INTERMOTIVE VEHICLE CONTROLS

An ISO 9001:2008 Registered Company

H-CVC501-A HVAC & Fast Idle CAN Vehicle Controller
2023 Ford F250-F600 6.7L Diesel engine Only (-G)
2023 Ford F250-F600 6.8L, 7.3L Gas engine (-G3)
H-CVC502-A HVAC Control without Fast Idle
2023 Ford F250-600 - 6.7L diesel, and 6.8L, 7.3 gas Engines
Contact InterMotive for additional vehicle applications

System Overview

The CVC501/502 are designed to activate the OEM air conditioning system based on aftermarket equipment requests (typically rear auxiliary AC systems), even when the front AC is turned off. This allows the rear AC on ambulances and transit buses to operate even if the front AC is off. The CVC501/502 monitors two "Rear AC Request" inputs: one active low (ground) and one active high (12V). When the engine is running and either of these inputs are active, the CVC501/502 will activate the OEM AC system to provide air conditioning for the rear. The OEM AC system monitors pressures and temperatures as originally designed.

Whenever the rear AC system requests AC on (wire to the CVC501/502), the CVC501/502 will engage the OEM clutch/compressor. As defaulted from the factory*, the CVC501/502 will cycle the clutch/compressor on/off based on both the front evaporator temperature and rear freeze switch (if used). This prevents freezing of the front evaporator. In climates where front evaporator freezing is not an issue, this default setting can be modified such that clutch cycling is only based on the rear system requirements. This will provide maximum cooling for the rear system.

The OEM Ford system has conditions & safety overrides which may shut the clutch/compressor off (pressure, outside air temp too cold, etc). When the rear AC is off, the front AC system works as intended from the factory.

The CVC501/502 also monitors an active high (12V) "Front AC Off Request" input. This can be used to prevent rear evaporator freeze up. If this input activates with the engine running and the front AC on, the CVC501/502 will deactivate the OEM AC compressor clutch. This input must be grounded in order for the OEM AC system to turn on. Leaving it floating or applying 12V causes the CVC to request the front AC off. If this function is not needed, it must be permanently grounded.

Fast Idle—The CVC501 also provides an engine Fast Idle capability with an external request input. Fast Idle is useful to protect the vehicle battery from becoming discharged, and is also helpful to increase the AC system's output. When the external Fast Idle input is activated and all safety conditions are met, CVC501 will increase engine idle speed to 1400 RPM. The Battery Charge Protect feature will automatically increase idle speed and maintain Fast Idle whenever the charging system voltage falls below 12.7V. After the battery voltage increases above 13.5V for one minute, or the safety conditions are no longer met, idle speed will return to normal. In all cases, the Park Brake must be set for any Fast Idle to occur. The external Fast Idle input can be wired to the Park Brake switch, which will cause the system to Fast Idle whenever Park Brake is set.

Review Ford SVE Bulletin Q-195 and ensure final system wiring complies with all of Ford's requirements.

* Firmware version 4.69 (June 2023) and later defaults the system to monitor front evaporator temperature and cycle the compressor as needed to prevent freeze up. This can be disabled with a special procedure outlined in these instructions.

Installation Instructions

Disconnect vehicle battery before proceeding with installation.

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

IMPORTANT—READ BEFORE INSTALLATION

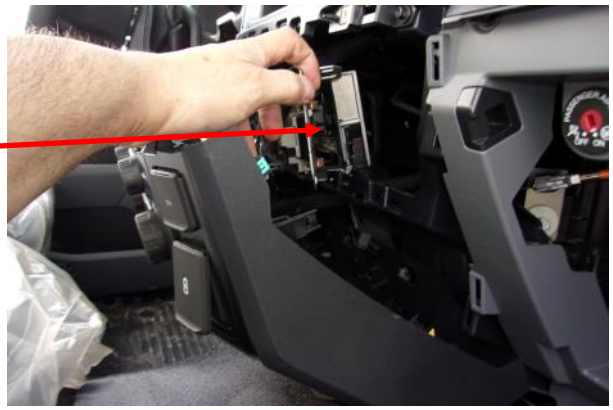
It is the installer's responsibility to route and secure all wiring harnesses where they cannot be damaged by sharp objects, mechanical moving parts and high heat sources. Failure to do so could result in damage to the system or vehicle and create possible safety concerns for the operator and passengers.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

CVC501-A Module

Remove the lower dash panel below the steering column area and find a suitable location to mount the CVC501-A module. Locate the module in an area away from any high heat sources (engine heat, heater ducts, etc.). Do not mount the module until all wire harnesses are routed and secure. The last step of the installation is to mount the module.

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:



Installation Instructions (continued)

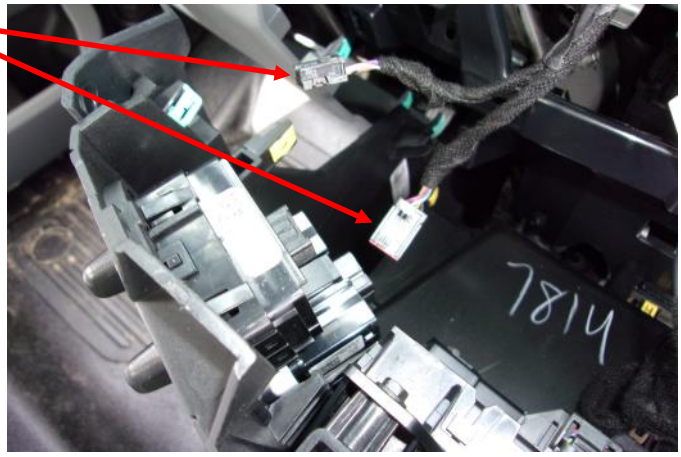
1. Remove the RH instrument panel trim using a trim removal tool. The trim starts at the ignition switch and ends at the silver clip. The glove compartment can be opened to better access the back side of the trim.

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.

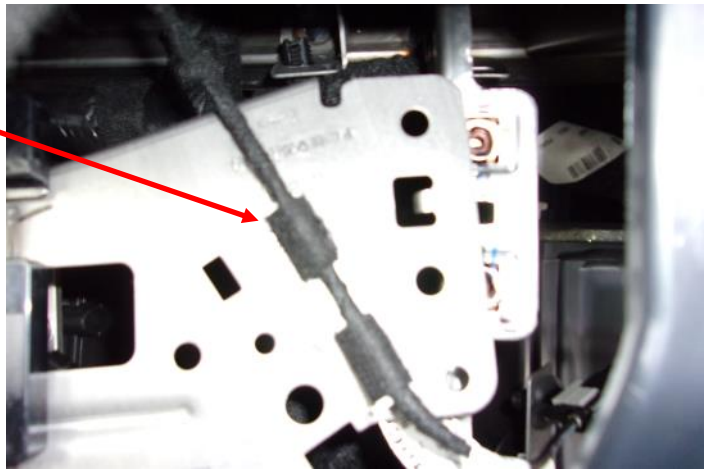
3. Remove the 4 bolts (Size: 7mm) located at the top of the center stack.

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.



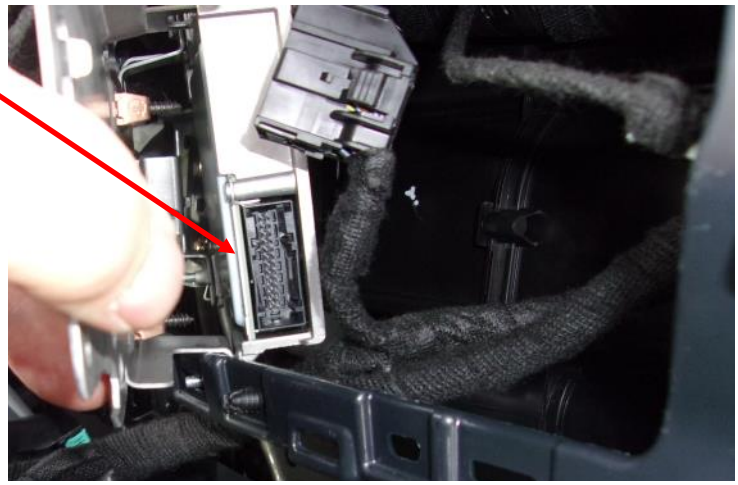
6. Detach the push-mount cable tie from the bracket and position the cable out of the way.



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 CVC module.

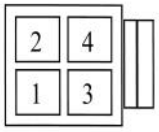
11. After the Datalink Harness is installed, reverse the installation procedure to reassemble.

Rear AC Request Input(s)

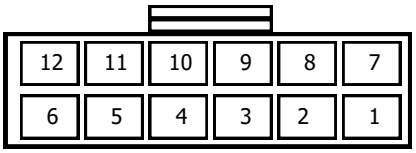
Note: The following connections must be made using solder and heat shrink or tape.

1. Determine the type of signal for the Rear AC System Request (active high-12V or active low-Ground).
2. If signal is active low: Connect the 4-pin connector pin #3 Gray wire to the Rear AC system's active low request wire.
3. If signal is active high: Attach the 12-Pin connector Pin #1 Blue wire to the Rear AC system's active high request.

Only one of these inputs will be used. The unused input can be left unconnected.



Back of connector



Back of Connector

Front AC Off Request Input

Used to prevent the rear AC evaporator from freezing

1. For applications which control this input, remove the eyelet from the 4 Pin connector Pin 1 White wire and connect to the rear AC system evaporator freeze switch. This provides a ground until the evaporator temperature approaches freezing. This input must be grounded in order for the OEM AC system to turn on. Leaving it floating or applying a +12V causes the CVC501-A to turn off the front AC clutch/compressor
2. For applications not requiring this input, the installer must permanently ground this input using the eyelet on the end of the wire.

Aux Fan output (optional)

Capable of sourcing 12V @ 1/2amp, this signal is intended to drive a relay coil to power fans on an auxiliary condenser. This signal goes active (12V) when the front clutch/compressor turns on and will shut off 30 seconds after the front clutch/compressor shuts off. It also activates when either rear request input is active. Normal clutch/compressor cycling will not shut this signal off and it does not matter which AC system (front or rear) is causing the clutch/compressor to be on. This signal stays on regardless of the "Front Off Request" signal.

Connect the 12-pin connector pin #8 Orange wire to the relay coil which controls the auxiliary condenser fan(s). Ground the other side of the relay coil.

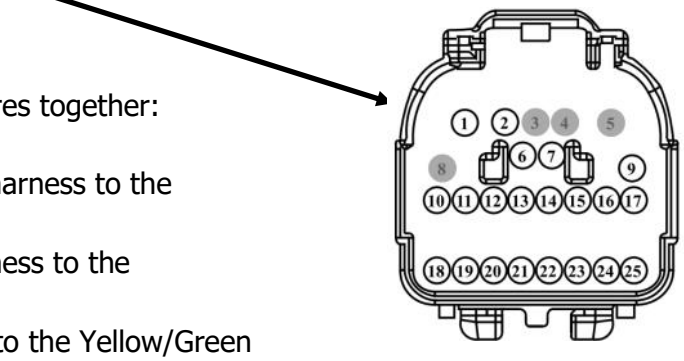
Fast Idle

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

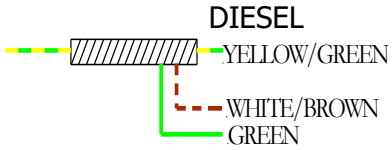
The Ford Super Duty can no longer Fast Idle over the CAN network.
Beginning in 2023, the following connections must be made:

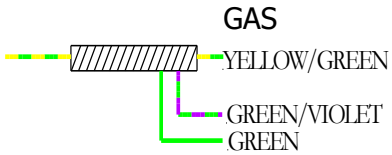
1. Locate the gray Customer Access 25-pin harness located behind the passenger kick panel. The harness is buried behind other harnesses above the BCM attached to another harness with a cable zip tie.
2. The mating 25-pin pigtail is included with the vehicle and will be located in the vehicle's glovebox.
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 into pin 10 of S-K07D1
5. Plug the 12-pin connector into the module.





Fast Idle Triggers		
Trigger Name	**Trigger Conditions**	**Disable Conditions**
Manual Engage Input	Fast Idle Engage Input wire activated	Fast Idle Engage Input wires not active
VBAT Low (if enabled)	VBAT < 12.7V (default)	VBAT > 13.5V for > 5 minutes (default)

Fast Idle Preconditions

The following preconditions must be met prior to initiating Fast Idle operation:

- Vehicle speed zero
- Transmission in Park
- Accelerator pedal not applied
- Engine Coolant temperature less than 230ºF
- Engine RPM must be greater than 200 and less than 2800
- Service Brake not applied
- Parking Brake must be applied

Fast Idle

Grounding the 12 pin connector Pin #5 Green wire will increase the engine RPM to 1500 on gas and 1200 on diesel when Park Brake is set and the other safety conditions are met.

Charge Protect is a feature that maintains battery voltage by increasing engine RPM's when necessary. This feature will initialize Fast Idle whenever the charging system voltage falls below 12.7V. The voltage must be above 13.5V for one minute before Fast Idle is shut off.

Safety conditions that must be met to engage or maintain Fast Idle operation

Parking Brake must be set
Vehicle NOT moving
Service Brake NOT pressed
Vehicle Transmission Range in Park
RPM inside of safe operating range.
Transmission Fluid Temperature below 250° F
Engine Coolant Temperature below 230° F

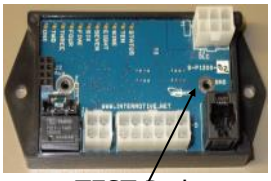
CVC501-A Module

Ensure all harness are properly connected and routed, and are not hanging below the dash area. Mount the CVC501-a module as described on page 2 and secure using screws or double sided tape.

Reconnect the vehicle battery

VIN Capture

The first time (from the factory) the module is plugged in, it will require a manual "VIN Capture". Make and hold a ground connection to the silver test pad on the module while plugging in the 6-pin connector with the key On. The module will "see" this and capture the VIN.



TEST Pad

Post Installation Check List

Start the engine

Rear AC Test

1. Set Front (OEM) AC off.
2. Confirm the OEM AC clutch engages with rear AC on.
3. Confirm the OEM AC clutch disengages with rear AC off.

Front AC Test (If Front AC Off Request Input used)

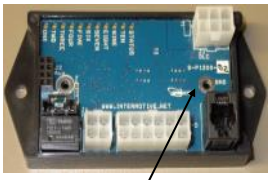
1. Turn on both Front and Rear AC systems.
2. Confirm both the Front and Rear AC systems are on.
3. Request Front AC off from the Rear AC system and confirm the OEM AC clutch turns off.

Fast Idle Function

1. Ensure Fast Idle safety conditions met (see previous page).
2. Activate the Fast Idle input & confirm Fast Idle engaged.
3. De-activate Fast Idle input & confirm Fast Idle disengages.

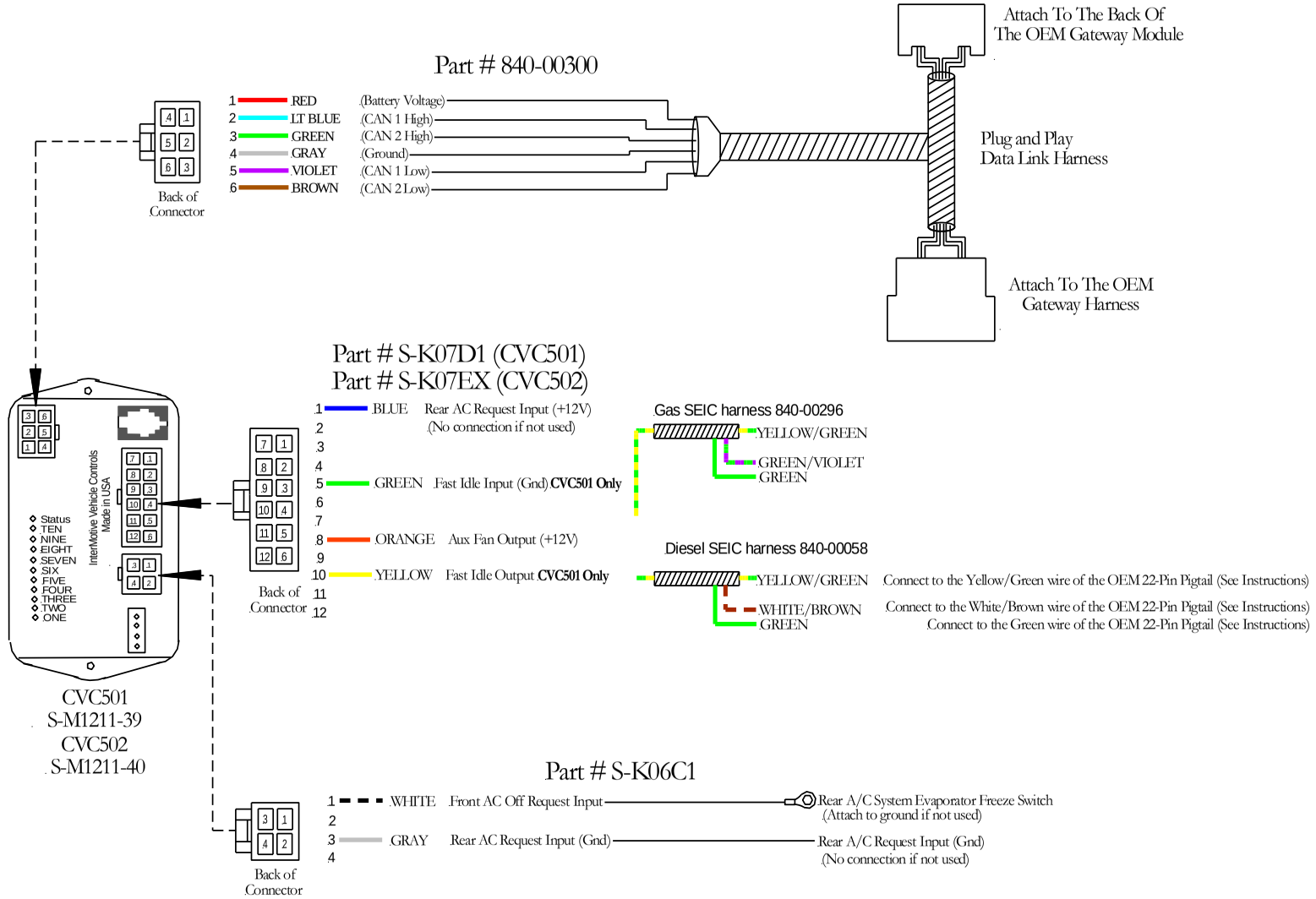
Diagnostic LEDs can be enabled by momentarily grounding the silver TEST pad. The on-board LEDs will begin flashing as described below. Exit this mode by grounding the TEST pad again.

STATUS: 2 Digit Diagnostic Code
LED10: Controlling front AC clutch
LED9: Fast Idle Engaged
LED8: Aux fan output active
LED7: Front AC Req Off input true (J6 p1)
LED6: Fast Idle Req is true (J5 p5)
LED5: N/A
LED4: Active high Rear AC Req is true (J5 p1)
LED3: Active low Rear AC Req is true (J6 p3)
LED2: Internal use
LED1: Internal use


TEST Pad

If the CVC501-A fails any step in the Post Installation review the installation instructions and check all connections.

Reinstall the lower dash panel



Submit product registration at www.intermotive.net

If the CVC501-A1 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.