

LineLazer™ ES 1000 / ES 2000

Airless Line Striper

3A4603J
EN

For the application of line striping materials.
For professional use only.
Not approved for use in explosive atmospheres or hazardous locations.

Maximum Operating Pressure: 3300 psi (22.8 MPa, 228 bar)



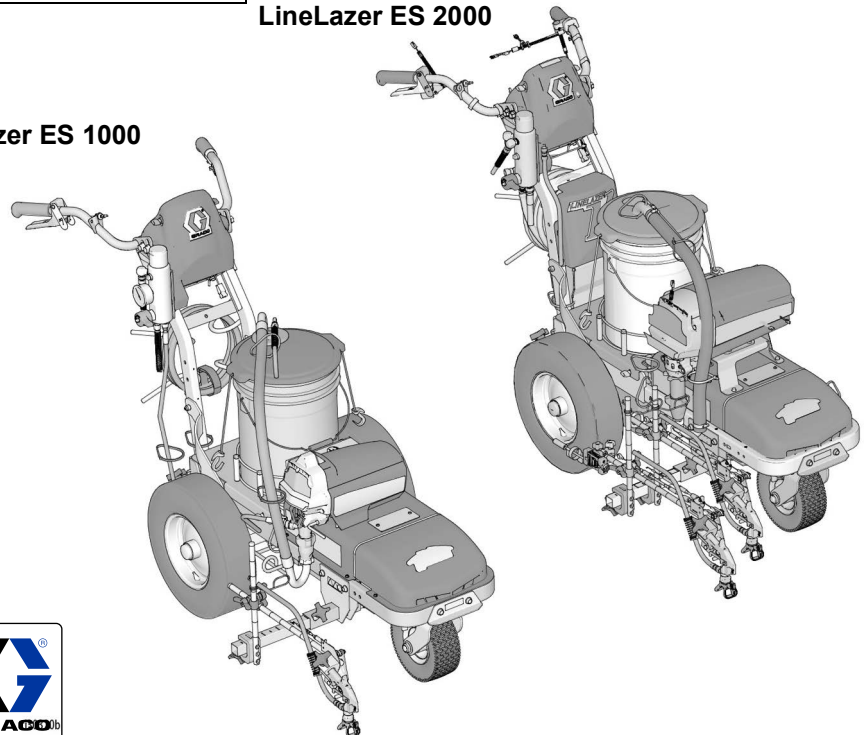
Important Safety Instructions

Read all warnings and instructions in this manual and in related manuals before using the equipment. Be familiar with the controls and the proper usage of the equipment. Save these instructions.

Related Manuals:			
ES 1000		ES 2000	
311254	Gun	311254	Gun
334599	Pump	310643	Pump
		3A3428	Auto-Layout Application Methods

LineLazer ES 2000

LineLazer ES 1000



Use only genuine Graco replacement parts.
The use of non-Graco replacement parts may void warranty.

Maintenance

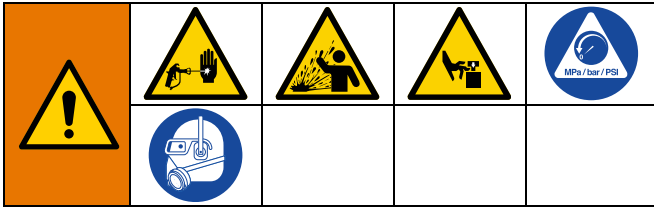
Routine maintenance is important to ensure proper operation of your sprayer. Maintenance includes performing routine actions which keep your sprayer in operation and prevents trouble in the future.



Activity	Interval
Inspect/clean sprayer filter, fluid inlet strainer, and gun filter.	Daily or each time you spray
Inspect motor shield vents for blockage.	Daily or each time you spray
Fill TSL by adding through TSL fill point.	Daily or each time you spray
Check hose for wear and damage.	Daily or each time you spray
Check gun safety for proper operation.	Daily or each time you spray
Check drain valve for proper operation.	Daily or each time you spray
Verify calibration.	Daily or each time you spray
Tighten nut under dust cover on front caster until spring washer bottoms out, then back off the nut 1/2 to 3/4 turn.	Once per year or as needed
Grease wheel bearings.	Once per month
Check caster wheel alignment.	Daily or each time you spray
Check sprayer stall. With sprayer gun NOT triggered, sprayer motor should stall and not restart until gun is triggered again. If sprayer starts again with gun NOT triggered, inspect pump for internal/external leaks and check prime valve for leaks.	Every 1000 gallons (3785 liters)
Throat packing adjustment When pump packing begins to leak after extended use, tighten packing nut down until leakage stops or lessens. This allows approximately 100 gallons of additional operation before a repacking is required. Packing nut can be tightened without O-ring removal.	As necessary based on usage

Troubleshooting (ES 1000 & ES 2000)

Mechanical/Fluid Flow



1. Follow **Pressure Relief Procedure**, page 16, before checking or repairing.
2. Check all possible problems and causes before disassembling the unit.

Problem	What to Check If check is OK, go to next check	What to Do When check is not OK, refer to this column
Control board status light is blinking or the light is off and there is power to the sprayer.	Fault condition exists.	Determine fault correction from page 56. Follow Pressure Relief Procedure , page 16.
Pump output is low	Spray tip worn.	Follow Pressure Relief Procedure , page 16, then replace tip. See separate gun or tip manual.
	Spray tip clogged.	Follow Pressure Relief Procedure , page 16. Check and clean spray tip.
	Paint supply.	Refill and reprime pump.
	Intake strainer clogged.	Remove and clean, then reinstall.
	Intake valve ball and piston ball are not seating properly.	Remove intake valve and clean. Check balls and seats for nicks; replace if necessary. See pump manual. Strain paint before using to remove particles that could clog pump.
	Fluid filter or tip filter is clogged or dirty.	Clean filter.
	Prime valve leaking.	Follow Pressure Relief Procedure , page 16, then repair prime valve.
	Verify pump does not continue to stroke when gun trigger is released. (Prime valve not leaking.)	Service pump. See pump manual.
	Leaking around throat packing nut which may indicate worn or damaged packings.	Replace packings. See pump manual. Also check piston valve seat for hardened paint or nicks and replace if necessary. Tighten packing nut/wet-cup.
	Pump rod damage.	Repair pump. See pump manual.
	Low stall pressure.	Turn pressure knob fully clockwise. Make sure pressure control knob is properly installed to allow full clockwise position. If problem persists, replace pressure transducer.
	Piston packings are worn or damaged.	Replace packings. See pump manual.
	O-ring in pump is worn or damaged.	Replace o-ring. See pump manual.
Intake valve ball is packed with material.	Clean intake valve. See pump manual.	
Large pressure drop in hose with heavy materials.	Reduce overall length of hose.	
Check extension cord for correct size.	See Extension Cords , page 14.	

Problem	What to Check If check is OK, go to next check	What to Do When check is not OK, refer to this column
Motor runs but pump does not stroke	Connecting rod assembly damaged.	Replace connecting rod assembly. See pump manual.
	Gears or drive housing damaged.	Inspect drive housing assembly and gears for damage and replace if necessary.
Excessive paint leakage into throat packing nut	Throat packing nut is loose.	Remove throat packing nut spacer. Tighten throat packing nut just enough to stop leakage.
	Throat packings are worn or damaged.	Replace packings. See pump manual.
	Displacement rod is worn or damaged.	Replace rod. See pump manual.
Fluid is spitting from gun	Air in pump or hose.	Check and tighten all fluid connections. Cycle pump as slowly as possible during priming.
	Spray tip is partially clogged.	Clear tip.
	Fluid supply is low or empty.	Refill fluid supply. Prime pump. See pump manual. Check fluid supply often to prevent running pump dry.
Pump is difficult to prime	Air in pump or hose.	Check and tighten all fluid connections. Cycle pump as slowly as possible during priming.
	Intake valve is leaking.	Clean intake valve. Be sure ball seat is not nicked or worn and that ball seats well. Reassemble valve.
	Pump packings are worn.	Replace pump packings. See pump manual.
	Paint is too thick.	Thin the paint according to supplier recommendations.
Sprayer operates for 5 to 10 minutes then stops	Pump packing nut too tight. When pump packing nut is too tight the packings on the pump rod restrict pump action and overloads the motor.	Loosen pump packing nut. Check for leaks around throat. If necessary, replace pump packings. See Pump manual.

Electrical (ES 1000)

Symptom: Sprayer does not run, stops running, or will not shut off.



<p>Keep clear of electrical and moving parts during troubleshooting procedures. To avoid electrical shock hazards when covers are removed for troubleshooting, wait five minutes after disconnecting power cord for stored electricity to dissipate.</p>				

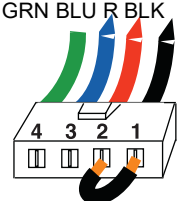
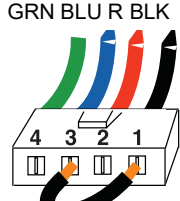

1. Perform **Pressure Relief Procedure**, page 16.
2. Turn the ON/OFF switch **OFF** wait 30 seconds and then turn power back **ON** again (this ensures sprayer is in normal run mode).
3. Turn pressure control knob clockwise 1/2 turn.
4. Remove control box cover to view control board status light. To determine which code (or any other code besides voltage supply) refer to the control board status light. Turn the ON/OFF switch **OFF**, remove the control cover then turn power back **ON**. Observe the status light. Blinking LED total count equals the error code (for example: two blinks equals CODE 02).

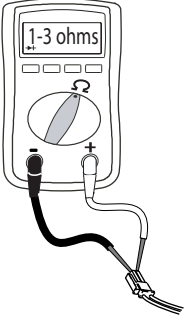
Error Code Messages

CODE	MESSAGE	ACTION
02	HIGH PRESSURE DETECTED - RELIEVE PRESSURE	Check for clogs. Use only Graco spray hoses, use a minimum of 50ft/15m.
03	PRESSURE TRANSDUCER NOT DETECTED	Check transducer connection.
05	MOTOR NOT SPINNING	Check for mechanical failure and check motor connections. Material may be too thick, thin material.
06	MOTOR OVERHEATED	Turn sprayer OFF. Check motor connections. Check shroud vents for blockage. Sprayer may take up to an hour to cool.

Problem	What to Check	How to check
Sprayer does not run at all AND Control board status light never lights	See flow chart, page 68.	
Sprayer does not shut off AND Control board status light blinks 2 times repeatedly	Control board.	Replace control board.

Problem	What to Check	How to check
<p>Sprayer does not run at all AND Control board status light blinks 2 times repeatedly</p>	<p>Check transducer or transducer connections</p>	<p>Make sure there is no pressure in the system (see Pressure Relief Procedure, page 16). Check fluid path for clogs, such as clogged filter.</p> <p>Use airless paint spray hose with no metal braid. A small hose or metal braid hose may result in high-pressure spikes.</p> <p>Turn ON/OFF switch OFF and disconnect power to sprayer by unplugging power cord and disconnecting battery.</p> <p>Check transducer and connections to control board.</p> <p>Disconnect transducer from control board socket. Check that transducer and control board contacts are clean and secure.</p> <p>Reconnect transducer to control board socket. Connect power, turn ON/OFF switch ON and control knob 1/2 turn clockwise. If sprayer does not run properly, turn ON/OFF switch OFF and go to next step.</p> <p>Install new transducer. Connect power, turn ON/OFF switch ON and control knob 1/2 turn clockwise. Replace control board if sprayer does not run properly.</p>
<p>Sprayer does not run at all AND Control board status light blinks 3 times repeatedly</p>	<p>Check transducer or transducer connections (control board is not detecting a pressure signal).</p>	<p>Turn ON/OFF switch OFF and disconnect power to sprayer by unplugging power cord and disconnecting battery.</p> <p>Check transducer and connections to control board.</p> <p>Disconnect transducer from control board socket. Check to see if transducer and control board contacts are clean and secure.</p> <p>Reconnect transducer to control board socket. Connect power, turn ON/OFF switch ON and control knob to 1/2 turn clockwise. If sprayer does not run, turn ON/OFF switch OFF and go to next step.</p> <p>Connect a confirmed working transducer to control board socket.</p> <p>Turn ON/OFF switch ON and control knob to 1/2 turn clockwise. If sprayer runs, install new transducer. Replace control board if sprayer does not run.</p> <p>Check transducer resistance with an ohmmeter (less than 9k ohm between red and black wires and 3-6k ohm between green and yellow wires).</p>

Problem	What to Check	How to check
<p>Sprayer does not run at all AND Control board status light blinks 5 times repeatedly</p>	<p>Control is commanding motor to run but motor shaft does not rotate. Possibly locked rotor condition, an open connection exists between motor and control, there is a problem with motor or control board, or motor amp draw is excessive.</p>	<ol style="list-style-type: none"> 1. Remove pump and try to run sprayer. If motor runs, check for locked or frozen pump or drive train. If sprayer does not run, continue to step 2. 2. Turn ON/OFF switch OFF and disconnect power to sprayer by unplugging power cord and disconnecting battery. 3. Disconnect motor connector(s) from control board socket(s). Check that motor connector and control board contacts are clean and secure. If contacts are clean and secure, continue to step 4. 4. Set sprayer to OFF and spin motor fan 1/2 turn. Restart sprayer. If sprayer runs replace control board. If sprayer does not run, continue to step 5. 5. Perform Spin Test: Test at large 4-pin motor field connector. Disconnect fluid pump from sprayer. Test motor by placing a jumper across pins 1 & 2. Rotate motor fan at about 2 revolutions per second. A cogging resistance to motion should be felt at the fan. The motor should be replaced if no resistance is felt. Repeat for pin combinations 1 & 3 and 2 & 3. Pin 4 (the green wire) is not used in this test. If all spin test is positive, continue to step 6. <div style="text-align: center;"> <p>STEP 1:</p>  <p>STEP 2:</p>  <p>STEP 3:</p>  </div>

Problem	What to Check	How to check
		<p>6. Perform Field Short Test: Test at large 4-pin motor field connector. There should not be continuity from pin 4, the ground wire, and any of the remaining 3 pins. If motor field connector tests fail, replace motor.</p> <p>7. Check Motor Thermal Switch: Unplug thermal wires. Set meter to ohms. Meter should read 100k ohms.</p>  <p>8. Reconnect motor connector(s) to control board socket(s). Connect power, turn ON/OFF switch ON and control knob to 1/2 turn clockwise. If motor does not run, replace control board.</p>
<p>Sprayer does not run at all AND Control board status light blinks 6 times repeatedly</p>	<p>Motor is hot or there is a fault in the motor thermal device.</p>	<p>Allow sprayer to cool. If sprayer runs when cool, correct cause of overheating. Keep sprayer in cooler location with good ventilation. Make sure motor air intake is not blocked. If sprayer still does not run, replace motor.</p> <p>NOTE: Motor must be cooled down for the test.</p> <ol style="list-style-type: none"> 1. Check thermal device connector (yellow wires) at control board. 2. Disconnect thermal device connector from control board socket. Make sure contacts are clean and secure. Measure resistance of the thermal device. If reading is not correct, replace motor. <p>Check Motor Thermal Switch: Unplug thermal wires. Set meter to ohms. Meter should read 100k ohms.</p> <ol style="list-style-type: none"> 3. Reconnect thermal device connector to control board socket. Connect power, turn sprayer ON and control knob 1/2 turn clockwise. If sprayer does not run, replace control board.
<p>Basic electrical problems</p>	<p>Motor leads are securely fastened and properly mated</p>	<p>Replace loose terminals; crimp to leads. Be sure terminal are firmly connected.</p> <p>Clean circuit board terminals. Securely reconnect leads.</p>
	<p>Motor armature commutator for burn spots, gouges or extreme roughness.</p>	<p>Remove motor and have motor shop resurface commutator if possible.</p>
<p>Inverter will not turn on during initial power up.</p>	<p>Batteries are not connected, loose battery-side connections</p>	<p>Check the batteries and cable connections. Check DC fuse and breaker.</p>
	<p>Low battery voltage below 10V</p>	<p>Charge the battery with external charger (not charger on board the unit).</p>
<p>No AC output voltage and indicator lights ON.</p>	<p>Output circuit breaker tripped</p>	<p>Check circuit breaker and reset if necessary, page 71.</p>

Problem	What to Check	How to check
AC output voltage is low and the inverter turns loads OFF in a short time.	Low battery	Check the condition of the batteries and recharge if possible.
Charger is inoperative and unit will not accept AC.	AC voltage has dropped out-of-tolerance	Check the AC voltage for proper voltage and frequency.
Charger is supplying a lower charger rate.	Charger controls are improperly set.	Refer to the section on adjusting the "Charger Rate"
	Low AC input voltage.	Source qualified AC power.
	Loose battery or AC input connections.	Check all DC / AC connections.

ES 2000 Troubleshooting

Problem	What to Check	How to check
Gallon (liter) counter not adding fluid volume.	Fluid pressure not high enough.	Must be over 800 psi (55 bar) for counter to add.
	Broken or disconnected pump counter wire, both pumps.	Check wires and connections. Replace any broken wires.
	Missing or damaged magnet.	Reposition or replace magnet on pump, see Parts manual (Pump parts) for magnet location.
	Bad sensor, both pumps.	Replace sensor.
Sprayer operates, but display does not.	Bad connection between control board and display.	Remove display and reconnect.
	Display damaged.	Replace display.
Distance not adding properly (Measure mode will be inaccurate and speed will be wrong).	Machine not calibrated.	Perform calibration procedure. See Operation manual.
	Rear tire pressure is too low or too high.	Adjust tire pressure to 55 +/- 5 psi (380 +/- 34kPa).
	Gear teeth missing or damaged (right side when standing on platform).	Replace distance gear/wheel hub.
	Distance sensor is loose or broken.	Reconnect or replace sensor.
Mils not calculating or calculates wrong.	Distance sensor.	See "Distance counter not operating properly".
	Gallon counter.	See "Gallon (liter) counter not adding fluid volume."
	Line width not entered.	Set line width on main striping screen.
	Bad or damaged control board.	Replace control board.
Fluid spray starts after spray icon is shown on display.	Interrupter.	Turn screw counterclockwise until spray icon synchronizes with fluid spray, page 24.
Spray icon does not show on display when fluid is sprayed.	Loose connector.	Check connector and reconnect.
	Interrupter is improperly positioned.	Turn screw counterclockwise until spray icon synchronizes with fluid spray, page 24.
	Reed switch assembly is damaged.	Replace reed switch assembly.
	Magnet on assembly is missing.	Replace reed switch assembly.
	Cut or sliced wire.	Replace distance sensor harness.
	Control board is damaged.	Replace control board.
	Display is damaged.	Replace display.

Problem	What to Check	How to check
Spray icon is always shown on display.	Interrupter is improperly positioned.	Turn screw clockwise until spray icon is synchronized with fluid spray, page 24.
	Reed switch assembly is damaged.	Replace reed switch assembly.
AUTO GUN MODE		
Auto Gun won't actuate when the red button is pressed.	Gun is not activated.	Press the 1 or 2 button on control to activate a gun.
	Cable is not adjusted properly.	Adjust Cable to properly actuate gun trigger, page 25.
	Not on main striping screen.	Go to main striping screen on control to Actuate Auto Guns.
	Low Speed Shut off is enabled.	Disable Low Speed Shutoff, see page 49.
	Battery Voltage is too low.	Check battery voltage on Diagnostic Screen, pages 37 & 50, or with Volt meter. If below 11.5V, charge battery or replace battery.
	Cable is not adjusted properly.	Adjust Cable to properly actuate gun trigger, page 25.
	Red button is broken.	Test button functionality in Diagnostic screen, page 50, replace if broken.
	Auto Gun Cable is broken or extremely kinked resulting in too much drag.	Replace Auto Gun Cable.
	Solenoid wire is disconnected or broke.	Check Wiring Diagram, pages 109 or 112, repair or replace wires if necessary.
	Fuse to battery is removed or blown.	Check and replace fuse.
	Solenoid is jammed.	Spray Lubrication on solenoid plunger.
	Solenoid is failed.	Check resistance across solenoid wires. Resistance should be between .2 and .26 ohms. If it's not, replace solenoid.
	Control board has failed.	Replace Control board.
Line Spacing is not accurate	Wrong line pattern loaded.	Reload the correct pattern.
	Machine is out of calibration.	Calibrate the machine, page 31 or 40.
Battery won't stay charged.	Accessories are left on and drain the battery when unit is not in use.	Turn off accessories when machine is not in use.
Auto Gun won't shut off	Cable is kinked.	Repair or replace cable.
	Solenoid is jammed.	Lubricate solenoid plunger, Check for solenoid damage.
	Needle in gun is clogged.	Clean out gun.
LAYOUT MODE		
No dots or poor dots in Layout and Marking Mode.	Too small of Dot setting.	Increase Dot size, page 44.
	Gun is not activated.	Press the 1 or 2 button on control to activate a gun.
	Cable is not adjusted properly.	Adjust Cable to properly actuate gun trigger, page 25.
	Tip clog.	Clear tip or Replace tip.
	Battery voltage is too low.	Charge battery or replace battery.
	Pump is not on, or pressure is not set.	Increase pressure to a minimum of 200 psi.

Electrical (ES 2000)

Symptom: Sprayer does not run, stops running, or will not shut off.



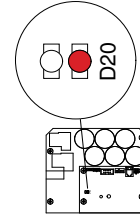
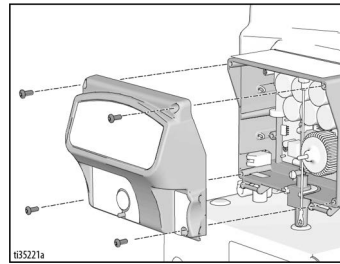
1. Perform **Pressure Relief Procedure**, page 16.
2. Set power switch OFF for 30 seconds and then ON again (this ensures sprayer is in normal run mode).
3. Turn pressure control knob clockwise 1/2 turn.



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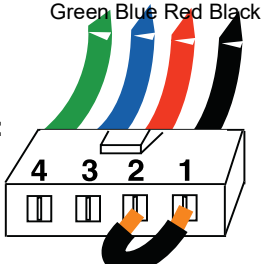
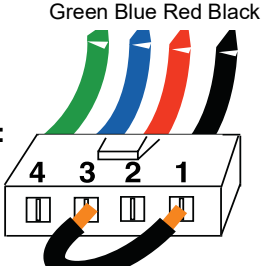
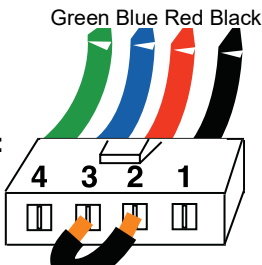
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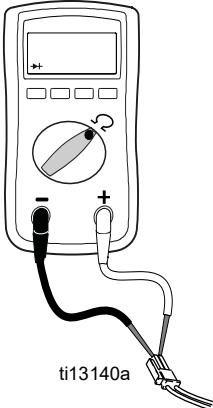
Control Board Status Light

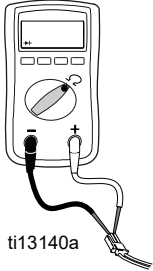


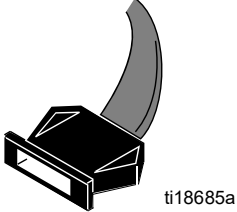
TYPE OF PROBLEM	WHAT TO CHECK	HOW TO CHECK
Sprayer does not run at all Control board status light never lights	See flow chart, page 68.	
Sprayer does not run at all Control board status light blinks 2 times repeatedly	Check transducer or transducer connections	<ol style="list-style-type: none"> 1. Make sure there is no pressure in the system (see Pressure Relief Procedure, page 16). Check fluid path for clogs, such as clogged filter. 2. Use airless paint spray hose with no metal braid 3/8 x 20' minimum. Smaller hose or metal braid hose may result in high-pressure spikes. 3. Set sprayer to OFF and disconnect power to sprayer. 4. Check transducer and connections to control board. 5. Disconnect transducer from control board socket. Check that transducer and control board contacts are clean and secure. 6. Reconnect transducer to control board socket. Connect power, set sprayer ON and control knob 1/2 turn clockwise. If sprayer does not run properly, set sprayer to OFF and go to next step. 7. Install new transducer. Connect power, set sprayer ON and control knob 1/2 turn clockwise. Replace control board if sprayer does not run properly.

TYPE OF PROBLEM	WHAT TO CHECK	HOW TO CHECK
Sprayer does not run at all Control board status light blinks 3 times repeatedly	Check transducer or transducer connections (control board is not detecting a pressure signal).	<ol style="list-style-type: none"> 1. Set sprayer to OFF and disconnect power to sprayer. 2. Check transducer and connections to control board. 3. Disconnect transducer from control board socket. Check to see if transducer and control board contacts are clean and secure. 4. Reconnect transducer to control board socket. Connect power, set sprayer ON and control knob to 1/2 turn clockwise. If sprayer does not run, set sprayer to OFF and go to next step. 5. Connect a confirmed working transducer to control board socket. 6. Set sprayer ON and control knob to 1/2 turn clockwise. If sprayer runs, install new transducer. Replace control board if sprayer does not run. 7. Check transducer resistance with ohmmeter (less than 9k ohm between red and black wires and 3-6k ohm between green and yellow wires).
Sprayer does not run at all Control board status light blinks 4 times repeatedly	Check voltage supply to the sprayer (control board is detecting multiple voltage surges).	<ol style="list-style-type: none"> 1. Set sprayer to OFF and disconnect power to sprayer. 2. Locate a good voltage supply to prevent damage to electronics. 3. See Inverter (ES 1000 & ES 2000), page 71.

TYPE OF PROBLEM	WHAT TO CHECK	HOW TO CHECK
<p>Sprayer does not run at all</p> <p>Control board status light blinks 5 times repeatedly</p>	<p>Control is commanding motor to run but motor shaft does not rotate. Possibly locked rotor condition, an open connection exists between motor and control, there is a problem with motor or control board, or motor amp draw is excessive.</p>	<ol style="list-style-type: none"> 1. Remove pump and try to run sprayer. If motor runs, check for locked or frozen pump or drive train. If sprayer does not run, continue to step 2. 2. Set sprayer to OFF and disconnect power to sprayer. 3. Disconnect motor connector(s) from control board socket(s). Check that motor connector and control board contacts are clean and secure. If contacts are clean and secure, continue to step 4. 4. Set sprayer to OFF and spin motor fan 1/2 turn. Restart sprayer. If sprayer runs, replace control board. If sprayer does not run, continue to step 5. 5. Perform Spin Test: Test at large 4-pin motor field connector. Disconnect fluid pump from sprayer. Test motor by placing a jumper across pins 1 & 2. Rotate motor fan at about 2 revolutions per second. A cogging resistance to motion should be felt at the fan. The motor should be replaced if no resistance is felt. Repeat for pin combinations 1 & 3 and 2 & 3. Pin 4 (the green wire) is not used in this test. If all spin test is positive, continue to step 6. <div style="text-align: center;"> <p>STEP 1:</p>  <p>STEP 2:</p>  <p>STEP 3:</p>  </div>

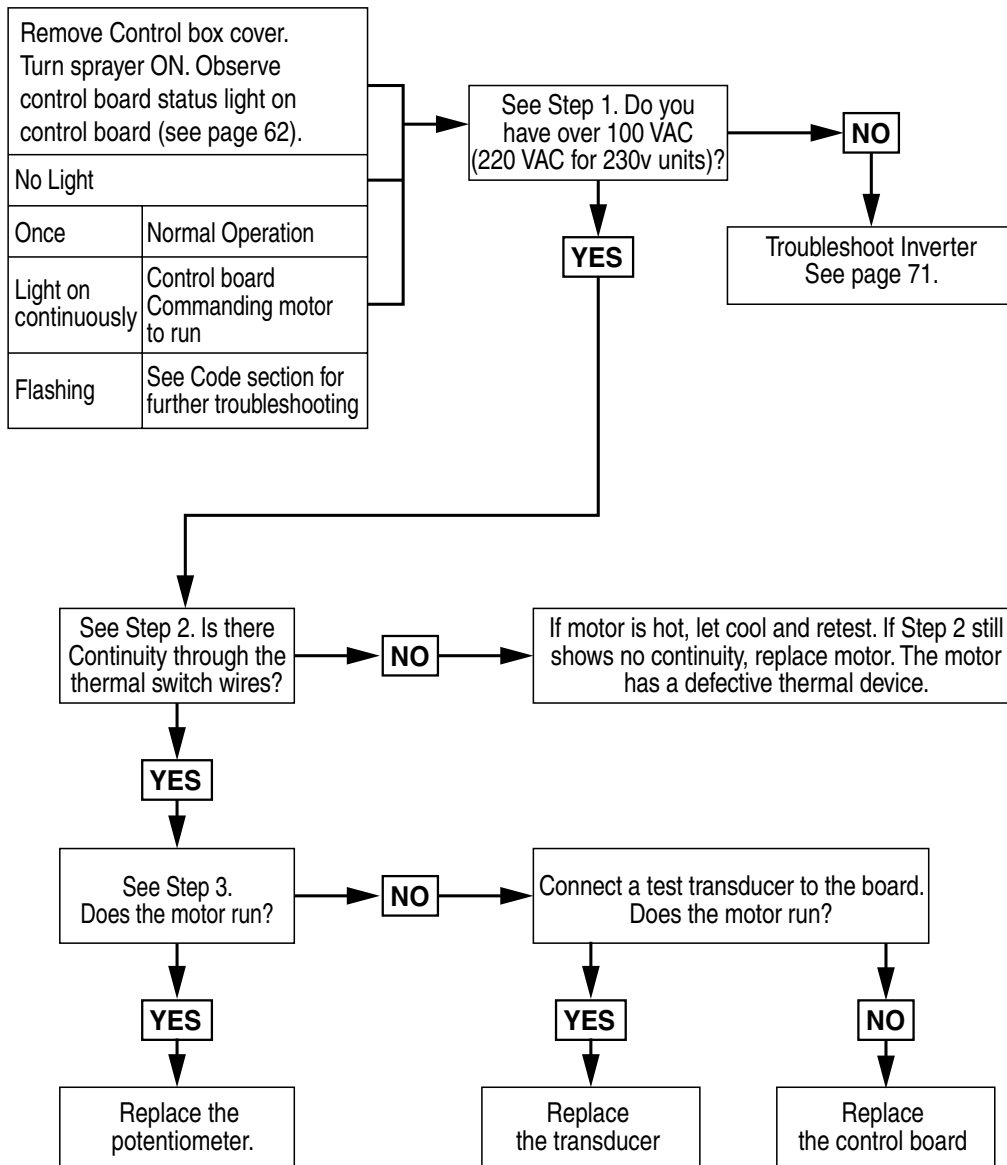
TYPE OF PROBLEM	WHAT TO CHECK	HOW TO CHECK				
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Resistance Table:						
ES 2000	2k ohms					

TYPE OF PROBLEM	WHAT TO CHECK	HOW TO CHECK				
Sprayer does not run at all Control board status light blinks 6 times repeatedly	Allow sprayer to cool. If sprayer runs when cool, correct cause of overheating. Keep sprayer in cooler location with good ventilation. Make sure motor air intake is not blocked. If sprayer still does not run, follow Step 1.	<p>NOTE: Motor must be cooled down for the test.</p> <ol style="list-style-type: none"> 1. Check thermal device connector (yellow wires) at control board. 2. Disconnect thermal device connector from control board socket. Make sure contacts are clean and secure. Measure resistance of the thermal device. If reading is not correct, replace motor. <p>Check Motor Thermal Switch: Unplug thermal wires. Set meter to ohms. Meter should read the proper resistance for each unit (see table below).</p>  <table border="1" data-bbox="906 890 1377 961"> <thead> <tr> <th colspan="2">Resistance Table:</th> </tr> </thead> <tbody> <tr> <td>ES 2000</td> <td>2k ohms</td> </tr> </tbody> </table> <ol style="list-style-type: none"> 3. Reconnect thermal device connector to control board socket. Connect power, turn sprayer ON and control knob 1/2 turn clockwise. If sprayer does not run, replace control board. 	Resistance Table:		ES 2000	2k ohms
Resistance Table:						
ES 2000	2k ohms					
Sprayer does not run at all Control board status light blinks 8 times repeatedly	Check voltage supply to the sprayer (incoming voltage too low for sprayer operation)	<ol style="list-style-type: none"> 1. Set sprayer to OFF and disconnect power to sprayer. 2. Troubleshoot inverter. 				
Sprayer does not run at all Control board status light blinks 10 times repeatedly	Check to see if control board is over heating.	<ol style="list-style-type: none"> 1. Make sure motor air intake is not blocked. 2. Make sure fan has not failed. 3. Make sure control board is properly connected to back plate and that conductive thermal paste is used on power components. 4. Replace control board. 5. Replace motor. 				
Sprayer does not run at all Control board status light blinks 12 times repeatedly	Excessive current protection enabled	<ol style="list-style-type: none"> 1. Cycle power on and off. 				
Sprayer does not run at all Control board status light blinks 15 times repeatedly	Check the connections above the motor	<ol style="list-style-type: none"> 1. Set sprayer to OFF and disconnect power to sprayer. 2. Remove motor shroud. 3. Disconnect motor control and inspect for damage at connectors. 4. Reconnect motor control. 5. Turn power on. If code continues, replace motor. 				

TYPE OF PROBLEM	WHAT TO CHECK	HOW TO CHECK
Sprayer does not run at all Control board status light blinks 16 times repeatedly	Check the connections. Control is not receiving a motor position sensor signal	<ol style="list-style-type: none"> 1. Turn power OFF. 2. Disconnect motor position sensor and inspect for damage at connectors.  <ol style="list-style-type: none"> 3. Reconnect sensor. 4. Turn power ON. If code continues, replace motor.
Sprayer does not run at all Control board status light blinks 17 times repeatedly	Check voltage supply to the sprayer (sprayer plugged into wrong voltage)	<ol style="list-style-type: none"> 1. Set sprayer to OFF and disconnect power to sprayer. 2. Locate a good voltage supply to prevent damage to electronics. 3. See Inverter (ES 1000 & ES 2000), page 71.

Sprayer Will Not Run (ES 1000 & ES 2000)

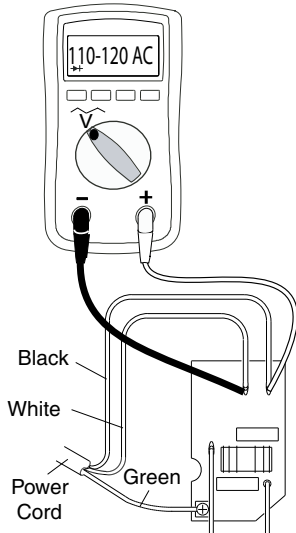
(See following page for steps)



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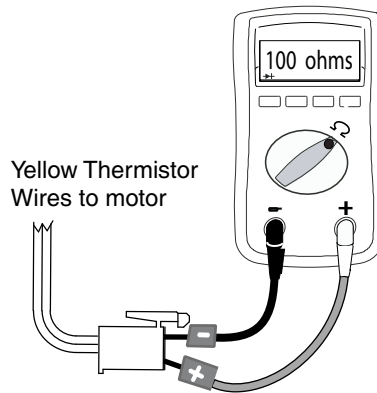
Step 1:

Plug Power cord in and turn switch ON. Connect probes to ontrol board. Turn meter to AC Volts.



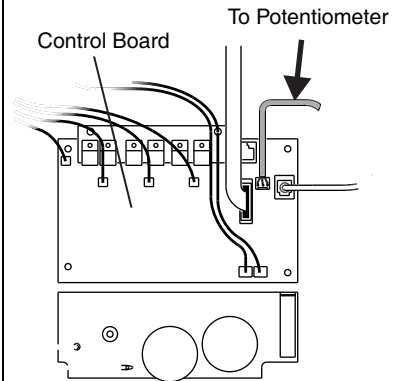
Step 2:

Check motor thermal switch. Unplug yellow wires. Meter should read 100 ohms. NOTE: Motor should be cool during reading.



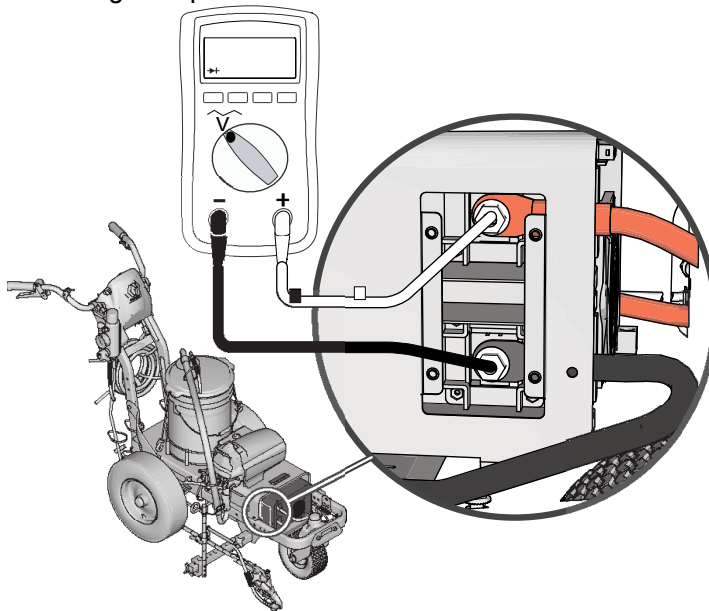
Step 3:

Disconnect potentiometer. Plug power cord in and turn switch ON.



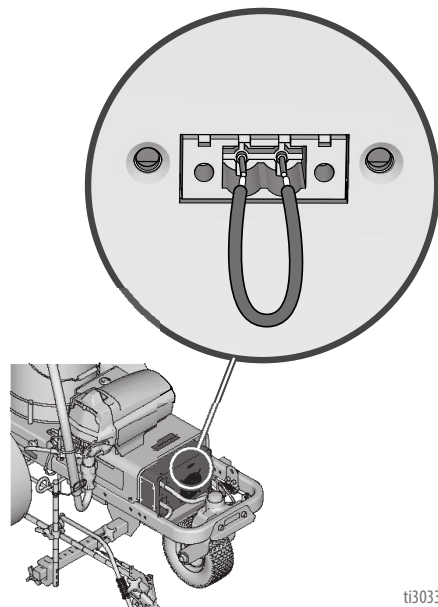
Step 4:

Connect probes to positive and negative posts on inverter.



Step 5:

Connect jumper across pins 1 and 2

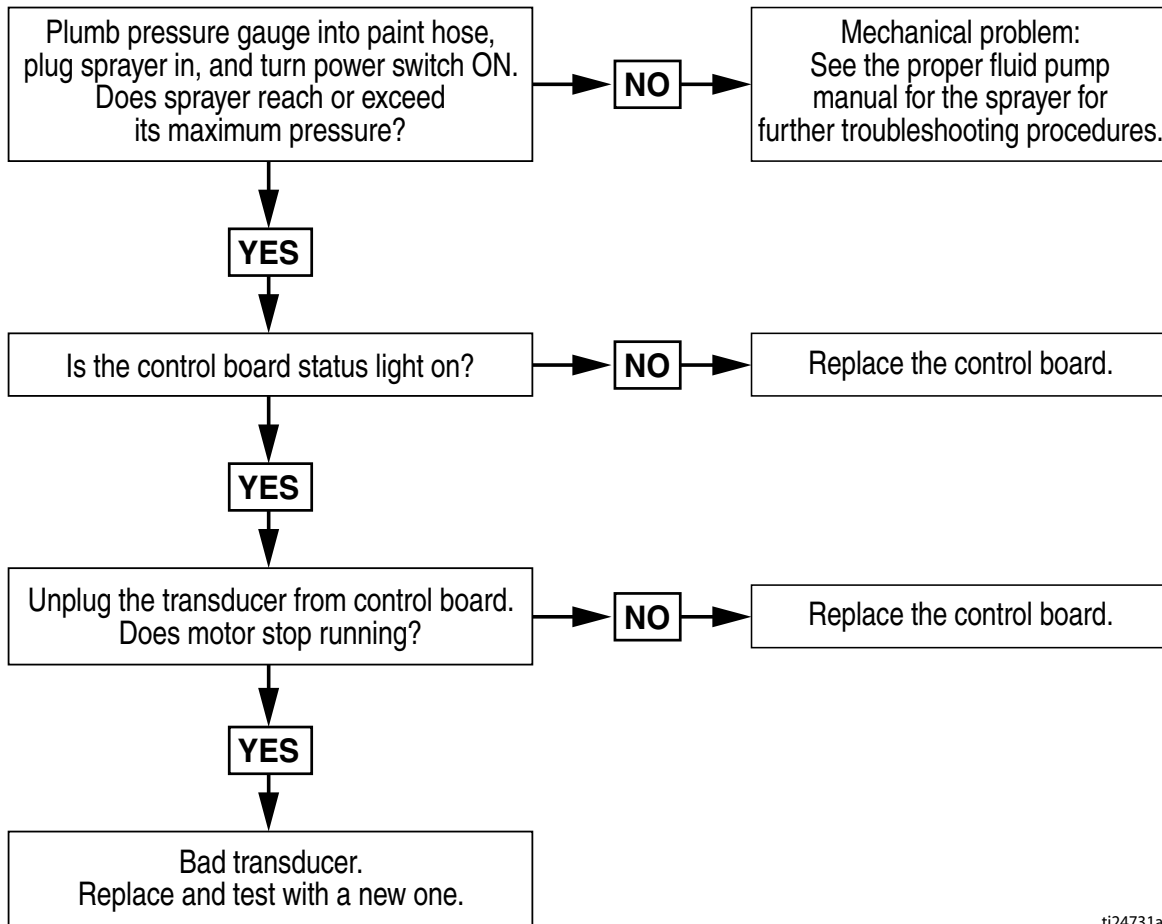


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Sprayer Will Not Shut Off (ES 1000 & ES 2000)

1. Perform **Pressure Relief Procedure**, page 16. Leave prime valve open (down) and turn ON/OFF switch **OFF**.
2. Remove control box cover so the control board status light can be viewed if available.

Troubleshooting Procedure

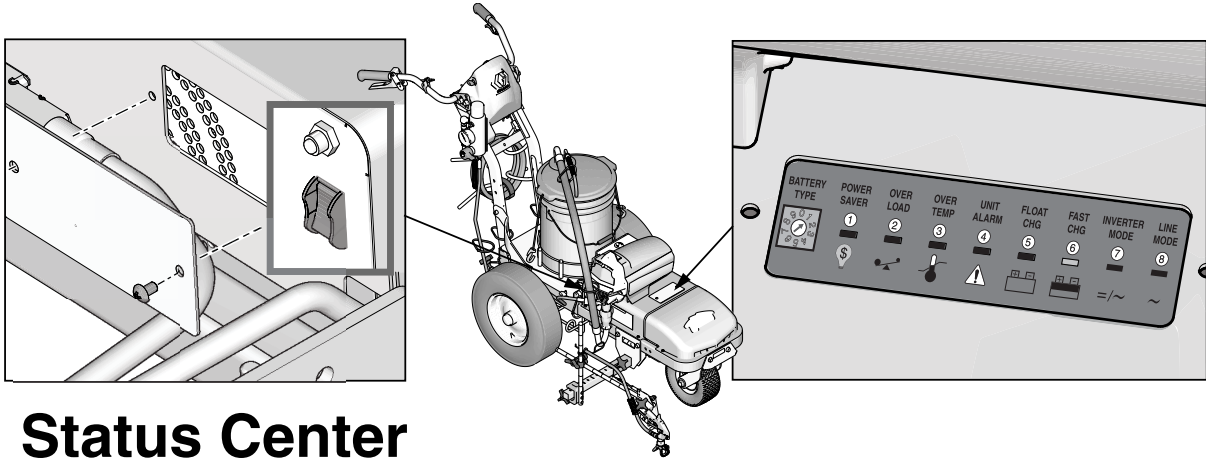


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Inverter (ES 1000 & ES 2000)

The inverter has 2 circuit breakers, and an LED Status Center that communicates inverter operation status.

See chart below for different functions, alarms, and fault modes.



Status Center

BATTERY TYPE	POWER SAVER	OVER LOAD	OVER TEMP	UNIT ALARM	FLOAT CHG	FAST CHG	INVERTER MODE	LINE MODE
	① 	② 	③ 	④ 	⑤ 	⑥ 	⑦ 	⑧

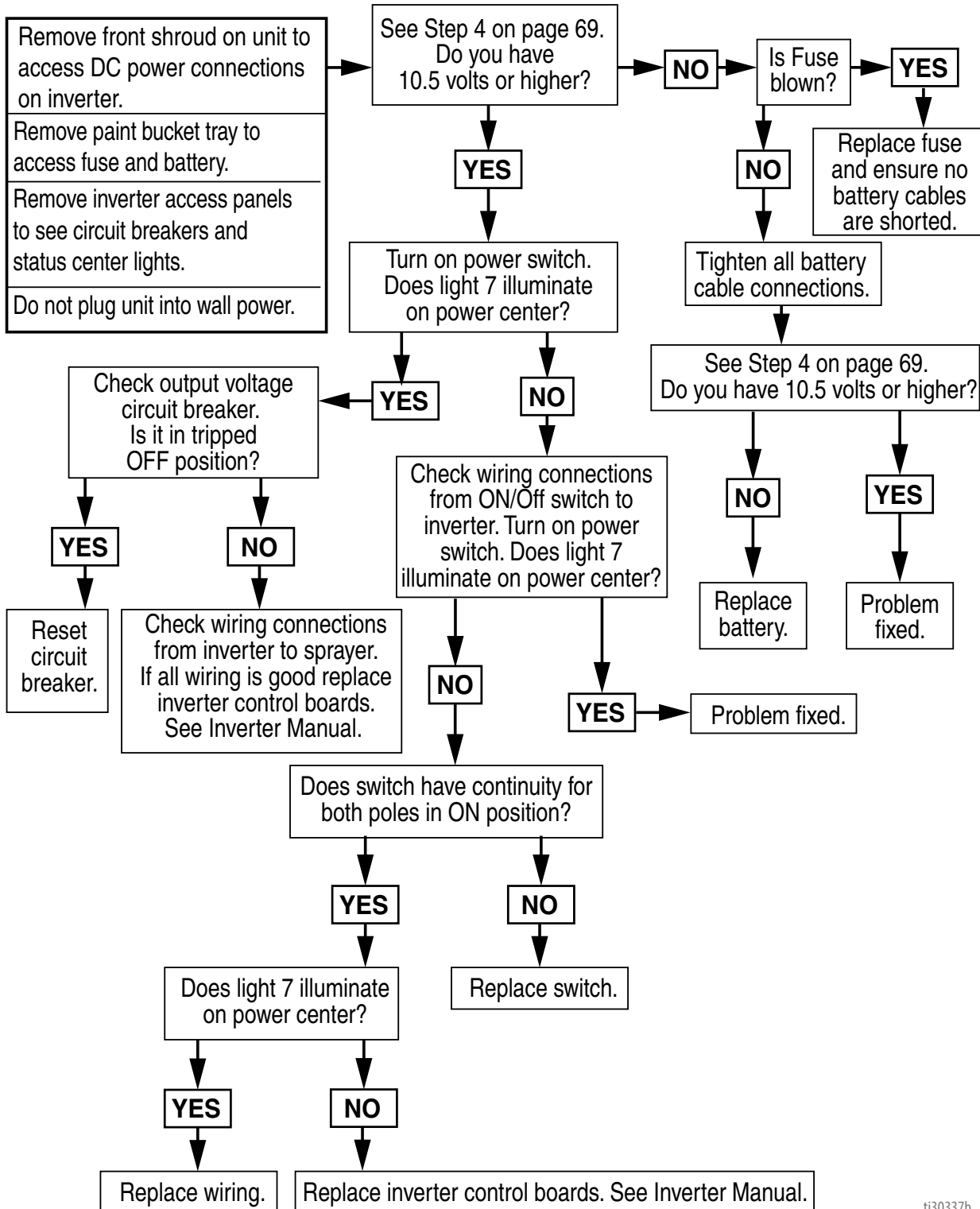
Indication & Fault finding chart

Status	L.E.D.s Function	①	②	③	④	⑤	⑥	⑦	⑧	Alarm
Charge function	Constant current charge						on Flash		on	
	Constant voltage charge								on	
	Float					on			on	
	Standby								on	
Inverter mode	Inverter on							on		
Alarms	Battery low voltage				on			on		beep 0.5s every 5 s
	Battery high voltage				on			on		beep 0.5s every 5 s
	Over load (inverter mode)		on		on			on		beep 0.5s every 5 s
	Over temp (inverter mode)			on	on			on		beep 0.5s every 5 s
	Over temp (line mode)			on	on	on			on	beep 0.5s every 5 s
	Over charge				on	on			on	beep 0.5s every 5 s
Fault mode	Fan lock									beep continuous
	Battery high voltage							on		beep continuous
	Inverter mode overload		on							beep continuous
	Over temperature			on						beep continuous

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Sprayer does not have - 100 VAC for 120V units - 220 VAC for 230V units (ES 1000& ES 2000)

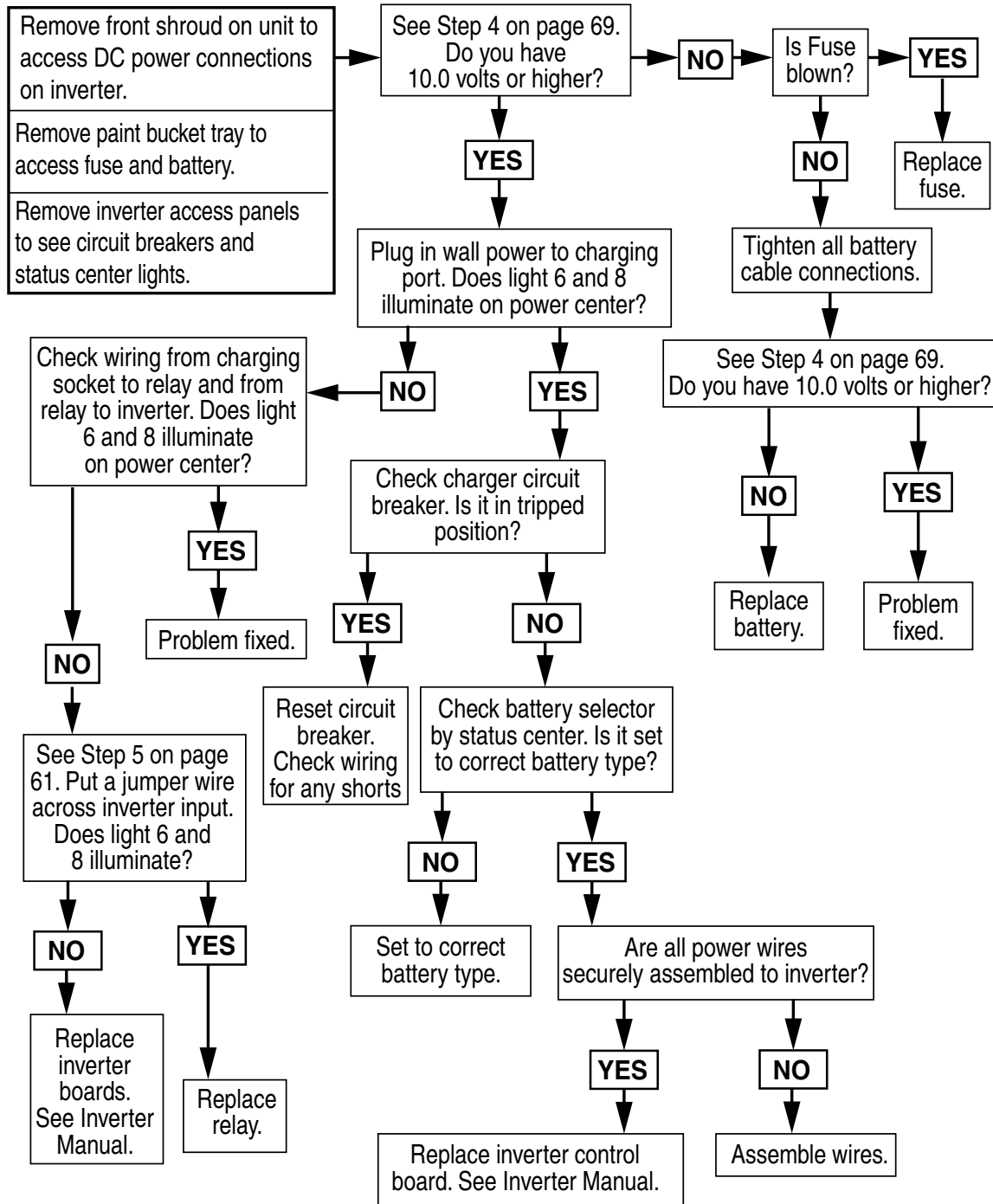
Troubleshooting Procedure:



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Battery Will Not Charge (ES 1000 & ES 2000)

Troubleshooting Procedure:



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