# Multiple Port Air Sampling Valve

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The methods of sampling air or gas in different locations has generally been accomplished by a series of micro switches and solenoid valves. When more than six sampling ports are needed the price can become prohibitive to many researchers.

When $CO_2$ studies at Colorado State University were started in 1958 an inexpensive sampling valve (Figure 1) was sought and finally built with the aid of the University machine shop. The drive source consists of a 1/20 hp Bodine motor with the following specifications: Speed, 1 rpm; torque, .110 in oz; gear ratio, 1800; type frame, KYC-22RC; and catalog number B8122E-1800C. Information as to a local source can be obtained from the Bodine Electric Company, 2288 W. Ohio St., Chicago 12, Ill. Coupled to the motor is a Boston reducing gear unit which yields an end result of 2 rphr .

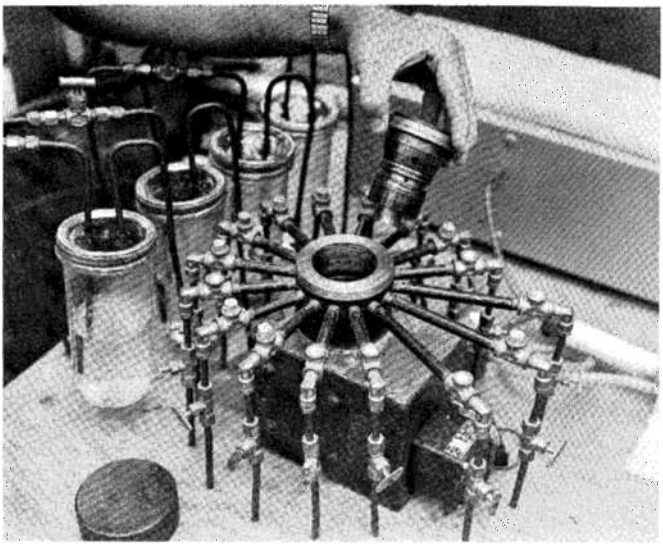

Fig. 1.--Multiple port air sampling valve used to obtain samples for $CO_2$ analysis throughout the research greenhouse range at Colorado State University.

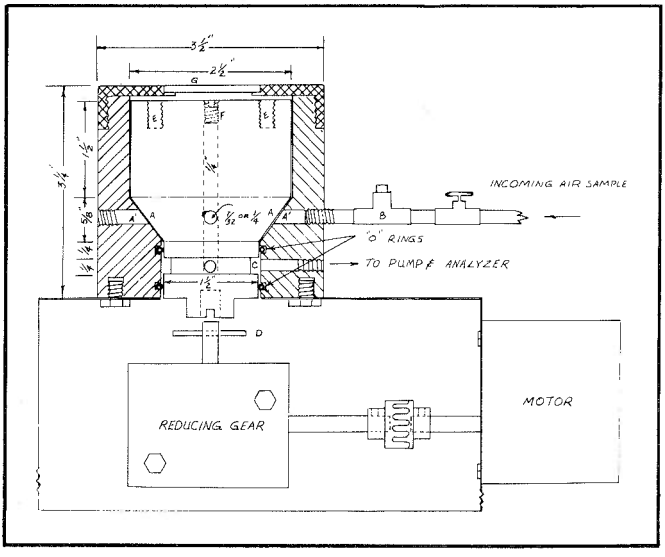


Fig. 2.--Side view of the complete sampling system and a cross section of the multiple port valve.

The address of local distributors can be obtained from the Boston Gear Works, Quincy 71, Mass. If a selector valve larger than the one described is desired, the next size motor is recommended.

A side view of the complete sampling unit is shown in Figure 2. Only the diagrammed selector valve portion is to exact scale. The measurements used in the drawing are based on a 16 port system (Figure 3).

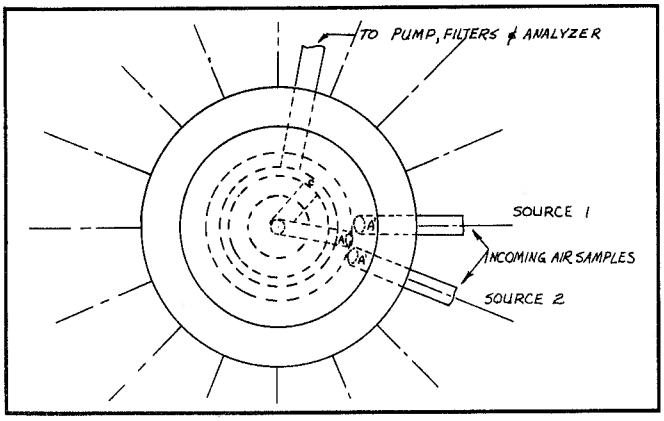


Fig. 3.--Top view of selector valve designed to sample air from 16 different locations.

## Valve Description

1. Any number of ports could be developed and the only precaution needed is to be sure the diameter of the intake hole A in the cone is equal to or slightly smaller than the distance between the A' holes (incoming ports). The seating of the cone at points A and A' is very important. Stopcock grease is used in this area to lubricate and produce a tight fit. If a tight fit is not achieved, a small spring can be placed between the top of the cone and the cover at point F (Figure 2).

2. Point B is a pipe tee with a plug. By connecting the tees and turning off the valves of the lines to which connections are made, one sample can be read several times during each revolution.

3. C is the manifold area and is automatically flushed as each successive port is sampled.

4. D is an aluminum pin used to connect the reducing gear to the cone of the valve.

5. Points marked E are two tapped holes in the top of the cone. Two bolts can be inserted to lift out the cone for cleaning, lubricating, etc.

6. F is a plug for the center bore.

7. G is a round piece of plastic or glass mounted in the center of the cap. By placing a mark directly above the inlet hole of the cone, the sampling location can be observed at all times.

Zero reference:

One of the ports is connected to a tube containing soda lime which clears the incoming air sample of all $CO_2$. This is used as the zero marker and by timing the valve a zero reading is obtained on the hour and half hour for reference.

Pump:

A No. 2 dyna pump made by the Cole Palmer Company is used to collect the air samples. The pump is placed between the selector valve and analyzer. Thus the sample is pulled through the valve and pushed through the analyzer.

Filter and drier:

A 1'' diameter glass tube approximately 6'' long is used as holder for the cotton air filter. The cotton needs to be changed about once a year. It is suggested that a drying material be used to control moisture in the line. The cotton filter should be placed between the pump and analyzer and the drier on either side of the pump.

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