Instructions

INTERMOTIVE VEHICLE CONTROLS
An ISO 9001:2015 Registered Company

Eco-Star (Work Truck Application)
ECO655 2020 - 2023 Silverado/Sierra

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System Overview

The ECO655-AW is an automatic engine stop/start system that provides enhanced fuel economy, lower vehicle emissions, and allows an operator to remotely control engine stop/start. Vehicle fuel economy is improved by automatically shutting off the vehicle's engine to prevent unnecessary idling. Restarts can be automatically triggered by low battery voltage or user restart requests. With the battery charge protect feature, auto restarts can prevent a dead battery situation. Two separate battery system inputs allow auto restarts from either battery source. Additionally, a user has the ability to request the ignition to remain off after a shutdown, thus minimizing the draw on the battery and further reducing engine idle time. A hood switch interlock input disables the system when the hood is open. Auto restarts are preceded by a warning beeper sound.

If a temperature activated auto-restart is desired, an optional thermistor may be attached to the Engine On input. Instructions for this option can be found in the Eco-Star App Notes found at www.Intermotive.net.
The following are default vehicle safety and pre-conditions for Auto Stop and Auto Start. These and other parameters may be altered to suit specific needs, using a laptop and an InterMotive communication cable. (See ECO-App Note.)

Auto Stop Defaults	Auto Restart Defaults
Battery Voltages > 11.8 V	Vehicle Hood = Closed
Trans Range = Park (Speed = 0)	Trans Range = Park (Speed = 0)
Engine On Request = Not Active	Engine Auto Stopped by ECO655-AW
Brake Pedal = Not Pressed	Ignition Key in Run Position
Vehicle Hood = Closed	

When all Auto Stop Defaults are met, the ECO655-AW will automatically stop the engine. The engine will shut off when the idle timer expires or an external discrete wire Ignition Off Request is activated. The default idle timer is set to 15 seconds.

Engine restart is initiated automatically by a low battery voltage or the application of a user restart input. There are two separate battery sources that can be configured to trigger a battery charge protect restart. By default, the restart voltage is set to 11.8 volts for the main battery with a recharge period of at least 60 seconds. The secondary battery input is turned off by default, though it is capable of monitoring up to a 36 volt input

ECO655-Add-On Options

ECO655 AW-B: Hood Switch to allow Auto Restart only when hood is closed.

ECO655 AW-T: Thermistor for temperature activated Auto Restart.

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Installation Instructions

Disconnect vehicle battery before proceeding with the installation.

WARNING
Disconnect the battery to prevent setting a check engine light.

IMPORTANT—READ BEFORE 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 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.
Avoid placing the module where it could encounter strong magnetic fields from high current cabling connected to motors, solenoids, etc. Avoid radio frequency energy from antennas or inverters next to the module. Avoid high voltage spikes in vehicle wiring by always using diode clamped relays when installing upfitter circuits.

ECO655-AW Module

Remove the lower dash panel below the steering column and find a suitable location to mount the module. 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. Ensure when routing the harnesses that the tilt steering column does not contact them in the full down position. When installing the harnesses, leave several inches of take-out so the module can be removed if necessary.

Data Link Harness Installation

1. Locate the vehicle OBDII Data Link Connector. It will be mounted below the lower left dash panel.
2. Remove the mounting screws for the OBDII connector. Plug the Red connector from the ECO655-AW Data Link Harness into the vehicle's OBDII connector. Ensure the connection is fully seated and secure with the supplied wire tie.
3. Mount the Black pass through connector from the ECO655-AW Data Link Harness in the former location of the vehicle's OBDII connector.
4. Secure the ECO655-AW Data Link harness so that it does not hang below the lower dash panel.
5. Plug the free end of the Data Link harness into the mating 6-pin connector on the ECO-601/602-AW module.

Data Link Harness plugs in here

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I/O Features (solder and heat shrink all connections)

Hood Open Disable Switch

The Hood Open Disable Switch in ***not*** an optional input. This grounding connection ***must*** be made in order for the module to operate. It is one of the most important safety features and the time must be taken to properly install a switch so that a ground contact is made only with the hood fully closed .

Pin #3 of the module's 4 pin connector is the Hood Open Disable input. A ground signal enables auto restarts when the hood is closed. 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 firewall into the engine compartment (solder and heat shrink all connections). Attach the Hood Open Disable wire to a installer supplied hood switch which grounds this signal when the hood is closed. A low current switch with gold contacts is recommended.

Engine/Ignition Off Request Input

Pin #2 (White wire) of the module's 12 Pin Connector is an Engine/Ignition Off Request input to the module which can be used as a remote engine shut down request. When this input is active (grounded), ignition switch power will remain off. This mode reduces the draw on the battery to a minimum, allowing the greatest amount of time between low battery restarts. **This switch input must provide a ground when engine off is desired.** (Solder and heat shrink all connections).

Multiple engine shutdown triggers may be used by wiring multiple switches in parallel. Note that it may not be possible to wire existing OEM switches (i.e. door switches) in parallel without affecting other systems. Install additional separate switches if necessary.

Engine On Request Input

Pin #5 (Green wire) of the module's 12 Pin Connector is the Engine Start Request input. **This switch input must provide a ground when restart is desired.** (Solder and heat shrink all connections). This input also acts as a Shutdown Inhibit. As long as it is active (grounded), the Anti-Idle shutdown timer and the Request Engine/Ignition Off inputs will not turn the vehicle off.

An optional thermistor may be attached to the Engine On input if a temperature activated auto-restart is desired. Instructions for this option can be found in the Eco-Star App Notes found at www.Intermotive.net.

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 automatically shut off if the Transmission is shifted out of Park. A hidden keyed switch could be used for added security. Crimp one of the provided Molex pins onto an installer supplied wire and insert into cavity 1 of the 4 pin Molex header. Connect the free end of wire to installer provided switch.

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Ignition Switch Connector

1. Remove the lower steering column trim cover. Locate the Ignition Switch connector and disconnect it from the switch.

2. Remove the OEM 6 pin connector from the ignition switch and connect it to the female connector of the ECO655 harness. Connect the male Idle-Lock connector to the OEM ignition switch.

3. Plug the 12-pin and 4-pin connectors into the ECO655-AW module.

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Un-Interrupted Load Control

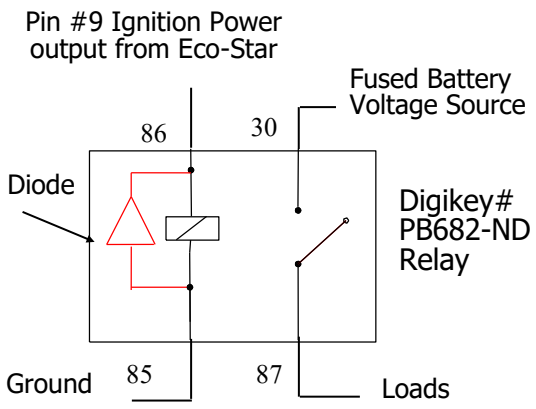
Eco-Star shuts down the vehicle's engine by simulating a "key off" condition. Any electrical loads that normally shut off when the key is turned off will be shut off as long as the Ignition Off Request is active. This may not be desirable for all loads and can be avoided by wiring an external relay to Eco-Star's Ignition Power output Pin #9 (1 Amp max, see below). This Pin #9 will provide Ignition Power with the key in the Run/ Start position or with the key off and left in the ignition switch. These loads will drain the battery faster. Use of LED lights and high capacity batteries is recommended. A spare Molex pin is provided when using this optional connection.

Equipment Enable Output

Pin #10 Pink wire of the module's 12 pin connector is the Equipment Enable output. When this output is grounded it forces the user to depend on Eco-Star stop/start capability in order to use their equipment. This load is only active when the Request Engine Off input is active. While this input is active, Eco-Star will cycle the engine based on primary/secondary battery voltages and the Request Engine On input (which now includes the optional thermostat function).

The Equipment Enable Load Output is similar to the Un-Interrupted Load Output. The difference is that this load ensures that EcoStar is cycling the engine. In the case of the Un-Interrupted Load Output there are ways to disable the stop/start capabilities of Eco-Star (disable Idle Timer or set to 30min idle time) while retaining the output.

The Pin #9 and #10 outputs are capable of driving up to 1 Amp max. The use of a diode clamped relay, such as Digikey part number PB682-ND, is strongly recommended. 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.



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 fails below a user defined level. By default, this feature is disabled at the factory, but can be enabled via a laptop connection. Contact InterMotive for details. A spare Molex pin is provided in the kit to allow the use of this input.

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Restart Beeper

Pin #3 of the module's 12 Pin Connector drives a warning beeper that will sound for 2 seconds prior to a low battery restart.

1. Find a suitable location for mounting the warning beeper so that it is audible to the driver. Some vehicle's have a vertical bracket under the center of the dash which work well as a mounting bracket.
2. Connect lead to Red post of beeper, and 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

Module Mounting

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. 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 test pad on the module labeled "TEST". When test mode activates, the status LED will start blinking; the ECO655-AW now functions without monitoring the following pre-conditions: Engine Temp, RPM, Battery Voltage, or Ambient Air Temp. This allows for easier testing for the installer.

There are several conditions that will prevent ECO655-AW from auto-shutdown in test mode: Trans Range Not in Park, Brake Pedal Applied, Hood Open (Open = Not Grounded), Vehicle Speed not 0, or Engine On/Auto-Stop Inhibit Input is grounded.

Test 1. With engine running, transmission in Park, hood closed, activate the Ignition Off Request switch input. Engine will shut off.

Test 2. Release the Ignition Off Request. Ignition power will be restored once the input is released, loads that are powered with key in Run will be restored.

Test 3. Activate the Engine Start Request. The Engine will automatically restart.

Test 4. Release the Engine Start Request and wait 15 seconds for the Idle Timer to shut the engine off. **Note:** Applying the brake pedal will prevent the timer from counting down and shutting off the engine.

Test 5. Repeat test 3 with hood open. As a safety feature, the ECO655-AW **should NOT auto restart or stop the engine when the hood is open.** If the ECO655-AW auto restarts engine with hood open, check hood switch wiring.

NOTE: Manually starting the engine with the ignition key after the ECO655-AW has shut the engine off will put the system in Override Mode. ECO655-AW will not shut off the engine for 15 seconds in Override Mode.

If the system fails ANY of the above tests, check the related wiring. If necessary, call InterMotive tech support. Do NOT release vehicle for service unless it has passed ALL of the above tests.

Want to change default settings?

To make changes to the default Eco-Star configuration, see InterMotive Application Note for the ECO655 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.

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LEAVE IN VEHICLE

Operating Instructions - Eco-Star model (Work Truck Application)

ECO655-AW (2020 - 2022 Silverado/Sierra)

System Operation

The ECO655-AW provides enhanced fuel economy and lower vehicle emissions to customers by limiting engine idle time. Vehicle fuel economy is improved by automatically shutting off the vehicle's engine to prevent unnecessary idling. Restarts can be automatically triggered by low battery voltage or user requests.

The Engine/Ignition Off trigger is a remote switch that, when activated, turns the engine off by switching off ignition power. The ignition remains off until the vehicle is auto-restarted or the Ignition Off input is removed. This feature reduces the demand on the batteries to a minimum, thereby delaying a low battery restart as long as possible.

The Engine will also be auto-stopped when the idle time exceeds the time out period. The default timeout period is 15 seconds of idling in Park. After that period elapses, the engine will be automatically turned off. The brake pedal and the Engine On/Auto-Stop Inhibit requests will reset the idle timer.

The Engine On input is a remote switch that, when activated, will auto-restart the vehicle after an auto-stop has occurred. Activating the Engine On Input while the vehicle is running will prevent any auto-stops from occurring. If the vehicle is equipped with the optional thermistor option, the vehicle may auto-restart and shut off when certain temperatures are reached.

Once the vehicle has been auto-stopped, ECO655-AW starts monitoring the main battery voltage in addition to a secondary battery input. If either fall below a minimum voltage, the module will sound an alarm for 2 seconds and auto-restart the engine to recharge the batteries. The default restart value is 11.8 Volts for the main battery with no secondary battery input. Once the main battery charges above 13.5 Volts, a recharge timer of 60 seconds begins that will turn off the engine again.

If the security feature is active, the engine will be turned off if the transmission is moved out of the Park position. This can prevent theft and/or unauthorized driving.

Default requirements for auto engine shut off

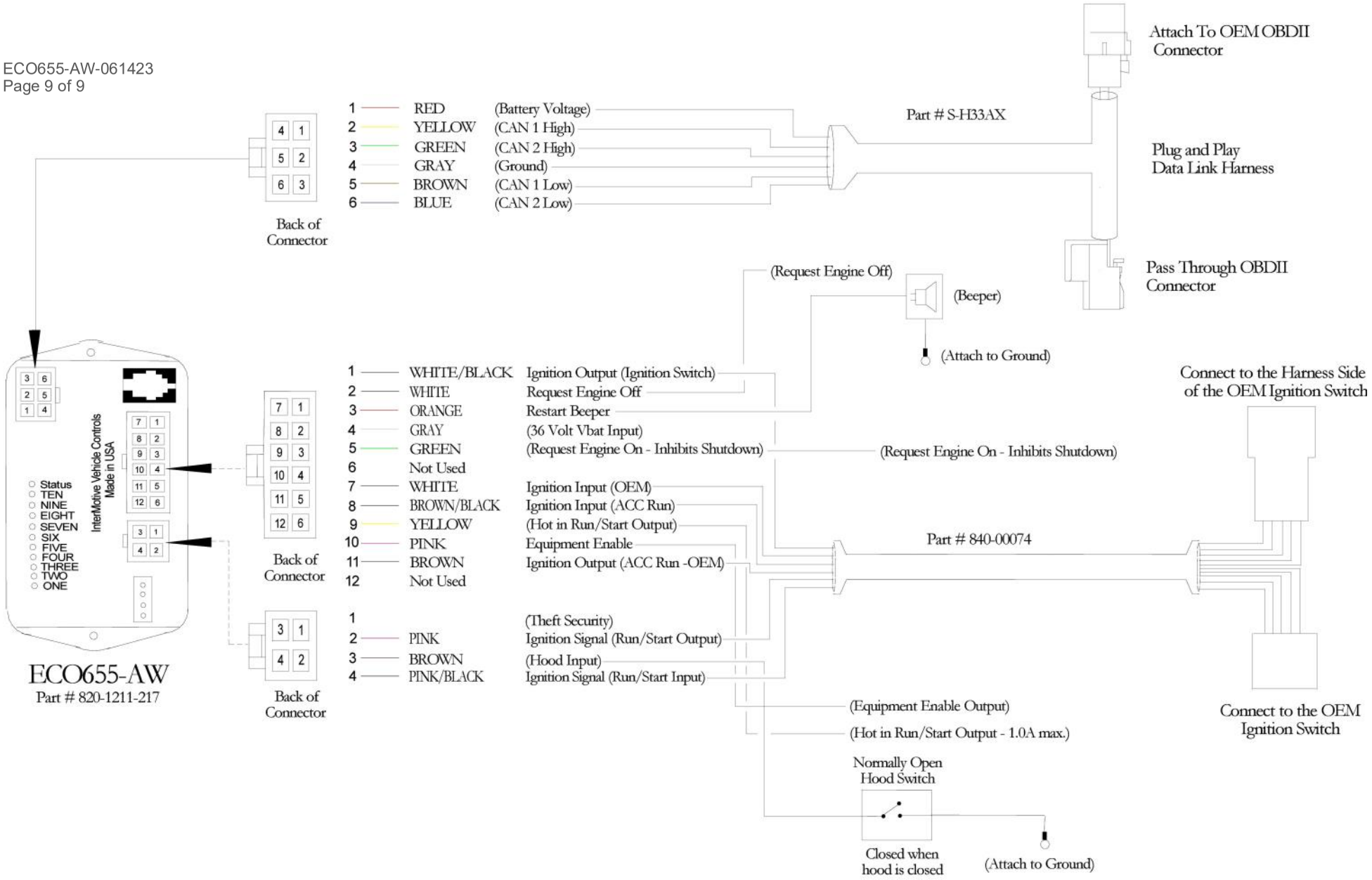
Transmission in Park (vehicle not moving), Hood Closed, Service Brake not applied, Battery voltage greater than 11.8 Volts (may differ from default setting), no thermostat trigger, and Engine Restart switch must not be "on" (this switch input overrides the Engine Off Request and Idle timer).

Note: The module will not respond to any Ignition Off Requests for 15 seconds after a manual key restart.

Default requirements for auto engine restart

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

Once above conditions are met, the engine will restart when the Engine On input is activated or a low battery is detected or the thermostat triggers a restart.



Submit product registration at www.intermotive.net

If the ECO655 fails any step in the Post Installation Check List, review the installation instructions and check all connections. If necessary, call InterMotive Technical Support at (530) 823-1048.