

# **Stanley Firing-Up and Blow-down Sequence & Checklist**

May 15, 2013

## **Car Preparation For Firing Up**

- 1) Uncover the car of any sheets, blankets, or other materials.
- 2) Check that;
  - 2.1) No wheel cocks in place
  - 2.2) The parking brake is released.
  - 2.3) The water automatic bypass valve under the right dash is open.
  - 2.4) Throttle is fully open.
  - 2.5) Drip valve is open two turns
- 3) The following items are to be checked routinely (when the car hasn't been driven for a couple of weeks).
  - 3.1) Top up or down as required. Side curtains installed or stored as required
  - 3.2) Tire Pressures should be 70 PSIG minimum (including the spare)
  - 3.3) Check that the battery is serviceable and the disconnect bolt is installed on the positive terminal cable.
  - 3.4) Check the copper engine cover to insure at least one inch (1") of oil in the crankcase (beginning of the season, mid-season, etc)
  - 3.5) Check that the license plate registration sticker is valid and the insurance card and vehicle registration paperwork are in the driver's door pocket.
  - 3.6) Check the hydraulic brake fluid cylinder under the front seat for proper fluid level.
  - 3.7) Check the foot and hand brake mechanisms to insure they function and are not sticking
  - 3.8) Lubricate the valve stem at the packing gland for the steam automatic and water level automatic (steam cylinder oil)
  - 3.9) Grease the various vehicle fittings on the undercarriage as necessary
  - 3.10) Drain the water supply tanks and check (replace as required) the steam cylinder socks in the front and rear of the water tank.
- 4) Pushing on the WHEELS ONLY, move the car to the desired position for firing it up. DO NOT PUSH ON THE BODY, WHEEL FENDERS, SPARE TIRE, TOP BOWS, WINDSHIELD, OR OTHER CAR BODY PARTS. It is acceptable to push on the rubber tires, elliptical springs, or the undercarriage to move the car. When the car is in the location that it will be fired up, apply the parking brake. Also place a drip pan under the steam cylinder drip valve to catch any oil/water that will come out of the engine.
- 5) Check the following fluid levels;
  - 5.1) Kerosene tank – should be at least a ½ tank or more
  - 5.2) Steam Cylinder Oil tank – should be at least a ¼ tank or more

5.3) Pilot Fuel tank – gauge on the top should read at least ¼ tank or more (Note: gauge needle has a tendency to stick at the Full mark, lightly tap the side of the gauge with the rubber end of the pump handle to insure it reads accurate.) If the tank is low on fuel it will need to be depressurized and filled.

5.4) Water Tank – the gauge should show around ¼ tank of “fuel” indicating the boiler has siphoned full of water. If the gauge indicates much higher than a ¼ tank the boiler has not siphoned and the issue must be resolved before driving the car. Use a hose to fill the boiler with water until it runs out the engine drip.

6) Prepare the car for lighting the pilot;

6.1) Close the drain valve under the steam oil separator.

6.2) The kerosene fuel pressure should be at least 100 PSIG to fire-up the car. Make sure the fuel pump is primed by pumping on the hand pump several times. The fuel gauge needle should move a needle’s width with each stroke of the pump handle. If the needle moves more than a needle’s width with each stroke of the pump handle, the kerosene service tank will need air pressure. Pressurize the kerosene service tank to 100 to 110 PSIG. Pump fuel and see if the needle now moves a needle’s width with each stroke of the pump handle. If it doesn’t, when firing the burner, allow the kerosene pressure to drop to 80 PSIG and then raise the fuel pressurize with air to 100 to 110 PSIG. (See Step 10 under Firing Up)

6.3) The pilot fuel tank pressure should be between 20 and 25 PSIG to fire-up the car. Pressurize the pilot fuel tank to 25 PSIG.

6.4) Install a clear plastic hose from the tool box on the right running board on each of the two blow-down copper pipes at the front left of the car. Open the front left and center left blow-down valves. Open the steam stack blower valve to admit air to the boiler. Water should run into the bucket. Drain off 1-½ buckets of water from the boiler. It is OK to complete the following steps through lighting the pilot; but go no further until the 1-½ buckets of water have been drained from the boiler.

### **Firing Up**

1. Open both hood panels if they are not already open. Open the trap door on the smoke bonnet at the top of the boiler if it is not already open.
2. Open the pilot door on the burner. Clean the door’s glass with a rag if it is covered with black soot or other burner combustion material. Run the pilot nozzle cleaning wire in and out to make sure the pilot nozzle is clear.
3. Run the burner nozzle cleaning wire in and out to make sure the nozzle is clear.
4. Light the propane torch (stored in the tool box on the right running board) and start heating the circular pilot vaporizing tube as well as the pilot nozzle. Also heat the burner tube and nozzle.

5. After about 90 seconds of heating open the pilot fuel needle valve a ½ turn and open the pilot fuel valve a half turn. Continue heating only the pilot vaporizer tube until the pilot lights. At this point do not put the propane torch near the pilot nozzle as it might light the fuel mixture in the pilot mixing tube – only heat the top area of the pilot vaporizer tube above the pilot nozzle. The pilot should burn with a light blue flame. Remove the torch and extinguish the torch.
6. If the pilot continues to burn a nice blue flame, close the pilot door. Leave the pilot burning for about 10 minutes. During this time, partially close the needle valve to reduce the pilot flame to about 1/4" to 3/8" of height. Now might be a good time to check the water level in the bucket and if it is near full, to dump it prior to draining off the last ½ bucket of water.
7. After about 10 minutes of the pilot burning, open the firing-up valve. Open the valve quickly a ¼ turn and close it. Wait about 30 seconds then quickly open the firing-up valve a ¼ turn a 2<sup>nd</sup> time and close it. After another 20 seconds or so, quickly open the firing-up valve a ¼ turn a 3<sup>rd</sup> time and close it. The burner may light on the 3<sup>rd</sup> opening of the valve. If it does, leave the fuel valve cracked open. If the burner does not light off, wait about 10 seconds and just crack-open the firing-up valve. Listen for the familiar woosh of the burner lighting. When the burner lights, open the firing-up valve just enough to hear the burner and leave it burning to heat the burner vaporizer that will take roughly 10 minutes.
  - 7.1. Remember the water drain-off bucket at the front of the car and that only 1-1/2 buckets of water needs to be drained from the boiler.
  - 7.2. When the proper amount of water has been drained, remove the clear plastic tubes from the blow-down tubes and store them in the toolbox.
8. After about 10 minutes, close the firing-up valve and crack open the burner fuel valve. With the increased fuel pressure of the burner fuel system the sound of the burner should get louder. Observe the burner nozzle as the changeover from pilot fuel to kerosene occurs. Some dripping at the burner nozzle may occur and is acceptable if there is only a few drops and the dripping stops within 30 seconds or so. After about 3 minutes of the burner firing the burner fuel valve may be opened to ¼ open as long as the fuel exiting the burner nozzle is clear to lightly gray.
9. Allow the burner to heat the boiler water and start the generation of steam.
10. Monitor the fuel pressure of the burner and when it falls to 80 PSIG, manually pump up fuel pressure to at least 120 PSIG.
  - 10.1. As you pumped fuel during Step 5 above, if the burner fuel pressure gauge needle moved more than a needle's width with each stroke of the pump handle, the service tank needs additional air pressure applied from the compressor. With the burner firing, allow the kerosene pressure to drop to 80

PSIG and then raise the pressure of the service tanks with air from the compressor to 100 to 110 PSIG.

- 10.2. Make a few pumps with the pump handle and observe the gauge needle. If it moves less than a needle's width on each stroke of the pump handle, there's sufficient air in the service tanks. If the needle moves more than a needle's width with each pump of the handle, additional air will need to be added. Let the pressure drop to 80 PSIG and repeat step 10.1 above.
11. Watch for steam escaping from the engine drip valve or out of the exhaust duct just in front of the firewall. Close the stack blower valve.
12. When there's a strong steam flow from the engine drip, cut back the throttle so that the steam flow is reduced. The steam vapor cone should extend between the engine and the ground with little clouds of steam surrounding the impact point; a much stronger flow is not needed. The burner fuel valve may be opened to ½ open.
13. As steam pressure continues to rise, continue to monitor the position of the throttle and close it as needed to maintain the proper steam flow from the engine drip valve. Also monitor the burner fuel pressure and maintain it between 80 and 120 PSIG. Continue to check around the boiler and car for any steam leaks or otherwise.

### **Initial Road Test**

1. When the steam gauge reaches 400 PSIG, start preparing the car for its initial movement under steam.
  - 1.1. Close the trap door on the smoke bonnet over the boiler and put both hood panels down and latch them.
  - 1.2. Remove the rubber running board protectors and store them flat in the pole barn.
  - 1.3. Make sure all the tools are in the car, nothing is laying under the car, etc.
2. From the driver's seat do the following;
  - 2.1. Close the steam drip valve and then open it a full turn. Release the parking brake.
  - 2.2. Slowly open the throttle just enough to move the car forward. Listen for water coming out the drip. Only open the throttle enough to move the car and allow the water to clear the drip. Too much steam and/or movement of the car too fast will not allow sufficient time for the water to escape the drip and could lead to cylinder damage. Run the car sufficiently forward and reverse to clear all water out of the engine cylinders. When the steam pressure is at least 500 PSIG and the cylinders are clear of water, the car is ready for a test drive.
3. When ready to do a short test drive, perform the following;

- 3.1. Close the drip. Turn ON the headlights; the ammeter should show a discharging battery condition.
- 3.2. Take the car on a short drive to insure everything on the car is functional.
- 3.3. Make sure the winker is winking and indicating oil flow to the engine cylinder.
- 3.4. Make sure the steam automatic shuts down the burner before the steam pressure reaches 600 PSIG
- 3.5. Make sure the ammeter shows the battery being charged by the generator.
- 3.6. Make sure you hear the water pumps pumping.
- 3.7. Make sure the fuel pump raises the fuel pressure to no higher than 120 PSIG.
- 3.8. The engine hook-up functions properly.
- 3.9. The car drives and "feels" good when moving along the road.
- 3.10. With the above complete, return to the garage to complete the preparations for running the cars.
- 3.11. Before reaching the garage, turn off the burner fuel valve to limit the steam pressure to 400 to 500 PSIG when back at the garage.
- 3.12. Back at the garage set the parking brake and open the engine drip. Lock the throttle stop.
4. Prepare the car for driving by insuring the following are done;
  - 4.1. Remove the condenser cap and place it on the driver's seat. Fill the water tank is full of water; to just overflowing. Replace the condenser cap.
  - 4.2. All tools and supplies are onboard.
  - 4.3. At least one cell phone is onboard.

### **Blowdown**

1. When returning from a trip with the car, park it in front of the garage door so that it can be backed in.
2. Place the rubber running board protectors on the running boards.
3. Set the parking brake. Open the drip. Turn OFF the burner fuel valve. Turn OFF the pilot fuel valve. Turn off the headlights, etc.
4. Remove the condenser cap and place it on the driver's seat. Fill the water tank to overflowing. Reduce the fill rate while the tank overflows to float off any globs of oil on the surface of the water in the tank. When no more oil floats out, turn off the water and replace the condenser cap.
5. Open the hood panels. Place the blowdown plywood sheet under the car if required.
6. While waiting for the pilot to burn out, open each of the blowdown valves to unseat the valve stem but leave them closed or just weeping.

7. When the pilot has burned out, open the blowdown valves around the engine. Generally a ½ turn is sufficient.
  - 7.1. The blowdown on the water indicator kidney should be the first to blow steam only. Close it when it is blowing steam only.
  - 7.2. The center blowdown with the internal 4" standpipe in the boiler will be the 2<sup>nd</sup> blowdown to blow steam. Close it when it is blowing steam only.
  - 7.3. Watch the remaining four blowdowns. When they start blowing steam, get them turned off as soon as possible. Generally the blowdowns that are highest on the high end of the boiler as the car sits will blow steam first. With the water blown out of the boiler close all blowdown valves. Tighten them only enough to stop the steam flow – do not "crank" them closed as they will be next to impossible to open later.
  - 7.4. Remove the blowdown plywood from under the car and store it.
8. Back the car into the garage storage location.
9. Secure the car by doing the following;
  - 9.1. Set the parking brake.
  - 9.2. Close and lock the throttle.
  - 9.3. Make sure the engine is not in hook-up.
  - 9.4. Close the water automatic bypass valve under the right dash.
  - 9.5. Place the catch container under the steam cylinder oil drain line. Open the steam cylinder oil separator drain valve.
10. Secure any tools, or other items in the car.