Instructions

INTERMOTIVE VEHICLE CONTROLS
An ISO 9001:2015 Registered Company

EVO506

H-EVO506-A-G3 2023+ Ford F250-F600 (Gas)
H-EVO506-A-G 2023+ Ford F250-F600 (Diesel)

Patent Pending
Contact InterMotive for specific engine applications.
Not for use on chassis with Push to Start ignition systems

Introduction

The H-EVO506-A product is designed for the Ford F250-F600 chassis. It will automatically start and stop the vehicle's engine (when enabled) to charge either the OEM 12V battery and/or an auxiliary battery system. It allows unattended (key out) operation for enhanced security. The product has several field programmable parameters which can be modified to user specifications.

H-EVO506-A interfaces with the vehicle through the use of "plug & play" connectors that plug directly into the factory OEM connectors. This method of installation reduces the installation time and improves connection reliability.

The module provides internal safeguards as well as functional preconditions to ensure the safe operation of the vehicle. In addition, there are diagnostic functions that allow for rapid troubleshooting.

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 and solenoids when installing upfitter circuits.

CAUTION

All electronic products are susceptible to damage from Electrostatic Discharge or ESD. Ground yourself before handling or working with the module and harnessing by first touching chassis ground, such as the barrel of the cigarette lighter.

Installation Instructions

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

Disconnect vehicle battery before proceeding with installation.

EVO506 Module

Remove the lower dash panel below the steering column and find a suitable location to mount the module. Locate the module in an area away from excessive heat sources (engine, heater ducts, etc.). Ensure when routing 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. Do not mount module until all wire harnesses are routed and secure. The last step of the installation is to mount the module.

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Shift Lock Connection

Locate connector C2008 (4-pin connector). Remove the OEM connector and plug it into the mating 4-pin connector T-harness supplied with the EVO506. Plug the remaining male connector into the OEM cavity.

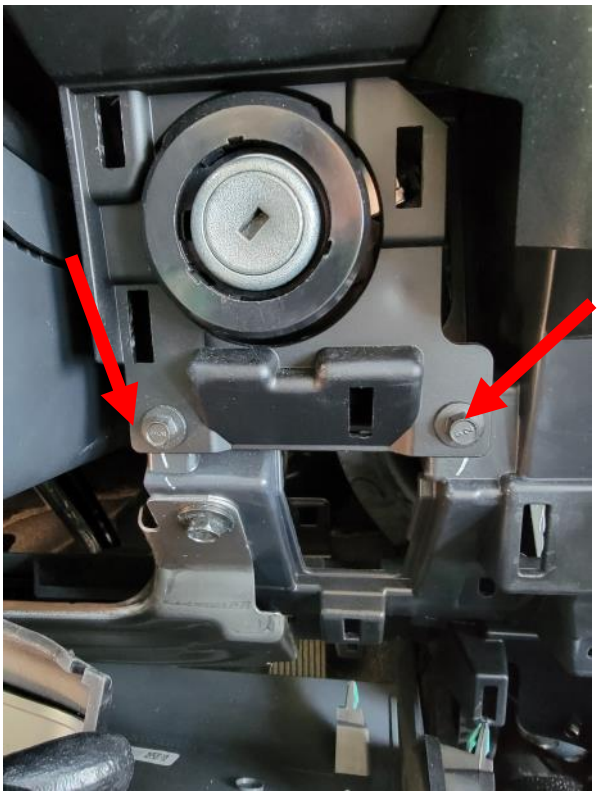
Ignition Switch Connections

1. Remove the left side trim piece using a trim removal tool. There are several clips and a “tree” plug securing it to the dash.

Instructions

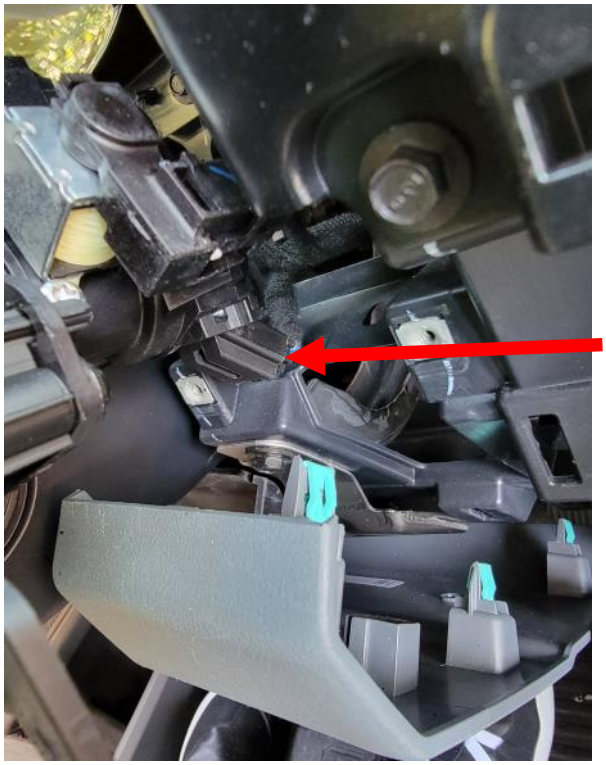
2. Remove the dash upper trim using a trim removal tool. It is attached by multiple clips. (Trim piece already removed in picture)

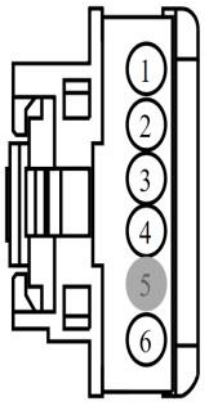
3. Remove (3) 7mm screws securing the Instrument Panel Surround to the dash.



Instructions

4. Lower the steering column and pull the Instrument Panel Surround away from the dash. There are a couple clips securing it to the dash. Connector C250 is on the bottom side of the ignition switch. Plug the mating ends of the InterMotive ignition harness into the ignition switch and OEM harness.
5. Route the harness to the mounting location of the EMS module.





C250
Front of
Connector

Data Link Harness Installation

The Ford Super Duty has an OEM Gateway module located on the other side of the SYNC 4 module, which is behind the center console. Follow the steps below to access it:

Instructions

Installation Instructions (continued)

1. Remove the RH instrument panel trim using a trim removal tool. The trim starts at the ignition switch and ends at the silver clip. The glove compartment can be opened to better access the back side of the trim.

2. Using a trim removal tool, pop out the upper right corner of the lower steering column close out panel. Position it away from the center stack.

3. Remove the 4 bolts (Size: 7mm) located at the top of the center stack.

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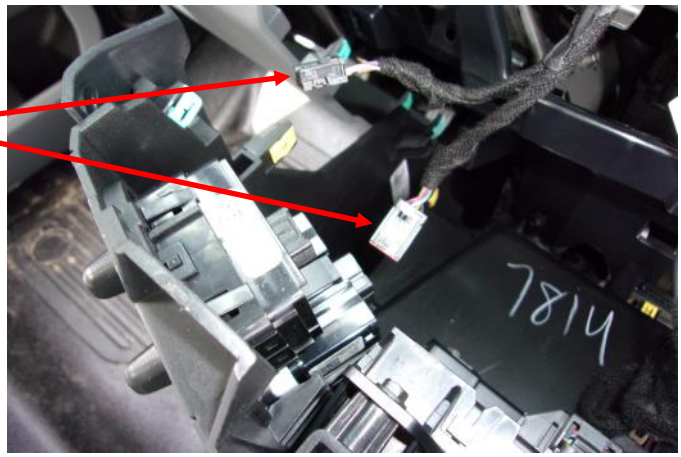
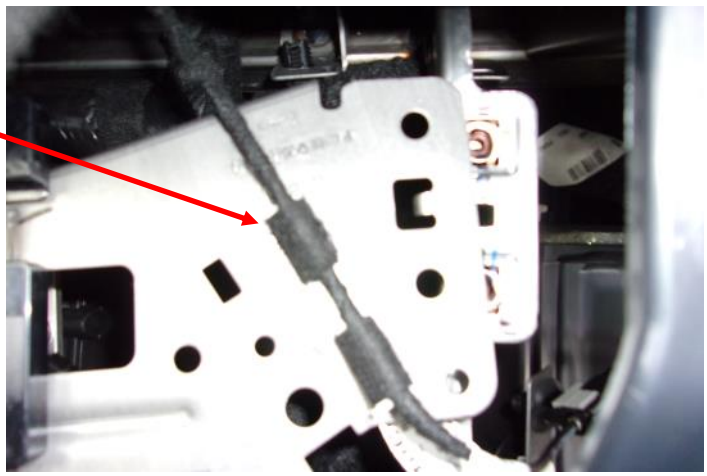
Installation Instructions (continued)

4. Release the clips on both sides of the center stack using a trim removal tool. Position the center stack away from the mounting points.

5. Disconnect the 2 connectors behind the center stack.



6. Detach the push-mount cable tie from the bracket and position the cable out of the way.

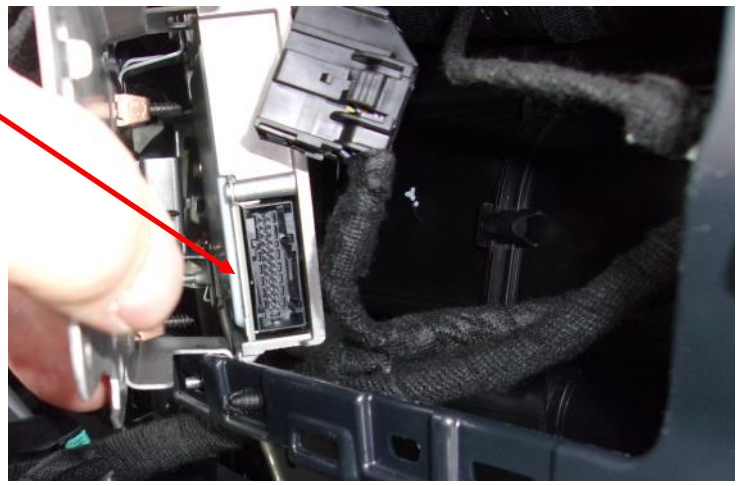


Instructions

Installation Instructions (continued)

7. Remove the 4 bolts (Size: 7mm) and position the bracket away from the mounting points to access the Gateway Module. The Gateway Module is located behind the bracket.

8. Disconnect the Gateway Connector by pressing down on the tab and pulling the connector away from the module.



9. Install the Datalink Harness between the Gateway Module and the disconnected Gateway Connector.

10. Run the 6-pin connector of the datalink harness to the mounting location of the EVO506 module.

11. After the Datalink Harness is installed, follow the installation instructions for the key fob box, key fob harness, SEIC harness and Monitor Mode LED harness. Reverse the installation procedure to reassemble.

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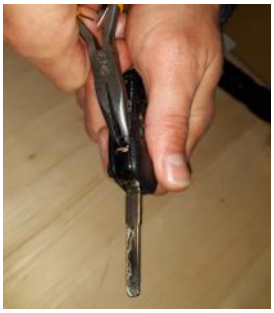
Key Fob Box

A spare key fob will need to be modified and inserted into the provided enclosure to allow the H-EVO506-A system to work with the key out of the ignition. Make sure the key fob is programmed before installing it in the box.

1. Push the silver button so that the key is flipped out.
2. Rotate the fob so that the Ford logo faces up. Stick a flathead screwdriver into the slots and use the leverage of the screwdriver to pop off the back cover as shown.

3. Remove the star screw highlighted in the picture below using a T6 Torx (star) screwdriver.

4. Gently pry apart the two halves of the fob. This is most easily accomplished by inserting a pair of needle nose pliers into the fob and slowly opening up the pliers.



5. Remove the switchblade key, the battery, and the silver loop from the back (optional).

6. Reassemble the key fob.

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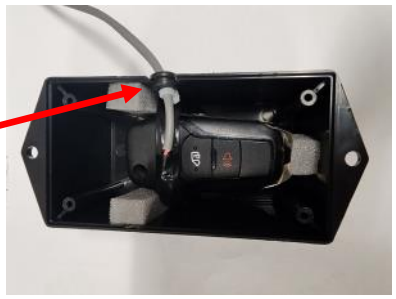
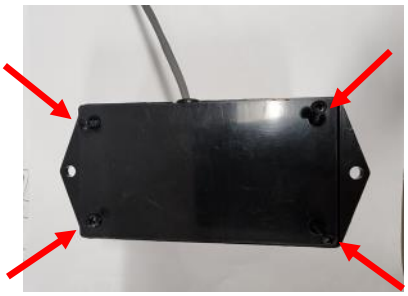
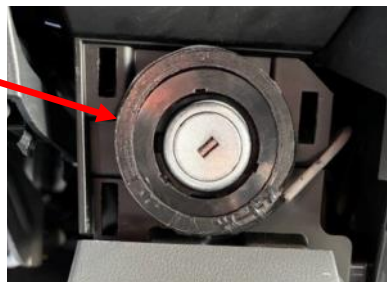
7. After the larger antenna coil is installed, route the harness to the mounting location of the key fob box. (See step 10) Remove the cover of the included key fob box. Insert the key fob into the ring on the key fob box harness as shown.



8. Insert the key fob into the bottom of the key fob box and route the harness toward the hole on the side of the box. Place the rubber grommet in the hole as shown.



9. Replace the cover onto the box and secure it with the 4 included screws. Plug the 3-pin connector into the mating connector on the key fob harness.



10. Install the larger antenna coil from the key fob box harness around the OEM Immobilizer Coil by sliding it over the ignition lock cylinder.

11. Plug the 3-Pin H-EVO506-A Molex connector from the key fob harness into J13 of the module.

12. Find a suitable location below the steering column to mount the key fob box. Be sure to leave space for the H-EVO506-A module as well.

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Stationary Elevated Idle Control (SEIC) Harness

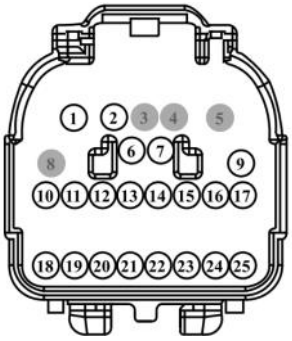
Fast Idle

The fast idle system controls engine idle RPM in response to a number of triggers in order to increase electrical and mechanical output of the vehicle. By default, gas engines idle at 1500 RPM while diesel engines idle at 1200 RPM.

Fast Idle SEIC connections

EVO506 can no longer Fast Idle the Ford Super Duty over the CAN network. Beginning in 2023, the following connections must be made:

1. Locate the Customer Access 25-pin harness located behind the passenger kick panel.
2. The mating 25-pin pigtail is included with the vehicle and will be located in the vehicle's glovebox.
3. Using solder and heat shrink, connect the following wires together:



- **Diesel:** White/Brown wire from the InterMotive SEIC harness to the White/Brown wire of the OEM 25-pin pigtail.
- **Gas:** Green/Violet wire from the InterMotive SEIC harness to the White/Brown wire of the OEM 25-pin pigtail.
- Yellow/Green wire from the InterMotive SEIC harness to the Yellow/Green wire (Pin 7) of the OEM 25-pin pigtail.
- Green wire from the InterMotive SEIC harness to the Green/White wire (Pin 5) of the OEM 25-pin pigtail.

4. Plug the Yellow/Green wire from the InterMotive SEIC Harness into the configured SEIC output of the 4-way dual row connector, J5-Pin 4.

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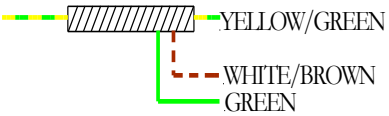

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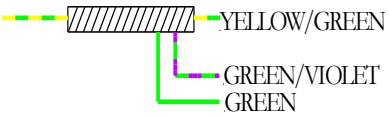

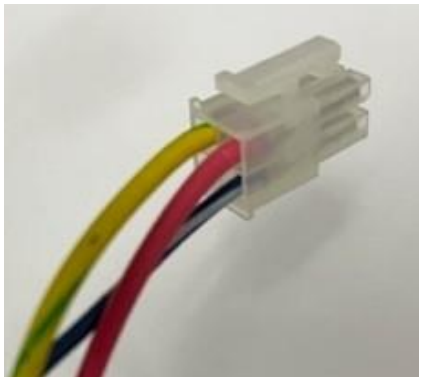

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Monitor Mode Push Button LED Installation (S-H84KX)

EVO506 Monitor Mode Switch and LED (S-H84KX)

A switch with LED is provided in the kit which illuminates when Monitor Mode is active.

1. Drill a 16mm (0.630”) hole in the desired mounting location.
2. Route the harness through the hole to mount the switch in the hole:
   A. Remove lock nut from switch
   B. Do not dis-assemble the switch to install
   C. Pull the harness through the hole
3. Slide the lock nut onto the harness and snug it down onto the back of the switch.
4. Plug in the 4 pin (Black) connector of the S-H84KX harness into the mating connector on the EVO506 main harness.

Final Steps

Verify that the following connections and installations have been made:

1. The Data Link Connector has been installed.
2. The key fob key as been removed, the fob has been inserted into the ring of the key fob box, and the key fob box has been mounted. The 3-pin Molex connector J13, has been plugged into the EVO506 module.
3. The Ignition Switch connectors have been plugged into the ignition switch and the EVO506 main harness.
4. The Shift Lock harness has been plugged into the Shift Lock connector (connector C2008).
5. The SEIC harness has been mounted and connected to the vehicle SEIC connector and plugged in to the EVO506 main harness.
6. The LED control button has been mounted and has been plugged into the EVO506 main harness.

Make the following connections from the H-EVO506 main harness to the H-EVO506 module:

Plug the 4-Pin connector into J8 of the H-EVO506 module.

Plug the 4-Pin Molex connector into J5 of the H-EVO506 module.

Plug the 8-Pin Molex connector into J4 of the H-EVO506 module.

Plug the 16-Pin Molex connector into J7 of the H-EVO506 module.

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Final Steps continued

Make the following connections from the key fob harness to the H-EVO506 module:

Plug the 3-Pin connector into J13 of the H-EVO506 module.

Make the following connections to the H-EVO506 harness:

Connect the 2-pin Molex connector from the auxiliary battery system to the connector on the H-EVO506 main harness.

NOTE: For the main harness 840-00320, The dark green wire senses an auxiliary battery system voltage. The pink wire is an output to indicate when the engine is running and the brown wire is an optional discrete hood switch input.

Reconnect vehicle battery

With the key in the RUN position, plug the free end of the H-EVO506 Data Link harness into J11 of the H-EVO506 module.

Once all connections have been made, installation is complete. Prior to re-installing panels on the vehicle, be sure to conduct all post installation checks and verify correct operation of the module.

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MODULE OPERATION

When activated, the H-EVO506 module will auto-start a vehicle under certain conditions, allowing the alternator to keep both the OEM and auxiliary batteries properly charged.

The module initiates the auto-start functions based on three possible events:

1. The OEM battery State-of-Charge (SoC) or voltage is monitored directly by the module, and if it falls below a pre-programmed set point, the module will start the engine. While engine is running, the module continues to monitor the battery SoC/voltage, and when it increases to a pre-programmed level, a timer (configurable) is started. The engine continues to run until the time interval has elapsed at which point the module will auto-stop the engine.
2. If configured to do so, the auxiliary battery voltage is monitored directly on the module, and if it falls below a pre-programmed set point, the module will start the engine. While engine is running, the module continues to monitor the battery voltage, and when it increases to a pre-programmed level, the module will auto-stop the engine.
3. If configured to do so, EVO506 can communicate with a Battery Management System and receive a 12V start trigger. When the 12V is received, the engine will start. When this 12V source is removed, the engine will auto-stop.

NOTE: The module is configured to monitor EITHER event 2 or event 3, but NOT BOTH. Both OEM and auxiliary battery sources are required to be fully charged in order to auto-stop the engine. “Fully charged” for event 2 means that the module has measured auxiliary voltage to be at or above pre-programmed level. “Fully charged” for event 3 means that the 12V trigger has been removed.

Fast Idle:

After an auto-start, the engine is commanded to run at a higher speed to facilitate an optimal charging time. The engine speed is determined by an SEIC input voltage which is set through a specific resistance value. The RPM is typically 1500 for gas engines, and 1200 RPM for diesel engines. For desired idle speeds other than 1500 and 1200, replacement of the SEIC harness resistor is required. Consult the Ford Body Builder’s Layout guide for the applicable resistor charts.

Fast Idle is an independent feature controlled by preconditions set by Ford. Consult the Body Builder’s Layout Book for further details. The following are required for Fast Idle to be enabled:

- Vehicle in PARK
- Vehicle speed is 0 MPH
- Engine coolant temp (ECT) between (-7°C to 110°C or 20°F to 230° F).
- Service brake and accelerator pedals are not pressed
- Engine is at a stable idle speed

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VIN Scroll:

Upon a hard boot, the H-EVO506 module receives VIN information from the vehicle in order to verify that the module is connected to the vehicle that it is designed for. If power is provided to the module (data-link harness is plugged in) without the key in "RUN," the module will VIN scroll (LEDs blink in ascending, then descending order) for a few seconds before going to sleep. Turning the key to the "RUN" position will allow the module to verify VIN information and operate as intended.

Monitor Mode:

For the H-EVO506 to control engine start/stop, it must first be in "Monitor Mode". If the preconditions below are met, this mode can be entered by pushing and holding the control button for a pre-programmed amount of time. Preconditions for entering Monitor Mode are the following:

- Vehicle in Park
- Service Brake released
- Parking Brake applied
- Hood Closed
- Fuel Level above configured value
- Key in the RUN position (if using the push button to enter Monitor Mode)
- Engine coolant temp (ECT) is below the "shutdown ECT" configured value

If preconditions are met and Monitor Mode is entered, the Monitor Mode button LED turns ON as a visual indication. As long as Monitor Mode is active, the LED remains ON continuously. The key can be removed from the ignition after entering Monitor Mode.

Upon entering Monitor Mode, the instrument cluster will turn on, a 30 second timer will start, and the module will monitor the OEM and auxiliary batteries. If both batteries are above their respective trip-points and the 30 second timer expires, the system will turn the dash lights off and continue to monitor the batteries with the dash lights off. Once the batteries drop below their trip-points, or the module receives a 12V start trigger, the system will turn on the dash lights and auto-start/high idle the engine as normal.

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Monitor Mode (Continued)

There is a configurable engine-run timeout that will start each time the system auto-starts. The engine will run until both the OEM and auxiliary batteries are fully charged, or until the engine timeout timer expires, whichever comes first.

A continuous LED on the Monitor Mode button indicates normal operation. If the LED is blinking, either an error has occurred or an unwanted state has been entered. Four states are defined:

- The engine failed to start after 3 tries
- The engine failed to stop after 3 tries
- The engine prematurely stopped
- The service brake is applied while in Monitor Mode

The fourth state is an anti-theft precaution. In this case, auto-start/stop is again disabled for a period of time (configurable) before automatically returning to normal Monitor Mode operation. In addition to the Monitor Mode LED blinking, each of these states will also cause a module LED to light up as a way to visually identify the state. Module LEDs 1-4 are assigned to the above states respectively. Error states can be exited by inserting the key and turning it to CRANK. For each of these cases, the auto-start/stop function is disabled until Monitor Mode is reset, by exiting and then re-entering Monitor Mode.

Exiting Monitor Mode is accomplished either by pushing and holding the Monitor Mode button, or by consecutively pressing the fob unlock button three times. If the engine is running, the H-EVO506 will first shut it OFF and then exit Monitor Mode (Monitor Mode button LED turns OFF).

Battery Force Charge:

An additional feature in Monitor Mode allows the user to start the engine and Fast Idle in order to top-off the charge on the OEM and auxiliary batteries. If the module is in Monitor Mode, the user can press the Monitor Mode button three times within a 3-second window. The engine will start and go to Fast Idle. Once the batteries are fully charged, the H-EVO506-A will shut off the engine.

Note that Fast Idle charging will also terminate if the engine run timer expires, or the fuel level drops below the configured low-fuel threshold.

Instructions

Configuration:

The operational aspects of the H-EVO506 are defined/controlled with the use of several parameters. Each has a preset value stored in non-volatile memory. Any of these values can be modified in the field with the use of an InterMotive download cable and a laptop running a terminal emulator application. This laptop/download cable combination is also used to update firmware in the field. Contact InterMotive to order a download cable if required.

The following parameters are available for modification:

- **OEM battery SoC trip point** - The engine auto starts when OEM battery falls to this level. Default value 45%.
- **OEM charge restore point** - When the voltage level is reached, module will start an extended timer. Default value is 90%.
- **OEM battery low voltage trip point** - Engine auto starts when OEM battery falls to this level. Default value 11.8V.
- **OEM charge restore point** - When the voltage level is reached, module will start an extended timer. Default value is 13.5V.
- **Extended charge time** - How long engine continues to run after OEM restore point is reached. Default value is 1200 sec. Range is between 10 and 3600 sec.
- **Fast Idle engine speed** - Applicable on vehicles that command Fast Idle on the vehicle network, the default value is 1850 RPM. Range is 950 RPM—2000 RPM.
- **Monitor Mode lockdown time** - When in Monitor Mode a temporary lockout occurs if the service brake is applied, disabling auto-start/stop; this time determines how long before the module reverts back to normal Monitor Mode with auto-start/stop functions restored. Default value is 300 sec. The range is 10 - 600 sec.
- **Push Button Latency** - The button must be held at least this long before it takes effect. Default value is 2 sec. Range is 2 sec to 10 sec.
- **Shutdown ECT** - Maximum coolant temperature beyond which the engine will shut down (if already running) and the module will exit monitor mode. Default value is 110° C (230° F).
- **Maximum ECT** - Maximum coolant temperature beyond which Fast Idle ceases to operate. Default value is 106° C (219° F). Range is 65° C to 110° C (149° F — 230° F).
- **Minimum ECT** –Coolant temperature must be at least this value before Fast Idle will operate. Default value is –10° C (14° F). Range is –10° C to 15° C (14° F — 59° F).
- **Auxiliary Battery low voltage trip point** - Engine auto starts when auxiliary battery falls to this level. Default value is 49.9V. Range is 40V to 60V.
- **Auxiliary Battery charge restore point** - When voltage level is reached, module will auto-stop the engine. Default value is 57V. Range is low limit to 60V.
- **Low Fuel Level threshold value** - If the fuel level on vehicle is below this value, system will not enter monitor mode. Default value is 25% of full tank. Range is 0-100%
- **Engine-Run Timeout Value** - Maximum allowable time engine will run on a single auto-start event. Default time is 60 minutes. Range is 50—120 minutes.

Instructions

Diagnostics

The H-EVO506 module is equipped with diagnostic features which can facilitate status and troubleshooting. Diagnostic functions use module LEDs as well as the red test button to assist the user.

There are four LEDs (F1 - F4). When lit, indicate the adjacent fuse is blown.

Five other LEDs labeled 1 - 4 and "ST" are used to display status information depending on the diagnostic page that is selected. The "ST" LED will "blink out" the current diagnostic page. For example, it will blink once if on page 1, then delay and blink once again; if on page 2, it will blink twice then delay, then twice again, etc. There are 7 pages currently defined. If the "ST" LED is OFF, the other 4 LEDs will identify a Monitor Mode error if one should occur.

Pages are sequentially selected by pushing the red test button; the next page's data is displayed after each push. One can proceed either forward (1->7) (with Park Brake applied) or reverse (7->1) (with Park Brake released).

Pages 1-6 will display status information as follows:

	PAGE1 module inputs 1-4	PAGE2 module inputs 5-7	PAGE3 LCO outputs
LED1	Control Button	Start/Stop Trig Type	LCO1, Ignition Crank
LED2	12V Trigger Start Req	Aux Battery Low Request	LCO2, unused
LED3	Hood Closed	Crank key Position	LCO3, +12V, engine running
LED4	OFF/RUN key Position	Monitor Mode LED	LCO4, optional +12V SEIC Output

	PAGE4 Relay 1-4	PAGE5 Internal Use Only	PAGE6 Internal Use Only
LED1	Relay 1, Shift Lock	—	—
LED2	Relay 2, Key ACC	—	—
LED3	Relay 3, Key RUN	—	—
LED4	Relay 4, Ignition Power	—	—

Page 7 is a special mode that modifies some operational parameters to aid in efficient testing. These changes are only temporary, and the parameter values return to normal the next time the module is powered up:

1. Extended charge time is set to 15 seconds.
2. If applicable, Engine OverRev value set to 1700 RPM.
3. Monitor Mode lockdown time is set to 10 sec (after pressing Service Brake while in Monitor Mode).

Post Installation Checks

With all connections properly made to the module, ignition switch, hood latch, and auxiliary battery system, verify that engine will start using the OEM key and that vehicle drives properly.

Monitor Mode:

Begin with vehicle stopped, in PARK, ignition on and engine off, hood closed, parking brake applied, and service brake released.

1. Push and hold the Monitor Mode button for at least 2 seconds (depending on the button latency setting). The button LED will light up indicating the vehicle is now in the Monitor Mode. The module is now monitoring the OEM battery, the auxiliary battery voltage, or 12V start input.
2. Push and hold the Monitor Mode button again and verify LED turns OFF, taking module out of Monitor Mode.
3. Apply the Parking Brake and put the vehicle in a gear other than PARK. Push and hold the Monitor Mode button again and verify module **does not** go into Monitor Mode. Release the button.

Post Installation Checks (continued)

4. Put the vehicle back into PARK, apply and hold the Service Brake, and (by pushing and holding the Monitor Mode button) again verify the module **does not** go into Monitor Mode. Release button.

5. Release the Service Brake, open the hood, and (by pushing and holding the Monitor Mode button) again verify the module **does not** go into Monitor Mode. Release button.

6. Close the hood and repeat STEP 1 with the key in the RUN position. Module should go into Monitor Mode.

7. Turn the key to the OFF position and remove.

8. Turn ON some vehicle loads such as the headlights to draw down the OEM battery. When the OEM battery eventually falls to the preset point, verify that the engine automatically starts.

9. With the engine running, verify Fast Idle is enabled after a couple seconds. The engine RPMs should increase to some point and stabilize until the module stops the engine.

10. Verify that engine runs for the appropriate amount of time and then stops automatically. NOTE: For testing purposes this run time can be reduced with a diagnostic feature as explained on Page 14.

11. Repeat steps 8 and 9 to get the engine running again. Once engine is running at Fast Idle, apply the Service Brake and verify the following:

- Fast Idle is disabled
- The engine stops
- The Monitor Mode button LED starts blinking

12. Verify button LED continues to blink for a time, then returns to a continuous ON status. **NOTE:** During the "blinking time" the auto start/stop feature is disabled.

13. With the engine OFF, draw down the auxiliary battery or cause external battery management system (BMS) to send the 12V engine start request signal.

- If the module is configured to monitor auxiliary battery voltage directly, verify the engine starts and runs at Fast Idle until the auxiliary battery voltage reaches the preset level .
- If the module is configured to receive a 12V request signal from a battery management system, verify the engine starts and runs at Fast Idle while the signal is active (+12V) and then shuts OFF when the signal goes inactive (0V)

14. Push and hold the Monitor Mode button again and verify the LED turns OFF. In this state, auto start/stop is deactivated - this can be verified by drawing down the OEM battery (see step 8) and observing the engine will not auto start.

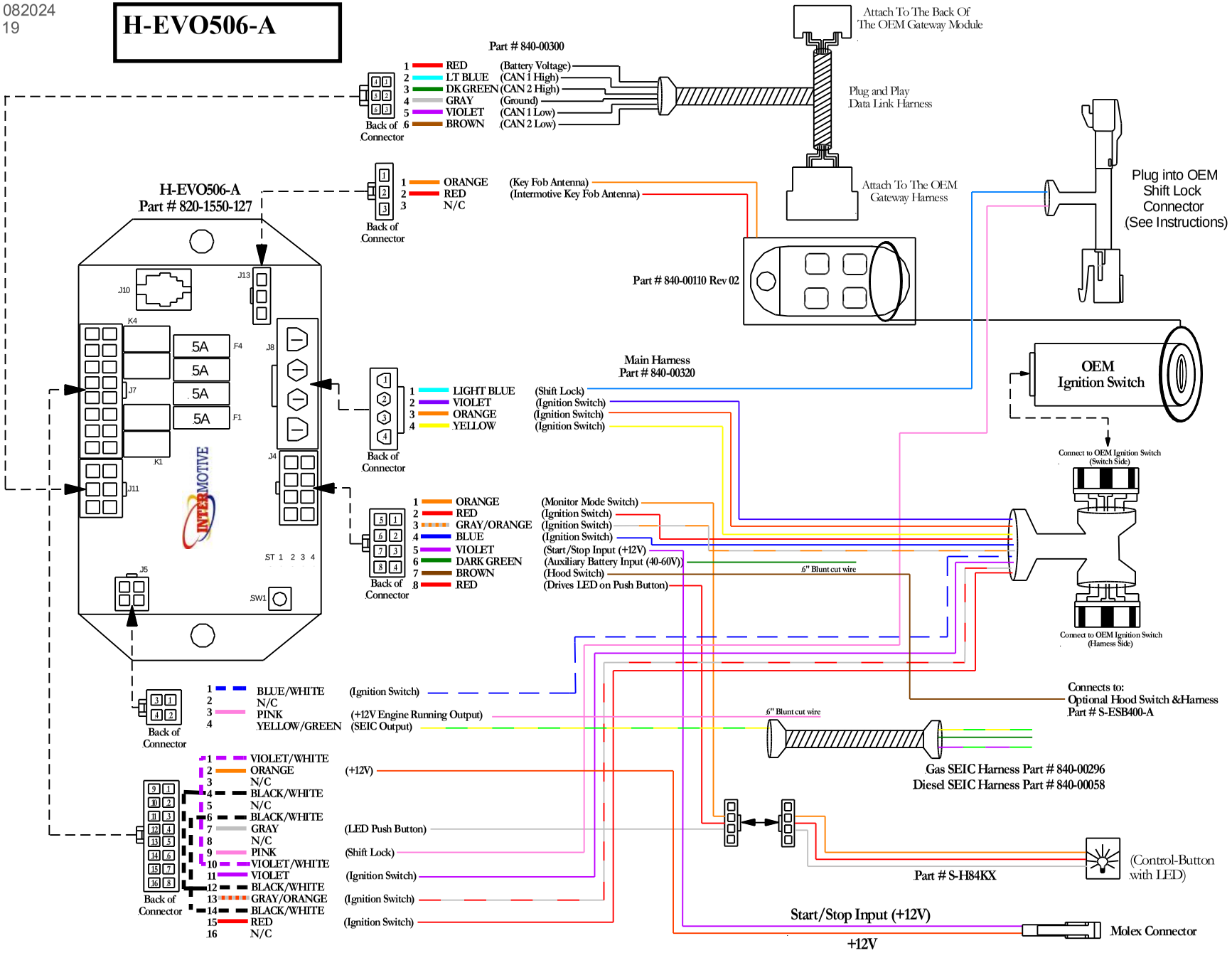
15. Verify alternate activation of Monitor Mode by pressing the fob LOCK button three times.

16. Verify alternate deactivation of Monitor Mode by pressing the fob UNLOCK button three times.

If the module fails any step in the checklist, review the installation instructions and check all connections. If necessary, call InterMotive Technical Support at (530) 823-1048.

Submit product registration at www.intermotive.net

H-EVO506-A



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If the H-EVO506 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.