1.0 SYSTEM DESCRIPTION

1.1 General System Description

The ABM, high performance Mask Alignment and Exposure System is designed to provide precise, repeatable mask alignment and exposure of photoresist-coated substrates. These systems can be manufactured in a variety of configurations each designed to provide the user with the level of performance desired. Modular in design, the system incorporates all the functions necessary to produce high-quality patterning on materials that can have a wide range of physical size, and photolithographic properties.

Major subsystems (modules) are integrated in a typical system which include:

a. Mask alignment tooling module
b. Operator's control module
c. Alignment optics
d. Proximity-type, collimated UV or DUV lightsource system
e. Lamp power supply/controller

All of these (sub) systems are integrated within a laboratory grade console that produces a fully operational, table top, high performance mask aligner system with outstanding capabilities and exceptional reliability.

Before attempting to operate this system, spend time reviewing this and the other associated appendices which describe in greater detail the functions of the system's major components. Also included in this (operator's) manual, there are sections covering the UV/DUV lightsource system, and lamp power supply controller.

Contact ABM, Inc., or it's local representative, if there are any questions regarding this or any other ABM equipment you may have. Failure to operate this equipment properly can cause damage in addition to negating the warranty.

1.2 Basic Subsystem Description

The aligner has been designed to provide the versatility needed for R & D, Pilot Production and Production.

1.3 Mask-to-Wafer Alignment Modules

ABM features the choice of two types of Vacuum Chucks. Technical descriptions are listed below, the basic difference being the leveling operation of the chuck.

1.3.1 Fixed Level Wafer-to-Mask Vacuum Chucks / Alignment Module

A high precision mask alignment tooling module (proximity and contact adjustable) incorporates functions necessary to produce precise, repeatable sub-micron features. X,Y and O motions are precise, backlash-free micrometer movements capable of resolving 0.1 micron increments (optional differential micrometers). Rotation of the Z axis knob allows the user to set the chuck assembly for mask-to-wafer separation to a precision of better than 2.5 microns for substrate thickness compensation, proximity gap adjustments and alignment separation.

The tooling module includes one (1) set of interchangeable mask holders and substrate chucks (with pre-alignment). The wafer chuck is precision lapped to ensure wafer flatness and to ensure a good wafer-to-mask seal, both important especially when using previously processed wafers. The chuck seal is designed in close proximity to the edge of the wafer chuck so that the contact sealing is made directly on the mask creating minimal leverage and resulting in negligible mask bow. The chuck also incorporates a nitrogen (N2) purge to minimize outgasing which effects the printing quality when some negative resists are used. The mask assembly is pneumatically actuated up and down for operator convenience and to safeguard against the operator accidentally dropping the mask assembly and damaging the mask or other components. The alignment module is capable of accommodating proximity, soft contact and hard contact (vacuum) printing requirements.

Fixed Level Vacuum Chucks are primarily used with flat wafers & substrates.

1.3.2 Planarizing Wafer-to-Mask Vacuum Chucks / Alignment Module

The semiconductor-grade mask alignment tooling module (proximity and contact adjustable) incorporates functions necessary to produce precise, repeatable sub-micron features. X,Y and O motions are precise, backlash-free micrometer movements capable of resolving .1 micron increments (optional differential micrometers). The chuck mechanism utilizes an air bearing which is needed to planarize previously processed wafers. The chuck seal is designed in close proximity to the edge of the wafer chuck so that the contact sealing is made directly on the mask, creating minimal leverage and resulting in negligible mask bow. The mask assembly is pneumatically actuated up and down for operator convenience and to safeguard against the operator accidentally dropping the mask assembly and damaging the mask or other components. The alignment module is capable of accommodating proximity, soft contact and hard contact (vacuum) printing requirements.

Planarizing Vacuum Chucks are primarily designed for high resolution, precise registration and proximity printing requirements.

1.3.3 Specification for Alignment Module adjustments

Z Motion (Fixed Level Chuck)	.250" Motion, in 2.5 micron increments with Z knob adjustment
Z Motion (Planarizing Chuck)	.250" Motion, in 2.5 micron increments with Z knob adjustment air bearing auto leveling
Theta	Chuck rotates approximately ±5°
Mask rotation (O)	Mask holder rotates approx. ±45° may be rotated 360° if necessary
Fine Theta (O)	Chuck mask ±5° - micrometer driven
X Motion	Micrometer driven ±0.5
Y Motion	Micrometer driven ±0.5
Optional:	Micrometer, coarse/fine. Fine, <1 micron

NOTE: Differential micrometers may also be fitted to theta (O).