

**INSTRUCTIONAL MANUAL  
CAT. 50120-10**

**Model 900  
Grinding and Polishing Machine**



**Electron Microscopy Sciences**

P.O. Box 550 ♦ 1560 Industry Road ♦ Hatfield PA 19440

*Toll Free: 1-800-523-5874*

[www.emsdiasum.com](http://www.emsdiasum.com)

[sgkcck@aol.com](mailto:sgkcck@aol.com)

*Tel: 215-412-8400 ♦ Fax: 215-412-8450*

## Introduction

The Model 900 is a small, compact grinding and polishing machine designed to fit the needs of most metallographic specimen preparation needs. It utilizes a variable speed motor which allows for both high speed grinding and low speed polishing of all materials. It is surrounded by a structural foam housing which will never rust, especially important when dealing with water as the coolant. Coolant is applied to the surface of the grinding wheel via an adjustable, flow controlled goose-neck spout and is connected to a constant water supply with a compression fitting at the rear of the instrument. All coolant is contained within the unit by the metal splash guard which surrounds the polishing wheel, preventing splash. The grinding wheel is removable and can easily be replaced, making maintenance and use simple.

Whatever the application, the Model 900 can be a valuable addition to any laboratory.

## Specifications

Dimensions: 13" x 15.25" x 9.5"  
 Net Weight: 35 lbs  
 Motor Speed: 0-1725 RPM (continuously adjustable)  
 Motor: 1/3 HP  
 Grinding Plate Diameter: 8"  
 Electrical Input: 90-120 VAC; 50/60 Hz  
 200-240 VAC; 50/60 Hz

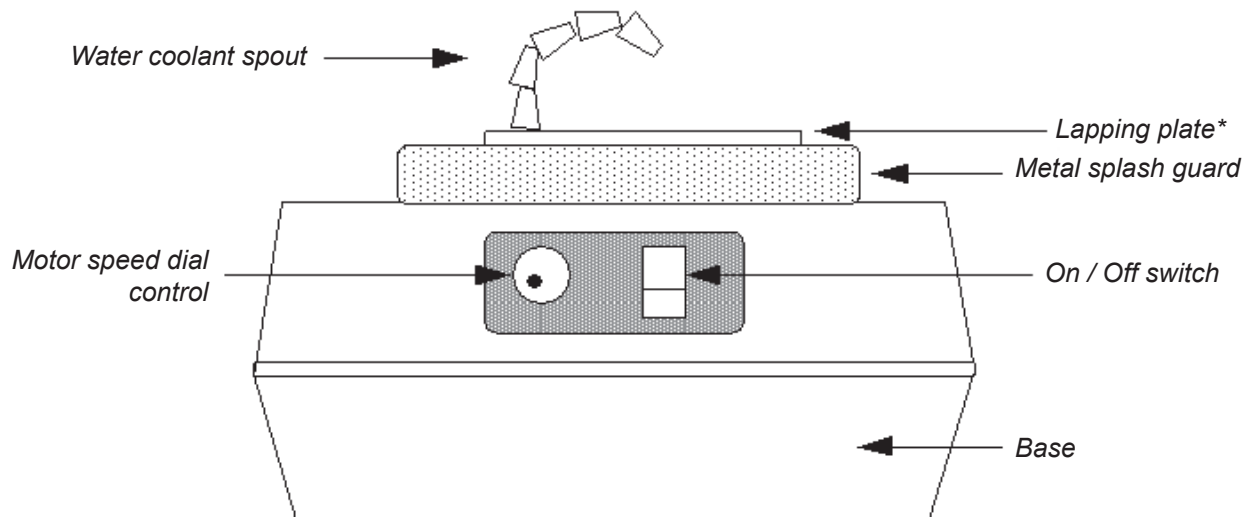
## Shipping Kit and Accessories

The Model 900 comes standard with an aluminum lapping plate, the splash guard, and a retaining knob for lapping plates with the center hole removed. These items are listed below along with spare parts and accessories available for use with the Model 900.

DESCRIPTION	ITEM #	QTY	CHECK
8" Grinder / Polisher machine	Model 900	1	
Power Cord	Attached	1	
Rubber splash guard	01-01334-01	1	
Fuses, 2A Slo Blo (for 115V)	0652-017	2	
Fuses, Lamp Slo Blo (for 220V)	0652-004	2	
Metal splash guard	01-01410-01	1	
Wrench	01-01328-01	1	
Holding Band	01-0129-01	1	
Glass lapping plate (optional)	0705-012	1	

## Construction and Basic Layout

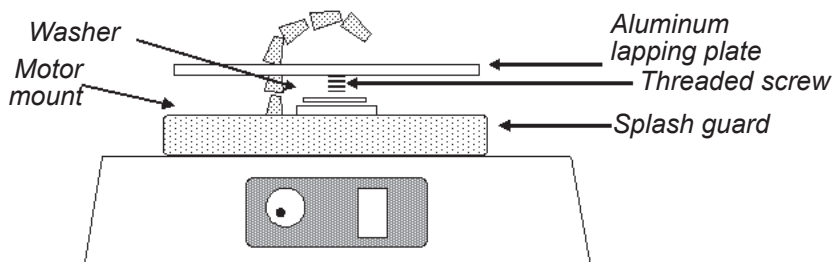
The Model 900 has a basic, straightforward construction and is similar to most grinding and polishing machines in the basic design concept. The Model 900 allows for the grinding and polishing of most specimen types, and is versatile enough to accommodate most hand-held fixture types, including many of the EMS Lapping and Polishing fixtures. The following diagram is a basic schematic showing the various parts of the Model 900.



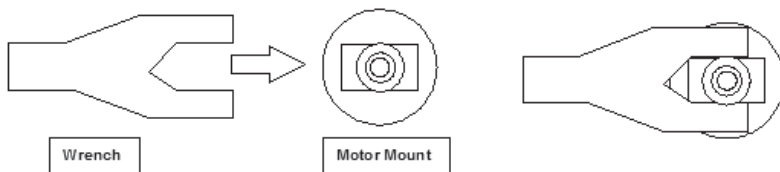
**\* Note:** The lapping plate will not be visible when the splash guard is in place. This diagram shows this so that the user can see all of the components of the instrument.

## Mounting of the Lapping Plate

The only real assembly required for the Model 900 is the mounting of the aluminum lapping plate. Aluminum lapping plates can be used with sticky-backed grinding papers such as SiC or in conjunction with a glass plate attached to the top of the plate for use with plain backed films. A procedure for all of these is listed below and shown in the following diagrams.

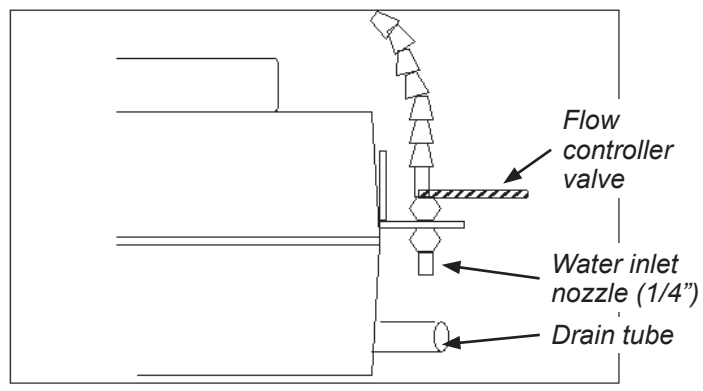


1. Remove the splash guard from the Model 900.
2. Place the lapping plate removal wrench onto the motor mount. The wrench should be oriented such that the two flats of the wrench slide onto the two flats machined onto the motor mount (see diagram at right).
3. Place the washer onto the motor mount.
4. Place the lapping plate onto the motor mount with the threaded screw placed into the threaded hole.
5. Slowly rotate the lapping plate clockwise while holding the wrench. Rotate until the plate is tight against the motor mount.
6. If using a glass plate, tape the glass plate onto the top of the aluminum plate using electrical tape around the edge of the aluminum plate, securing the glass plate in place.
7. Remove the wrench and replace the splash guard.
8. Turn the instrument ON and increase the lap speed. Check the wobble of plate.
9. Re-install the lapping plate if not rotating level.



### Water and Drain Hose Installation

It is advisable to have the Model 900 hooked up to a water supply to provide both a coolant during use as well as to wash debris from the lapping surface during grinding or polishing procedures. A small compression fitting is provided at the rear of the instrument to allow water hook up to any standard water fitting. The drain hose should be connected to either a closed loop, recirculating system or to a proper drainage set-up. The diagram to the right shows the layout of the water hose fitting and the drainage tube.



### Operating Procedure

Operation of the Model 900 is fairly straightforward and is similar to most grinding and polishing machines in terms of operation. Generalized information regarding different applications will be discussed below.

#### General Grinding

Most grinding procedures are characterized by high lapping wheel speeds and coarse grit sizes to do the bulk removal. Typical RPM ranges are 300 – 1000 rpm for grinding, and specimens are typically mounted to some type of fixture or encapsulated in a mold, using either acrylic resins or epoxy resins

Grit Size	Grain Size (Microns)	Amount For Removal (Microns)
60	260	780
80	200	600
120	125	375
180	76	228
240	52	156
none	46	138
320	35	105
none	30	90
none	26	78
400	22	66
none	18	54
600	14	42
800	10	30
1000	8	24
1200	5	15

#### Polishing

Polishing, unlike grinding, uses fine grits to produce optically flat, scratch and damage free specimens for optical or electron microscopical analysis. Polishing is characterized by the use of polishing cloths or fine sized abrasive wheels to create the highly polished surface of the specimen. Polishing is usually done at lapping wheel speeds around 50-300 rpm, depending upon the material being polished. Below is a chart describing the various polishing cloths available and their applications to polishing.

## Specimen Preparation for SEM and TEM

Preparing specimens for SEM or TEM is also possible using the Model 900. These types of grinding and polishing steps are usually done with Diamond films at slow speeds. Typical rotation speeds are around 25-200 rpm, with the final stages of polishing done at the slower speed. Usually a glass plate is used for the lapping plate and the abrasive discs are placed onto the wheel using a squeegee and water. The films are held on by surface tension and are easily removed. Using the Model 590 Tripod Polisher it is possible to make both SEM and TEM specimens using the Model 900. A brief outline of the types of diamond film sizes and lapping wheel speeds are described below to use as a general guideline for grinding and polishing SEM and TEM samples.

Film Size (microns)	Wheel Rotation (RPM)
30	200
15	150
9	100
3	50
1	20-40
0.5	20
0.05 colloidal silica	20-40

## Basic Maintenance

The Model 900 Grinding and Polishing machine requires very little maintenance to maintain its optimum working conditions. Cleanliness is perhaps the most important aspect of the maintenance to ensure the instrument maintains its optimum working conditions.

**Cleaning** It is important to keep the instrument clean so as to ensure no contaminants reach the electronics or moving parts. Cleaning the instrument following the use of colloidal silica products is imperative to prevent contamination.

**Lapping Wheel Surface** Making sure the lapping surface is completely clean and free of any contaminants is important both in instrument upkeep as well as specimen quality. When using a glass lapping plate, it is important that both the glass surfaces and the aluminum lapping wheel surface are both clean before mounted.

**Water Hook-up** When installing the instrument, the water supply hook-up at rear of the instrument should properly be fitted. Make sure there are no leaks which may ultimately end up on the electronics of the instrument.

**Lapping Wheel Installation** It is important that the lapping wheel is never over tightened to the point where the threads become damaged. This will prevent the instrument from being used.

## Safety

If one follows basic lab safety guidelines, there should not be any problems. These general guidelines should be followed to ensure safe use.

- Do not plug instrument in with wet hands.
- Do not place hands inside the lapping area during operation. The lapping wheel can cause damage to hands and fingers if they are caught in the wheel spindle.
- Make sure proper electrical and water hook-ups are used and available.
- Unplug instrument if working on the electrical components of the instrument.