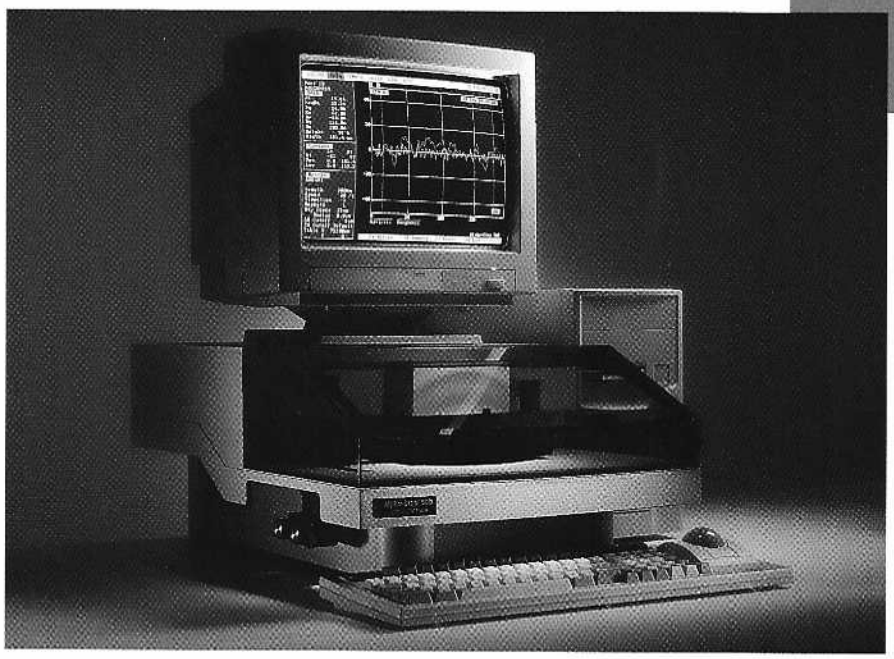
T E N C O R I N S T R U M E N T S

Alpha-Step 500
Surface Profiler



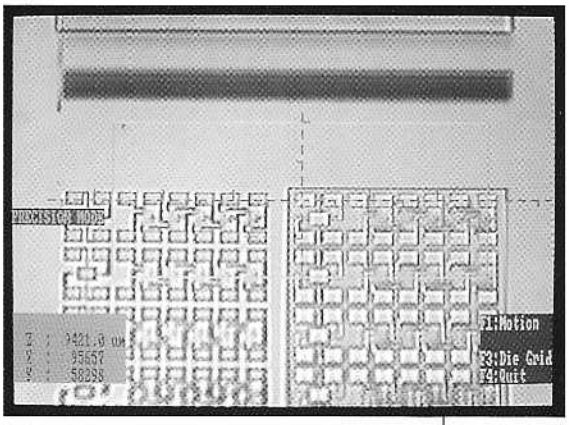
Precise. Versatile. Economical. The Tencor Alpha-Step® 500 is a state-of-the-art, stylus-based surface profiler that combines high measurement precision with versatility and economy. With resolution to 1Å and a guaranteed repeatability of 10Å, the Alpha-Step 500 accurately measures surface characteristics such as step height, roughness, and etch depth on a wide variety of surface substrates, including:

- Semiconductor wafers,
- Ceramic hybrid circuits,
- Disk media and thin film heads,
- Glass substrates for displays and optical storage devices,
- Polymer, photoresist, paper and other materials used in a wide spectrum of industries.

For applications that need additional range, an Extended Vertical Range option increases the vertical measurement height capability to 2 mm (80 mil.), enabling precise profiling of a variety of feature sizes.

The Alpha-Step 500's economical combination of performance and versatility makes it ideal for applications such as semiconductor pilot lines and materials or process research.

TENCOR INSTRUMENTS



A cross-hair in the video image view facilitates stylus positioning over the smallest features.

Advanced Features

The Alpha-Step 500 consists of a high-precision scanner unit, powerful 486DX-based IBM-compatible computer and monitor. Advanced system features include computer-controlled scanning and data collection, comprehensive data analysis software, and intuitive user interface.

Easy to Use

While designed for high performance, the Alpha-Step 500 is extremely easy to use, ensuring accurate and consistent measurements.

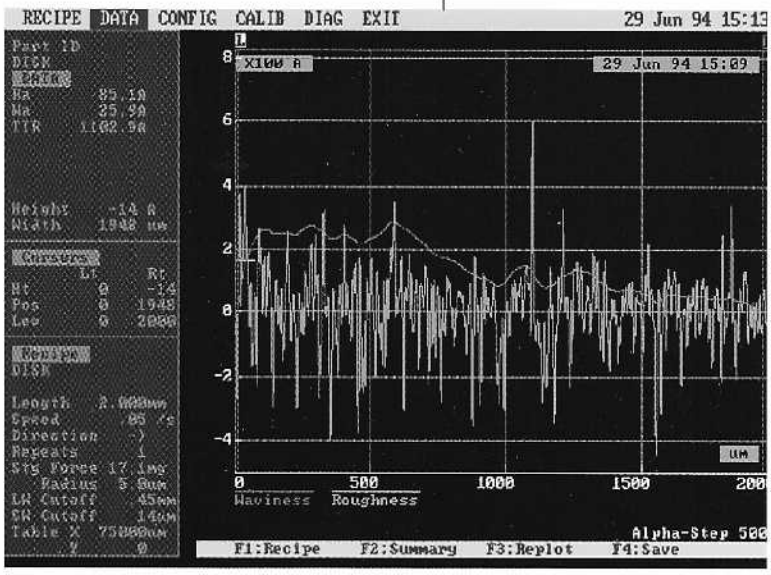
- Application-specific recipes are easily programmed to provide automatic leveling, scaling and measurement analysis—eliminating errors due to operator interpretation and sample positioning. Recipes can also be saved for repeated use by different operators.
- High-resolution VGA monitor makes it easy to visually identify specific features for measurement.
- Zoom optics provide magnification up to 210X (480X optional) for precise micro-measurements.
- Intuitive user interface simplifies operator training.
- Stylus force—adjustable between 1 and 100 mg—can be tailored for specific surface conditions.

Other advanced features include a Multi-Scan Average Mode, which automatically scans the same location up to 10 times, then averages the scans together for a final printout. When measuring a series of steps, the Alpha-Step 500 intelligently determines the number of steps and calculates the average step height automatically.

Powerful Data Analysis

In addition to accurate measurements, the Alpha-Step 500 offers advanced data analysis capabilities. Two user-selectable bandpass filters separate the scan data into roughness and waviness components for simultaneous viewing. Up to 30 standard surface parameters can then be selected for display and further detailed analysis. (See Data Analysis and Display Parameters on back page).

Roughness and waviness components can be separated and displayed simultaneously with other key measurement data.



Scan data and recipes are stored in the computer's Database Manager. Data can be saved and retrieved according to multiple, user-defined categories, such as production site, equipment, operator, process, time and other factors.

Individual scan data can also be exported in a standard ASCII format for customized analysis on commercial spreadsheet programs.

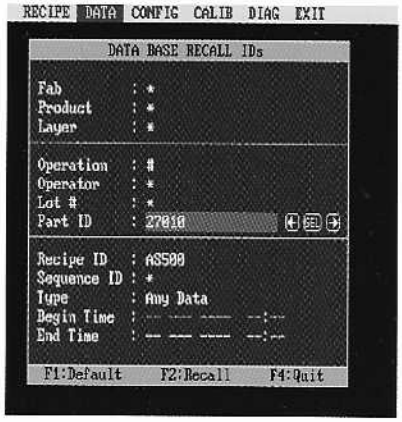
Isolation from the Environment

Designed to handle high-sensitivity measurements with ease, the system features a removable isolation hood to block out drafts as well as acoustic noise. Integrated isolation feet further protect the system from environmental interference.

Application-Specific Options

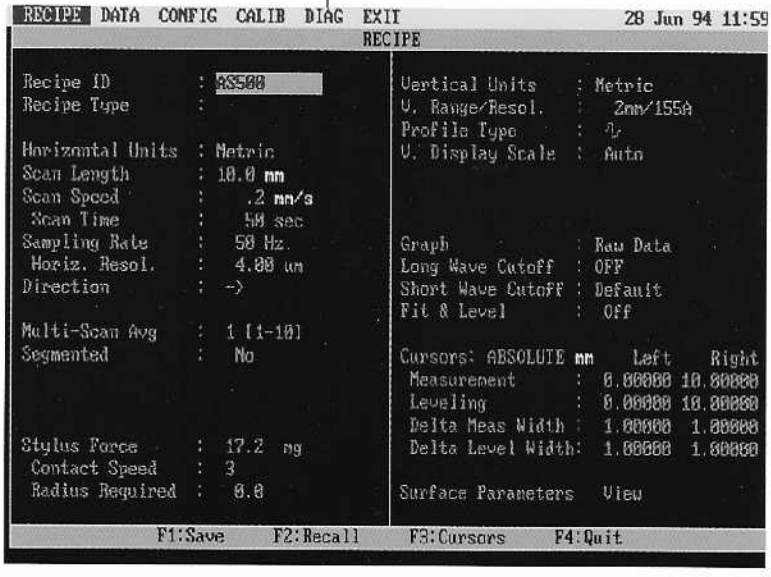
A number of hardware and software options can be added to the Alpha-Step 500 to meet the needs of specific applications:

- The *Extended Vertical Range* option increases the profiler's vertical range from the standard 300 microns (12 mil.) to 2 mm (80 mil.), extending the profiler's use to such applications as hybrid packages and micro-machined parts.
- *Additional Surface Roughness Parameters* add powerful analysis capabilities that increase the total number of surface parameters to 39.
- A *Motorized X-Y Stage* allows the user to position the stage with either the track ball or arrow keys for greater speed and accuracy. Load/unload and measurement positions can be easily programmed for convenient sample handling.
- *High Magnification Optics* increase the optical range to 160-480X from the standard 70-210X, ideal for applications requiring larger view magnification.
- A *Color Camera* is available for viewing color features.



Flexible database capabilities allow data to be stored and retrieved according to user-defined categories.

User-selected parameters can be programmed into a recipe tailored for a specific application.



DATA ANALYSIS AND DISPLAY PARAMETERS

STANDARD

Roughness

R_a	Arithmetic Average
Max R_a	Maximum of 19 overlapping sections
R_q	Root-Mean-Square (RMS)
R_p	Maximum Height
R_v	Maximum Depth
R_t	Maximum Peak-to-Valley
R_z	Ten-Point Height
R_{3z}	Six-Point Height
R_h	Rough Height

Waviness

W_a	Arithmetic Average
W_q	Root-Mean-Square (RMS)
W_p	Maximum Height
W_v	Maximum Depth
W_t	Maximum Peak-to-Valley
W_h	Waviness Height

General

StpHt	Step Height
StpN	Number of Steps
StpMn	Mean Step Height of N Steps
StpSD	Standard Deviation of N Steps
MaxHt	Maximum Height
MinHt	Minimum Height
TIR	Total Indicator Runout
Avg	Average Height
Slope	Slope
Rad	Radius of Curvature
Area+	Area of Peaks
Area-	Area of Valleys
Area	Total Area
ProfL	Profile Length
Edge	Distance to Edge
StpWt	Width of Step

OPTIONAL

Roughness

Bearing Ratio
Cutting Depth
Peak Count
High Spot Count
Mean Peak Spacing
Mean Peak Height
RMS Slope
RMS Wavelength
Standard Deviation of Heights

Selected Specifications

Step Height Repeatability, 1σ
0.001 µm (10 Å) maximum in the 13 µm range

Note: Measured at 10 mg stylus force with the isolation hood, repeated 10 times at one position on a 9400 Å VLSI step height standard.

Physical Characteristics

Height:	67 cm (26.4")
Width:	49 cm (19.3")
Depth:	79 cm (31.1")
Weight:	41 kg (90 lb.)
Power Requirement:	150 VA

Scan Access
Capable of measuring any point on a 162 mm sample. Can accommodate larger samples with limited access.

Maximum Sample Stage Movement

	Manual	Motorized
X-Axis:	151 mm (5.94")	150 mm (5.91")
Y-Axis:	80 mm (3.15")	79 mm (3.11")
Theta:	360°	180°

Maximum Sample Thickness
21 mm (0.82")
17 mm (0.67") with Motorized X-Y Stage option

Maximum Sample Weight
1 kg (2.2 lbs)

(For complete specifications see the separate Alpha-Step 500 specification sheet)

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