
Magnum Light Tower MLT Training

3060-3080-4060-4080-4150-4200-5060-5080-5150-5200
SECTION IV

TROUBLESHOOTING

- **Engine will not crank when the engine start switch is rotated to the start position.**
 - **Step 1.** Check the control panel to see if the “TURN MAIN BREAKER OFF” light is illuminated. If light is illuminated, turn the main breaker “OFF”. If light is off, proceed to step 2.
 - **Step 2.** Make sure the engine start battery is connected. If the battery is disconnected, connect the battery cables to the engine starting battery, RED to POSITVE and BLACK to NEGATIVE. If the battery is connected, proceed to step 3.
 - **Step 3.** Ensure that the battery connections are tight and clean. Inspect the connections to the engine start battery. Tighten and/or clean the connections. If the battery connections are clean and tight, proceed to step 4.
 - **Step 4.** Check for sufficient engine starting battery voltage. Battery voltage must be at or above 12.6V DC for proper starting. If battery voltage is below 12.6V DC, charge or replace the starting battery. If battery voltage is at or above 12.6V DC, proceed to step 5.
 - **Step 5.** Check for sufficient battery voltage at the “B” terminal on the engine starter solenoid, to ground. Then check at the “B” terminal on the back of the engine start switch. If battery voltage is insufficient, check all wires and connectors from these terminals back to the battery and tighten connections as needed. Replace or repair as necessary.
 - **Step 6.** Check for sufficient battery voltage at the “C” terminal on the back of the engine start switch when in the start position. If sufficient battery voltage is present, proceed to step 7. If battery voltage is insufficient, and we have sufficient battery voltage at the “B” terminal, replace the start switch.
 - **Step 7.** While the switch is in the start position, check for sufficient battery voltage at the “S” terminal on the back of the engine starter solenoid. If sufficient battery voltage is present, replace the starter solenoid. If battery voltage is not sufficient, check the continuity the green wire from the main breaker to the starter solenoid. Repair or replace if necessary. Be sure that the main breaker is closed or off.

- **Engine cranks but will not start.**
 - **Step 1.** Check for sufficient engine starting voltage. Battery voltage must be at or above 12.6V DC for proper starting. If battery voltage is below 12.6V

- DC, charge or replace the engine battery. If battery voltage is at or above 12.6V DC, proceed to step 2.
- **Step 2.** Check the fuel level in the fuel tank. If the fuel tank is empty, fill fuel tank. Check the screen at the bottom of the fuel pick-up tube, clean if necessary. Proceed to step 3.
 - **Step 3.** Check for proper fuel pump operation. Turn the key to the “RUN” position. If fuel pump is not functioning (no audible hum), check for DC voltage at the fuel pump. If no voltage is present, check the 10 amp circuit breaker (re-set if tripped) located on the side of the control box. Also be sure that all of the pump connections are tight and check the continuity on all the wires to make sure they are not broken or grounding. If the fuel pump is functioning properly (audible hum, approximately 15 seconds.), proceed to step 4.
 - **Step 4.** The fuel line may have air in it. Open the bleeder screw until the fuel flows adequately, tighten the screw. Proceed to step 5.
 - **Step 5.** Check for leaks or air in the fuel system. Inspect and repair or replace any loose or broken fuel lines. Install a clear hose in place of the fuel line to look for possible air bubbles. Bleed any air from the fuel system. If no leaks can be found and the fuel system is bled of any air, proceed to step 5.
 - **Step 6.** Check for DC voltage on the brown/red wire from the fuel solenoid (pull circuit) to ground. If voltage is present when the key is in the start position, proceed to step 7. If voltage is not present, check the condition of the brown wire between the connection to the fuel solenoid and the “C” terminal on the back of the engine start switch and the connection of the fuel solenoid plug. Verify that all of the wires in the solenoid plug are tight and the connections are secure. Repair and replace wires or connections as needed.
 - **Step 7.** Check the fuel injection rack to see if it is “frozen” (locked up). If fuel rack is frozen, free the fuel rack by moving by hand, back and forth. If fuel rack is free, replace the fuel solenoid.
- **Engine starts but shuts down when the switch is placed in the run position.**
 - **Step 1.** Check the 10 amp circuit breaker on the side of the control box. If breaker is tripped, push to reset. If breaker is not tripped, proceed to step 2.
 - **Step 2.** Check for DC voltage on the white or orange wire from the fuel solenoid (hold circuit) when the engine start switch is placed in the RUN position. Note: engine time delay relay will only allow power for 15 seconds. If DC voltage is present, replace fuel solenoid. If DC voltage is not present, go to step 3.
 - **Step 3.** Check operation of fuel pump when engine start switch is placed in the RUN position. Note: engine time delay relay will only allow power for 15



seconds to the fuel pump if the engine is not running and the ignition start/run switch is in the Run position. If fuel pump is running (listen for audible hum) go to step 4. If fuel pump is not running (no audible hum) go to step 5.

- **Step 4.** Check for DC voltage at the “BR” terminal on the rear of the engine start switch when the switch is in the “RUN” position. If DC voltage is not present, replace the engine start switch. If DC voltage is present, go to step 5.
 - **Step 5.** Check for DC voltage on the red wire in the #3 position on the time delay relay, with the engine start switch in the run position. If DC power is present, continue to step 6. If DC power is not present, check the red wire for breaks or cuts, check all connections and repair or replace as necessary.
 - **Step 6.** Check for DC voltage on the red wire going from the time delay relay to the 10 amp circuit breaker with the engine start switch placed in the run position. Note: engine time delay relay will only allow power for 15 seconds. If DC voltage is not present, verify that all of the wires and connections are good, replace the time delay relay. If DC voltage is present, proceed to step 7.
 - **Step 7.** Check for DC voltage on both terminals of the 10 amp circuit breaker with the engine start switch placed in the run position. Note: engine time delay relay will only allow power for 15 seconds. If DC voltage is present on one terminal and not the other, replace the 10 amp circuit breaker.
- **Engine Starts but shuts down after 10 – 15 seconds of operation.**
 - **Step 1.** Check for low engine oil level. Check engine oil level with oil dipstick. Oil level should be between FULL and ADD markings. If oil level is low, add engine oil. If oil level is correct, proceed to step 2.
 - **Step 2.** Check the fuel level in the fuel tank. If fuel tank is empty, fill fuel tank. If the fuel is full, proceed to step 3.
 - **Step 3.** Test the resistance (ohms) of the coolant temperature switch by disconnecting the purple overheat temperature switch wire from the time delay relay switch and checking continuity to ground.
 - If continuity exists to ground, replace the coolant temperature switch. *Ohm's will be very high, as this is a N/O switch. Switch closes if the unit heats up.*
 - If continuity is open to ground, replace low oil pressure switch. *Ohm's are very low, 5 ohms or less, this is a N/C switch and opens when there is oil pressure.*
 - Remove the pink wire from the time delay relay and start the unit and see if it will run for over a minute. Then connect the pink wire and see if the unit shuts down after 15 seconds. *This will verify if the time delay relay is operating properly.*



- **Note:** If condition persists, high coolant temperature or low oil pressure may be signs of pending engine failure. Notify a Field Service Representative.
- **No output from #1 mast light.**
 - **Step 1.** Check if #1 light switch is “On”. If light switch is “Off”, turn switch “On”. If #1 light switch is on, proceed to step 2.
 - **Step 2.** Check if bulb is defective. Secure in the socket? If bulb is defective, replace bulb. If bulb is not defective, proceed to step 3.
 - **Step 3.** Check to see if #3 mast light functions properly. If #3 indicator light functions properly, proceed to step 4. If #3 indicator light does not function properly, proceed to step 6. *The indicator light should be bright and then dim as the lights are striking, and then get brighter as the lights illuminate.*
 - **Step 4.** Check to see that approximately 400V AC is present at the #5 terminal on the #2 terminal block when the #1 light switch is turned “On.” If 400V AC is present, inspect the wiring to the mast junction box, from junction box to the light, and all associated connections. If 400V AC is not present, proceed to step 5.
 - **Step 5.** Check that there is 120V AC at position #1 on the #2 terminal block. If 120V AC is present, inspect wiring connections at terminal block #2 and inside the #1 ballast box. Check for voltage inside the ballast box. Inspect transformer in ballast box for proper function. Check capacitor with VOM for proper UF or microfarad reading. Replace if necessary. If 120V AC is not present, inspect wire and connections between position #1 on terminal block #2, #1 light switch, and #10 position on #1 terminal block. Check for proper operation of switch. Replace if necessary.
 - **Step 6.** Check that 120V AC is present at the red wire on the #10 position of terminal block #1 to ground or neutral. If 120V AC is present, proceed to step 7. If 120V AC is not present, and there is only residual voltage (2–6V AC), check that the frequency is set above 50 Hz. (Factory standard setting is 60.7 Hz under no load). If the frequency is correct, check the generator capacitor with the VOM for proper UF or microfarad reading. Replace the capacitor if necessary.
 - **Step 7.** Check that black wires are connected to positions #9 and #10 of terminal block #1 and secure. If connections are not secure, tighten and test lights.
- **No output from #2 mast light.**
 - **Step 1.** Check if #2 light switch is “On”. If light switch is “Off”, turn switch “On”. If #2 light switch is on, proceed to step 2.
 - **Step 2.** Check if bulb is defective. Secure in the socket? If bulb is defective, replace bulb. If bulb is not defective, proceed to step 3.



- **Step 3.** Check to see if #4 mast light functions properly. If #4 indicator light functions properly, proceed to step 4. If #4 indicator light does not function properly, proceed to step 6. *The indicator light should be bright and then dim as the lights are striking, and then get brighter as the lights illuminate.*
 - **Step 4.** Check to see that approximately 400V AC is present at the #6 terminal on the #2 terminal block when the #2 light switch is turned “On.” If 400V AC is present, inspect the wiring to the mast junction box, from junction box to the light, and all associated connections. If 400V AC is not present, proceed to step 5.
 - **Step 5.** Check that there is 120V AC at position #2 on the #2 terminal block. If 120V AC is present, inspect wiring connections at terminal block #2 and inside the #2 ballast box. Check for voltage inside the ballast box. Inspect transformer in ballast box for proper function. Check capacitor with VOM for proper UF or microfarad reading. Replace if necessary. If 120V AC is not present at position #2 on terminal block #2, inspect wire and connections between position #2 on terminal block #2, #2 light switch, and #8 position on #1 terminal block. Check for proper operation of switch. Replace if necessary.
 - **Step 6.** Check that 120V AC is present at the red wire on the #10 position of terminal block #1 to ground or neutral. If 120V AC is present, proceed to step 7. If 120V AC is not present, and there is only residual voltage (2–6V AC), check that the frequency is set above 50 Hz. (Factory standard setting is 60.7 Hz under no load). If the frequency is correct, check the generator capacitor with the VOM for proper UF or microfarad reading.
 - **Step 7.** Check that the black wires are connected to positions #9 and #10 of terminal block #1 and secure. If connections are not secure, tighten and test lights.
- **No output from #3 mast light.**
 - **Step 1.** Check if #3 light switch is “On”. If #3 light switch is “Off”, turn switch “On”. If #3 light switch is “On”, proceed to step 3.
 - **Step 2.** Check if bulb is defective. Secure in the socket? If bulb is defective, replace bulb. If bulb is not defective, proceed to step 3.
 - **Step 3.** Check to see if #1 mast light functions properly. If #1 indicator light functions properly, proceed to step 4. If #1 indicator light does not function properly, proceed to step 6. *The indicator light should be bright and then dim as the lights are striking, and then get brighter as the lights illuminate.*
 - **Step 4.** Check to see that approximately 400V AC is present at position #7 on the #2 terminal block when the #3 light switch is turned “On. If 400V AC is present, inspect the wiring to the mast junction box, from junction box to



- the light, and all associated connections. If 400V AC is not present, proceed to step 5.
- **Step 5.** Check that there is 120V AC at position #3 on the #2 terminal block. If 120V AC is present, inspect wiring connections at terminal block #2 and inside the #3 ballast box. Check for voltage inside the ballast box. Inspect transformer in ballast box for proper function. Check capacitor with VOM for proper UF or microfarad reading. Replace if necessary. If 120V AC is not present, inspect wire and connections between position #3 on terminal block #2, #3 light switch, and #10 terminal on #1 terminal block. Check for proper operation of switch. Replace if necessary.
 - **Step 6.** Check that 120V AC is present at the red wire on position #10 on terminal block #1 to ground or neutral. If 120V AC is present, proceed to step 7. If 120V AC is not present, and there is only residual voltage (2–6V AC), check that the frequency is set above 50 Hz. (Factory standard setting is 60.7 Hz under no load). If voltage is 2–6V AC, check that the frequency is above 50 Hz. Check the generator capacitor with the VOM for proper UF or microfarad reading. Replace the capacitor if necessary. If 120V AC is present, proceed to step 7.
 - **Step 7.** Check that the black wires are connected to terminals #9 and #10 of terminal block #1 and secure. If connections are not secure, tighten and test lights.
- **No output from #4 mast light.**
 - **Step 1.** Check if #4 light switch is “On”. If #4 light switch is “Off”, turn switch “On”. If #4 light switch is “On”, proceed to step 3.
 - **Step 2.** Check if bulb is defective. Secure in the socket? If bulb is defective, replace bulb. If bulb is not defective, proceed to step 3.
 - **Step 3.** Check to see if #2 mast light functions properly. If #1 indicator light functions properly, proceed to step 4. If #1 indicator light does not function properly, proceed to step 6. *The indicator light should be bright and then dim as the lights are striking, and then get brighter as the lights illuminate.*
 - **Step 4.** Check to see that approximately 400V AC is present at position #8 on the #2 terminal block when the #4 light switch is turned “On. If 400V AC is present, inspect the wiring to the mast junction box, from junction box to the light, and all associated connections. If 400V AC is not present, proceed to step 5.
 - **Step 5.** Check that there is 120V AC at position #4 on the #2 terminal block. If 120V AC is present, inspect wiring connections at terminal block #2 and inside the #4 ballast box. Check for voltage inside the ballast box. Inspect transformer in ballast box for proper function. Check capacitor with VOM for proper UF or microfarad reading. Replace if necessary. If 120V AC is not



- present, inspect wire and connections between position #4 on terminal block #2, #4 light switch, and #8 terminal on #1 terminal block. Check for proper operation of switch. Replace if necessary.
- **Step 6.** Check that 120V AC is present at the red wire on position #10 on terminal block #1 to ground or neutral. If voltage is 2–6V AC, check that the frequency is above 50 Hz. Check the generator capacitor with the VOM for proper UF or microfarad reading. Replace the capacitor if necessary. If 120V AC is present, proceed to step 7.
 - **Step 7.** Check that the black wires are connected to terminals #9 and #10 of terminal block #1 and secure. If connections are not secure, tighten and test lights.
- **Lights are on but one or more turn off randomly**
 - If two or more lights shut off and then come back on, it is probably a fuel related issue. Either a clogged filter or screen, or air in the fuel system. Please refer to steps 3, 4 & 5 in the *Engine cranks but will not start section*.
 - Check the hertz by inserting multi-meter leads into the GFCI receptacle with the meter turned to the hertz setting. Hertz should read 60.7 Hz without a load. Adjust the idle jack bolt on the engine as necessary.
 - **No generator output.**
 - **Step 1.** With the generator running, check if the frequency is above 50 Hz. (Recommended factory setting of 60.7 Hz with no load, which is 1800 rpm's). If frequency is below 50Hz, check fuel filter or air filter for obstructions. Also be sure that the throttle linkage lock nut is securely tightened. Excitation of generator occurs at or above 50Hz.
 - **Step 2.** With the engine running, check for residual voltage with a digital MULTI meter (DMM) at the Red & Black wires on the terminal block located inside the generator box L1–N, L2–N and L1–L2. If residual voltage readings are as follows, proceed to Step 3. L1–N, 2–6 volts AC; L2–N, 2–6 volts AC; L1–L2, 4–12 volts AC. If residual voltage is not present (0–1V AC), see the generator manual for instructions to “Flash the Field”. Check for continuity between T1 & T4. If there is not continuity between the T1 & T4, or there is between T1 & T4 individually to ground, then there is a short in the generator wires and the generator will need to be replaced.
 - **Step 3.** Check generator capacitor with DMM for proper capacitance. Remove and carefully discharge the capacitor, take the DMM and place the meter leads on the opposite capacitor posts. Turn the DMM to capacitance setting, hold leads on capacitor for 5 seconds. Meter should read the proper UF rating written on the capacitor. If meter reads different than the label on the capacitor, the capacitor is bad. *For another way to test, see below.* If capacitance value does not match the UF rating on the capacitor, replace the



capacitor. If capacitance value does match the UF rating of the capacitor, check for any loose or damaged wires and replace as necessary. If connections are fine, consult your local Marathon Dealer.

- *Capacitor check without a capacitance mode on volt meter, using ohm readings.*
 - Disconnect the capacitor from the circuit. Discharge the capacitor by shorting between the terminals. Check the capacitor with the ohmmeter set at the highest resistance scale. If the meter indicates a very low resistance which gradually increases, the capacitor does not require replacement. If the meter indicates a very high resistance which does not diminish, it is open and should be replaced. If the meter indicates a very low resistance which does not increase, the capacitor is shorted and should be replaced.

