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SECTION I

GENERAL INFORMATION

1-1 INTRODUCTION

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1-2 This manual describes the concepts, operation, installation and programming of the Micro Automation Model 1006 Dicing Saw. For detailed maintenance information, refer to the Maintenance Manual.

1-3 Section I of this manual provides a general description of the Model 1006, gives a general overview of equipment operation and explains the warranty. Section II describes installation procedures. Section III gives detailed instructions for initial setup and principle operations of the Model 1006 and Model 1006A. Section IV describes programming and the software. A separate maintenance manual offers electronic troubleshooting guides and provides the necessary preventive and corrective maintenance procedures.

1-4 The appendices contain recommended spare parts lists.

1-5 EQUIPMENT AND OPERATION DESCRIPTION

1-6 The Model 1006 Programmed Dicing Saw is the first microprocessor-controlled, fully motorized, high-speed dicing system. On the Model 1006, all x, y, z, and theta saw-stage movements are driven by closed-loop digital stepping motors through precision lead screws. Once programmed to a dicing pattern, the Model 1006's microprocessor computes and controls the dicing process for all subsequent identical wafers to be diced.

1-7 Because the microprocessor controls the length of each cutting stroke, the Model 1006 cuts only a fraction of an inch further than the distance across the circular wafer in each pass. At the center of the wafer, this distance is the same as that cut by a conventional saw...at the top and bottom, the Model 1006's cutting stroke is roughly 25% less than the length of travel of a conventional saw.

1-8 The Model 1006 performs dicing functions faster and more efficiently than previous dicing saw designs.

Because of motorized X and θ axis movement, wafer alignment is faster. Because of microprocessor control, the cutting speeds are much faster. First, only the street chord length is cut, not a square, allowing the average index to be only 75% of the wafer diameter. Second, the blade velocity at wafer intercept is a controlled slow speed with acceleration up to a much higher speed after wafer entry. Thus edge damage is eliminated and higher cutting speeds are possible. These features of the Model 1006 produce a sizeable improvement in the speed with which any given semiconductor wafer can be diced. This high speed rate of operation, coupled with other design innovations that permit fast wafer loading and alignment, ease of control, and operator convenience, makes the total performance of the Model 1006 quite remarkable.

1-9 When a new wafer geometry is to be diced, the operator enters dicing instructions on the programming keyboard as follows:

1	Program	Enables Programming.
2	English or Metric	Microprocessor treats subsequent numbers as either English or Metric data, depending on this control step.
3	First Index	Interval distance between X-axis street centerlines across wafer.
4	Second Index	Interval distance between Y-axis street centerlines across wafer.
5	Height	Z-axis stage position during cutting or scribing.
6	Thickness	Thickness of wafer.
7	Angle	Angle of rotation from X to Y (normally 90% can be any angle necessary for non-orthogonal chips).
8	Speed	Controlled velocity of stage movement during X and Y cut strokes (or scribes) ...microprocessor automatically programs lower entry/exit speeds to prevent wafer damage.

9	Wafer Diameter	Up to 6.00"...microprocessor automatically calculates X and Y travel lengths so each pass is no longer than necessary to cut across circular wafer.
10	Scribe or Dice	Scribe cuts both directions. Dice cuts forward only and returns rapidly above wafer surface.

1-10 EQUIPMENT SPECIFICATIONS

1-11 General specifications for the Model 1006 Saw are given in Table 1-1 on page 6.

1-12 EQUIPMENT SUPPLIED

1-13 Standard equipment supplied with the saw includes:

a) Vacuum chuck blade loading tool set.

b) Spindle spanner wrench set.

c) 0.109 inch gauge plate.

d) Dual Water Flooding Nozzle with Splash Shield, WF-100.

1-14 ACCESSORIES

1-15 Standard available accessories include:

a) Air & Water Service Unit, Model SU-106

b) Chip Chuck Adaptor for cutting 3" wafers on film.

c) Film carriers

d) Spare parts kits.

e) Blade adaptors.

1-16 Operating supplies are:

a) Diamond cutting wheels.

b) Mounting film (where required).

c) Blank wafers for dressing.

1-17 EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-18 The following tools and test equipment will be needed for setting up and adjusting the Model 1006 Saw.

a) Allen wrenches, both ball type and conventional sizes (1/16-, 0.050-, 5/64-, 3/32-, 7/64-, 9/64-, 5/32-, and 1/4-inch).

b) Screwdrivers (wideface, sizes 1/16- through 1/4-inch).

c) Stereo microscope (at least 80X).

d) Volt-ohmmeter (Triplet Model 630 or equivalent).

e) Mechanics mirror.

f) Carpenters level.

g) Open-end wrenches (sizes 3/16-, 1/4-, 5/16-, 11/32-, and 3/8-inch).

STANDARD SPECIFICATIONS - MODEL 1006 DICING SAW

Specification	English	Metric
Wafer Size	To 6 inches	To 155mm
Index Stepping Range	.00025 inches to wafer diameter	6 microns to diameter
Minimum Index Step	.000125 inch	3 microns
Cutting Feed Speed	0.05 to 12 inches/seconds	1.25 to 300mm/seconds
Return Stroke	to 12 inches/seconds	300mm/seconds
Spindle Index Repeatability	.00016 inch	4 microns
Chuck Flatness	.0004 inch across six inches	10 microns over 155mm
Cutting Depth Range	Blade limited	
Cutting Depth Increments	.00025 inch	6 microns
Chuck Height Range	0.50 inch	13mm
Chuck Rotation	0 to 120 degrees	
Chuck, Fine Adjustment	± 3 degrees	
Rotation Resolution	.0025 degrees	
Microscope Magnification	60X Monocular or 100X Split Field T.V.	
Cutting Wheels Diameter	2 inches to 2.2 inches	50 to 56mm
Kerf Width With .001 (.025mm) Blade	0.0012 to 0.0014 inch	30 to 35 microns
Wheel Coolant Consumption	1/2 to 1 gpm	2 to 4 lit/min.
Cooling Water Consumption-Spindle	6 gph	24 lit/hr.
Wheel Coolant Pressure	30 psi	2 Kg/cm^2
Vacuum	20 inches Hg min.	500mm Hg
Air	85 psi, 4 CFM	6 Kg/cm^2, 120 lit/min.
Base Dimensions	32 inches x 26 inches	81cm x 65cm
Height (With TV)	25 inches	73cm
Weight	220 lbs.	100 Kg
Power	100-250 VAC± 10%, 50/60 Hz, 1500w	
Spindle	High Frequency Drive Air Bearing 1350w	
Spindle Speed	5,000 to 45,000 rpm	