



Operator's Handbook

Idle Free FLEX System

PN 701021
[REV C 7/2023]



Operator's Handbook

Idle Free Vocational Heat Kit

PN 701021 – Operator's Handbook, Idle Free FLEX
[REV C – 7/2023]

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Foreword



At Idle Free, we recognize the importance of improving safety, increasing efficiency, reducing downtime, and being environmentally responsible.

Please take a few minutes to read through this handbook and familiarize yourself with the basic principles of the Idle Free FLEX system. In addition to safety information, this handbook will equip you with the operational, management, and maintenance practices to maximize performance and product life.

This handbook also contains diagnostic information, schematics, and a list of service parts. Detailed service information for major components can be found in their respective manuals.

Keep this handbook in the truck so all operators have access to critical information at their fingertips.

Idle Free is committed to providing professional support not only to our dealership network, but to the end user as well. For questions or concerns related to the Idle Free FLEX system, contact Idle Free Technical Support at 920-206-9333 or email us at techsupport@idlefreesystems.com

Introduction

This vehicle is equipped with the Idle Free FLEX system. The system is designed to reduce unnecessary engine idling, while maintaining the safety and comfort of the operator. Certain sections and components referenced throughout this handbook may or may not apply to this vehicle's FLEX system.

The FLEX system on this truck heats the engine coolant and provides electrical power for the truck without running the truck's engine. This means you can remain comfortable and safe inside the truck for over 6 hours with the truck engine off.

Fuel Fired Coolant Heater

The fuel-fired coolant heater heats and circulates the coolant. This provides heat for both the cab interior and the engine block. The coolant heater burns a small amount of fuel in relation to the truck's engine. An electric circulating pump on the heater continuously circulates the coolant through the cab heat exchanger and then to

the engine block. In addition to providing heat to the cab interior, the driver can also keep the windows defrosted as if the truck engine were running.



Ultracapacitor Engine Start Module

The ultracapacitor engine start module (ESM) is installed in place of one of the truck's batteries and is used exclusively to crank the truck's engine. Using an ESM for starting the truck frees up the other batteries to be used in providing electrical power when the truck engine is off. The other batteries in the truck are deep-cycle batteries designed to run the electrical loads for extended periods of time. This auxiliary power can be used for running the blower fan in the cab, strobe lights, two-way radio, and other accessories.



Operator Interface

The touchscreen is an intuitive interface for controlling the FLEX system. Centralized control placed in front of the driver promotes utilization. All buttons are pre-programmed and are self-explanatory in their function. The touchscreen powers up automatically when the truck's ignition is turned "OFF," reminding the operator the system is available for use. Battery voltage is displayed providing the operator with a fuel gauge of available power. The system also includes an integrated low-voltage disconnect ensuring loads are turned off when the batteries are depleted.



Safety

Safety is the priority and duty of the operator. Adhere to all safety notices and recommendations contained in manuals and decals. The warnings contained in this section pose a threat to both personal injury and/or equipment damage. Included with the kit are two decals that are installed in the vehicle. A copy of these decals is included at the end of this section.

Fuel Fired Coolant Heater

WARNING

**EXPLOSION HAZARD**

Do not operate coolant heater in presence of explosive materials, dust, or fumes.
Do not operate coolant heater while refueling or at fueling stations.

WARNING

**FIRE HAZARD**

Do not operate coolant heater in presence of flammable materials, dust, or fumes.

WARNING



ASHPYXIATION HAZARD
Do not operate coolant heater in enclosed spaces or in presence of toxic materials, dust, or fumes. Ensure adequate ventilation.

Ultracapacitor Engine Start Module

WARNING



ARCING HAZARD
Do not short terminals.
Do not connect in reverse polarity.
Do not connect battery to “S+” terminal.
ESM and/or battery damage may result.

WARNING



BURN HAZARD
Do not connect in reverse polarity. ESM and/or battery damage will result.

WARNING



DO NOT JUMP START

Do not jump start to the “S+” circuit.

Arcing and/or battery damage may result.

Jump start only to batteries directly.

Decals



CAUTION

The batteries installed in this vehicle are used for auxiliary engine-off power. Discharging batteries below 11.0 volts or leaving batteries in a discharged state for extended periods will cause battery damage. Disconnect batteries when vehicle is out of service for extended periods. Proper battery management is the responsibility of the operator.



NOTICE

This vehicle is equipped with a fuel fired coolant heater for auxiliary engine-off heat. Turn ignition OFF, and turn heat on using touchscreen. Use the truck dash controls to adjust heat level. For maximum runtime, set blower speed to low setting and only power up required equipment.

- ① *Ensure the above decals are clearly visible to the operator.*

Turn Your System On

To use the Idle Free FLEX system, you **MUST** start by turning the truck's ignition to the "OFF" position. The touchscreen now powers up and is the central control point. From the touchscreen you will control loads and monitor power consumption. A fully charged battery will measure about 12.5 volts on the touchscreen. As you use power, the voltage will drop until you get to 11.2 volts. At 11.2 volts the batteries are depleted, and the touchscreen will turn off after 2 minutes. Recharge the batteries as soon as possible, this may take several hours of engine runtime.

Fuel Fired Coolant Heater

The coolant heater is turned on by pressing the HEAT switch on the touchscreen. The heater has three output levels consisting of low, medium, and high. It will cycle between these modes to keep the coolant between 140° F and 170° F. In the low stage, only the circulating pump is running as the coolant is already warm. Partial load is 50% heat output while full load is 100% heat output.

- ① *Refer to the included coolant heater operation manual for further safety, specification, troubleshooting, and maintenance details.*

Cab interior heat from the touchscreen and dash controls


Begin by pushing the HEAT button on the touchscreen. This starts the coolant heater and provides power to the dash heating controls. The dash heating controls are the standard truck temperature controls (blower fan speed and the temperature control knob). Always turn the knob to the hottest setting and control the temperature in the cabin by slowing the fan speed down. This method utilizes the least amount of electrical energy and extends runtime. *Note: you can also set the heating controls to defrost to keep your windows clear of ice.*

1. Shut down engine (turn ignition “OFF”).
2. Turn coolant heater “ON” at touchscreen.
3. Adjust FAN and COOL/HEAT knobs on dash to control heat level.
4. To turn off system turn ignition to “ON” position, or turn heat off on touchscreen.

- ① *To maximize runtime, minimize unnecessary electrical loads.*
- ① *To maximize runtime, turn temperature up and fan speed down to maintain a comfort zone.*
- ① *Touchscreen stays on for 30 minutes from last time it is touched and then it goes to sleep.*
- ① *The system has a maximum runtime of 10 hours and then all loads controlled through the touchscreen will automatically be shut down.*


Powering Other Essential Equipment with the touchscreen

As an operator you will need other equipment to do your job. On the touchscreen, push the switch for the two-way radio. This sends power to the radio; however, you will still have to push the power button on the radio. Turn on the necessary body strobes/beacon to provide the necessary safety lighting. While in this mode of operation, the operator MUST always be present in the vehicle. When the touchscreen turns off because of low voltage, the driver MUST start the truck and charge the batteries.

 ***Do not leave the batteries discharged. Leaving batteries discharged will damage them. Always recharge batteries after every discharge cycle.***

Ultracapacitor Engine Start Module

The ESM retains electrical power in a bank of ultracapacitors. The actual ampacity of the ESM is rather small, less than 10% of a group 31 SLI battery. Yet, it has ability to discharge at an impressive 1,800 CCA. It also applies a higher than standard voltage to the starter, nominally 15.0 volts and up to 16.2 volts below 32° F. This results in faster RPMs and shorter crank times. Once discharged, the capacitor will automatically recharge itself using the connected batteries. For a typical start of less than 3 seconds, this recharge time is under 5 minutes. For excessive cranking and full discharge, the recharge time may be up to 15 minutes. The ESM has the ability to recharge down to a 9.0-volt input. This gives the ability for deeply discharged batteries to still recharge the ESM and thus provide full cranking potential to the vehicle.

 *Even though the ESM provides the cranking energy needed, other vehicle circuits still require battery power. Over-discharged batteries will still cause no-start situations.*

The ESM contains two onboard LED status lights and a Push-to-Test button. Pressing the button will display the ESM recharge status or fault codes. A chart on the ESM next to the LED status lights decodes their meaning.

Under normal conditions, the ESM requires no operator interaction. However, certain conditions require extended crank times beyond the deliverable of the ESM, such as fuel priming. In such cases, or in the event of ESM failure, disconnect the starter positive cable from the ESM and connect it to any positive battery post for cranking via battery power. Upon remedy of the situation, revert the starter positive cable back to the ESM.

① *Please refer to the included ESM user manual for further safety, specification, troubleshooting, and maintenance details.*

Touchscreen

Press HEAT on the touchscreen to turn on the coolant heater and heat controls on truck dash. On the truck's dash use the **FAN** and **Heat/Cool** knob to manage the climate inside truck. Every system is unique depending on customer needs. Use the other buttons on the touchscreen to power those loads required for operation and safety of your truck. Typically, you will have a button for the 2-way radio and strobe lights on the body. **DO NOT USE MORE POWER THAN REQUIRED. THE MORE POWER USED, THE LONGER THE TRUCK HAS TO RUN TO RECHARGE THE BATTERIES.**

The touchscreen has an integrated low-voltage disconnect built into it. When the voltage displayed on the screen reaches 11.2 VDC for 2 minutes, the system will automatically shut down.

- ① *Touchscreen powers up when the truck's ignition switch is turned "OFF".*
- ① *Touchscreen stays on for 30 minutes from last time it is touched and then it goes to sleep.*
- ① *Touchscreen has a deep sleep mode. After 10 hours of operation, system will automatically shut down all loads controlled through touchscreen.*
- ① *Touchscreen will not initialize (turn on) until the truck is started and batteries are recharged. When batteries are recharged system will function again.*

Battery Management

Battery management is the key to success and longevity of the FLEX system. System runtime is proportional to battery performance. Deep cycle batteries are a consumable item and capacity reduction over time is to be expected. Unfortunately, many batteries have this deterioration accelerated through improper battery management.

Battery lifespan can be greatly prolonged by diligently following the practices below.

- ⚠ Do not over-discharge the batteries. The low-voltage disconnect in your system will prevent this from happening. There are loads such as running lights that by law we cannot control. It is your responsibility to turn them off when the touchscreen goes off. We recommend only using strobes controlled through the touchscreen.**
- ⚠ Do not leave the batteries discharged. Leaving batteries discharged will damage them. Always recharge batteries after every discharge cycle.**
- ⚠ Disconnect the batteries when the vehicle is out of service. Disconnecting the batteries when the vehicle is out of service prevents parasitic loads from draining the batteries and causing damage.**
- ① It may take up to 4 hours of engine runtime to completely recharge fully depleted batteries. *Don't waste energy!***

Maintenance

Fuel Fired Coolant Heater

Annually

- ☐ Inspect heater body for damage or corrosion.
- ☐ Inspect wiring harness for damage, corrosion, or loose connections.
- ☐ Inspect air intake system for damage or restrictions.
- ☐ Inspect exhaust system for damage or restrictions.
- ☐ Inspect fuel line for damage, restrictions, or leaks.
- ☐ Inspect coolant lines for damage, restrictions, or leaks.
- ☐ Inspect coolant circulation pump for damage or leaks.
- ☐ Change fuel filter if equipped.

Monthly

- ☐ Run system for 20 minutes per month.
- ① *Running the heater monthly reduces carbon buildup inside of the burn chamber. This extends the burn chamber life.*

Ultracapacitor Engine Start Module

Monthly

- ☐ Inspect ESM for loose connections or corrosion.
- ☐ Test functionality of Push-to-Test button.

Deep Cycle AGM Batteries

Quarterly

Batteries should be serviced on a quarterly basis using an “ABC” practice. ABC stands for Alternator-Battery-Connections. Poor alternators, underperforming batteries, and excessively corroded connections must be repaired or replaced.

Alternator

- ☐ Inspect alternator for signs of stress or damage.
- ☐ Test alternator to ensure proper voltage, amperage, and ripple.

Batteries

- ☐ Inspect all batteries for signs of damage including heat, cracks, leaks, or smells.
- ☐ Test each battery using a battery analyzer. Each battery in the bank should perform consistently. If battery capacity is in question, each battery should be discharge tested.

Connections

- ☐ Inspect and clean all connections points on the alternator, battery bank, and chassis ground.
- ☐ Use protective grease or spray on all connections upon reassembly.

Monthly

- ☐ Inspect battery bank for loose connections or corrosion.

Troubleshooting

The troubleshooting steps contained in this section are intended as a first approach by the operator to address common issues. For troubleshooting assistance, please contact Idle Free Technical Support. (920-206-9333)

- ▲ *If any of these symptoms become persistent occurrences, the vehicle should be scheduled for service by a qualified technician.*
- ① *Full-service information and advanced troubleshooting guides are available in the included manuals for the coolant heater and ESM.*

Fuel Fired Coolant Heater

Symptom	Possible Cause	Resolution
Coolant heater does not turn on.	Coolant heater in fault lockout	Remove heater fuse and replace after 10 seconds.
Coolant heater shuts down automatically.	Flame extinguishes	Inspect fuel tank standpipe for proper pickup.
		Inspect fuel filter for restriction.
	Overheating	Inspect coolant circuit for restrictions or valves.
	Battery voltage too low	Fully recharge vehicle batteries.
Heater expels black exhaust.	Intake or exhaust tube restriction	Inspect intake and exhaust tubes.

Ultracapacitor Engine Start Module

Symptom	Possible Cause	Resolution
Vehicle cranks slow or not at all.	Discharged ESM	Test ESM for recharge status.
	Battery voltage too low	Fully recharge vehicle batteries.
	Faulty ESM	Test ESM for fault codes.
Vehicle shuts down immediately after start.	Battery voltage too low	Fully recharge vehicle batteries.

Deep Cycle AGM Batteries

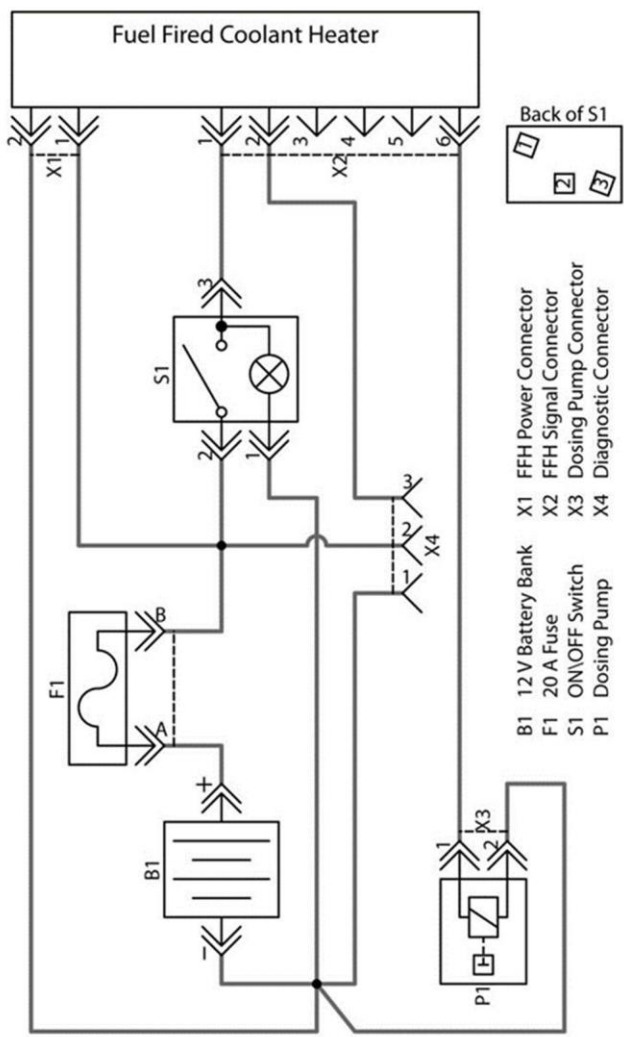
Symptom	Possible Cause	Resolution
Short engine-off auxiliary electrical power runtime.	Excessive DC loads	Disable unnecessary engine-off accessories.
	Undercharged batteries	Fully recharge vehicle batteries.
	Low-capacity batteries	Replace vehicle batteries.
Short battery lifespan.	Batteries being over discharged	Limit vehicle battery discharge to 10.5 volts.
	Batteries not being recharged after cycling	Fully recharge vehicle batteries after every discharge cycle.
	Batteries self-discharging when out of service	Disconnect vehicle batteries when out of service.

Touchscreen

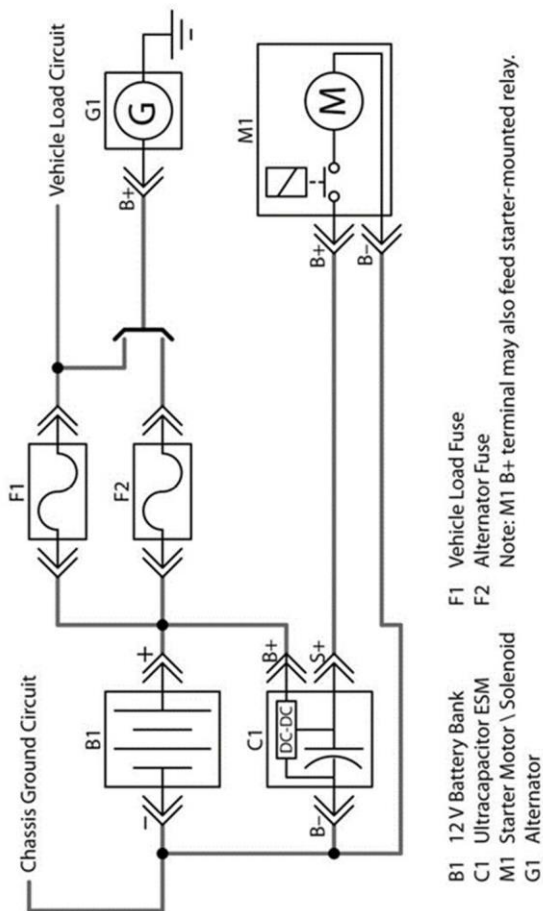
Symptom	Possible Cause	Resolution
Touchscreen does not power up	Ignition switch	Ensure ignition switch is turned to "OFF"
	Battery voltage too low	Fully recharge batteries, voltage must be > 11.9 volts
	Fuse blown	Replace fuse - in line with ignition relay and relay board under dash
Touchscreen shuts down and does not power back up	This is normal	Batteries are discharged and need to be recharged
	Other touch screen issues reference the Touch Screen User Manual	

Schematics

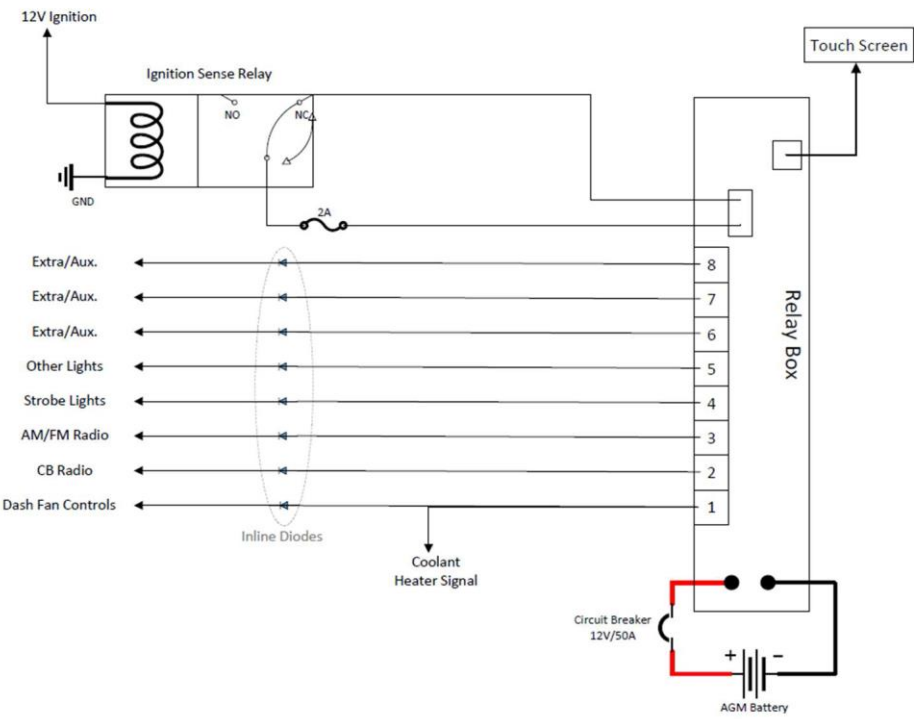
Fuel Fired Coolant Heater



Ultracapacitor Engine Start Module



Relay Module and Touchscreen



Thermo Top C Service Parts

Genuine Idle Free service parts keep the VHK operating at full potential year after year. The list below contains common replaceable items. Please contact your local Idle Free dealership for ordering information. For help locating a dealership or identifying the proper part, please contact Idle Free Technical Support.

Part	Description
42001	Fuel Fired Coolant Heater
35013	Ultracapacitor Engine Start Module
24101	Fuel Line Clamp
49002	Heater to PC Diagnostic Kit
42002	Fuel Filter
42003	Coolant Pump Kit
42004	Fuel Pump Kit
8720021	Circuit Breaker, 50A with Boot

Thermo Top Evo Service Parts

Part	Description
8720021	Circuit Breaker, 50A with Boot
8720072	Fuel Fired Coolant Heater
8720073	Glow Plug
8720074	Fuel Dosing Pump DP42.2
8720075	Fuel Filter, Inline 25-30 Microns
8720076	Circulation Pump U4847 12V
8720077	PC Diagnostic Kit
8720078	Diagnostic Adapter Cable

SPOD Control Parts (Universal)

Part	Description
8720002	Relay Board (The Source – Rectangular)
8720020	Control Cable, Touchscreen
8720022	Bracket, 90-degree, (The Source)
8720050	Touchscreen
8720051	Relay Board (BantamX – Square)
8720052	Bracket, 90-degree (BantamX)

Warranty

The FLEX system comes with a 2-year limited warranty. This warranty is backed nationwide by the Idle Free dealership network. Please contact your local Idle Free dealership to schedule warranty repairs. For help locating a dealership or identifying a warrantable failure, please contact Idle Free Technical Support.

Included with the FLEX system is a **serial number label installed next to the vehicle VIN label**. This serial number is required for all warranty claims. For full warranty details or to check on warranty status, please contact Idle Free Warranty Support at 920-206-6900 or warranty@idlefreesystems.com.



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