot be damaged by sharp objects, mechanical moving parts such as the Park Brake and tilt steering wheel mechanisms and high heat sources. Failure to do so could result in damage to the system or vehicle and create possible safety concerns for the operator and passengers.

Remove the lower dash panel below the steering column and find a suitable location to mount the module. Do not mount the module where it will be exposed to excessive heat. Do not mount the module until all wire harnesses are routed and secure. The last step of the installation is to mount the module. It is recommended the module be mounted with two screws, however 2-sided foam tape may also be used. When installing the harnesses, leave several inches of take-out so the module can be removed if necessary.

Data Link Harness Installation

- Locate the vehicle's OBDII Data Link Connector. It will be mounted below the lower left dash panel.
- Remove the mounting screws for the OBDII connector. Plug the Red connector from the ECO501-AT Data Link Harness into the vehicle's OBDII connector. Ensure the connection is fully seated and secure with the supplied wire tie.
- Mount the Black pass through connector from the ECO501-AT Data Link Harness in the former location of the vehicle's OBDII connector.
- Secure the ECO501-AT Data Link harness so that it does not hang below the lower dash panel.
- Plug the free end of the Data Link harness into the mating 6-pin connector on the ECO-501-AT module.

Data Link Harness plugs in here



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ECO501-AT-03-INS

Ignition Switch Connections

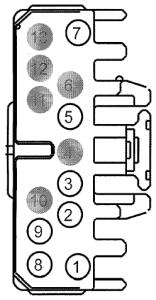
- Remove the lower steering column trim cover. Locate the ignition switch connector and disconnect it from the ignition switch.
- Note the Pin Numbers on the Ignition Switch connector. The supplied white 2-pin pigtails will be tapping into several of these wires.
- In the following instructions, the supplied **male** pigtail has Blue and Purple wires, the **female** pigtail has Red and Purple wires. Pigtail connectors will be plugged into each end of s-h41-cx harness. Find a place on the vehicle's steering column / Ignition Harness with ample space to locate these 2-pin connector pigtails.

Note: Perform only one step at a time, using caution when attaching the correct ignition wire to the appropriate 2-pin pigtail wire. These connections must be made by using solder and the supplied heat shrink tubing. Cut tubing to 1" lengths for this purpose.

- Proceed to the appropriate section below for your vehicle application.

2009-2012 E-Series Ignition Switch Connectors

- Locate Pin #5 Blue/White wire and Pin #1 White/Orange wires.
- Cut the Ignition Switch Pin #1 White/Orange wires and attach the Harness side of the wires to the **male** 2-pin connector Pin #1 Blue wire.
- Attach the Ignition Switch side of the Pin #1 White/Orange wires to the **female** 2-pin connector Pin #1 Red wire.
- Cut the Ignition Switch Pin #5 Blue/White wire and attach the Harness side of the wire to the **male** 2-pin connector Pin #2 Purple wire.
- Attach the Ignition Switch side of the Pin #5 Blue/White wire to the **female** 2-pin connector Pin #2 Purple wire.

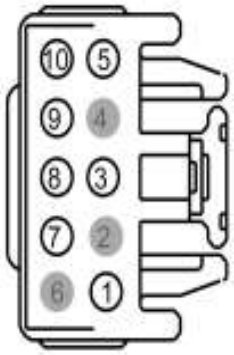


E Series C250 Front of Connector

Proceed to the "**Plug in Ignition harnesses"** section below.

2009-2010 F-Super Duty Ignition Switch Connectors

- Locate Pin #10 Blue/White wire and Pin #1 White/Orange wire.
- Cut the Ignition Switch Pin #1 White/Orange wire and attach the Harness side of the wire to the **male** 2-pin connector Pin #1 Blue wire.
- Attach the Ignition Switch side of the Pin #1 White/Orange wire to the **female** 2-pin connector Pin #1 Red wire.
- Cut the Ignition Switch Pin #10 Blue/White wire and attach the Harness side of the wire to the **male** 2-pin connector Pin #2 Purple wire.
- Attach the Ignition Switch side of the Pin #10 Blue/White wire to the **female** 2-pin connector Pin #2 Purple wire.



2009-10 F Series C250 Front of Connector

Proceed to the "**Plug in Ignition harnesses"** section below.

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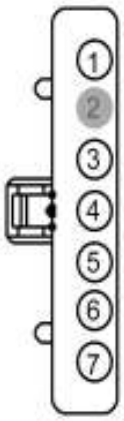
2011-2012 F-Super Duty Ignition Switch Connectors

- Locate the Pin #7 Blue/White wire and Pin #1 White/Orange wire.
- Cut the Ignition Switch Pin #1 White/Orange wire and attach the Harness side of the wire to the **male** 2-pin connector Pin #1 Blue wire.
- Attach the Ignition Switch side of the Pin #1 White/Orange wire to the **female** 2-pin connector Pin #1 Red wire.
- Cut the Ignition Switch Pin #7 Blue/White wire and attach the Harness side of the wire to the **male** 2-pin connector Pin #2 Purple wire.
- Attach the Ignition Switch side of the Pin #7 Blue/White wire to the **female** 2-pin connector Pin #2 Purple wire.



2011-2012 F Series C250 Front of Connector

Plug in Ignition harnesses

- Plug in the 2 pin pigtails into the respective ECO501-AT harness connectors.
- Plug the ECO501-AT 12 Pin connector into the mating 12 pin connector on the ECO501-AT module.
- Plug the ECO501-AT 4 Pin connector into the mating 4 pin connector on the ECO501-AT module.

Wiring Discrete I/O

- See the descriptions of the I/O features to decide which of the optional connections will be used.
- The Hood Open Disable Switch is ***not*** an optional input. This grounding connection ***must*** be made in order for the module to operate. This is one of the most important safety features and the time must be taken to properly install a switch such that a ground contact is made only with the hood fully closed (see below).

I/O Features and Descriptions: (Solder and heat shrink all connections.)

Hood Open Disable Switch

Pin #3 (Brown wire) of the module's 4 pin connector is the Hood Open Disable input. This low true signal prevents auto restart when the hood is open. As an important safety feature, this connection must be made to prevent auto restarting when someone is working under the hood area. Extend the Brown Hood Open Disable wire through the bulkhead into the engine compartment. (Solder and heat shrink all connections.) Attach the Hood Open Disable wire to a normally open hood switch that grounds this signal when the hood is closed (floating with hood open). A low current switch with gold contacts is recommended.

Engine Off Request Input

Pin #2 (White wire) of the module's 12 Pin Connector is an Engine Off Request input. Connect this input to a grounding switch that activates whenever engine off is desired (e.g. passenger door, driver door, or lift door opening).

Shutdown Inhibit Input

Pin #5 (Green wire) of the module's 12 Pin Connector is the Shutdown Inhibit input which may be wired to other vehicle equipment which requires the engine to continue running. As long as this input is active (grounded), the Anti-Idle shutdown timer and the Engine Off Request inputs will ***not*** turn the engine off.

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I/O Features and Descriptions (Cont.)

Security Input

Pin #1 of the module's 4 Pin Connector is an optional security input. When this input is grounded by a switch, the engine will auto shut off if the Transmission is shifted out of Park. A hidden keyed switch could be used for added security. Connect one of the provided Molex pins to an installer supplied wire and insert into cavity 1 of the 4 pin Molex header. Connect free end of wire to installer provided switch.

Aux Battery Input (Up to 36 Volt)

Pin #4 of the module's 12 Pin Connector is an auxiliary battery voltage monitor input. It measures the analog battery input and can trigger a low battery restart when this input falls below a user defined level. By default this trigger is disabled, but it may be enabled via a laptop connection. Contact InterMotive for details or refer to Eco-Star Application Note. A spare Molex pin is provided in the kit to allow the use of this input.

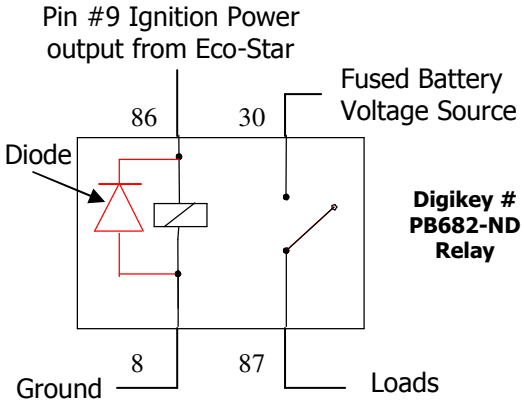
Restart Beeper

Pin #3 Orange wire of the module's 12 Pin Connector drives a warning beeper that will sound for 2 seconds prior to a low battery restart. Find a suitable location for mounting the warning beeper so that it is audible to the driver. Some vehicles have a vertical bracket under the center of the dash which works well as a mounting bracket. Connect lead to Red post of beeper, and the Black lead to the negative post. The Black lead eyelet must be grounded in order for the beeper to function. The bezel on the beeper can be rotated to control volume.

Hot in Run / Start Output

ECO501-AT shuts down the vehicle's engine by simulating a "key off" condition. All electrical loads that are powered from the hot in Run/Start circuit will momentarily lose power when the engine is turned off. This may not be desirable for all loads and can be avoided in 1 of 2 ways. The first is to re-wire any loads that you don't want to lose power to the Run/Acc circuit. The second is by wiring an external relay to Eco-Star's Hot in Run/Start Signal Pin #9 Yellow wire (1 Amp max, see below). This signal simulates the hot in Run/Start signal, but it does not momentarily drop out when Eco-Star shuts the engine off. Additional loads will drain the battery faster, resulting in a low voltage restart. Use of LED lights and higher capacity batteries is recommended to maximize engine off time.

The Pin #9 (Yellow wire) output is capable of driving up to 1 Amp max. When connecting to a relay, always use a diode clamped relay, such as Digikey part number PB682-ND, or add a diode across the relay coil as shown, observing the required diode polarity. The use of a relay without diode clamped suppression causes high voltage spikes when the relay coil is deactivated. These voltage spikes may cause damage or intermittent behavior to on-board vehicle control modules. Resistors and other methods of clamping are not as effective and are not recommended.



Mounting Location

Ensure all the harnesses are properly connected and routed, and are not hanging below the dash area. Mount the module as described on page one. Verify the module is in an area away from any external heat sources (engine heat, heater ducts, etc.), and mount it with two screws or double sided tape.

Reconnect the vehicle battery

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Post Installation Operational Test

Setting module into Installation Test Mode.

The installation test mode can be entered by applying a ground to the silver pad on the module labeled "TEST". When test mode activates, the status LED will start blinking; the ECO501-AT now functions without monitoring the following pre-conditions: Engine Temp, RPM, Battery Voltage, or Ambient Air Temp (when applicable). This allows for easier testing/troubleshooting for the installer.

There are still several conditions that will prevent ECO501-AT from auto-shutdown in test mode: Trans Range Not in Park, Service Brake Pedal Applied, Hood Open (Open = Not Grounded), Vehicle Speed not 0, or Shutdown Inhibit Input Active (Grounded).

Test 1. With engine running, transmission in Park, hood closed, activate the Engine Off Request input. Engine will shut off. Ignition will go off for several seconds before Run/Start Output is restored.

Test 2. Apply the Service Brake. The Engine will automatically restart.

Test 3. Release the Service Brake and confirm the module shuts off the engine after 15 seconds. Note: Applying the Service Brake resets and prevents the timer from counting down and shutting off the engine.

Test 4. With the engine still auto-stopped, open the hood and repeat test 2. As a safety feature, the ECO501-AT **MUST NOT start or stop the engine when the hood is open**. If applying the Service Brake starts the engine with hood open, check hood switch wiring.

NOTE: ECO501-AT will not shut off the engine for 5 seconds after the engine is started.

IMPORTANT:

If the system fails any of the above tests, check all related wiring. If operational issues persist, call InterMotive Tech Support. Do NOT release vehicle for service unless it has passed ALL of the above tests.

Want to change default settings?

If changes need to be made to the default Eco-Star configuration, see Intermotive Application Note for the ECO501 on our website (www.intermotive.net). This document goes into greater detail on the parameters and safety conditions of Eco-Star. If the configuration is altered, make note of the modifications for future serviceability and include them with the vehicle.

Eco-Star model ECO501-AT (Transit)
Operating Instructions (to be left in vehicle)
2009-2012 Ford E-Series
2009-2012 F250-550 Series

- The ECO501-AT module provides enhanced fuel economy and lower vehicle emissions by limiting engine idle time. Vehicle fuel economy is improved by automatically shutting off the vehicle's engine to prevent unnecessary idling. After an auto shutoff has occurred, restarts can be automatically triggered by low battery voltage or applying the Service Brake.
- The Engine Off Request is an input that, when activated, stops an idling engine by switching off ignition power. Usually this is connected to the passenger door, such that loading passengers (in Park) will shut off the engine. Once the vehicle is turned off, it will can be automatically restarted by either: 1) low battery voltage or 2) applying the Service Brake. It can, of course, also be restarted with the key.
- The Engine will also be shut off when the idle time exceeds the timeout period. The default timeout period is 15 seconds of idling in Park. After that period elapses, the engine will be automatically turned off. Note that the Service Brake and the Shutoff Inhibit input will prevent idle timer shutoff.
- The Shutoff Inhibit input is a trigger that, when activated, will prevent the engine from auto stopping. If connected, this input may be connected to the vehicle's Heater or A/C or other equipment.
- Once the engine has been auto-stopped, ECO501-AT monitors the battery voltage. If it falls too low, the module will sound an alarm and auto-restart the engine to recharge the battery. Once it is determined that the battery has been sufficiently recharged, the engine will shut off again.
- If a security switch has been installed and is "on", the engine will be turned off if the transmission is shifted out of Park. This can prevent theft and/or unauthorized driving.

Default requirements for auto engine shut off:

Transmission in Park (vehicle not moving)
Service Brake not applied
RPM's less than 1100
Hood Closed
Battery has sufficient charge
Engine is warm
Outside temperature above 32 F and below 100 F (not supported on 6.0 or 6.4 L diesels)
Inhibit Shutdown input (if used) must not be "on" (this switch input overrides the Engine Off Request and the Anti-Idle Timer).

Note: The module will not respond to an Engine Off Request for 5 seconds after the engine is started.

Default requirements for auto engine restart:

Engine must have been auto-stopped
Transmission in Park, and the key remained in the Run position.
Hood Closed

If those conditions are met, the engine will restart when the brake pedal is applied OR a low battery is detected.

The ECO501-AT may be removed from the vehicle by unplugging the ECO501-AT 6 pin harness (behind lower drivers dash panel) and restoring the OEM ignition switch wiring (under steering column trim cover).

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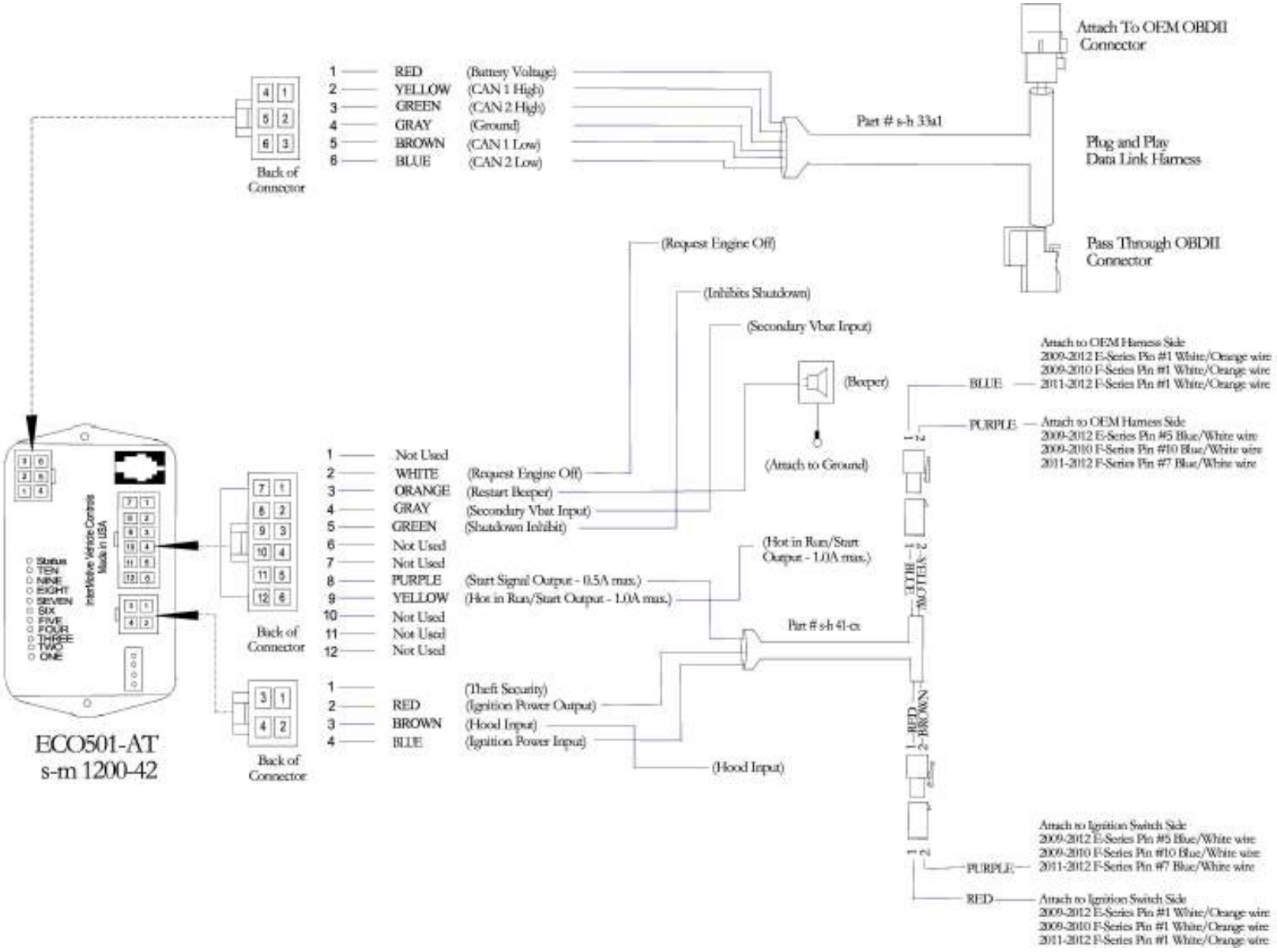

Submit product registration at www.intermotive.net

If the ECO501-AT fails any step in the Post Installation Test, review the installation instructions and check all connections. If necessary, call

InterMotive technical support @ (530) 823-1048.