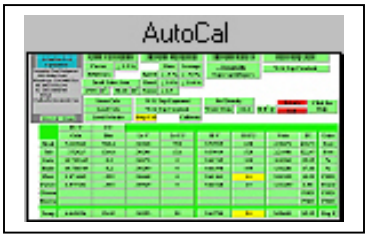
Actuation Test Equipment Company Index Test Optimizer.

This is a screen gallery of the data displays already prepared for this project.

(Click on picture
For larger imge)

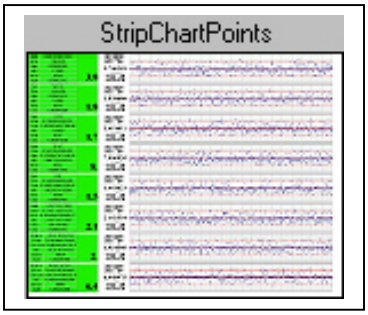
The first operator interface displayed at initial startup is the registration panel. Information about location, equipment and contact personnel are entered, then registration can take place either automatically by logging on to our web site, or manually by calling us on the phone.

Fig 1. Operator Interface



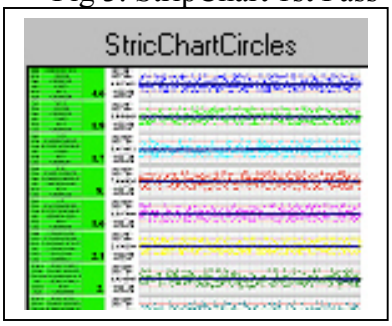
The next operator interface to is the calibration screen. The gain and offset values for each channel can be entered directly, or the AutoCal program provides a zero & span forced calibration utility.

Fig 2. AutoCal Screen



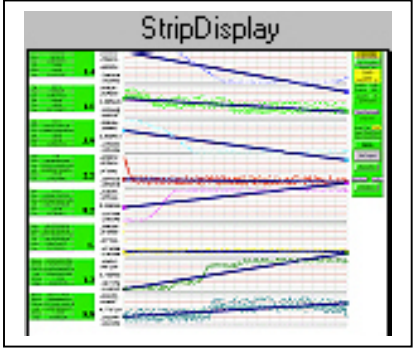
Raw data is collected by the StripChart program. Voltage values are stored at maximum speed into an array. The program then analyzes the snapshot data to determine if the unit was operating steady state or not. The program constantly monitors operation, capturing and analyzing blocks of data then storing away any steady state values that are found. When a new data point is found, the program will redraw the desired output graphs.

Fig 3. StripChart 1st Pass



The statistical manipulation of the data to determine steady state is graphically demonstrated by re-plotting each point as a small circle while the computer executes the average, standard deviation, linear regressions and outlier discard routines.

Fig 4. StripChart 2nd Pass



When the unit parameters are moving, as shown to the left, the regression lines show the best-fit through the data, and the slope of this line is compared with the preset limits for steady state. The standard deviation from these data sets will be higher also, and if they, or the slope exceed preset limits the data will be discarded and the program restarted.

Fig 5. Data In Motion

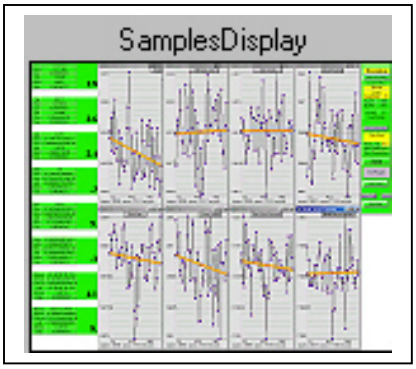


Fig 6 A few points

The steady state analysis routine looks at the data points and determines the slope of the best fit through the data cloud. Source data for the graph at the left is thermal drift of 8 voltages provided by pots and op-amps in a test rig.

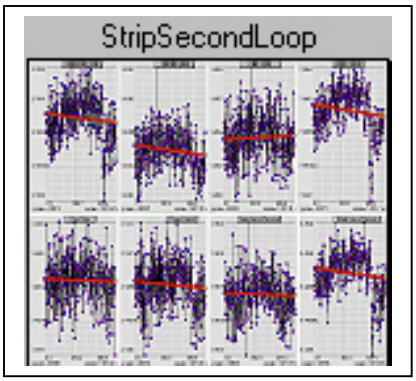


Fig 7 A lot of points

The program is capable of manipulating thousands of average values taken from bursts of data. The reasonable numbers of averages, rates and limits will be decided in the field. This demonstration is just to show that the software is ready now.

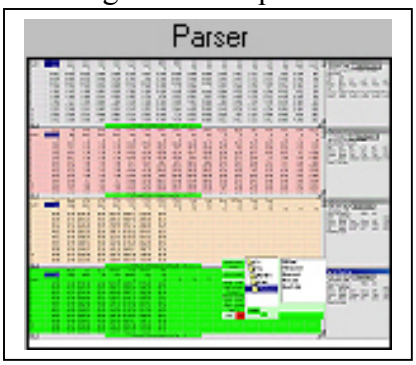


Fig 8 Data Array

As they are captured, steady state points are stored in the Parser array shown to the left. This format was defined by the sample spreadsheet from McNary Unit #6 that shows the format of the data that will be worked with on this project. The boxes to the right show the header information read from the spreadsheet files as they are loaded.

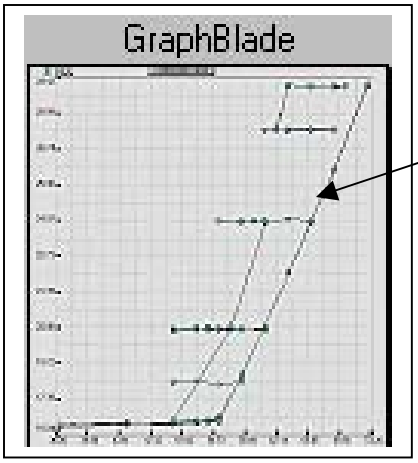
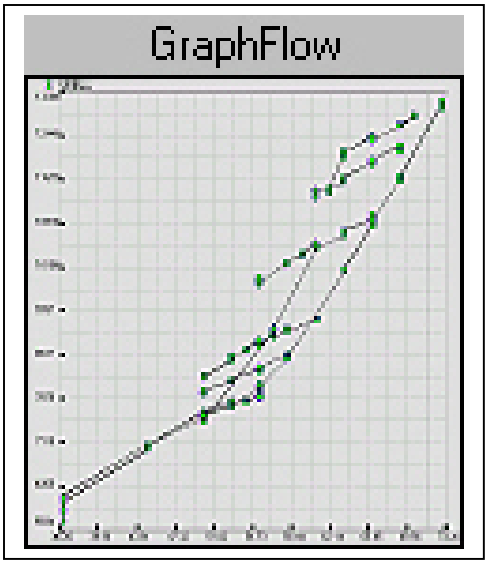


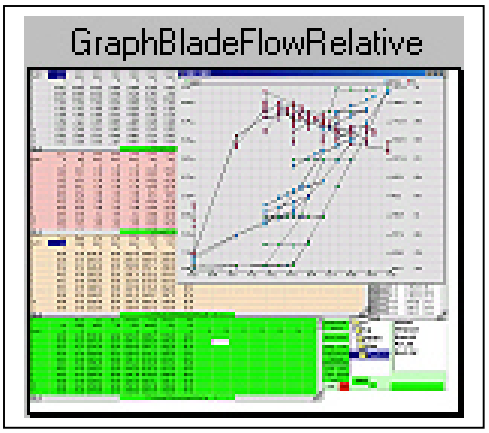
Fig 9 Graph of Blade/Gate

The first graph is blade/gate. The on-cam line is the right-most, almost vertical line. The horizontal lines are the test points from the “fixed blade, moving gate” style index tests reported by this data set.



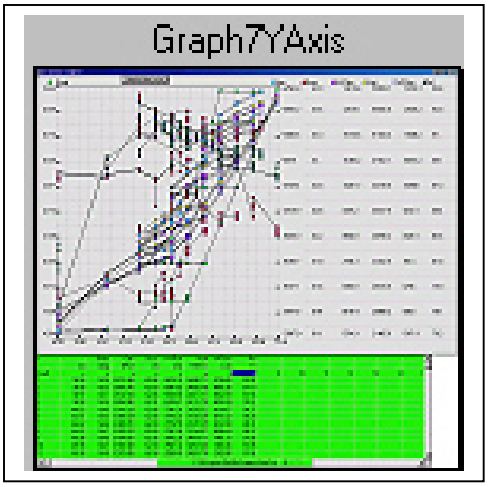
This is a graph of flow/gate. To set which columns of data will be plotted along the Y axis, enter a "y" in the 3rd row of the to tell the graphing routine this is a "Y" axis column. Enter an "x" into the 3rd row position of whichever column is to be the "X" axis. For this graph, the x is in the 2nd column of gate values, and the y is in the 6th column of flow values of the Results(2) data set.

Fig 10 Graph of Flow/Gate



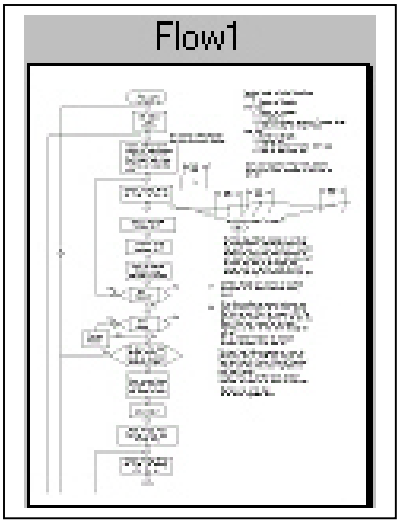
This graph shows the three most critical measurements of the index test, Gate, blade, flow and efficiency. These three Y axis displays are set by entering the y into the 3rd, 6th and 9th columns in the Results(2) data set.

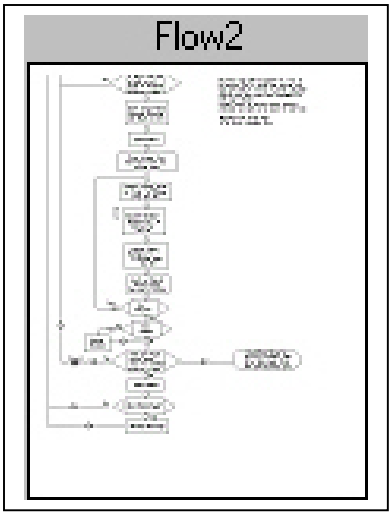
Fig 11 Graph of 3 Vars/Gate



This image shows 7 variables graphed at the same time so the overlap can be seen. The graphing routine can plot as many at 10 sets of data against a single other variable. From looking at this graph it seems a good next improvement would be to set all axis values at even values instead of the randomness the auto scale routine derives from the actual numbers.

Fig 12 Graph of 7 Vars/Gate





Flow chart of SteadyState procedure. This document describes the software to produce all of the display formats of Figs 3 to 7. The steady state values identified by the program are saved in the array of Fig 8. The output graphs of figs 9 to 12 are updated automatically each time a new steady state data point is captured and stored.

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