HIAC/ROYCO PARTICLE COUNTER INSTALATION

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ABSTRACT

A HIAC/ROYCO particle monitoring system is being installed to monitor aerosols in the RIT clean room. The system is controlled by a VAX mainframe computer using a Fortran program to read the data from the counter process it and write it to an output file. This file is used to generate control charts monitoring the particle levels at several locations in the cleanroom workspace.

INTRODUCTION

HIAC/ ROYCO particle counting systems are capable of sampling either a liquid or gaseous medium. The pump in the model 1100 aerosol sensor draws the gas from the location being sampled through the model 160/161 ten port scanner into the sensing unit. The gas flow rate is approximately 1.0 =+- 0.5 cubic feet per minute. The sensing unit contains an optical sensor which is used to detect particles in the gas stream. The unit is capable of detecting up to 300,000 particles per cubic foot with the sizes ranging upward from .5 micrometers.

The sensing unit creates a data signal which the model 4150A system control unit uses to produce count data. The count data can be broken down into six particle size ranges called channels. These channels have an associated size threshold that is preset at the factory and which varies from unit to unit. A typical distribution of the channel threshold levels is shown in Table 1. When in cumulative mode, each channel counts all particles larger than the threshold. In differential mode each channel counts particles between the two adjacent thresholds. It is capable of manual, timed or volume controlled sample modes. The system control unit has an RS232 interface allowing external computer control.

Table 1 : Particle Size Threshold Levels

CHANNEL	1	2	3	4	5	6
THRESHOLD	.5um	1.5um	3.0um	5.0um	10.0um	15.0um

This project involved setting up the system as shown in Figure 1 and writing a Fortran program so that the number of particles in the RIT clean room air could be monitored by this system automatically. The results from each count are written to a data file which is used to update a statistical control chart.

HIAC/ROYCO

PARTICLE COUNTING SYSTEM

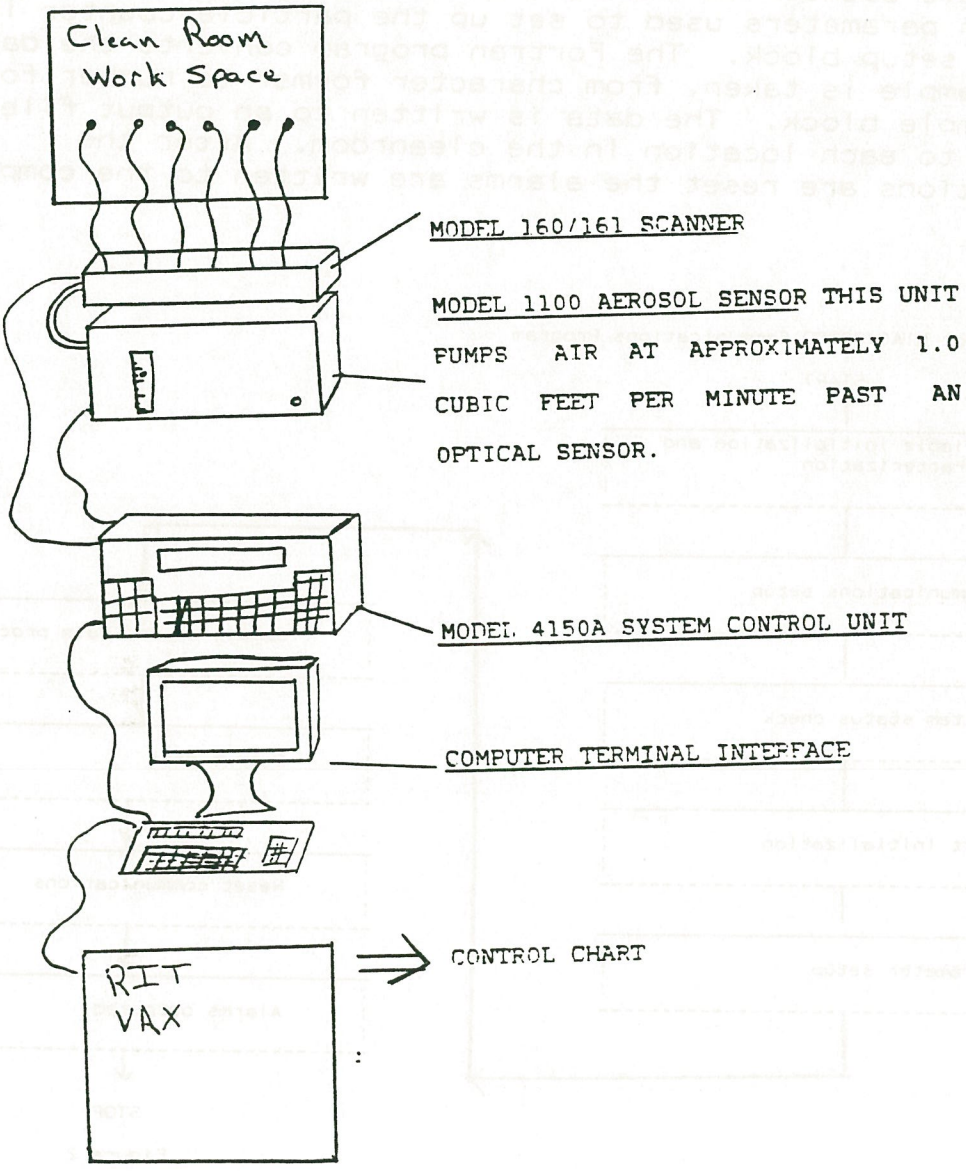

Figure 1

EXPERIMENTAL

A Fortran program was written on the VAX to set up the necessary particle counter parameters. The more significant values include the upper and lower count levels, the air flow stabilization time, and the sample time. It then initiates a count, and receives the count data. The program converts the data from character to integer format and calculates the number of particles per cubic foot of air from the gas flow rate, gas flow time, and the number of particles counted in the sample. The date and time the sample was taken is written along with the count to a data file unique to each port location.

Figure 2 is a block diagram of the program with a full flow chart given in Appendix A. Commands are issued so that data is passed from the particle counter to the VAX and from the VAX to the particle counter in the communications set up block. There are eleven parameters used to set up the particle counter in the parameter setup block. The Fortran program converts the data, after a sample is taken, from character format to number format in the sample block. The data is written to an output file that is unique to each location in the cleanroom. After the communications are reset the alarms are written to the computer terminal.

Block Diagram for HIAC/ROYCO Communications Program

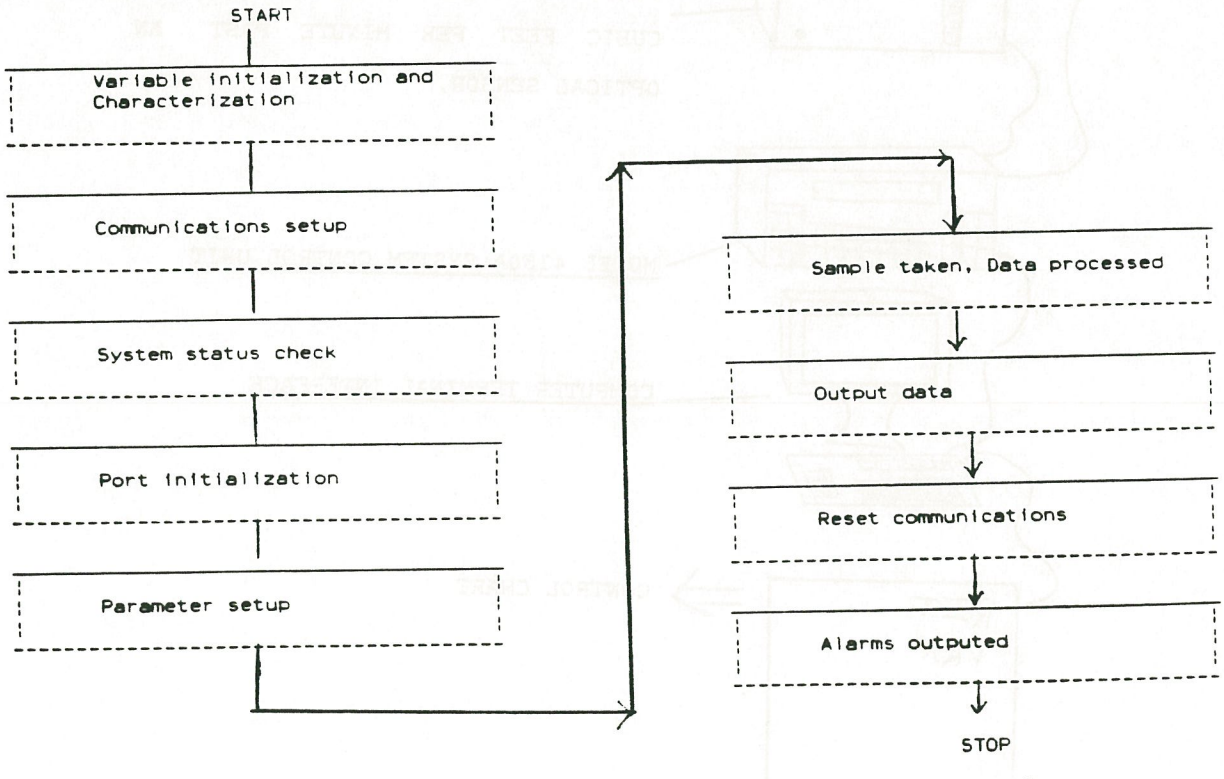

Figure 2

RESULTS/DISCUSSION

The Fortran program sets up the particle counter, initiates a count, processes the data, and writes it to a seperate data file for each different location in the cleanroom. It takes samples from each port every half hour until 6:00 in the evening.

RIT has six of these individual particle monitoring systems. A multicommunications port has been received that can be used control all of the six of these systems. One of improvements that can be made to the program is to implement control of all six systems using the new communications port.

Another improvement that could be made is to write the alarms that are written out at the end of the program into a file so that they can be retrieved for later review.

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