ATLANTEK MODEL 300
THERMAL RESPONSE TEST SYSTEM

OPERATORS MANUAL
Rev. 1.01

October 1996

1.0 SYSTEM OVERVIEW

The ATLANTEK Model 300 Thermal Response Test Station is designed to provide the user a means to conveniently produce thermal response versus optical density data for direct thermal imaging media. This stand alone test system is ideal for use by manufacturing and quality assurance personnel in material control and production environments. The Model 300 consists of a user adjustable direct thermal print engine, utilizing a popular two inch wide, thin film printhead. The engine is controlled and driven by a print control module integrated within this packaged system, providing the user: selection of two energy levels to support testing of top coated and non top coated papers; mechanical adjustment of printhead pressure; a "flip-top" printhead assembly which facilitates printhead cleaning, media loading and dot line inspection for media deposits; switch selection of three pre-programmed test patterns; and controlled operation of the media transport.

Approximately two inch wide samples of facsimile papers, specialty grade plotter media, thermal tag and label stock are easily loaded for test printing. The three selectable test patterns are a versatile subset of those offered in the ATLANTEK MODEL 200 Dynamic Response Test System, making the new Model 300 a quick testing tool with correlation back to the comprehensive, PC based, Model 200 system. The full featured Model 200, designed as an R&D development tool for the laboratory, is the recommended test instrument called out an ASTM standard for dynamic response testing of direct thermal media.

2.0 GETTING STARTED

Please follow these steps to verify proper operation of the Model 300 system.

2.1 Unpack and unwrap all enclosed parts and components.

2.2 Install the 2 inch thermal printhead assembly into the printhead pivot using the shoulder screw and spacer. Connect the 25 pin (provides data and power) and 2 pin connector (provides substrate heating) to the printhead assembly. **Note: the shoulder screw and spacer may already be mounted into the printhead pivot, the screw can be removed by using the 1/8" hex wrench that is provided.**

2.3 Plug the system into A.C. power source, and turn it on. **Power switch is located in the rear of the unit.**

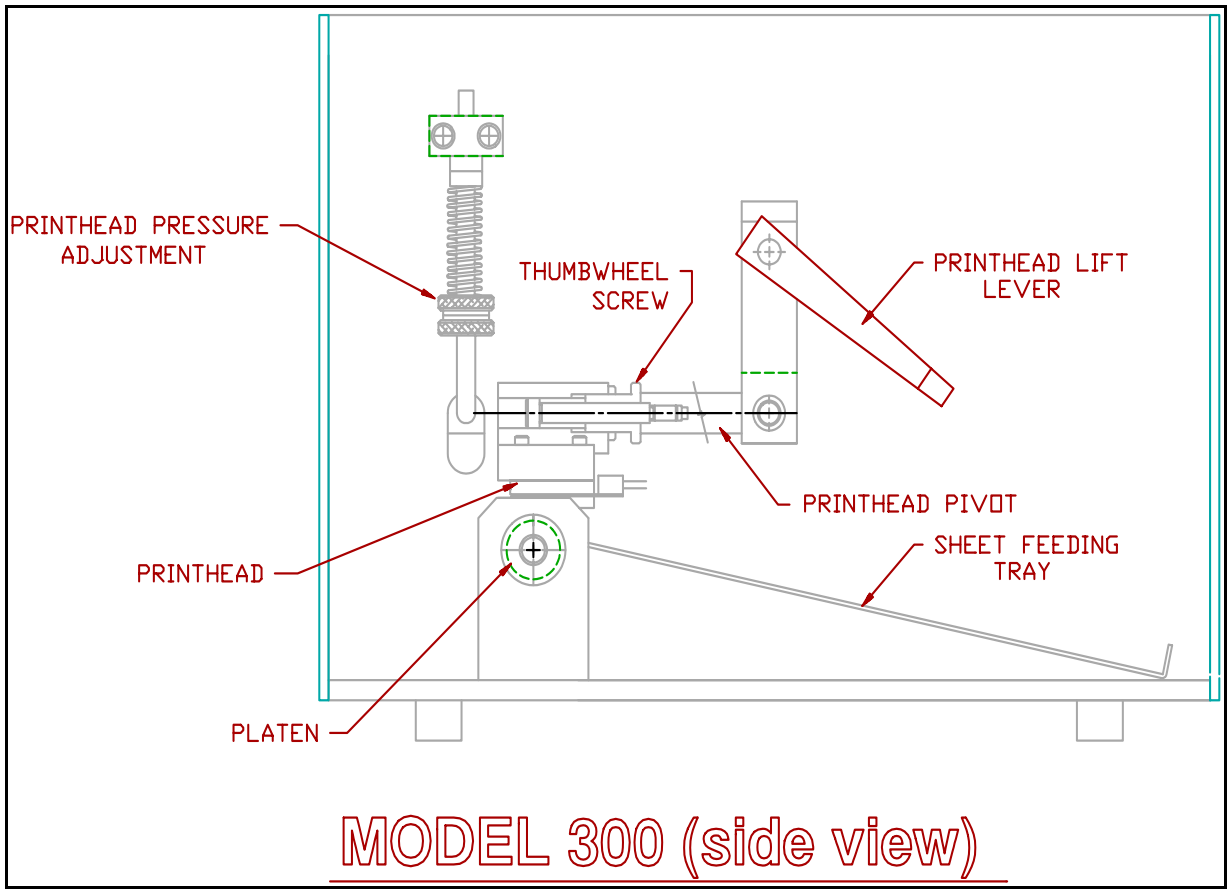
2.4 The green LED on the front panel labeled "Ready" will blink until the printhead substrate has been preheated to the desired temperature level. The warm-up time is approximately 2-5 minutes.

2.5 Select a test pattern by depressing the ***PATTERN*** switch in the lower left corner of the front panel. The available choices for the test pattern are:

2.5.1 STD - 100% pattern, all dots energized simultaneously.
2.5.2 OPTION 1 - Checkerboards approximately 1/8" square.
2.5.3 OPTION 2 - Bar codes, UPC-A picket fence and ladder direction at an approximate density of 114%. These bar codes decode to 1234567890.

2.6 Select a desired energy level by pressing the ***ENERGY*** switch in the lower right corner of the front panel. Use the following guide in selecting a desired energy level.

HIGH ENERGY - Top coated papers and films, older less sensitive paper grades.
LOW ENERGY - Non-top coated papers, high speed paper grades.



The test sequence that is printed by the Model 300 increases print energy for each of the five print areas imaged. We recommend that two of the five sections be at (or approaching) the saturation density for the direct thermal paper. The total number of density readings available per test image is six. Five imaged areas and a background reading.

NOTE: Refer to Appendix A for a listing of the energy levels used for each area.

2.7 Load a sample of direct thermal paper into the Model 300. With the printhead in the "up" position, place the sample on the sheet feeding tray and gently slide the leading edge in between the printhead and the platen. The sample should be no more than 2.75 inches wide and at least 5 inches long. NOTE: When the printhead is in the "up" position it should float freely about the mounting screw.

2.8 Verify that the printhead is "down" or in the loaded position. This is done by checking that the printhead is in contact with the paper under test. Also, verify that the pin on the printhead pivot is full engaged locking the printhead into position. If the printhead is in the "up" position, lower it by rotating the head lift lever until the printhead is placed on the test sample.

***** I M P O R T A N T *****

Firing a thermal printhead into the open air or against the print platen may severely damage the heating elements. Never press the PRINT button while cleaning or loading paper in the MODEL 300 system.

2.9 To start the test, press the ***PRINT*** button located in the upper right corner of the front panel. Regardless of the pattern or energy level selected, the test sequence appears as five independent print areas with increasing density moving down the sample sheet.

3.0 INTERPRETING THE RESULTS

Assuming the proper energy level is selected, several characteristics related to the performance of the direct thermal media can be obtained from a Model 300 test sample.

3.1 Dynamic Response - Using the optional DATA COLLECTION and plotting software, the operator can easily read the optical density of each image area, and background, with a densitometer, have it automatically combined with the appropriate energy level. The results are typically plotted in a graph showing optical density versus print energy.

3.2 D_{max} and D_{min} - Either by direct measurement or from a dynamic response curve, the background and maximum density achievable with the media under test can be obtained.

3.3 Voids and Bleeding - By careful examination the operator can determine the presence of voids in the imaged sample. Voids are usually a result of inconsistent, or a lack of direct thermal coating on the base paper. "Bleeding", or "blooming" occurs when heat from the printhead seeps into neighboring areas of the paper that heat was applied. The most obvious example of this condition is when ladder direction bar codes are printed with an excessive amount of energy. The resultant bar code appears smeared, with the bar being too wide.

3.4 Continuous Tone Response - By evaluating the slope of the dynamic response curve, an assessment can be made as to the performance of the test sample in a continuous tone, or grey scale plotting application. A steep slope implies a bi-modal response, whereas a very gradual slope is applicable for grey scale printing.

4.0 SYSTEM SPECIFICATIONS

4.1 Printhead: Kyocera KST-48-8MPD1, Thin-Film 200 dpi **(Complete printhead specification in Appendix B)**

4.2 Printhead Pressure: 3 lbs (approx.)

4.3 Printhead Power: 0.3 w/dot

4.4 Print Speed: 0.7 inches/sec (Low energy Setting)
0.5 inches/sec (High energy Setting)

4.5 Substrate Temperature: 33 - 37°C

4.6 Print Platen: neoprene, 45 - 55 durometer

4.7 Print Width: 48 mm

4.8 Average Printhead Resistance: 533 W ±15%

4.9 Heating Element size: 0.105 x 0.140 mm

4.10 Paper Advance per dot line: 0.125 mm

5.0 System Maintenance

5.1 Depending on usage, the printhead should be cleaned regularly to remove debris and other build up that may accumulate along the dot line that could ultimately affect test results and printhead life.

Follow these steps to clean the printhead:

5.1.1 Lift the printhead to the unload position by engaging the PRINTHEAD LIFT LEVER. When unloaded, the printhead should be off the paper and pivoting freely about the mounting screw.

5.1.2 Pull the head lift pin on the PRINTHEAD PIVOT and lift the printhead. When the printhead pivot block has been fully raised, the head lift pin may pushed in holding the printhead in an UP position, exposing the dot line for cleaning and observation.

5.1.3 Acetone, Methanol and/or Isopropyl Alcohol applied to a swap or soft cloth should be used to clean the printhead.

5.2 Periodically the printhead force should be verified. This measurement can easily be done by hooking force dial in the eyelet located above the dot line on the printhead mounting block. With a strip of paper loaded in the Model 300, and the printhead in the down position, lift up on the force dial until the paper sample moves freely. Increasing the printhead force is done by turning a screw on the PRINTHEAD PRESSURE ADJUSTMENT to compress the spring assembly. The force should be set between 2 and 4 lbs.

5.3 Depending on usage, the thermal printhead's resistance should be verified that it is within the manufactures specifications. Over time, the heater elements resistance can change because of chemical contamination, electrical over stressing or abrasive wear. With normal usage the printhead should be verified every six months. Contact ATLANTEK about printhead resistance verification.

A method to calibrate the Model 300 system is to retain a sample, and unimaged supply, of a readily available grade of direct thermal media. Periodically compare a recent sample of this paper, imaged in the Model 300 system, against the original test sample, if significant differences in optical density exist then the printhead's heater elements may have changed resistance and the printhead should be verified.

6.0 Trouble Shooting Guide

Use the following guide to diagnose potential system problems.

Problem: Ready LED blinks continuously after power-up.
Remedy: At power-up the substrate of the printhead is preheated to be assured of a constant operating baseline for testing. Normal preheat time after power-up is 2-5 minutes. If the LED continues beyond this time verify the connections to the printhead.

Problem: The Ready LED blinks when the print button is pressed.
Remedy: If the printhead is in the unloaded, or UP position the control electronics will not allow a test session to take place. **Firing printhead heating elements into open air, or against the print platen may severely damage the printhead.**

Problem: Printed image is light or uneven across the printhead's dot line.
Remedy: The position of the heating elements relative to the apex of the platen is adjustable by turning the thumbwheel screw at the rear of the printhead assembly. This adjustment is made at the factory and should not need adjustment unless the printhead is removed and the thumb screw position changed. Also, verify the applied printhead force using a force dial.

ATLANTEK MODEL 300

Print Energy Levels
for 10 Image areas per print sample software version

Version m300_V
12/24/02

Print Section	**Low Energy** (Tcycle = 5.00 msec)		**High Energy** (Tcycle= 9.75 msec)	
	T_{on}* (msec)	**Print Energy** (mj)	T_{on}* (msec)	**Print Energy** (mj)
1	**0.1267**	**0.038**	**0.512**	**0.154**
2	**0.253**	**0.076**	**0.660**	**0.198**
3	**0.380**	**0.114**	**0.807**	**0.242**
4	**0.506**	**0.152**	**0.955**	**0.287**
5	**0.633**	**0.19**	**1.102**	**0.331**
6	**0.760**	**0.228**	**1.250**	**0.375**
7	**0.887**	**0.266**	**1.397**	**0.419**
8	**1.013**	**0.304**	**1.545**	**0.464**
9	**1.140**	**0.342**	**1.692**	**0.508**
10	**1.267**	**0.38**	**1.840**	**0.552**

* T_{on} is amount of time the heating elements on the printhead are activated for.