

CLOUD RINGS by Ned Kahn

MAINTENANCE INSTRUCTIONS

GENERAL INFORMATION:

A smoke ring is generated in this exhibit by pushing on a large annular ring. The torus shaped smoke ring travels straight up as far as the ceiling will allow. The exhibit uses a reverse osmosis water filter to supply clean water to the humidifier. The filtered water greatly increases the life of the humidifier, especially in locations that have hard water. About 1 gal/hr is used during operation. The exhibit is equipped with a sump and pump to drain condensation that collects inside the dish.

General Cleaning:

A drain screen is located in the center of the dish to catch foreign particles. The maintenance crew will need to clean this screen at regular intervals. The finished or painted surfaces of the exhibit may be cleaned with a mild soap solution or general purpose cleaner. The acrylic graphic panels should be cleaned with a plastic cleaner and a soft wipe that will not leave scratches, (we suggest Wipe-All™).

Initial Set-up:

The exhibit needs to be positioned in an area with a high ceiling. The viewer should see a dark background when looking up. A spotlight aimed down will give the best illumination of the ring as it ascends. A skylight can also work well, just keep in mind that the vantagepoint that views the ring with the skylight behind it will lose sight of the ring.

The reservoir is nested against the side of the exhibit. Be sure the cabinet clears the circuit breaker switch. The water hose from the reservoir is fed through the opening in the base and pushes onto the humidifier inlet.

The reverse osmosis water filter should be mounted in a washroom with a feed line running to the exhibit. The filter will dump around 70% of the water it uses, so it needs to be mounted near both

a drain and water supply. The exhibit has a pump that is capable of pumping the condensate up to a 10-15 foot head (@10 GPM). If a municipal drain cannot be located near the exhibit, a suggested Ø3/8" (10mm) I.D. hose will need to be routed from the exhibit to the drain. It will most likely be routed along side the feed line through a hole in, or a 'pancake' strip along, the floor. Choose tubing for the drain line that will not collapse in time. ABS or polyethylene are recommended. Vinyl will work if the wall thickness is at least 1/8". If a copper line is run, place a silicone phosphate cartridge between the reverse osmosis filter and the copper pipe. This will prevent the purified water from leaching copper. Be sure to change the pre-filter cartridge on a routine annual basis. This will insure that the life of the expensive membrane is optimized.

The reverse osmosis filter is supplied with all of the fittings necessary in most circumstances to connect it to the water supply and drain. In addition, the exhibit is supplied with a fitting on the sump pump, humidifier and filter for connecting Ø1/4" or (6mm) O.D. polyethylene or copper tubing to the humidifier, and Ø3/8" I.D. hose to the sump pump. The connection for the drain hose to the municipal drain will need to be determined by the client.

The sump (plastic tank) is located inside the exhibit directly underneath the drain. To remove it, the 1-1/2" drain tailpiece must be loosened. The sump can then be slid out. Inside is a float switch, and pump. The electrical cords are run out of the slot located at the rear of the tank. The float switch plugs into the ground-fault outlet, and the pump plugs into the float switch outlet, (which is built into the plug.) The pump sets into the sump away from the float so as not to interfere with its swing. Slide the sump back into the exhibit and wind the nipple back into the drain fitting by first inserting it through the opening in the lid.

Filling the Reservoir:

The reservoir will have to be filled every two days. It holds a maximum of 20 gallons. (Approximately 80 liters.) A fill cap is located on the top right side of the reservoir cabinet. Removing the Allen fastener will access the reservoir for filling. A funnel has been provided for filling with a large container. Otherwise a hose can be inserted through the opening if a portable transfer unit is used for filling.

Humidifier Maintenance:

Periodically check the unit for proper operation by removing the hose connections at the tops of the output pipes. The unit should produce a steady stream of mist from each pipe.

Every 12 weeks, the exhibit should be checked for any moisture accumulation inside the cabinet, and mineral deposits inside the humidifier.

1. Do not fill the reservoir with water for a few days before cleaning so that it will be low.
2. Disconnect the humidifier wiring cable (multi-connector plug) from the electrical box to prevent either accidental filling or powering of the transducers.
3. If the unit needs to be removed for servicing, loosen the drain tailpiece and disconnect the four discharge hoses from the manifold. The humidifier tray can then slide out from under the dish.
4. If the unit needs to be removed for servicing, disconnect the water supply from the solenoid valve.
5. If the unit needs to be inverted to access the transducers or circuit boards, remove the screws that secure the unit to the floor.
6. The PVC top cover will lift out of the fog machine to inspect the sump, transducers and float switches.
7. The fog machine (humidifier) has switches for level control and "low water". The unit will automatically shut down when low on water. The switches are in the reservoir and should be checked for proper operation with each routine maintenance. (However be careful not to power the transducers without water over them, this overloads the electronics.)
8. Clean inside the fog machine by absorbing dirty water with paper towels or a cloth. Wash all of the interior surfaces down with a sterilizing solution consisting of a tablespoon of liquid bleach in 1/2 liter of water. This will sterilize any bacterium

that can become air borne during operation. Give the solution a few minutes to soak then carefully wipe the inside and transducers on the bottom of the tank. It is recommended to sterilize the humidifier and water tank four times a year.

9. If the tube that connects the fog machine to the water tank appears dirty, remove and clean the tube.

10. If sludge is apparent in the water reservoir, remove the top of the cabinet. Clean the water tank with paper towels. The tank should also be sterilized as in step #8. Replace the top.

11. Fill the tank with filtered water.

12. Replace the PVC cover on the fog machine.

13. If the humidifier has a difficult time starting, check for air bubbles in the fill tube that connects the tank to the fog machine. Topping off the water tank should push the bubble through the tube. Jiggling the tube or sliding it off of one of its hose barbs can vent the bubble out if topping off the tank is inconvenient.

14. If the humidifier has poor output, even after cleaning, than one or more of the transducers may be bad. Transducers and boards are replaceable. Unplug the humidifier and remove the drain line. Remove the inlet hose from the water tank and plug it with a suitable object. Lift the humidifier from the base of the exhibit and drain it. First test the unit in a place that you can fill it with enough water to lift the float switches, and plug it in while observing the disc shaped transducers in the bottom of the reservoir. They should produce a stream that spurts over the top of the humidifier. Keep track of the discs that are not operating and proceed to the next step.

15. Find a suitable location to work on the humidifier assembly and remove the top cover to access the transducers. The transducers are bolted to the stainless steel plate in the bottom of the tank. Remove the two bolts that retain the transducer to replace the unit. DO NOT remove the fasteners in the corners of the plate since these seal the plate to the bottom of the plastic sump. DO NOT power up the circuit board with the piezoelectric transducers disconnected from the circuit board. This will

destroy the power transistor on that board. Replace the bad transducers and boards, and reconnect the plumbing for another test. Remember, running the unit without water over the transducers will overload the electronics, so don't override the float switches, or plug it in while upside down.

Replacing the Membrane:

First remove the screws that fasten the Outer Clamping Sectors to the edge of the aluminum dish, keeping track of their positioning; i.e., with pieces of numbered tape. The membrane and Push-Ring will then lift off. Then dis-assemble the Inner Clamping Sectors to free the old membrane, keeping track of their positioning with respect to the Push Ring. Place the new membrane into position on the Push Ring and mark the hole pattern. After punching the holes, reassemble the membrane, Push Ring and Inner Clamping Sectors. Replace the membrane assembly onto the dish, with the Inner Clamping Sectors aligned correctly over the springs in the dish. (Removing two of the springs will allow the membrane to lie flat.) Then place the Outer Clamping Sectors in position to serve as a template for marking the holes in the membrane. Note that the gaps between the sectors are staggered with the gaps in the dish brackets. Mark the holes in the membrane and punch them out. (The membrane will probably have to be removed for this, so keep track of orientation.)