

# PROPANE BOXXER TROUBLESHOOTING

## SECTION I. ENGINE

### 1.0. Will not turn over

1.1. **There is a loose or corroded battery terminal.** Clean and tighten the battery terminal connections.

1.2. **The battery is dead.** Recharge or replace the battery. Test the charging system. Repair as necessary. *WARNING: Do not attempt to jump-start this machine from a running vehicle. The amperage output from an automobile will damage the charging system of the truckmount.*

1.3. **The 25 amp main power fuse in the electrical panel has blown.** Inspect the wiring thoroughly to locate shorted or damaged wires.

1.4. **The vacuum blower has seized.** Attempt to turn the engine by hand. If it will not turn, refer to Vacuum section III 5.0.

1.5. **The ignition switch is defective.** Test to see if there is 12 volts to the switch. If there is, but there is not 12 volts coming from the switch, replace the switch.

1.6. **There is a problem with the starter solenoid.** If there is 12 volts at the battery connection and at the key switch connection with the key in the start position but there is not 12 volts on the starter connection of the solenoid, replace the solenoid.

1.7. **The starter motor is defective.** Check to see if the engine can be turned over by hand. If it can and if there is 12 volts from the starter solenoid to the starter, replace the starter.

1.8. **There is a mechanical problem with the engine.** If the engine can not be turned over by hand and the vacuum blower is not locked up, refer the engine to a qualified service technician to determine the cause of the problem.

### 2.0. Turns over but will not start. *There is no spark*

*(Note: To check for spark, use the following procedure. Remove a spark plug from the engine. Attach the lead wire back onto the plug. Ground the threaded part of the spark plug to an unpainted engine surface. While holding the plug and wire assembly by the insulated wire, crank the engine over by turning the ignition switch to the "start" position. You should observe a blue spark between the two electrodes of the spark plug.)*

2.1. **The spark plugs are faulty.** Remove and inspect. Replace as necessary.

2.2. **The engine ignition system is malfunctioning.** Refer to a qualified engine service technician for inspection.

### 3.0. Turns over but will not start. There *is* spark

3.1. **Fuel is not reaching the carburetor inlet.** Check to make sure the propane tank valve is fully opened and the tank is full. Also make sure all propane quick-connectors are tight.

3.1.1. **The propane shutdown solenoid is faulty.** Check for 12 volts and a ground at the solenoid. If 12 volts and a ground are present and propane is not flowing through the solenoid while the engine is being cranked over, replace the solenoid.

3.1.2. If 12 volts is not present at the propane shutoff solenoid while the engine is being cranked over, inspect the wiring from the solenoid back to the ignition switch, including the diode. Repair or replace as necessary.

3.2. **The spark plugs are dirty or worn.** Inspect and replace as necessary.

3.3. **There is a mechanical problem with the engine.** Have engine inspected by a qualified engine service technician.

### 4.0. Starts then dies immediately

4.1. **One of the engine kill switches is activated.** Inspect the machine to determine if one of the following conditions exists:

4.1.1. Is the recovery tank full? Is the water box empty? Is the engine oil low? Has the machine overheated? If one of the above conditions is observed, correct the condition and re-start the machine.

4.1.2. **Note:** If the machine has shut down due to the high temperature switch being activated, thoroughly inspect the machine to determine the cause of the overheating. See section IV, Heating System.

4.1.3. **Note:** If the machine has shut down due to the engine low oil pressure switch being activated and the engine oil level appears to be normal, make sure the oil filter is an original equipment Kawasaki part. Some after-market oil filters, although they may fit on the engine, do not have the correct by-pass pressure internally and can cause the oil pressure to be too low.

4.2. **One of the engine kill switches is faulty.** Disconnect one of the wires from each kill switch and attempt to start the machine. If the machine starts after a wire is removed, test the switch. Replace as necessary.

**4.3. The Carbon Monoxide detector has activated the engine shutdown function.** Temporarily disconnect the orange wire from the CO detector to the engine shutdown relay. *If the engine starts and runs with this wire disconnected, this indicates that the CO detector has determined that the Carbon Monoxide level in the general area of the machine location is dangerously high. **Do not run the machine again until the area has been thoroughly ventilated and the problem has been corrected.** Refer to a qualified service technician for diagnosis and repair.*

## **5.0. Will not come up to operating speed**

**5.1. Throttle linkage is out of adjustment.** Inspect for broken or loose linkage. Repair or replace as necessary and adjust to proper RPM. Note: It is important to use an accurate tachometer to adjust engine speed to 3000 RPM while it is under a vacuum load of between 10"hg and 14"hg. Too high or too low will cause severe damage to machine components.

**5.2. The propane flow to the carburetor or regulator is impeded.** Check to see that the propane tank valve is fully open and that the screw-on quick connects for the propane lines are tight.

**5.3. There is excessive load on the engine due to the blower-to-recovery tank hose becoming delaminated.** Remove and inspect the inside of the hose. Replace as necessary.

**5.4. There is excessive back-pressure on the engine or blower exhaust.** Check for clogged blower heat exchanger.

## **6.0. Runs rough at medium or high speed**

**6.1. One or both spark plugs are defective.** Remove and inspect spark plugs. Replace as necessary.

**6.2. A spark plug wire is loose at the spark plug or has been damaged.** Inspect wire. Replace wire and coil as necessary.

**6.3. The propane regulator is out of adjustment.** Refer to qualified service technician for diagnosis and adjustment.

**6.4. Low compression on one or both cylinders.** Check compression. If low, check valve adjustment. If incorrect, adjust to proper specs. This operation should be performed by a qualified service technician.

6.4.1. If adjustment is okay, there is a possibility of burned valves, burned head gasket or worn cylinders. Refer to qualified engine service technician.

**6.5. Poor spark on one or both cylinders.** The engine ignition system is faulty. Refer to qualified engine service technician.

## **7.0. Engine overheats**

7.1. **Low engine oil level.** Check oil level and replenish as necessary.

7.2. **Engine RPM too high.** Check RPM with an accurate tachometer. Adjust as necessary to 3000 RPM.

7.3. **Restricted engine or blower exhaust.** Disassemble exhaust components to locate restriction. Repair as necessary.

7.4. **Poor ventilation in vehicle.** If the machine is being operated while inside a vehicle, all cargo area doors must be open for proper ventilation. Roof vents are strongly recommended for machines that are operated in hot climates. Any item that might restrict air flow to the machine such as other equipment or a solid divider between the cargo and passenger areas should be moved or modified to permit proper air flow.

## **SECTION II. VACUUM SYSTEM**

### **1.0. Weak vacuum at wand. Gauge reads normal (10" to 12" with hoses & wand attached)**

1.1. **Clogged vacuum hoses or wand tube.** Disconnect hoses and check carefully for an obstruction.

1.2. **Excessive length of hoses connected to machine.** Make sure machine is rated for the conditions under which it is being operated.

### **2.0. Vacuum gauge will not come up to 12" hg**

2.1. **There is an air leak somewhere in the vacuum system.** Check vacuum relief valve for proper adjustment. Carefully check all vacuum hoses for a cut or break. Check recovery tank lid gasket. Make sure recovery tank drain valve is fully closed.

2.2. **Vacuum blower is turning too slowly.** Check engine RPM. Adjust as necessary.

2.3. **The vacuum gauge is defective.** Test gauge and replace as necessary.

### **3.0. Vacuum gauge reads too high with no hoses attached**

3.1. **Filter in recovery tank is clogged.** Remove and clean or replace as necessary.

3.2. **Hose from vacuum blower to recovery tank is collapsed internally.** Inspect and replace as necessary.

## 4.0. Noisy vacuum blower

4.1. **Vacuum blower is low on oil.** Inspect oil level and replenish as necessary. Note: Running vacuum blower low on oil can cause severe mechanical damage. If this situation occurs, it should be inspected by a qualified service technician.

4.2. **Vacuum blower has internal damage.** Refer to qualified service technician.

## 5.0. Vacuum Blower is locked and will not turn

5.1. **The machine has been unused for a period on time and the blower was not properly lubricated when it was shut down, causing rust to build up on internal surfaces.** Spray penetrating oil into blower inlet and let sit for at least one hour. Then *very carefully* use pipe wrench on outer diameter of pulley on blower shaft and attempt to free up blower. *Do not use wrench directly on blower shaft.* If unable to free up blower in this manner, refer to qualified service technician.

5.2. **There is internal damage to the blower.** Refer to qualified service technician.

# SECTION III. HIGH PRESSURE SYSTEM

## 1.0. Will not come up to normal cleaning pressure

1.1. **Pressure adjusting valve is defective or dirty.** Disassemble valve. Repair or replace as necessary.

1.2. **Worn seals or valves in pump.** Test pump output volume directly from pump at normal operating RPM. If volume is below manufacturers specifications, replace seals and inspect for defective valves.

1.3. **Pump RPM is too low.** Check engine RPM and adjust as necessary to 3000 RPM. Check for loose pump belt. Adjust tension as necessary.

1.4. **High temperature dump solenoid is activated.** Refer to Heating System, section IV.

1.5. **Primary system control orifice is missing or loose.** Remove filter and inspect orifice. Tighten or replace as necessary.

1.6. **Primary system control orifice has been exchanged with secondary (hot water dump) orifice.** Inspect and reverse as necessary.

1.7. **Primary orifice is worn.** Measure orifice size and replace as necessary.

## 2.0. No pressure reading on PSI gauge

2.1. **No water in water box.** Refer to section 5.0.

2.2. **Pump belt is broken.** Replace belt.

### **3.0. PSI gauge reads normal; low pressure from wand**

3.1. **There is a restriction in the cleaning tool.** Inspect tool jet and clean or replace as necessary. Inspect any filters in the cleaning tool and clean or replace as necessary.

3.2. **There is a defective quick connect in the system.** Inspect each quick connect and replace as necessary.

3.3. **There is a restriction in one of the solution hoses.** Remove quick connects and inspect hoses. Clean or replace as necessary.

3.4. **There are hard water deposits restricting the system between the afterburner heat exchanger and the high-pressure solution connection at the front of the machine.** Descale the machine. If this doesn't solve the problem, disassemble this portion of the system and locate restriction.

### **4.0. Pressure pulsation**

4.1. **Water in the water-box is too hot and is approaching boiling point.** Check temperature of water in the water-box. If it is too high, refer to Heating System, section IV, 1.0.

4.2. **There is an air leak between the water box outlet and the pump inlet.** Physically check all hoses and fittings for cuts, breaks, cracks or tightness. Repair as necessary.

4.3. **One of the intake or outlet valves in the high pressure pump is defective or is being held open by debris.** Remove each valve and inspect for correct operation.

### **5.0. Water box empty or fills slowly**

5.1. **There is a restriction in the water supply system.** Inspect the supply system from the source through the incoming quick connects for kinks, clogs or restricted filters. Clean or repair as necessary.

5.2. **The float valve in the water box is defective.** If there is adequate water flow to the incoming valve in the water box, disassemble and inspect the valve. Repair or replace as necessary.

### **6.0. Water box overflows**

6.1. **There is either debris caught in the valve or the valve seal is bad.** Disassemble valve and repair or replace as necessary.

6.2. **The float has absorbed water and has lost buoyancy.** Detach float and check to see if it will float to the surface. Replace as necessary.

6.3. **The float has come out of adjustment.** Readjust float as necessary.

## **SECTION IV. HEATING SYSTEM**

### **1.0. Machine overheats and shuts down**

1.1. **One or both orifices or filter screens are restricted.** Remove and inspect. Clean as necessary. Note: Make sure orifices are not interchanged.

1.2. **High-pressure dump solenoid is restricted.** Inspect solenoid and the hose that delivers water to it. Clean or replace as necessary.

1.3. **High-pressure dump solenoid is not functioning.** Check fuse that provides power to the temperature controller.

1.3.1. If a fuse is blown, inspect electrical system for worn or damaged wires. Repair or replace as necessary.

1.3.2. If switch and relay are good, refer to qualified service technician to test temperature controller and RTD sensor.

1.4. **Engine RPM is too high.** Check RPM with accurate tachometer and adjust as necessary to 3000 RPM.

### **2.0. Unable to achieve normal cleaning solution temperature**

2.1. **Engine RPM is too low.** Check RPM with accurate tachometer and adjust as necessary to 3000 RPM.

2.2. **Cleaning solution flow is too great.** Measure flow at cleaning tool. If flow is too high;

2.2.1. Cleaning tool jet is too large or worn out. Inspect jet. Replace as necessary.

2.2.2. Cleaning solution pressure is too high. Adjust pressure to normal. Inspect pressure gauge for accurate reading.

2.3. **Heat exchangers have hard water scale build up internally.** Descale system.

## **SECTION V. CHEMICAL SYSTEM**

### **1.0. System will not prime**

1.1. **Check valves in chemical pump are faulty.** Remove valves and inspect. Clean or replace as necessary.

1.2. **Chemical pump diaphragm is faulty.** Remove and inspect. Replace as necessary.

1.3. **Check valve in high pressure pump (the one that the chemical pump attaches to) is faulty.** Remove valve and inspect. Clean or replace as necessary.

1.4. **Filter on feed line in chemical jug is clogged.** Inspect and clean.

1.5. **Feed line from chemical jug is loose, pinched or cut.** Inspect and repair.

1.6. **Three-way prime valve is faulty.** Inspect valve for leaks between ports. Replace as necessary. *Note: if the chemical system has been run dry, it is frequently necessary to insert the prime hose from the chemical jug into the vacuum inlet for a "boost" to purge all of the air from the system. Machines produced after April, 2001 will have the prime hose connected directly to the vacuum system.*

## **2.0. Chemical flow is unstable or low**

2.1. **Air in lines.** Check that all fittings and connections in the chemical system are tight and in good condition. Repair or replace as necessary.

2.2. **Filter screen in chemical jug is partially clogged.** Inspect and clean.

2.3. **Three-way chemical valve is faulty.** Inspect valve for leaks between ports. Replace as necessary.

2.4. **Chemical metering valve is faulty or partially obstructed.** Inspect valve and clean or replace as necessary.

2.5. **High-pressure check valve is faulty.** Remove and inspect. Clean or replace as necessary.

## **3.0. Solution jug fills with water**

3.1. **Three-way chemical valve is defective.** inspect valve for leaks between ports. Replace as necessary

3.2. **Inlet check valve in chemical pump is faulty.** Remove and inspect valve. Clean or replace as necessary.

## **4.0. Chemical in water box**

4.1. **Chemical pump diaphragm is faulty.** Remove and inspect. Replace as necessary.

4.2. **High-pressure check valve is faulty.** Remove and inspect. Clean or replace as necessary.



## SECTION VI. MISCELLANEOUS

### 1.0. Water from exhaust

1.1. **The recovery tank has been filled with foam or overfilled with water.** Remove recovery tank lid and inspect. If full, drain tank then inspect high-level shutoff switch for proper operation. Clean or replace switch as necessary.

1.1.1. If foam is observed in recovery tank, use defoamer on carpet being cleaned.

1.2. **Condensation.** This will be more pronounced in cool weather and humid climates. Observe how long this condition persists after starting machine. If it is only until the machine warms up, it is normal.

1.3. **A heat exchanger is leaking.** Test heat exchanger for leaks. Repair or replace as necessary.

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