CaviDyne™ LLC

CaviBlaster™

CaviBlaster 1228-G

Operation & Maintenance Manual

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CaviBlaster 1228-G – Preparing for Operating Instructions:

WARNING: TO ENSURE OPERATOR SAFETY AND EFFICIENT OPERATION OF THE CAVIBLASTER®, IT IS ESSENTIAL TO FOLLOW THESE INSTRUCTIONS.

Preparing the CaviBlaster System for Operation:

1. Inspect the CaviBlaster® Power Unit, hose and gun for any signs of damage.
2. Inspect Inlet Strainer (**Figure #1**) to ensure that it is not dirty or clogged. Clean as necessary.
3. Check oil and fuel levels, proper oil level in pressure pump (**Figure #2**) and engine (**Figure #3**), gasoline level in detachable fuel tank (**Figure #4**).

NOTE: If needed, fill lubricating oil(s) to proper level in the pressure pump (**Figure #5**) and engine (**Figure #6**) per manufacturers operating manual.

- Pressure pump oil is SAE 30W-non-Detergent (**Figure #7**)
- Honda engine oil is SAE 10W 30 (**Figure #8**)

NOTE: The new Honda engine has a “Low Oil Level Warning Light” (**Figure #24**)

4. Connect the 1” red rubber by-pass hose with the ¾” cam-lock socket (**Figure #9**) to the 3/4” cam-lock plug on the pressure regulating unloader (**Figure #10**). The by-pass hose has a cam-lock socket on one end, direct the other end away from the working area and secure the hose.
5. Connect the ½” High Pressure Hose (**Figure #11**) to the quick-connect plug under the pressure regulating unloader (**Figure #12**).

NOTE: Do not attach the ZT Gun (**Figure #21**) to the high-pressure hose, this hose must be cleaned before connecting the gun. This unit can deliver the required pressure up to 300 feet or 100 mts with a ½” thermoplastic hose, using greater lengths or smaller diameters may degrade its performance.

6. Connect the dual ¼” black rubber fuel lines (**Figure #13**) from the external fuel tank to the fuel lines of the unit (**Figure #14**), these connections are made with a quick connect fitting.
7. Connection of the water source.

Feeding Water with the Feed Pump Provided:

1. Connect the 1” diameter clear PVC feed hose (**Figure #15**) to the cam-lock plug on the inlet filter (**Figure #16**), This feed hose has the feed pump on one end and a cam-lock socket on the other end.
2. Insert the electrical plug powering the feed pump into the waterproof electrical outlet on the handle of the power unit cart (**Figure #17**), The plug cannot be wrongly connected because it will fit only in the correct position.
3. Drop the feed pump one or two feet into the water and tie to something to avoid going any deeper, make sure the wiring splice is kept dry prior to starting the feed pump. Either fresh water or see water can be used with this system.

NOTE: The feed pump has a neoprene check valve installed in the discharge, this valve will prevent water from draining out of the feed hose through the feed pump when the pump is turned off, however, this valve somewhat restricts the flow of water from the pump, if maximum water flow is required, this valve can be removed by removing the black hose barb fitting.

NEVER TURN OFF FEED PUMP WHILE WORKING

Feeding With an Alternate Water Source:

This source must supply water at a volume greater than 12 gallons per minute at a maximum pressure of 70-PSI. Connect the water source to the inlet of the pressure pump (**Figure #16**), make sure the feed hose is connected to the pressure pump and water is present prior to starting the unit.

Starting the CaviBlaster:

THE PREPARING STEPS (CHECKING AND CONNECTIONS) MUST BE ALREADY DONE BEFORE THIS POINT.

1. When using the feed pump, start the feed pump by pulling the feed pump switch (**Figure 18**) on the cart handle, to the “ON” position, when using a supplied water source, open the valve to supply water to the system.

NOTE: Make sure the system is primed and that there are no leaks, this is a positive displacement pump, and water must be supplied under pressure.

FAILURE TO FEED WATER MAY RESULT IN DAMAGE TO THE PUMP.

2. Hold the end of the high-pressure hose away before starting the unit.
3. Once the system is primed, turn the key (**Figure #19**) to the right for ignition, let the unit run for a few minutes to warm up / clean the interior of the high-pressure hose, to avoid particles of dirt going to the gun.

NOTE: If the unit does not start at first, wait for 10 seconds before trying again.

4. Once the unit is warm and the hose is clean, turn off the unit and turn off the feed pump.
5. Connect the Z/T Gun (**Figure #21**), and submerge it into water, make sure the diver has the trigger pressed in the ON position before starting the unit again, this will prevent a pressure chock wave from damaging the pump in the instant that the engine is restarted.
6. At this point is recommended to apply hearing protection to the operator and people near the unit prior to starting the engine.
7. Restart the feed pump again and restart the unit again, let the diver go to the desired position to work.

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8. Once the diver is ready and in position, move the throttle to the “MAX” position (**Figure #20)** so the diver can start the cleaning process.

Shutting Down the CaviBlaster:

1. Move the throttle to the “MIN” position (**Figure #29**)
2. Shut off the engine by turning the key to the “OFF” position (counterclockwise).
3. Stop the feed pump by pushing down the pump switch.
4. Squeeze the trigger on the gun to make sure all pressure is released while the gun is still submerged.
5. Now is safe to remove the gun from the water.
6. If it’s the end of the day, flush and rinse the unit with fresh water for 5 minutes to clean all hoses and the complete system.

Recommendations for Safety Operation of the System:

1. When the diver is ready to commence cleaning operations, make sure that the gun is submerged in water, before moving the throttle lever up to “MAX” (**Figure #20**).
2. Ensure that the power unit operator and other persons working in the vicinity of the unit wear appropriate hearing protection when the engine is running. If the diver is not wearing a helmet, hearing protection is recommended. CaviDyne recommends “Doc’s Pro-plugs” vented earplugs or equivalent for diver hearing protection.
3. To activate the cleaning cavitation stream, squeeze the trigger to the open or “ON” position, use the most efficient operating technique as explained in next chapter.
4. The diver must wear neoprene or rubber gloves to protect the hands and follow all safety regulations that may be applicable to the work being performed.
5. Ensure that the gun is submerged all the time the engine and pressure pump are operating.

Recommendations for Better Results:

Once the engine is throttled up to operating speed and the trigger on the gun is pulled, the diver must find the most effective distance between the gun nozzle and the surface to be cleaned.

The most efficient technique is to hold the tip of the nozzle 2-5 inches (5 – 12 cm) away from the surface to be cleaned at a 25-degree angle (**Figure #28**). The diver needs to observe the shape of the cavitation jet cone, at greater depths the pressure will make it smaller, please have in mind that the wider zone of the cone is the most efficient part of the cavitation jet. Placing the nozzle in less than 2 inches from the surface will not allow for efficient cavitation performance and will degrade the cleaning capability of the system.

FOLLOW THE SAFETY REGULATIONS THAT MAY BE APPLICABLE TO THE WORK BEING PERFORMED.

If the diver operating the system must be replaced of the cleaning operation terminated, disengage the pressure pump by pulling down the throttle to the “MIN” position (**Figure #29**) and then release the remaining pressure in the hose by pressing the trigger of the gun to the open position, revert to step 1 of operating instructions to start the cleaning again.

WARNING: ALTHOUGH THE CAVIBLASTER® SYSTEM IS SAFE TO USE WHEN SUBMERGED IN WATER, THE SYSTEM GENERATES A HIGH PRESSURE (UP TO 2,800-PSI) WATER STREAM, WHICH CAN CAUSE INJURY WHEN THE GUN IS OUT OF THE WATER. ALWAYS KEEP THE GUN SUBMERGED WHEN THE PRESSURE PUMP IS ENGAGED.

Adjusting the System for Maximum Performance:

1. **Using the pressure gauge included with the CaviBlaster power unit,** (**Figure #30**) the water pressure will need to be higher to account for sidewall friction loss in the pressure hose. The pressure at the pump should be 2,800-PSI plus 0.75-PSI per foot of pressure hose.

For example, if using the CaviBlaster with 100 feet of pressure hose, the pressure gauge located next to the pump should indicate 2,875-PSI. Pressure adjustments are made in the pressure regulator by turning the nuts of the green spring. There should always be a trickle of water through the bypass when the gun trigger is in the open or “ON” position.

2. **Using a calibration pressure gauge between the pressure hose and the CaviBlaster gun,** (**Figure #34**) (not included with the unit) the water pressure should be 2,800-PSI with the gun submerged and the gun trigger in the open or “ON” position.

The pressure is adjusted by turning the nuts on the end of the pressure-regulating unloader (**Figure #30**). This adjustment increases or decreases the flow of water through the bypass hose when the CaviBlaster gun trigger is in the open or “ON” position.

The flow of water through the bypass hose, in turn, determines the flow of water through the pressure hose and the gun. Less flow through the bypass hose means more flow through the gun which translates to higher velocity and pressure. There should always be a trickle of water through the bypass when the gun trigger is in the open or “ON” position, this ensures that the bypass will open without a pressure shock wave damaging the pump when the gun trigger is released to the closed position.

3. **Without a pressure gauge,** close the pressure-regulating unloader until there is just a trickle of water (less than ¼ GPM) coming out of the bypass with the gun trigger in the open or “ON” position.

Routine Maintenance of the CaviBlaster System:

1. Empty and clean the inline filter every day (**Figure #1**).
2. Check the oil level and consistency in the engine and pressure pump every day (**Figures #2 and #3**).
3. Flush the system and rinse the power unit with fresh water after each day's use, for at least 5 minutes, to make sure all inside residuals are removed.
4. Inspect the pump drive belt every week and replace the belt when cracking appears.
5. Change the engine oil after the first month or 20 hours and every six months or 100 hours thereafter. Replace the oil filter every 200 hours. Use SAE 10W-30 oil for general all- temperature use (**Figures #7 and #8**).
6. Clean the air cleaner cover, filter elements and base every three months or 50 hours. Replace the paper filter element every twelve months or 300 hours or if damaged or excessively dirty.
7. Change the oil in the pressure pump after the first 50 hours and every 500 hours thereafter. Use single weight lubricating oil (SAE 30 weight non-detergent)
8. Change the spring for the gun trigger every 12 months or less if required (**Figure #32**).

Oil Change(s) of the CaviBlaster System:

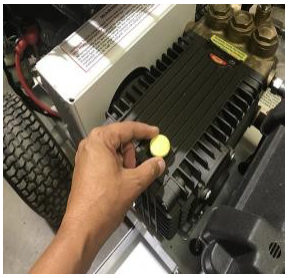
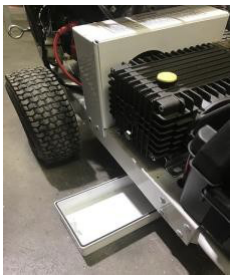
Honda Engine Oil Change:

1. Remove top oil cap from the engine
2. Set container to receive the used oil, under the engine
3. Open small hose at the foot of the engine
4. Let the engine oil drop, for about 20 minutes
5. Close small hose
6. Put in one ¼ **Oil SAE 10W-30**
7. Take measure of oil in engine
8. Place oil cap again




Pressure Pump Oil Change:

1. Set the unit in an inclined position, to easy drain the oil pump
2. Open oil cap from top of the pump
3. Set container to receive the used oil, under the pump
4. Remove oil cap from bottom of the pump
5. Let the oil drop for 20 Minutes
6. Close bottom cap
7. Set unit in a flat position
8. Put in one ¼ **Non-Detergent SAE 30 ISO100**
9. Place oil cap again and check the level in the pump, the middle is perfect.

Summarizing Daily Operating Instructions:

1. Inspect the system for damage. Clean the inlet strainer. Check oil level.
2. Attach all hoses to the unit and connect the feed pump electrical cable.
3. Start the feed pump or alternate water supply and ensure that the system is primed.
4. Attach the gun to the pressure hose.
5. Make sure that the diver is ready to work and that the gun is submerged in the water.
6. Apply hearing protection, start the engine and adjust the throttle to “MAX.”
7. Activate the cleaning cavitation stream by squeezing the gun trigger to open or “ON”.
8. Proceed with cleaning.
9. Bring the engine to the “IDLE” position and shut off **within 10 seconds.**
10. Stop the feed pump.
11. Release pressure from the hose(s) by squeezing the gun trigger to the open or “ON” position while under water.
12. Remove the gun from the water.
13. Flush the system and rinse the outside of the Power Unit with fresh water.

NEVER TURN OFF FEED PUMP WHILE WORKING

List of Figures:

Figure #1 – Inlet Water Strainer

Figure #2 – Oil Level in Pressure Pump

Figure #3 – Oil Level in Engine

Figure #4 – Gasoline Tank

Figure #5 – Oil Filling Port in Pump

Figure #6 – Oil Filling Port in Engine

NOTE: Red cap is for transportation purposes ONLY.

Figure #7 – SAE 30W Non-Detergent

Figure #8 – SAE 10W 30 Engine Oil

Figure #9 – By-Pass Hose

Figure #10 – By-Pass Hose Connection

Figure #11 – High Pressure Hose

Figure #12 – HP Hose Connection

Figure #13 – Dual Fuel Lines

Figure #14 – Fuel Lines Connection

Figure #15 – PVC Feed Hose / Pump

Figure #16 – Feed Hose Connection

Figure #17 – Feed Pump Connection

Figure #18 – Feed Pump ON / OFF Switch

Figure #19 – Ignition Panel

Figure #20 – Throttle to MAX Position

Figure #21 – Zero Thrust Gun

Figure #22 – Surface Lance

Figure #23 – Battery in Marine Case

Figure #24 – Low Oil Level Warning

Figure #25 – Noise Reduction Muffler

Figure #26 – Pressure Gauge / Manometer

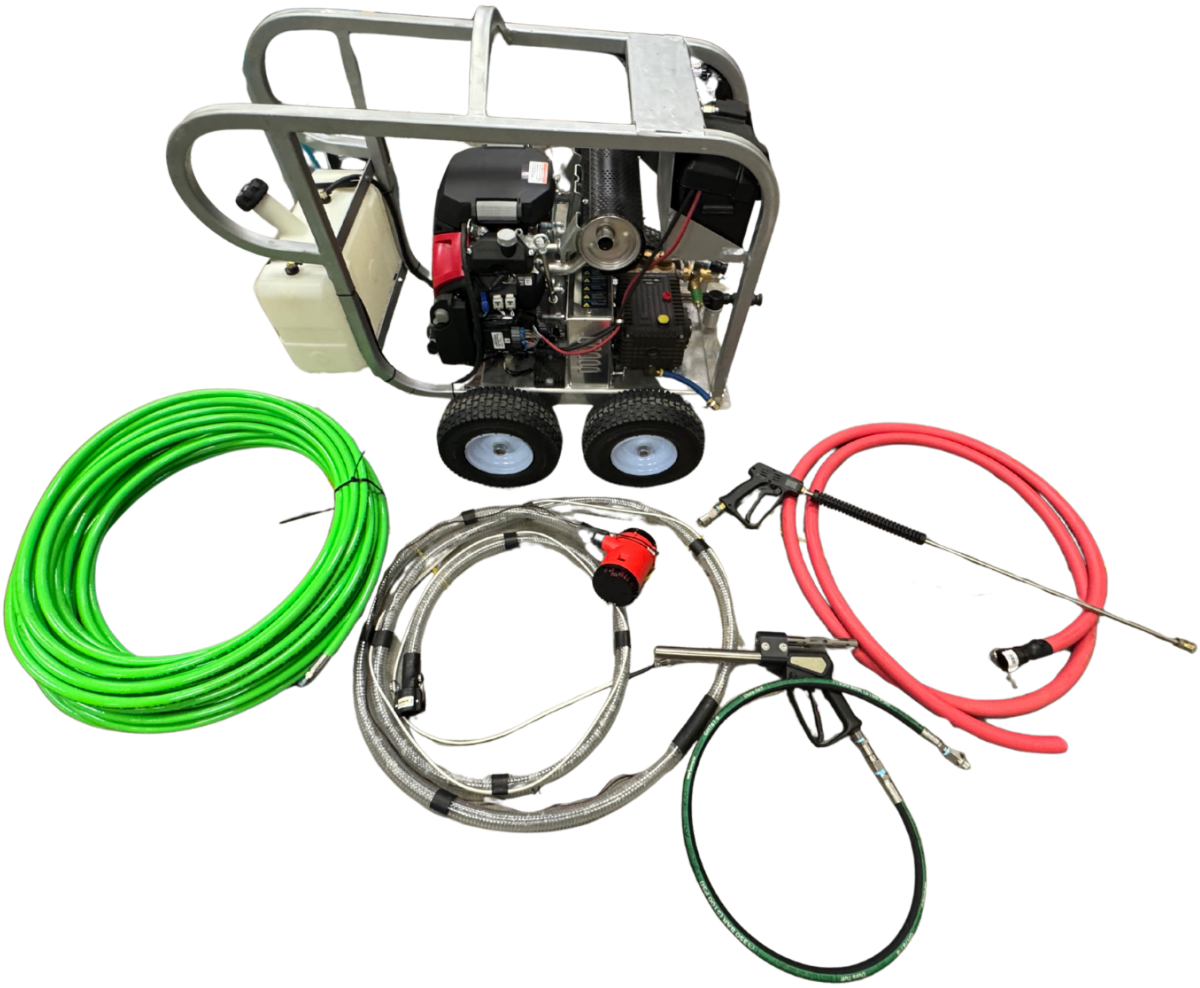


Figure #27 – CaviBlaster Complete System Assembled

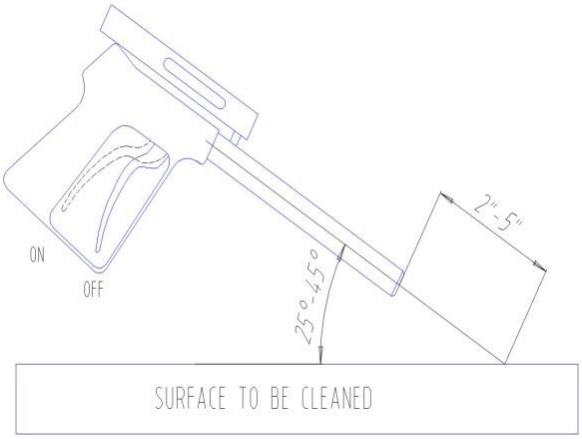


Figure #28 – Gun Position for Best Results

Figure #29 – Throttle in MIN Position

Figure #30 – Pressure Regulating Unloader

Figure #31 – Air Filter on Top of Engine

Figure #32 – Z/T Gun Repair Kit

Figure #33 – Z/T Gun Assembly

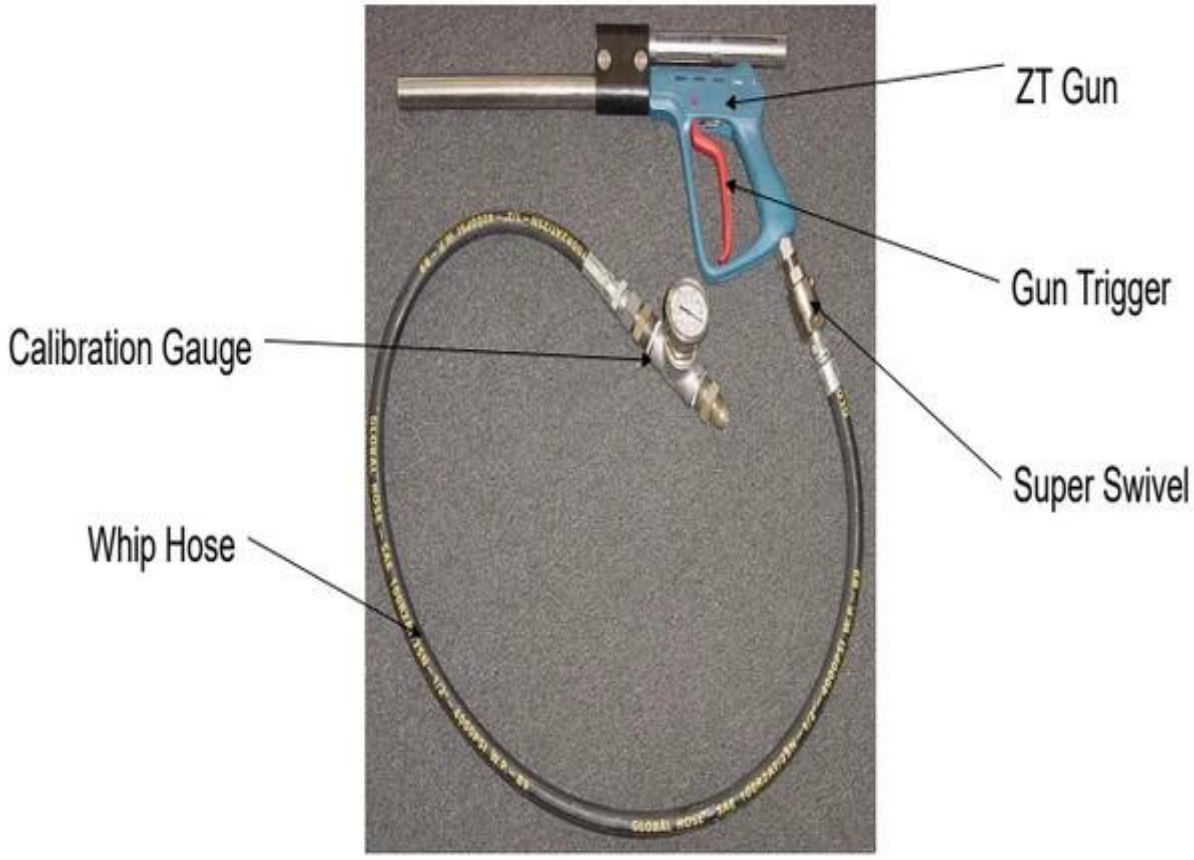


Figure #34 – Additional Calibration Gauge

WARNING:

While the CaviBlaster® system is very safe, operators should exercise care when using this equipment. With the diver lance underwater, the cavitation “flame” can be safely passed over the operators’ skin at normal operating distances of 2” – 3” from the tip of the nozzle. However, at very close distances (typically less than 1”) both nozzles can cause harm to the operator, particularly in the initial instant that the system is activated. For that reason, operators should exercise caution when operating the gun with the nozzles near the body. The operators should also ensure that the reverse-thrust nozzle guard is secured in the correct position prior to operating the gun. The operators of the CaviBlaster® systems should always wear neoprene or heavy rubber gloves to provide protection to the hands and nails. The gloves will absorb most of the energy produced by bursting cavitation bubbles and prevent the cavitation bubbles from contacting the operators’ hands. The gloves will also protect operators’ hands from the initial shockwave when the gun is activated. Serious harm and injury may result from the misuse of CaviBlaster® system equipment or improperly selected fittings, hoses or attachments. All components of the system should be checked against the manufacturers’ instructions to ensure that they are compatible with the pressures being used and of the correct thread type and pressure rating for the intended service.

Refer to these Operating Instructions and engine/pressure pump manufacturers’ operation manuals for instructions or call CaviDyne, LLC at +1 (941) 413-5431 | sales@cavidyne.com with any questions.

CAUTION: DO NOT USE IT TO CLEAN SENSITIVE SURFACES AS LED LIGHTS, UNDERWATER LIGHTS, ELECTRONIC EQUIPMENT, ETC.