

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Engine does not Crank	<ol style="list-style-type: none"> 1. Low battery voltage. 2. Battery connections loose. 3. Starter relay. 4. Broken engine ground strap. 5. Starter motor faulty. 	<ol style="list-style-type: none"> 1. Check batteries. 2. Tighten connections. 3. Check for power at relay during starting sequence. 4. Replace strap. 5. Check for power at starter solenoid.
Engine Cranks but does not Start	<ol style="list-style-type: none"> 1. Clogged air filter. 2. Clogged fuel filter. 3. Run solenoid not operating. 4. Glow plug or glow plug relay. 5. Lift pump faulty. 6. Governor Assembly. 	<ol style="list-style-type: none"> 1. Check air filter. 2. Replace filter. 3. Check 12v at run solenoid. 4. Check for power at the glow plugs and relay. 5. See section 6 6. See section 5.13.
Engine Hard to Start	<ol style="list-style-type: none"> 1. Air filter clogged. 2. Fuel. 3. Glow plugs. 4. Injectors clogged. 	<ol style="list-style-type: none"> 1. Replace air filter 2. See section 6 3. Check for power at the glow plugs. 4. Replace fuel injectors.
Engine Cranks Slowly	<ol style="list-style-type: none"> 1. Weak or bad batteries 2. Damaged / corroded battery connections. 3. Faulty starter. 4. Faulty A/C Compressor. 5. Faulty generator. 	<ol style="list-style-type: none"> 1. Inspect batteries 2. Replace or clean the battery connections 3. Check starter connections. 4. Compressor seized. 5. Generator seized.
Engine Shuts Down	<ol style="list-style-type: none"> 1. Clogged air filter. 2. Clogged fuel filter. 3. Blown fuses. 4. Damaged or loose wiring. 	<ol style="list-style-type: none"> 1. Replace air filter. 2. Replace fuel filter. 3. Replace fuse. 4. Inspect condition of wiring and wiring connections.
Dark gray/black Smoke	<ol style="list-style-type: none"> 1. Engine over loading. 2. Clogged air filter. 	<ol style="list-style-type: none"> 1. Seized belt driven component. 2. Check and/or replace air filter.

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Engine Starts and Stalls	<ol style="list-style-type: none"> 1. Speed sensor. 2. Clogged fuel filter. 3. Excessive load on the motor; generator, a/c compressor. 4. Damaged or loose wiring connections. 	<ol style="list-style-type: none"> 1. Check speed sensor resistance and gap. 2. Replace fuel filter. 3. Unplug the block heater when using the a/c compressor. 4. Inspect wiring connection & connectors.
White or Blue Smoke	<ol style="list-style-type: none"> 1. Excess engine oil. 2. Coolant in combustion chamber. 	<ol style="list-style-type: none"> 2. Inspect & correct oil level. 3. Check for blown head gasket.

Engine Runs Rough	<ol style="list-style-type: none"> 1. Air filter clogged. 2. Fuel filter clogged. 3. Fuel leak. 4. Worn/contaminated fuel injectors. 5. Engine in poor condition. 	<ol style="list-style-type: none"> 1. Check air filter assembly. 2. Replace fuel filter. 3. Inspect all fuel hoses and clamps. 4. Inspect Injectors. 5. Replace/rebuild the engine.
Loss of Engine Oil	<ol style="list-style-type: none"> 1. Oil seals leaking. 2. Leaking drain plug. 3. Pinched or clogged breather tube. 4. Engine worn or in poor condition. 	<ol style="list-style-type: none"> 1. Replace crankshaft seals. 2. Replace oil pan plug gasket. 3. Repair or replace the tube.. 4. Replace and/or rebuild the engine

CHARGING SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Batteries not Charging	<ol style="list-style-type: none"> 1. Loose or broken belt. 2. Damaged or loose battery connection. 3. Poor battery condition. 4. Faulty alternator. 	<ol style="list-style-type: none"> 1. Tighten or replace belt. 2. Inspect and/or replace battery connections. 3. Test batteries. 4. Check voltage at alternator field coil wire and truck batteries.
Batteries Overcharging	<ol style="list-style-type: none"> 1. Faulty alternator. 	<ol style="list-style-type: none"> 1. Check alternator output.

FUEL SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Fuel Odor or Leak	<ol style="list-style-type: none"> 1. Loose fuel fittings. 2. Damaged fuel line. 3. Damaged fuel filter bowl. 4. Fuel lift pump leak. 	<ol style="list-style-type: none"> 1. Tighten clamps. 2. Replace fuel hose. 3. Replace fuel filter assembly. 4. Replace lift pump.
No Start Condition (fuel getting to cylinders)	<ol style="list-style-type: none"> 1. Dirty fuel. 2. Clogged fuel filter. 	<ol style="list-style-type: none"> 1. Clean fuel system. 2. Replace fuel filter. (15% bio-diesel only)
SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Air in Fuel System	<ol style="list-style-type: none"> 1. Worn or crack in fuel line. 2. Lose hose clamps. 3. Faulty fuel bowl gasket. 	<ol style="list-style-type: none"> 1. Replace fuel line. 2. Tighten clamps. 3. Replace fuel bowl gasket.

COOLING SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Engine Overheating	<ol style="list-style-type: none"> 1. Coolant level low. 2. Engine fan belts loose. 3. Radiator fins blocked. 4. Electric fan. 5. Electrical fan temperature switch. 6. Faulty engine thermostat. 7. Engine overloading. 	<ol style="list-style-type: none"> 1. Add coolant and leak test system. (see S 11.3) 2. Tighten or replace fan belt. 3. Clean radiator fins. 4. Replace electric fan. 5. See S11.2. 6. See S5.12. 7. Seized belt driven component.
Engine Overcooling	<ol style="list-style-type: none"> 1. Check coolant mixture. 2. Faulty engine thermostat. 	<ol style="list-style-type: none"> 1. Replace coolant. 2. Replace engine thermostat.
Coolant Loss	<ol style="list-style-type: none"> 1. System over-filled. 2. External hose leak. 3. Internal hose leak. 4. Blown head gasket. 	<ol style="list-style-type: none"> 1. Check coolant level. 2. Check coolant hoses from main unit to the HVAC box. 3. Check coolant hoses inside the engine compartment. 4. Replace head gasket.
Poor Circulation	<ol style="list-style-type: none"> 1. Water pump not operating properly. 2. Cooling system restricted. 	<ol style="list-style-type: none"> 1. Check water pump and belt tension. 2. Check for weak or kinked hoses.

HVAC SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Poor Air Flow	<ol style="list-style-type: none"> 1. HVAC filter clogged. 2. HVAC air intake obstructed. 3. Excessive duct hose. 4. Poor placement of vent. 5. Faulty blower motor. 6. Ducted through trucks ventilation system. 	<ol style="list-style-type: none"> 1. Clean filter. 2. Remove obstruction. 3. Reduce the hose length. 4. Relocate the vent. 5. Replace blower motor. 6. See installation manual for mounting methods.
Little or No Hot Air	<ol style="list-style-type: none"> 1. Insufficient engine load. 2. Low Electronic coolant control valve faulty. 3. Low coolant or air lock. 4. Cooling system blocked. 5. Engine overcooling. 	<ol style="list-style-type: none"> 1. Check if main engine block heater is plugged in 2. Check water valve operation. (see S9.6) 3. Bleed system of air and fill. 4. Flush cooling system 5. Faulty engine thermostat.

SYMPTOM	PROBABLE CAUSE	SYMPTOM
Little or No Cold Air	<ol style="list-style-type: none"> 1. Cabin Controller not set to A/C mode. 2. No Output power to Pin 2 on connector J1. 3. A/C system leak. 4. Condenser/radiator dirty. 5. Compressor not working. 6. Evaporator core frozen. 7. Electric fan not operating. 8. Electronic coolant control valve faulty. 	<ol style="list-style-type: none"> 1. Set Controller temperature 2. Check for 12V at A/C clutch control output. 3. Check system pressures. 4. Clean radiator/condenser. 5. Check the compressor and fuse. 6. Replace thermostatic switch. 7. Check fan relay and fuse. 8. Replace electronic coolant control valve.

SERPENTINE DRIVE BELT

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Belt has Premature Wear	<ol style="list-style-type: none"> 1. Use of incorrect belt. 2. Damage to pulleys. 3. Misalignment of pulleys. 	<ol style="list-style-type: none"> 1. Use correct belt. 2. Replace damaged pulleys. 3. Realign pulleys.
Belt is Loose and/or comes off Repeatedly during Operation	<ol style="list-style-type: none"> 1. Use of incorrect belt. 2. Damage to pulleys. 3. Maladjusted Belt. 	<ol style="list-style-type: none"> 1. Use correct belt. 2. Replace damaged pulleys. 3. Re-Tension Belt.

Fault Codes

The APU's electronic control will display fault codes on the LCD screen if the unit fails to start or shuts down. The following table contains fault codes and information on the cause and/or remedy. These fault codes will display one time only; if the code is cleared from the cabin controller, failure will have to reoccur for the code to be displayed again.

CODE	REMEDY/CAUSE	REMEDY/COMMENT
Error Code 1 Safety Cover Open	Engine cover of APU unit is open. APU will not start or run until the cover is closed	<ul style="list-style-type: none"> • Cover not seated • Damaged wiring • Failed cover switch • Switch out of adjustment
Error Code 2 Low Oil Pressure	Low oil pressure	<ul style="list-style-type: none"> • Low oil level • Wiring damaged • Faulty switch • Dirty Oil Filter
Error Code 3 Battery Low Voltage	Low battery voltage - Start system immediately	<ul style="list-style-type: none"> • Damaged or broken battery cables • Excessive load on batteries • Bad battery • Faulty charging system

CODE	REMEDY/CAUSE	REMEDY/COMMENT
Error Code 4 Engine Run Failure	Engine started but did not run properly. Manual start attempts can occur.	<ul style="list-style-type: none"> • Speed sensor adjustment • Damaged speed sensor wiring • Failed speed sensor
Error Code 5 Low Coolant/ Engine Overheated	Engine will not run until temperature becomes normal or coolant level is at full.	<ul style="list-style-type: none"> • Low coolant • High Engine Temperature • Failed Temperature or Coolant Level Switch • Damaged Wiring
Error Code 6 Module Failure	Power Module is not responding.	<ul style="list-style-type: none"> • Failed Power Module
Error Code 7 Engine Start Failure	Engine did not start. Automatic start is disabled until operator presses select button.	<ul style="list-style-type: none"> • Bad glow plug relay • Bad starter relay • Failed glow plug • Lack of fuel
Error Code 8 No Communication Error	Communication between control panel and power module is lost. Engine will not run until communication is re-established.	<ul style="list-style-type: none"> • Communication Cable Damaged • Poor Connectivity at the terminals
Error Code 9 Main Engine Running	Truck engine is running. APU will not run if the main engine is already running.	<ul style="list-style-type: none"> • Optional engine wire is connected to DC voltage supply at the power module
Error Code 10 Run Timeout	The APU has shut down as the maximum run time has been exceeded in the AutoStart Time/Day Setting	<ul style="list-style-type: none"> • Engine will only run 3 hours max when set on AutoStart Time/Day
Error Code 11 Check Power Module Fuse	Very low battery voltage detected at the power module	<ul style="list-style-type: none"> • Check 20 Amp fuse at the power module (Located under the bunk on the HVAC unit)
Error Code 12 Battery Charging Failure	Battery voltage still low two minutes after cranking. Auto and manual starts can occur	<ul style="list-style-type: none"> • Faulty charging system • Bad batteries • Engine harness ground wires disconnected at the HVAC
Error Code 13 Battery Discharge	Alarm, system will enter low power mode. Auto and manual starts can not occur	<ul style="list-style-type: none"> • Bad batteries
Error Code 14 Check External Temperature Sensor	External temperature sensor disconnected from the power module	<ul style="list-style-type: none"> • External Temperature Sensor Disconnected • Connection loose or damaged

CODE	REMEDY/CAUSE	REMEDY/COMMENT
Error Code 15 External Temp Disable Limit	Engine shut down since the external temperature is outside the programmed range. Set default to OFF from factory.	The APU has been programmed not to start when the external temperature is outside a preprogrammed range.
Error Code 16 Module Reset – Set Clock	Power to the cabin controller has been lost.	<ul style="list-style-type: none"> Reset clock
Error Code 17	Service Exhaust Filter if unit is DPF equipped, if not DPF equipped then a Power Module failure likely	<ul style="list-style-type: none"> See authorized Dealer for Exhaust filter Servicing or Power Module diagnosis/replacement
Error Code 18	Replace Exhaust Filter if unit is DPF equipped, if not DPF equipped then a Power Module failure likely	<ul style="list-style-type: none"> See authorized Dealer for Exhaust filter replacement or Power Module diagnosis/replacement
Error Code 19 Please Register Unit	Unit will run for 4 hours after installation then the registration code must be entered into the Cabin Controller Display Keypad	Call unit Manufacturer and have your APU Serial # ready and the S/N # on back of cabin controller display - push in GREY plastic tab under bottom edge to release Display from plastic bracket on the wall (pry it outwards).
Error Code 20 Water Valve Overcurrent	Electronic Coolant Control Valve drawing excess Amperage	Unplug J2 connector, attempt again to see if Code doesn't display.
Error Code 21 GP Overcurrent	Glow Plug Relay drawing excess Amperage	Glow Plug relay operation is faulty or wire broken.
Error Code 22 RUN or GP Overcurrent	Run Solenoid or Glow Plug Relay drawing excess Amperage	Unplug Run Solenoid – power with jumper wire, attempt again. If code returns, Glow Plug relay problem.
Error Code 23 Run Overcurrent	Run Solenoid is drawing excess Amperage	Unplug Run Solenoid – power with jumper wire, attempt again, measure Amps. If code returns: broken wire.
Error Code 24 Start or Run Overcurrent	Starter Relay or Run Solenoid drawing excess current.	Unplug Run Solenoid – power with jumper wire, attempt again. If code returns, Starter Relay problem
Error Code 28 Output Overcurrent	A Power Module output Circuit is experiencing a rise in Amperage while trying to activate an electronic component. Output Circuit shuts off to protect itself.	Similar to the function of a Circuit Breaker. Power off Controller for a minute and function will return. Cause: “Stuck” or “Failed” Relay, Solenoid or other component. Test each power module output circuit for Amperage draw.

Additional information for E28 Error Code trouble shooting

The E28 Error Code is similar to a Circuit Breaker Function. It protects the Power Module Power Outputs in the case of a large current draw from an electrical component that it is attempting to activate, or a shorted wire to one of those components.

The appearance of the E28 Code on the Cabin Controller display will coincide with the activation of the problem circuit but the display may not indicate which circuit it is.

Note:

Power Modules produced in late 2011 (version 1.26) may indicate the problem circuit.

E28 CODE when Turning on APU Power:

When the APU is powered ON, the only activity from the Power Module is the checking of the "Water Valve" position (on the side of the HVAC box under the bunk – hoses with hot coolant connect to it). It does this by cycling it back and forth and reading its position. If an E28 code appears during this process, it indicates a problem with one of the circuits moving the valve. The Water Valve is likely binding or seized.

To diagnose:

- Put a mark on the white plastic rotor of the valve and observe it for movement
- Unplug the Water Valve (J2 connector on Power Module) and try this sequence again.

E28 CODE when Attempting to Start Engine:

The Power Module activates the Glow Plug relay and then counts down.

Next is the activation of the "Run" or "Fuel Solenoid" (black, cylinder shaped object behind the fuel filter bowl, has a single wire and you should hear a pronounced "Click" when it activates) which allows fuel delivery.

Final action, the starter motor will engage and crank the engine, attempting to start it.

Diagnostic Notes:

The relays on the back wall of the engine bay are positioned from left to right as:

1. Glow Plugs Relay
2. Starter Relay
3. Electric Fan relay (activated by selecting Air Cond.)
4. Another Electric Fan relay (activated by selecting Air Cond.)
5. Engine Temp Fan Relay.

These Relays are identical and may be swapped during diagnosis.

- The run solenoid does not have a Relay, it is wired directly to the Power Module. You can unplug the "Run" (or "Fuel") Solenoid and put 12volts directly to it to see if it activates and the engine starts. If a jumper wire activates the solenoid it could mean that a connection may be loose between the Power Module and the Solenoid or the Run Solenoid may be failing or sticking. The problem may not be limited only to these components.