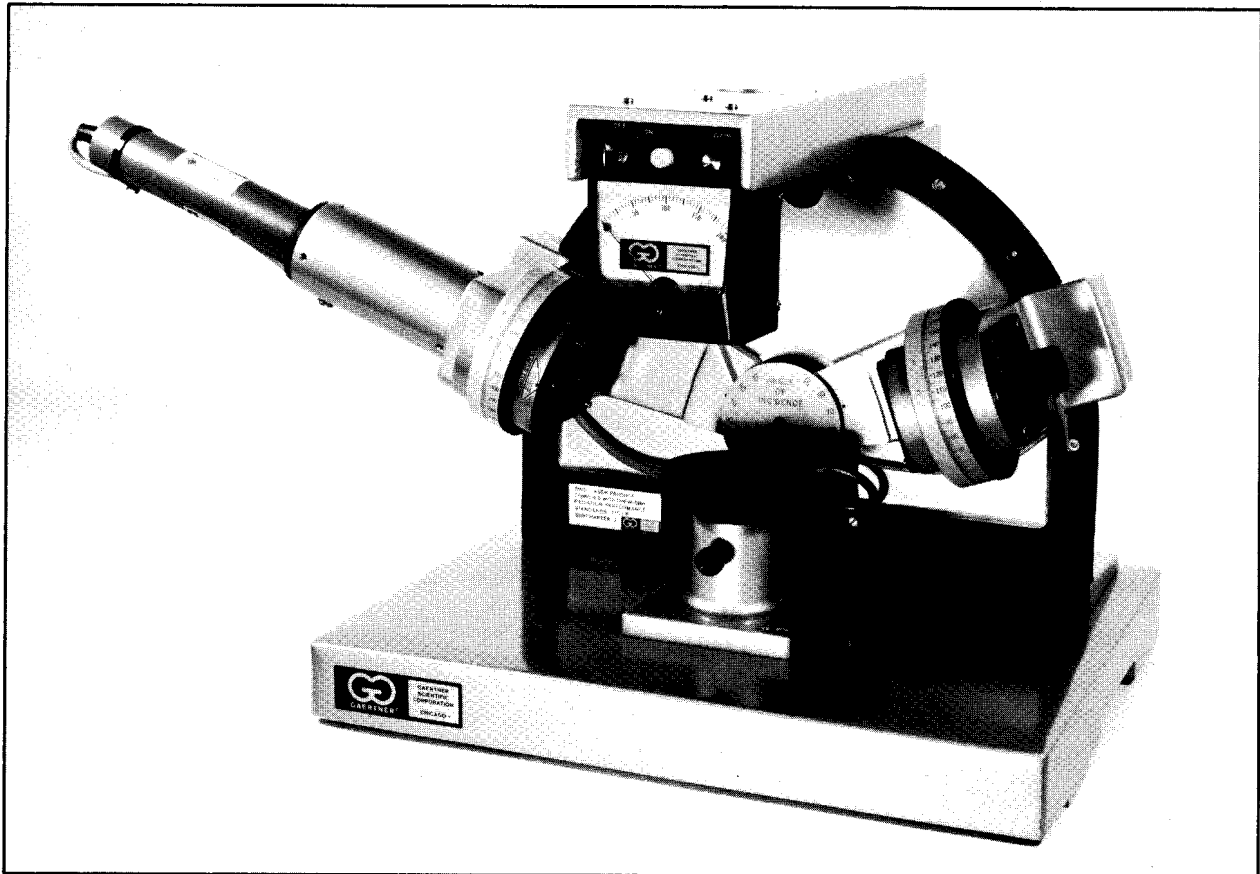



**GAERTNER**  
**MANUAL ELLIPSOMETER L117**

**FOR MEASUREMENT OF  
 SURFACE FILM THICKNESS  
 AND REFRACTIVE INDEX**



Range: from a few Angstroms (billionths of an inch) to thick films.  
 Use in QC, Production, or Laboratory.  
 Operable by non-technical personnel. Rapid determinations.

#### TYPICAL APPLICATIONS

- Semiconductor Wafers
- Optical Coatings
- Oxide and Corrosion Films
- Anodized and Paint Layers
- Contaminant and Impurities
- Blood-Coagulation and Immunological Reactions



#### Laser Safety Certification

All laser ellipsometers supplied by Gaertner comply with DHEW/BRH radiation performance standards 21CFR Subchapter J and carry BRH Certification.

## FEATURES

**LASER SOURCE** Operates in fully-lighted room. Light spot clearly visible on sample.

**SMALL BEAM DIAMETER** (1 mm or .04 in.) Enables checking of limited and different areas on the same sample. Indispensable for small samples.

**LASER WAVELENGTH** (6328 Å) More accurate than filtered low pressure mercury especially on difficult "rough" surfaces.

**SOLID STATE DETECTOR** Durable, sensitive. Eliminates phototube replacement.

**ASSURED REPEATABILITY—BUILT IN ALIGNMENT** Incidence angles quickly set at either 30°, 50°, or 70° by accurate pre-adjusted pin locks.

**CIRCLES: SMOOTH, EASY TO READ** Accurate over the full 360° precision engraved range. Large scale divisions are designed for easy reading to 0.1°.

**PRE-SET COMPENSATOR** Simplifies and speeds up measurement. Only the polarizer and analyzer circles have to be read. Eliminates common error source.

**PRECISE TABLES AND GRAPHS** Are furnished with the instrument for rapidly determining the thickness and refractive index of unknown films on silicon substrates.

**COMPLETELY SELF-CONTAINED** Compact and portable. Everything needed to make measurement. Just plug in and use.

**FULL WARRANTY** The laser, laser power supply including optical and mechanical components, associated electronics will be replaced at no cost (except for shipping charges) for one full year.

## ELLIPSOMETRY IS USED FOR MEASURING

Thickness and refractive index of thin films on dielectric or metallic surfaces such as silicon oxide and silicon nitride films on silicon surfaces. Ellipsometry has wide application in the *Semi-Conductor Industry* for measuring "wafer film thickness".

Oxide thickness and monitoring *oxide film growth on metals* (aluminum, aluminum alloys, iron, titanium, etc.)

Physical adsorption of water vapor and other *contaminants* on surfaces.

*Optical coatings* on lenses and filters—dichroic, dielectric and multilayer.

"The polish layer" on polished *glass surfaces* revealing the mechanism of polishing and extent of surface corrosion caused by polishing agents.

Surface uniformity and composition *vacuum deposition* including thin film breakdown, film formation or dissolution.

*Anodizing* processes especially anodized aluminum.

*Blood coagulation and immunological reactions* measured by changes in thickness due to antigen adsorption of a thick layer of antibodies.

New applications of Ellipsometry occur daily. Gaertner will gladly work with you to evaluate your requirements.

## INSTRUMENT DESCRIPTION

Non-technical persons can make exacting measurement of film thickness and index of refraction in amazingly little time, using Ellipsometer Model 117. On a familiar specimen, the results may be obtained in less than 2 minutes. Every feature has been included to make it accurate, reliable, repeatable, and easy to use.

Model 117 is the first simplified manual Ellipsometer instrument using a laser. This provides a known wavelength, narrow beam, and high light intensity. The small spot size enables the specimen surface to be explored for non-uniformity, in addition to being useful for very small samples.

The detector is solid state, simple and reliable. Its output is read on a taut band meter, with a sharp minimum, making it easy to recognize the proper setting. The meter sensitivity is adjustable. The polarizing optics are Glan-Thompson prisms of high quality, in extremely smooth, shake-free rotary mounts with clear, precise graduations. Angles between the arms are factory preset at 30°, 50°, and 70°; the operator has no difficulty in reproducing a setting without variation or error.

The specimen is horizontal, on a table adjustable for specimen thickness. The light spot on the specimen can be seen magnified 20 times with an optional microscope. The entire instrument is made with great precision, from strong, stable components, and is beautifully finished in lustrous durable gray hammerloid.

## DATA CONVERSION ACCESSORIES

**GRAPHS and TABLES** Graphs show critical areas in great detail. Tables are easy to look up and are supplied free with each L117.

**DESK TOP COMPUTER** With magnetic tape ellipsometer program. Punch dial readings into computer and read thickness on printed roll tape. Eliminates operator judgment. Provides permanent record. Measures films on substrates other than silicon.

**PUNCHED CARD DECK** Fortran IV Ellipsometer program for use with large computers.

## SAMPLE ACCESSORIES

**Viewer:** Microscope provides enlarged normal image of laser spot on sample surface.

**Positioning Stage:** Permits X-Y precision motion to .001" with micrometer thimbles.

**Micro Spot Optics:** Enables areas as small as 26  $\mu\text{m}$  to be explored.

SPECIFICATIONS	
<b>Light Source:</b>	HeNe 6328Å laser 1 mw
<b>Beam size at Object:</b>	1 mm spot dia.
<b>Angles of Incidence:</b>	30°, 50°, and 70° by positive pins
<b>Sample orientation:</b>	horizontal
<b>Extinction meter:</b>	built in, solid state amplifier
<b>Weight:</b>	approx. 50 lbs.
<b>Size:</b>	approx. 13¼" × 25" × 14" *
<b>Measuring Range:</b>	from a few Angstroms to thick films
<b>Accuracy:</b>	2.5Å to 10Å over most of the measuring range

## GAERTNER = TOTAL CAPABILITY IN ELLIPSOMETRY

Gaertner makes 8 different Ellipsometers. We have pioneered this field and we make instruments suitable for many purposes, at various levels of precision. In model L117 we have concentrated much of this know-how to produce an instrument of extraordinary performance at a very reasonable price.



## GAERTNER SCIENTIFIC CORPORATION

1201 WRIGHTWOOD AVE., CHICAGO, IL 60614 • TEL. 312-281-5335 • TELEX 206136

*Designers and manufacturers of electro-optical measuring instruments in the U.S.A. since 1896*

**NEW**

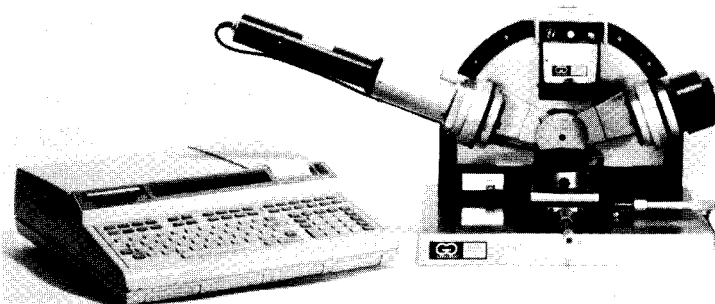


# L116 AUTOMATIC ELLIPSOMETER

## MEASURE THIN FILM THICKNESS AND INDEX IN 4 SECONDS



All laser Ellipsometers supplied by Gaertner comply with DHEW/BRH Radiation Performance Standards 21CFR Subchapter J and carry BRH Certification.



<b>100% Inspection:</b>	Check up to 750 wafers per hour
<b>Profiling:</b>	Scan hundreds of different areas on a single wafer in minutes

- SIMPLE:** Push-Button OPERATION almost no operator training required.
- RELIABLE:** Fully automatic operation eliminates common operator errors and variations between different operators. Printed tape provides permanent record.
- ACCURATE:** Rotating Analyzer is more accurate than manual ellipsometers because hundreds of data points are evaluated during a single measurement instead of only two.
- VERSATILE:** Automatic or Manual operation at the flip of a switch with measurements possible at 70, 50 and 30 degree incidence — aids in the verification and analysis of difficult to measure films.
- FLEXIBLE:** Buy our inexpensive manual L117 ellipsometer and convert to a fully automatic as funds permit. Uses the popular Hewlett Packard 9825 calculator already common in many industrial labs and QC departments.
- PROFILE:** Add a motor driven precision scanning stage controlled by the HP9825A and get surface measurements in both X and Y directions in any size steps down to one micron.
- "IN TRACK" MEASUREMENTS:** As your requirements grow automatically measure wafers directly in air tracks in remote "clean room" locations.

## INSTRUMENT DESCRIPTION

The L116 Automatic Ellipsometer using the Gaertner L117 Production Ellipsometer and the Hewlett Packard HP9825A Calculator is unmatched for performance and reliability.

The L117 Production Ellipsometer, has been used in production and quality control departments for over 2 years. Its Glan Thompson prisms and coated optics are of the highest quality. The entire instrument is made with great precision, from strong and stable components.

The Hewlett Packard HP9825 Calculator interfaces with the rotating analyzer on the L117. It collects data, calculates, displays or prints the film thickness, film index and period, all within 4 seconds. A single cassette contains a variety of different programs which enable you to select from fully automatic continuous display or print, pushbutton display or print, or from manually entered film and substrate measurement modes. Other specialized programs for multiple films and for absorbing films will be offered for this calculator as they become available. The HP9825 is also ideal for controlling scanning and profiling stages, plotters, printers and a variety of other instruments and wafer handling equipment.

## ACCESSORIES

The L116 can be equipped with all of the accessories which are available for the manual L117 (Refer to bulletin EA) plus those shown below:

### SCANNING MOTOR STAGE:

A stepper motor driven stage, automatically controlled by the HP9825 can be added to scan or profile your wafer. Film thickness, film index together with location on your sample can be printed on tape or fed to plotters and other data recording equipment.

### "AIR TRACK" INTERFACE:

The L116 can be equipped with a section of "air track" and interfaced directly into your system for remote and fully automatic measurements on wafers. Please contact the factory for details.

WARRANTY	Gaertner will replace at no cost (except shipping charges) the laser, rotating analyzer, all power supplies and associated electronics for 1
&	full year. Hewlett Packard warrants their 9825 calculator for 90 days.
SERVICE	Beyond the warranty periods, you are covered by a tradition of quality service from both Gaertner and Hewlett Packard.

Gaertner can put it all together for you — not just an automatic ellipsometer but an automatic measuring system.



## GAERTNER SCIENTIFIC COMPANY

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*Designers and manufacturers of precision English and Metric optical measuring instruments since 1896.*