

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 problem. 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 fuel system chapter 6. See Perkins service manual
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 fuel system chapter 3. Check for power at the glow plugs. 4. Inspect/service 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. Belt driven component problem. 	<ol style="list-style-type: none"> 1. Inspect batteries 2. Replace or clean the battery connections 3. Check starter connections. 4. Compressor or other belt driven component 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 loaded. 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. Damaged or loose wiring connections. 4. Excessive load on the engine; Alternator, a/c compressor. 	<ol style="list-style-type: none"> 1. Check speed sensor resistance and gap. 2. Replace fuel filter. 3. Inspect wiring connection & connectors.
White or Blue Smoke	<ol style="list-style-type: none"> 1. Engine oil too full. 2. Coolant in combustion chamber. 	<ol style="list-style-type: none"> 1. Inspect & correct oil level. 2. Possible failed head gasket.

SYMPTOM	PROBABLE CAUSE	REMEDY/COMMENT
Engine Runs Rough	<ol style="list-style-type: none"> 1. Air filter clogged. 2. Fuel filter clogged. 3. Fuel leak. 4. Worn/clogged 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/service 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 breather 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)
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. 4. If pick-up tube was installed in tank, may draw air if fuel too low. 	<ol style="list-style-type: none"> 1. Replace fuel line. 2. Tighten clamps. 3. Replace fuel bowl gasket. 4. Add fuel to tank so pick-up tube is submerged.

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. 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. Failed 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. Check/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. 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 Controller display shows fault codes on its LCD screen if the engine shuts down or fails to start. The following table contains fault codes and information on the cause and 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 to charge batteries.	<ul style="list-style-type: none"> • Damaged or broken battery cables, failed battery • Excessive load on batteries • Faulty charging system

Error Code 4 Engine Run Failure	Engine may have started but didn't run properly. "Autostart" is disengaged; - attempt manual starting with START button.	<ul style="list-style-type: none"> • Speed sensor adjustment (set air gap at 0.015") • 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 in surge tank.	<ul style="list-style-type: none"> • Low coolant or failed Coolant Level switch • High Engine Temp or failed Engine Temperature Sensor (top of water pump, has single wire) • Damaged Wire providing ground
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. "Autostart" is disabled until operator presses select button.	<ul style="list-style-type: none"> • Bad glow plugs or relay • Bad starter relay • Failed glow plug • Possible Speed Sensor issue
Error Code 8 No Communication Error	No communication between control panel and power module. Re-establish communication.	<ul style="list-style-type: none"> • "Cat5e" Communication Cable possibly damaged (commonly available in department stores) • Poor connection at terminal, try plugging in a few times
Error Code 9 Main Engine Running	APU will not run if the Truck's main engine is already running. This feature is "optional".	<ul style="list-style-type: none"> • If a "switched 12 volt DC wire" is connected to the J4,#4 (red) wire at the power module, the APU will not run. This is "optional".
Error Code 10 Run Timeout	APU shuts down at 3 hours of running when the "AutoStart" Time/Day Setting is used.	<ul style="list-style-type: none"> • Engine will only run for 3 hours 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 and J1 connector 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, failed batteries, poor connection. • Engine harness ground wires disconnected at the HVAC
Error Code 13 Battery Discharge	Alarm, system will enter low power mode. No starting options given.	<ul style="list-style-type: none"> • Failed batteries or connection • Possible poor connection at Power Module
Error Code 14 Check External Temperature Sensor	External temp. sensor may not be connected to the power module.	<ul style="list-style-type: none"> • External Temperature Sensor disconnected or failed • Connection loose or damaged
Error Code 15 External Temp Disable Limit	Engine shut down due to external temperature outside the programmed range.	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. 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 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. Registration code must be entered into the Cabin Controller Display Keypad.	To obtain registration code, please call the APU Manufacturer with the Serial # of your unit. There is no charge for this service.
Error Code 20 Water Valve Overcurrent	Electronic Coolant Control Valve drawing excess Amperage	Unplug J2 connector, turn POWER ON again. Code should not display when J2 is unplugged.
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 25 AC or Run Overcurrent	AC Clutch or Run Solenoid drawing excess current.	Unplug Run Solenoid-power with jumper wire, attempt again. If code returns, AC clutch problem
Error Code 26 BH Overcurrent	Phantom Code – block heater is not operated by Power Module output (no output on J1 pin#7)	May indicate damage to Power Module circuit board. Unplug J1 connector for 30 seconds, may not help.
Error Code 27 Power down to clear overcurrent	Power must be turned off with the Power button then turned back on.	This message appears if engine start is attempted without turning POWER OFF. Turn power OFF then ON.
Error Code 28 Output Overcurrent	A Power Module output Circuit sees a rise in Amperage while trying to activate an electronic component. Output Circuit shuts off to protect itself.	Similar to a Circuit Breaker function; caused by a stuck or failed: relay, Solenoid or servo. Power OFF with Controller for a minute and function will return. 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. E28 would also display if an output wire is shorted.

The appearance of the E28 Code on the Cabin Controller display will coincide with the activation of the problem circuit.

Note: Power Modules from late 2011 (p/n RP50-250, version 1.26) onwards will indicate the E28 Error Code problem circuit on the LCD display screen, previous versions will not.

E28 CODE when Turning power ON:

When the APU is powered ON, the Power Module checks the position of the "Water Valve" (on the side of the HVAC box under the bunk – hoses with hot coolant connect to it). It does this by rotating the valve and reading its position. If an E28 code appears during this process, it indicates a higher current in one of the circuits moving the valve which is likely binding or seized.

To diagnose:

- Put a mark on the white plastic rotor of the valve and observe its movement.
- Unplug the Water Valve (J2 connector on Power Module) and turn power ON.

E28 CODE when Attempting to Start Engine:

1. Power Module activates the Glow Plug relay and then counts down.
2. Activation of the "Run" or "Fuel Solenoid" (cylinder shaped object near the fuel filter bowl, single wire). It produces a pronounced "Click" when it activates (which allows fuel delivery).
3. Power Module activates the starter relay to crank the engine.

Diagnostic Notes:

The relays 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 Electric Fan Relay.

These Relays are identical and may be swapped to aid diagnosis.

- The run solenoid does not have a Relay it is wired directly to the Power Module. Unplug the "Run" Solenoid (or "Fuel" solenoid) and put 12volts directly to it to activate it. 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.

*Note: The Power Module will crank the engine 3 separate times while attempting the starting sequence. If the Run solenoid is powered directly and the engine starts and runs in this state, the Power Module may still engage the starter 2 more times. The Run Solenoid should only be jumped on the last cranking attempt to avoid possible damage to the starter motor.