

## THERMAL APPLICATIONS NOTE

### AUTOMATED ANALYSIS OF SPECIFIC HEAT/COOL SEGMENTS IN DSC CYCLIC EXPERIMENTS\*

The DSC Autoanalysis data analysis program (PN: 996379-945) contains all the features and benefits as the standard DSC data analysis program with the additional benefit of being able to “remember” and reuse previously developed data analysis routines (command files) without operator intervention. DSC Autoanalysis software consists of two parts; (1) setting up an analysis sequence based on analyzing a data file and (2) using that sequence on another new data file to produce similar results including analyzed plots or reports on the printer or plotter.

When conducting a cyclic experiment it is sometimes desirable to analyze individual portions of the experiment (e.g. 1st heat, 1st cool, etc.). Using DSC Autoanalysis data analysis software, a page feeding plotter (or printer) and a DSC 2920 or 2910, an analysis command file can be generated to obtain results for these individual heat or cool cycles. There are three key steps to achieve this desired result:

1. Conduct your experiment using a method containing the “Mark the end of Cycle X” segment. For example:

Equilibrate at 130°C  
Ramp 5 °C/minute to 170°C  
Mark the end of cycle 1  
Ramp 5 °C/minute to 130°C  
Mark the end of cycle 2  
Ramp 5 °C/minute to 170°C  
Mark the end of cycle 3

[“Mark the end of cycle” is a segment only available for the DSC 2920 or 2910]

2. Analyze the data using the DSC Autoanalysis program. Partition each cycle by pressing **[F1] - Rescale**, **[F7] - New Analysis Range**, then **[F2] - Select Cycle**. Configure the program to display only the selected data by pressing **[F2] - Customize Plot**, **[F3] - Curve Parameters** and enter “no” for “plot data outside of analysis range?”. Rescale, analyze, and customize the first cycle to obtain the desired result.

[“Select Cycle” is an option only available in the DSC Autoanalysis data analysis program.]

3. Save the first analysis sequence using the following steps: press **[F8] - Next File**, **[F1] - Autoanalysis**, then **[F1] - Save Analysis**. Enter a command file name for the sequence you are creating. Between each cycle return to data analysis by pressing escape twice. Follow the same steps as previously described to partition the data by cycle and save the sequence. When saving the second and subsequent cycles, save the analysis to the same file name and choose to append. This will add the analysis and plotting of each cycle into one command file, which can be executed for analyzing similar files in the future. A typical command file which results (hardcopy output of command file) is shown in Figure 1.

```

Program DSC-Auto V1.0E — Analysis sequence
Rem - Setup
Init
Customize Params Y1 PlotOutsideRange Yes
Customize Params Y1 Autoscale Manual Yes
Customize Params Y1 Autoscale Spooled Yes
Customize Params Y1 Color Green
Customize Params Y1 LineType Solid
Customize Params Y1 GridType None
Units Signal W/g
Axis Data X Temperature
Axis Scale X 120.000 180.000 10.0000 5.00000 0.0
Axis Data Y1 Signal A
Axis Scale Y1 -2.00000 3.00000 1.00000 0.500000 0.0
Axis Data Y2 Not Used
Axis Data Y3 Not Used
Rem — Read file and analyze
Read Next Run
Analyze Rarams Cycle 1
Analyze Peak Main 154.58 160.19
Rem — Generate reports
HardCopy Plotter
Program DSC-Auto V1.0E — Analysis sequence
Rem - Setup
Init
Customize Params Y1 PlotOutsideRange Yes
Customize Params Y1 Autoscale Manual Yes
Customize Params Y1 Autoscale Spooled Yes
Customize Params Y1 Color Green
Customize Params Y1 LineType Solid
Customize Params Y1 GridType None
Units Signal W/g
Axis Data X Temperature
Axis Scale X 120.000 180.000 10.0000 5.00000 0.0
Axis Data Y1 Signal A
Axis Scale Y1 -2.00000 3.00000 1.00000 0.500000 0.0
Axis Data Y2 Not Used
Axis Data Y3 Not Used
Rem — Read file and analyze
Read Next Run
Analyze Rarams Cycle 2
Analyze Peak Main 156.16 151.00
Rem — Generate reports
HardCopy Plotter
Program DSC-Auto V1.0E — Analysis sequence
Rem - Setup
Init
Customize Params Y1 PlotOutsideRange Yes
Customize Params Y1 Autoscale Manual Yes
Customize Params Y1 Autoscale Spooled Yes
Customize Params Y1 Color Green
Customize Params Y1 LineType Solid
Customize Params Y1 GridType None
Units Signal W/g
Axis Data X Temperature
Axis Scale X 120.000 180.000 10.0000 5.00000 0.0
Axis Data Y1 Signal A
Axis Scale Y1 -2.00000 3.00000 1.00000 0.500000 0.0
Axis Data Y2 Not Used
Axis Data Y3 Not Used
Rem — Read file and analyze
Read Next Run
Analyze Rarams Cycle 3
Analyze Peak Main 153.83 159.40
Rem — Generate reports
HardCopy Plotter

```

Figure 1  
Autoanalysis Sequence

\*This procedure applies to systems with RMX-based software, and does not apply to newer systems with OS/2™-based *Thermal Solutions* software.

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