

OSCAR-in-a-Box Treatment System
O & M and Troubleshooting Manual
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Manufactured by:

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OSCAR-in-a-Box System Layout

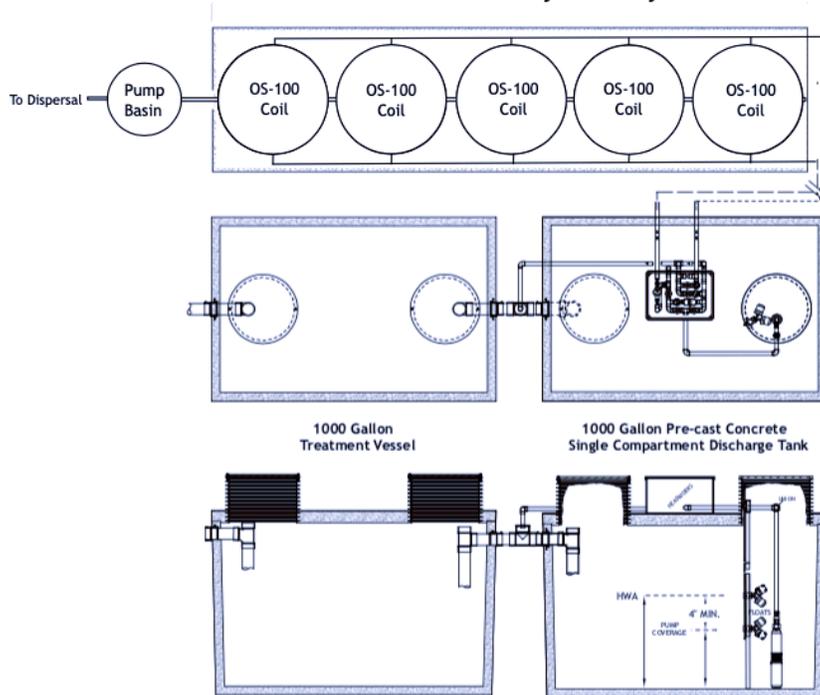


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System Description

The *OSCAR-in-a-Box (OS-B)* is an onsite sewage dispersal component for use with treated wastewater meeting concentrations of no more than 100 mg/l carbonaceous biological oxidation demand and 75 mg/l total suspended solids. Wastewater first passes through a treatment vessel and then into a dosing tank where it is dosed to the *OS-B* coils. Effluent is micro dosed into a layer of ASTM C-33 sand where physical, biological, and chemical treatment processes remove organic compounds and pathogens from the waste stream. Treated liquid then migrates downward to the receiving soil where final discharge of treated wastewater enters the soil environment.

Performance expectations

The typical performance of the *OS-B* system produces final effluent quality that is clear, odorless, or a slight musty smell. The *OS-B* system meets Class I wastewater treatment standards set forth in NSF/ANSI standard 40 and *Washington State Department of Health's* treatment level B. Testing performance during NSF testing was:

<u>CBOD</u>	<u>TSS</u>	<u>Fecal coliform w/UV</u>	<u>Turbidity</u>
<2	<3	<1000 MPN/100ml	<2 NTU

Parts list

Discharge tank:

- HWN-.7-RF Headworks
- Lowridge, 1/2 hp, 30 gpm, model LOT-30.
- Floats switches, normally open (SJ Rhombus)
- Control panel (***LF2P-RF-OS-AUXR, or LF2P-RF-OS-AUX***), *Lowridge Onsite Technologies, LLC*)

Headworks:

- Housing
- 3/4" *Netafim*™ disc filter, 120 mesh, 130 micron (part number 25A45-120)
- 5- 1" 24 volt solenoid valves, model number LVET1GH2 (made by *DOROT*)
- 3/4" ARAD flow meter
- 3-Pressure gauges: 0-100 psi oil filled

OSCAR-in-a-Box Media:

ASTM C-33 concrete sand as per WADOH *Recommended Standard & Guidance for Intermittent Sand Filter.*

Basic Tools and Equipment

Cordless drill motor & misc. bits
Philips and flat head screwdrivers
Multi test meter
DO test kit (recommend ampoule type)
Litmus paper
Shovel
Channel locks
Pipe cutter
Pipe saw
Glue
Water hose and nozzle
Extension cord
Wire cutters
Wire strippers
Turkey baster
Sump pump w/adapter to garden hose
Rubbing alcohol
Dielectric grease

Spare Parts

3/4" disc filter cartridge, 120 mesh, 130 micron
1" normally closed two- way solenoid valve, Netafim™
Normally open float switches
Splice box screws
Riser lid bolts
Wire nuts for 12 gauge and 16 gauge wire

Maintenance Schedule:

During the first two years after installation there are 4 inspections: two six month and two annual inspections. The items and intervals to be inspected are as follows:

Six month inspections: At six months and 18 months after installation the inspections are cursory in nature. Components to be checked and observations recorded are: Headworks pressure and forward flow, and surfacing effluent on OS-B.

Annual inspections: All components listed for the six month inspection plus all other items listed on the O&M inspection check list.

Routine Procedures

The most important aspects of operation and maintenance of onsite systems are the accurate observation of system performance and the complete recording of the observations. Incomplete or inaccurate data will lead to false conclusions and the corresponding maintenance activities could be un-necessary and costly. In a majority of cases, monitoring visits will result in a confirmation that the system

is functioning as intended. Other than routine, preventative maintenance, very little should be required to keep the system functioning properly. In the few instances where something is actually wrong with the system and significant corrective action is needed, proper diagnosis starts with correct observation. To insure no component of the system is skipped, follow the flow of wastewater: treatment vessel, discharge tank, headworks, *OS-B*, drainfield. For details of how to perform the specific operations mentioned below, see appendices.

Septic Tank:

Follow recommendations of septic tank's manufacturer.

Headworks:

Observations:

- Check and record pressures and flow.
- Check proper operation of flushing sequence.

Maintenance:

- Clean disc filter.

Discharge tank:

Observations:

- Measure sludge level.
- Check clarity of liquid.
- Check float switches: properly attached and function.

Maintenance:

- When 6 inches of sludge accumulates, pump the tank.
- Check inside splice box and remove any accumulated condensation.

Trouble Shooting

This section will outline the common problems that may arise. There will follow a detailed description of how to diagnose the critical internal components. For further information contact *Lowridge Onsite Technologies, LLC, 877-476-8823*.

Problem:	Possible causes:	Solutions:
No flow through the <i>Coils</i> .	Dosing pump doesn't run. Valves 1 or 2 don't open Disc filter plugged Emitters plugged	Repair or replace pump Repair or replace valve(s) Clean or replace disc cartridge Chlorine wash or replace
Disc filter clogging	Flush sequence failed Tanks need servicing	Restore flushing sequence Pump tanks

Failed float switch: If all other indicators test negative (no high water conditions and pumps work) a float switch may be shorting out. Use a clamp type amp meter to measure possible amperage on float switch leads inside the control panel. The float that registers current is shorting out and needs to be replaced.

Leaky tanks: If alarms are occurring during periods of rain fall, the tanks maybe leaking. Connections at the riser/tank connects, pipe connection to tanks, and protrusions through risers could be leaking. Inspect and seal as needed.

No Flow Through *Coil*:

Pump doesn't work:

See section on "**High Level Alarms**".

Valves #1 and #2 Don't Open: See "**Disc Filter Clogging**" section.

Disc Filter Clogged: "**Disc Filter Clogging**" section.

Emitter Clogged: Flush Coil into septic tank with chlorine solution or replace *Coil*.

Liquid Surfacing on OS-B:

Wrong Media: Refer to the media specifications in "**Parts List**".

Biological Overloading: Examples of the causes of biological overloading can be one or a combination of the following: heavy use of medications by the residence of the house, heavy use of disinfectants and cleaners, certain cooking habits (heavy use of cooking oils and fats), heavy use of oil based soaps and lotions. This list is not inclusive!

Effluent samples must be sent to a certified laboratory for analysis: biological oxidation demand (BOD), total suspended solids (TSS), and fats, oils and grease (FOG).

A professional should be consulted to determine what the cause of the over load is before lasting corrective action can be taken.

Underdrain plugged: The underdrain may have plugged. Replace underdrain.

Discharge pump failed: If the discharge pump failed effluent could back up and cause flooding of the OS-B. Correct issue with pump.

Disc Filter Plugging:

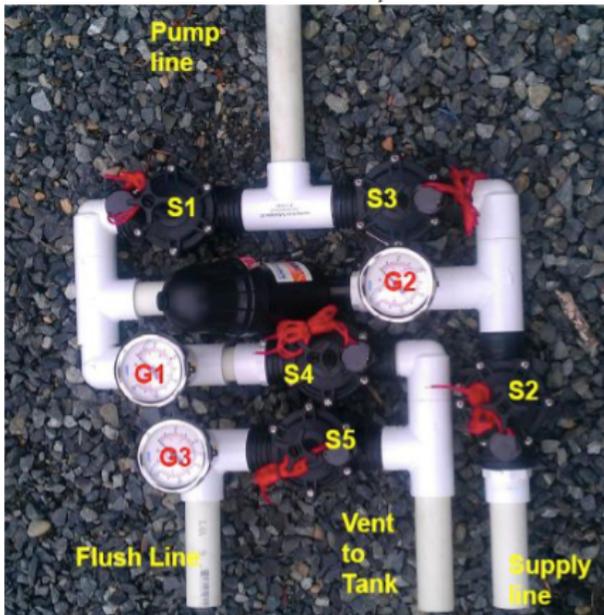
To determine if the disc filter is plugged, review the pressure gauge readings. The pressure gauges should read between 48-50 psi. There should be no more than 1-2 psi differential between gauges #1 and #2. There should be about 1-2 psi differential between gauge #2 and gauge #3. A pressure drop between #1 and #2 indicates the disc filter is plugging and restricting flow to the *Coil*. If so, conduct a manual flush of the disc filter. If the pressures are not corrected then disassemble and replace disc cartridge with a clean unit. The disc filter could be plugging for a variety of reasons.

- If the treatment vessel has not been serviced adequately, excessive solids may carry-over from the septic to the recirculation tank.

- Inappropriate wastewater habits in the house may cause a biological upset in the septic tank resulting in higher organic concentrations in the septic tank effluent.
- The Headworks valves malfunction and do not properly flush the disc filter or *Coil*.

Headworks Diagnostics:

To trouble shoot the headworks, refer to the following illustration and Appendix B:



Diagnostic check of reverse flush headworks:

Position all toggle switches inside the control panel to "OFF" mode.
Position pump 1 and valves 1 & 2 in "HAND" mode.

Pump runs but no pressure on any gauges. While pump is running manually open S1. If pressures on all three pressure gauges begin to rise, the solenoid for S1 needs replacing or solenoid is not being energized (possible bad wire connection). Check voltage at panel

between V1 and VN, and in the headworks at the corresponding wire connections. If voltage is good (24-27 volts) the solenoid is bad.

Pump runs and gauges G1 and G2 register pressure and G3 is "0". Manually open S2. If the readings on G3 begin to rise, the solenoid for S2 needs replacing or solenoid is not being energized (or wire connection is bad). Check voltage at panel between V2 and VN, and in the headworks at the corresponding wire connections. If voltage is good (24-27 volts) solenoid is bad.

Pump runs and all gauges read the same pressure (more than 0 psi). Emitters are plugged.

Pump runs and G1 registers pressure and G2 and G3 read 0 psi (or significantly less than G1). The disc filter is plugged. Further diagnostic work is needed to determine why filter is not functioning (see below).

Disc Filter Flush Diagnostics: Open inlet of septic tank. Position pump #1 and valves 3 & 4 in "HAND" mode (all other toggles in OFF). G2 will have a higher reading than G1, and G3 will be zero and water will be entering into the inlet of the septic tank at a rapid rate. If not, follow the diagnostic steps:

Pump running with no pressure and no flow into septic tank inlet. Manually open S3. If pressure on G2 and G1 rise and water flows into septic tank inlet, S3 needs replacing or is not getting energized (possible bad wire connection). If pressures rise with no water flowing into septic tank inlet, manually open S4. If pressures drop and water flows into septic tank, both S3 and S4 are bad or both are not getting energized. Check voltage at panel between V2 and VN, and in the headworks at the corresponding wire connections. If voltage is good (24-27 volts) one or more solenoids are bad.

Coil Flush Cycle Diagnosis: Position pump #1, valves 1 & 2, and 5 in "HAND" position.

Pump runs, pressures on all gauges are close to identical and no flow into septic tank inlet. Manually open S5. If pressure on G2 and G3 drop and water flows into septic tank inlet, S5 solenoid is bad or valve is not being energized (or has a bad wiring connection). Check voltage at panel between V3 and VN, and in the headworks at

the corresponding wire connections. If voltage is good (24-27 volts) solenoid is bad.

At completion of the diagnostic steps position all toggle switches in the "AUTO" position.

Appendices

Measuring *Coil* Dose Discharge Rate:

Position all Toggle switches in the "OFF" position. Switch pump 1, valves 1 & 2 to "HAND" and allow pump to run for a minute. While pump is running, measure flow for 1 minute on the flow meter. Flow for one OS-50 is 0.35 gpm. Flow for an OS-100 is 0.7 gpm.

Reposition all toggle switches to the "AUTO" position.

Panel Operations

The *LF2P-RF-OS-AUX* or *LF2P-RF-OS-AUXR* control panel is a 110 volt universal panel for most single family *OS-B* systems. It has the capacity to operate three major outputs: Dose pump, discharge pump, and the "*Reverse Flush*" headworks. All logic is controlled by a Siemens Logo. The pump operation options are as follows:

- Dose Pump (Pump #1): is operated in a time-dose mode. Pump #1 pressurizes the *Coil* and back-flushes the disc filter and forward flushes the *Coil(s)*. The control panel allows the operator to determine the number of dose cycles before the disc filter flush and *Coil* flush cycles (default setting is 90 doses). This pump has a redundant off float switch that will shut off Pump #1 if the liquid level falls below the minimum liquid level.
- Discharge Pump (Pump #3): The discharge pump is time-dosed. The bottom float switch operates as the "Timer On" float switch. The high level alarm float will override Pump #1 off as well as cause an audible and visual alarm signal.

The timers have the following factory default settings:

- Dose-pump: 7 minutes, 30 seconds off, 30 seconds on. (V1_OFF, V1_ON)
- Disc filter flush: after pre-set number of dose cycles have completed (90 doses), the disc filter flush “ON” cycle runs for 15 seconds. (V2_ON).
- Coil flush: after Disc filter flush is completed, the Coil flushes for 2 minutes (V1V3_ON).
- Discharge pump settings: 3 minutes 38 seconds off (DT off time) and 22 seconds on time (DT on time).

Start Up Procedures:

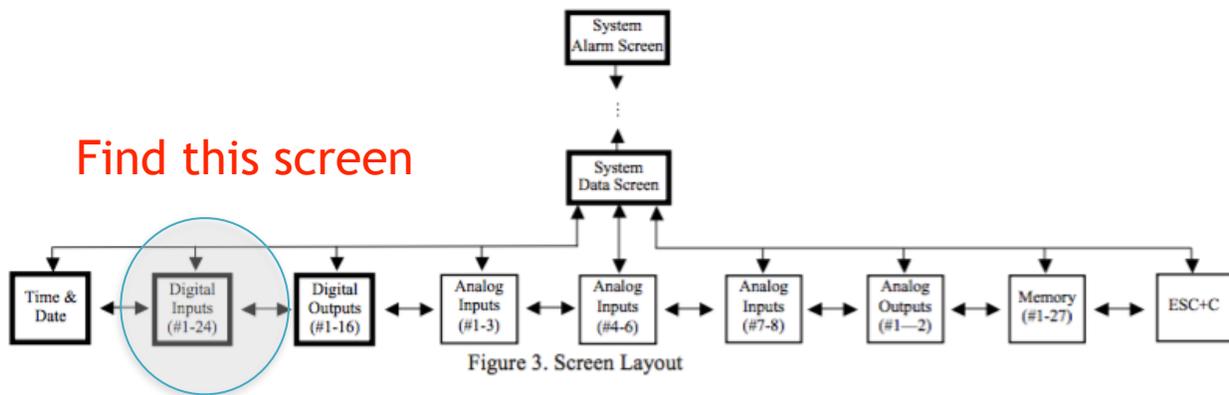
Prior to conducting any of the following procedures, inspect the wiring to insure the system is correctly wired. Pull all the float trees from the tanks and place across the tank openings so all the floats hang down. Now power up the system and turn all the breakers to the “ON” position and all of the toggle switches in the off position. Ensure there is enough water in tanks to conduct pump tests.

a. Test floats:

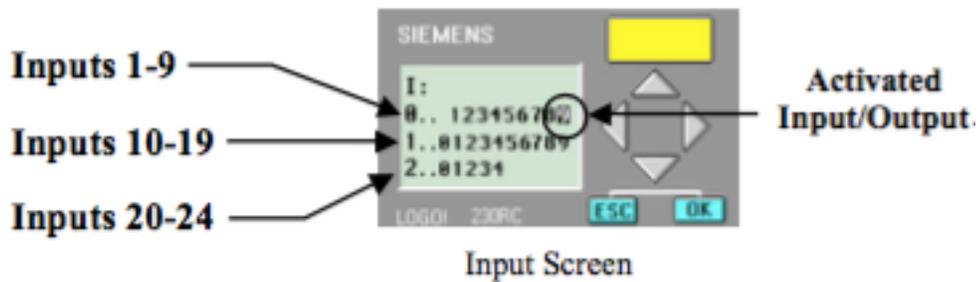
On the Seimens Logo scroll to the input screen as shown here:

Screen Navigation:

The screens are arranged in the order shown in Figure 3 below. To move between screens, use the four arrow keys. The screens of interest are shown in bold. Additional built-in screens will be present, but do not contain useful information.



The actual screen will look like this:



When lifting the floats check this screen to determine if the floats are wired into the correct position. When the floats are lifted a corresponding digit will be back lit. The input values are as follows:

- 1 = bottom recirc tank float
- 2 = top recirc tank float
- 3 = bottom discharge tank float
- 4 = top discharge tank float.

Test dose pump floats:

Lift top float. Input indicator “2” will back light and the alarm should sound and the beacon should illuminate.

Lift bottom float. Input indicator “1” will back light.

Test the discharge floats:

Lift top float. Input indicator “4” will back light and the alarm should sound and the beacon should illuminate.

Lift bottom float. Input indicator “3” will back light.

Place floats back into tanks.

b. Test pumps and valves:

Dose/Flush pump and valves:

Place valve 1 & 2 toggle switch and pump 1 toggle switch to MAN position. Pump should dose and all three pressure gauges should stabilize about 50 psi. No water should be flowing into septic tank.

Place valve 3 & 4 toggle switch to MAN and valves 1 & 2 toggle switch to OFF, pump #1 in MAN. Pump should run, pressures should change: gauge 2 highest pressure, gauge 1 less than 2, and gauge 3 should indicate 0 psi. Water should be flowing into septic tank very rapidly.

Place valves 1 & 2 and valve 5 in MAN position and valves 3 & 4 in OFF position, and pump 1 in MAN. Pressure on gauge 1 should indicate the highest pressure, gauge 2 less than 1, and gauge three should indicate between 0-3 psi and water should be flowing into septic tank at a moderate rate.

Position all toggle switches in the OFF position.

Discharge pump: Energize the discharge pump by switching the Pump #3 toggle switch to MAN.