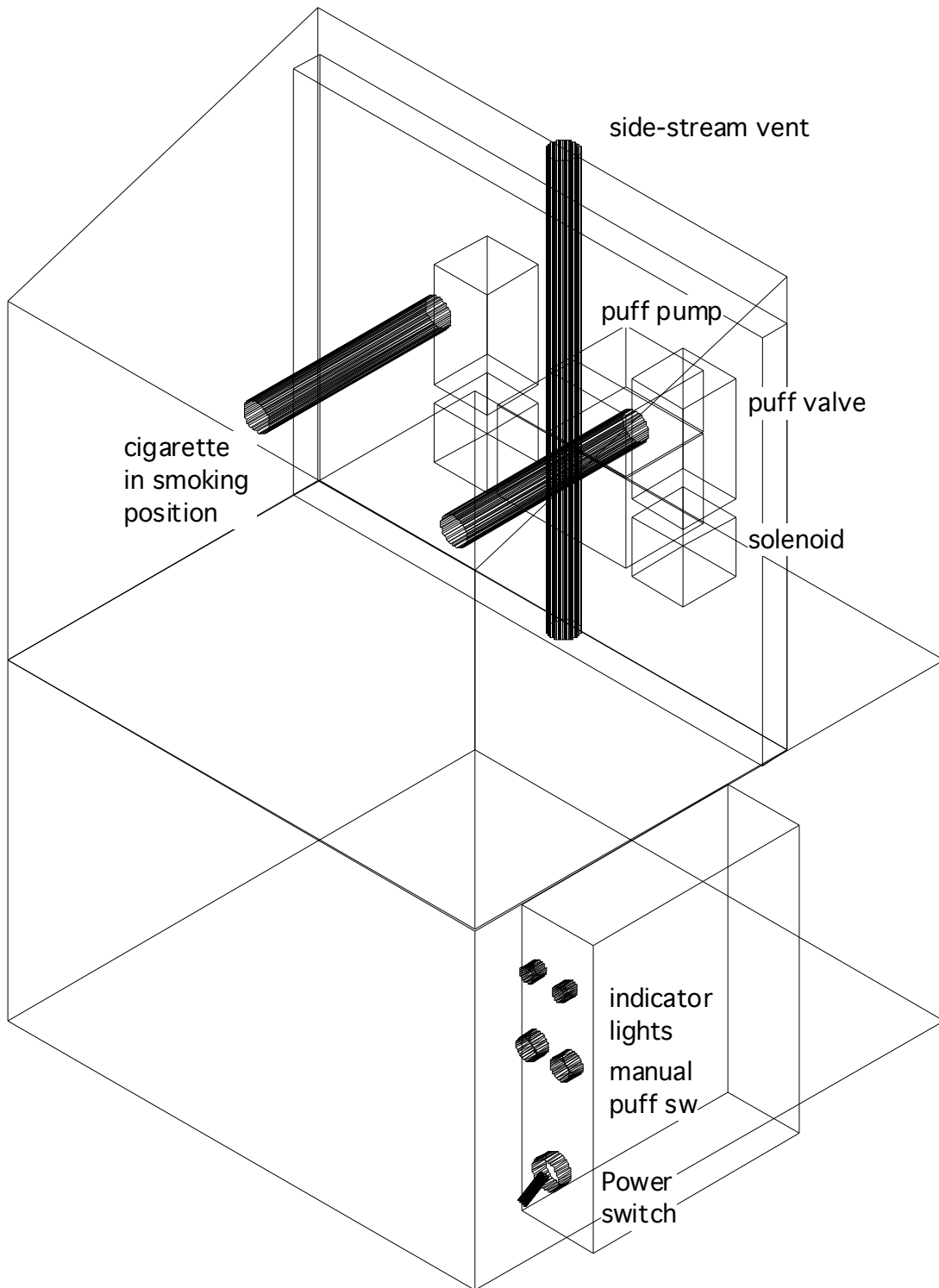


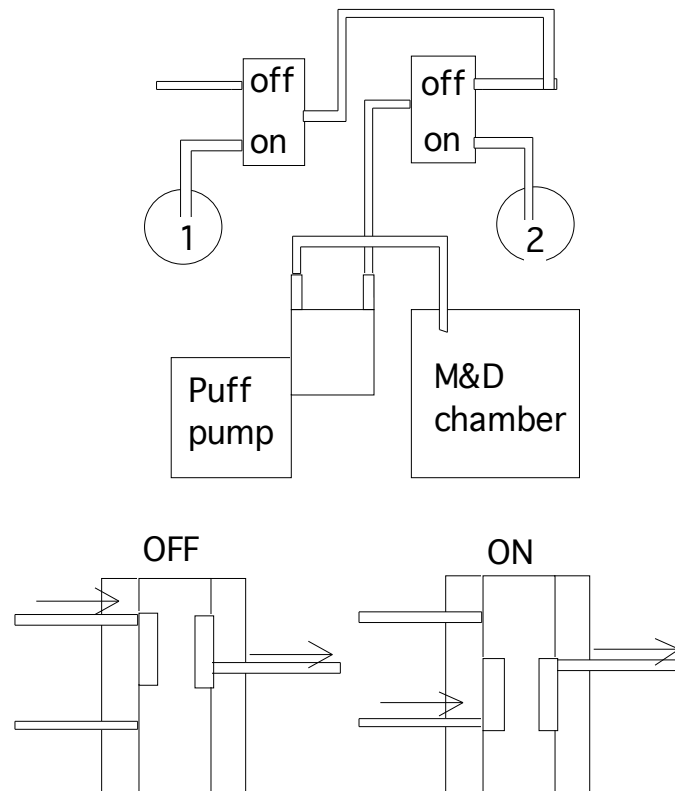
TE-2 SMOKING MACHINE



TE-2 machine with mixing and dilution chamber. Control box is on side of chamber.

Operation.

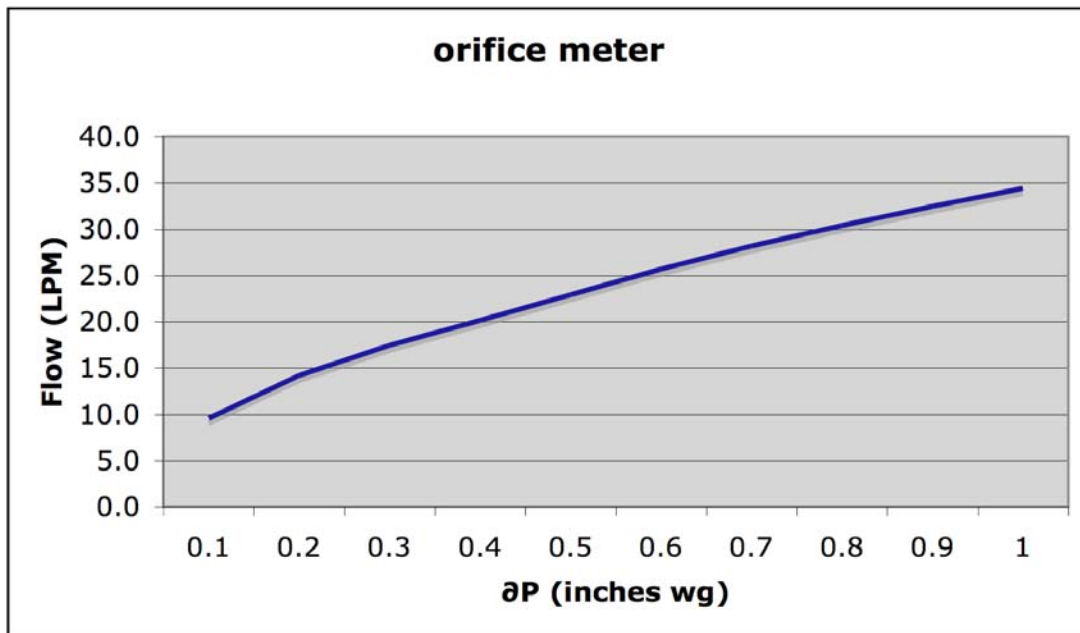
The TE-2 manual smoking machine puffs two cigarettes in accordance to the FTC method that are loaded manually into the ports inside of the hood or chimney. The machine requires a negative flow of air through the M&D (mixing and dilution) chamber into the exposure chambers, and 120 VAC. The machine consists of a hood or chimney to collect the side stream smoke, a vent pipe which is connected to the Mixing and Dilution (M&D) chamber, two ports to hold the cigarettes with valves to open up the cigarette ports to the puff vacuum the controls and the M&D chamber. The solenoid valves are three way valves which are normally closed to the ports. When the valves are closed to the ports air is pulled from the room air by the puff pump at 1.09 LPM through the valves and into the A&D chamber.



A set of pliers can be used to place the cigarettes into the ports to avoid having to hold and place the cigarettes in the smoke area of the hood or chimney. The cigarettes are placed in the pliers about a cm back from the end on the filter and placed into the port using a slight twisting action to push them into the "O" ring until they are seated all the way in. The vacuum pressure should be applied to the M&D chamber. Flow through the chamber should be at least 10 LPM and could be as great as 35 LPM. The power switch turns on the fan inside the M&D chamber. A switch on the control box on the side of the M&D chamber turns on the the puff pump. The pump light should now be on indicating the 12 VDC power is on to the pump. The control box will now activate one of the puff ports for two seconds each 30 seconds so there is one minute between puffs for each cigarette. In order to get the best distribution of smoke the first cigarette should be lighted and then after four puffs the second cigarette is lighted and then each cigarette is replaced every 5 minutes in a staggered fashion. When one cigarette is burned the other port can

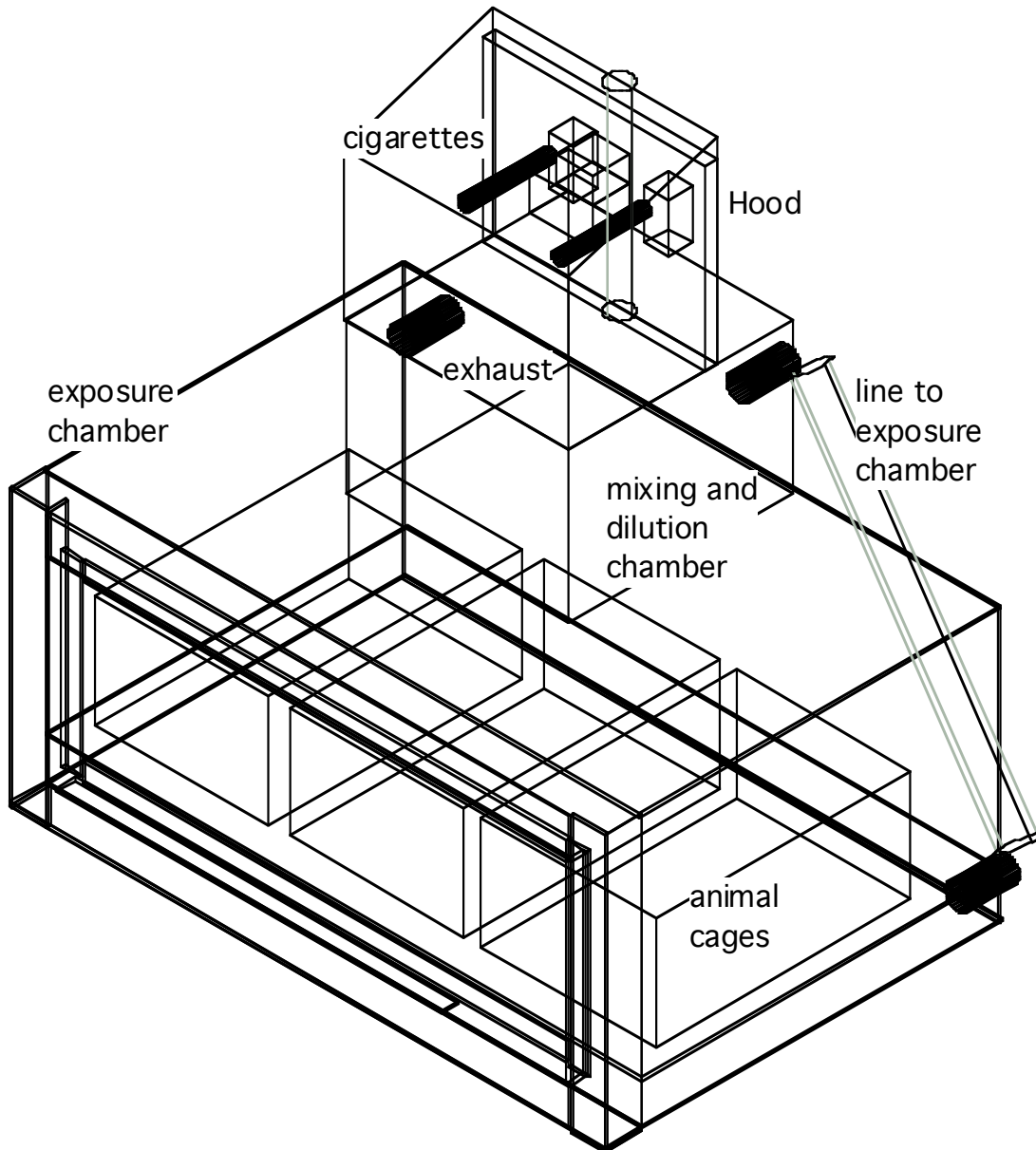
be loaded with a cigarette and as the burning cigarette is taking the last puff the new cigarette can be lighted. As the new cigarette takes the first puff the old butt can be removed. To assist in lighting the cigarettes a manual actuation for the puff can be done with the pushbutton switches on the control box. The controller turns on the solenoid valve which allows the puff pump to pull smoke from the cigarette into the A&D chamber. Smoking is continued in this manner for the duration of the test. A cigarette can be puffed for 9 or ten puffs before it will burn into the filter. This should be avoided.

Smoking system consists of the TE-2, aging and dilution chamber and the exposure chamber. A turbine blower is provided for air movement for the exposure chamber. To measure the flow rate a orifice meter is connected between the A&D chamber and the exposure chamber.



The system has a 3 mouse cage chamber for exposures. The volume of the chamber is 63 liters. For the calibration a flow rate of 30 LPM was used which is about 30 changes per hour. Burning two cigarettes at this flow rate gives 153 mg/m³. Using only one cigarette at a time gives a concentration of 78 mg/m³.

TE-2 System



Maintenance.

After each smoking session, Methanol should be flushed through the valves to clean off the tars from the cigarette smoke. After several days the puff pump can also be cleaned. Either methanol can be flushed through the pump or it can be taken apart and cleaned. In any case after several weeks of operation the head can be removed and the valves cleaned using a "Q" tip or chemwipe and methanol. Care should be taken to replace the parts of the valve the same way as they were removed.

TSP sampling:

1. Using 25 mm Pallflex membrane filters (EMFAB TX40H120-WW) weigh filter and record weight.
2. Using tweezers, place the filter in the filter holder and tighten the cap hand tight.
3. To set up sampler:
 - a. Place filter holder inlet tube is placed into chamber sample port.
 - b. Tube from filter holder is put into the inlet of sampler unit. The other tube from the sampler exit is placed into entrance to dry gas meter.
 - c. Sample time is set on sampler by pushing buttons on top or bottom of number.
 - d. Flow rate is adjusted by valve. To set flow-rate record dry gas meter, run for designated time on sampler, take sampled volume and divide by sample time to get flow in liters/ minute. Then adjust valve and test again until desired flow rate is achieved.
4. Record reading on AEM dry gas meter. e.g. 0013,020 is 13.020 cubic meters or 13,020 liters. The last digit on dial has horizontal lines to the right of the number. These are .2 liters per line and are read from the top. So, if the centerline on the far right is pointing to the second line from the top (zero is on top and one below it) the reading would be 13,020.2 liters or 13.0202 cubic meters. If you are sampling for a short time you could move the decimal point three places and read 20.2 liters as the starting value.
5. Turn on sampler and let it run until it stops.
6. Remove filter with tweezers and weigh recording the value.
7. Record the dry gas meter reading.
8. Calculate the TSP by taking the difference in weight divided by the volume collected.
 - a. e.g. filter weight before sampling was 24.45 mg and after 25.58 mg. Amount of smoke collected is therefore 1.13 mg.
 - b. e.g. dry gas meter was 13,020.2 before sampling and 13,025.8. Difference is therefore .0056 cubic meters (5.6 liters)
 - c. TSP is 1.13 mg divided by .0056 cubic meters or 201.8 mg/m³.