George C. Marshall Space Flight Center
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EM50-OWI-031
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ORGANIZATIONAL WORK INSTRUCTION

EM50

OPERATION OF

R.J. Lee Personal Scanning Electron Microscope™

Revision B

APPROVING AUTHORITY	NAME	TITLE	ORG	DATE
Group Leader	DeWitt Burns	Environmental Effects Branch	EM50	4/27/2005

**CHECK THE MASTER LIST—
VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE**

DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		01-10-03	Baselined OWI
Revision	A	08/23/04	Rules review updates
Revision	B	04-27-05	Changes made due to reorganization

OPERATION OF R.J. LEE PERSONAL SCANNING ELECTRON MICROSCOPE™

1. SCOPE

1.1 Scope.
This document establishes the organizational work instruction for operation of the R.J. Lee Personal Scanning Electron Microscope (SEM).

1.2 Purpose.
The purpose of this document is to outline the steps necessary for obtaining photomicrographs and particle size measurements using the Personal SEM.

1.3 Applicability.
This document applies to the Personal SEM used by EM50. This work instruction is not a substitute for formal training. Untrained personnel are not to attempt to use this document to operate the Personal SEM unless supervised by trained, certified operators.

2. APPLICABLE DOCUMENTS

	Personal SEM User's Manual V1.02
	Personal SEM User's Manual V2.0
MPD 1280.1	Marshall Management Manual
EM50-OWI-002	Document and Data Control
EM50-OWI-003	Control of Quality Records
EM50-OWI-004	Control of Customer Supplied Product
MPG 8730.5	Control of Inspecting, Measuring, and Test Equipment

3. DEFINITIONS

Warning - Warnings are used when failure to observe instructions or precautions could result in injury to personnel.

Caution - Cautions are used when failure to observe instructions could result in damage to equipment.

Note - Information to help clarify multi-person procedures or simultaneous multiple operations.

4. INSTRUCTIONS

Work performed and data generated within EM50 that affects the quality of products as specified in the scope of MPD 1280.1 shall be documented and controlled per EM50-OWI-002.

4.1 Sample Requirements

Sample size is limited to approximately 1″ X 1″. The sample must either be electrically conductive, be placed on a conductive material, or be coated with a conductive material.

4.2 General Operating Procedure

Additional information is provided in the User's Manuals referenced in the Applicable Document Section.

4.2.1 Samples are to be handled using clean, approved gloves.

4.2.2 Identify the sample to be analyzed. If it is a customer-supplied sample, it must be logged per document EM50-OWI-004.

4.2.3 Select and install an SEM stage (manually operated or joystick operated).

4.2.4 Place the sample onto the stage.

4.2.5 Pull down the elevator lever arm located on the left-hand side of the instrument, while simultaneously lifting on the underside of the sample stage. This will initiate the vacuum pumps. Do not proceed to the next step until the "Pump Indicator" light remains illuminated.

4.2.6 Select "kV Enable" on the main control screen. Ensure that the "15 kV" light and the "kV Enabled" light on the High Voltage Power Supply are illuminated.

4.2.7 Select "Auto Saturate" on the main control screen. Ensure that the "Filament OK" light on the High Voltage Power Supply is illuminated. If not, the filament must be changed (refer to the User's Manuals for instructions).

4.2.8 Select "Quick Focus" on the main control screen.

4.2.9 Select the desired magnification.

4.2.9.1 The focus may need to be adjusted as the magnification is increased. This can be accomplished by either repeating the “Quick Focus”, or by manually adjusting the “Focus”, “Stigmator” and “Spot Size” adjustments.

4.2.10 Use the “Area” and “Mode” controls as necessary to enlarge selected areas of the sample, or to further develop the image.

4.2.11 Save an image by selecting the “Disk I/O” icon and then inputting a file name. Return to the main control screen by selecting the “Console” icon.

4.2.12 Shut down the instrument by first disabling the electron beam, and then by pulling up on the elevator lever arm to eliminate vacuum to the sample chamber.

4.3 Particle Size Measurement

Prior to performing particle size analysis on an unknown sample, the calibration of the instrument should be verified. This is typically accomplished by measuring the diameters of NIST-traceable latex microsphere standards.

4.3.1 Load and view the sample per operations 4.2.1 through 4.2.9.

4.3.2 Select the “Disk I/O” icon to transition to the alternate control screen.

4.3.3 Activate the “Measurement” functions as indicated on the mouse icon in the upper right-hand section of the “Disk I/O” control screen.

5. NOTES

None.

6. SAFETY PRECAUTIONS AND WARNING NOTES

This work instruction is not a substitute for formal training. Untrained personnel are not to attempt to use this document to operate the Personal SEM unless supervised by trained, certified operators.

7. APPENDICES, DATA, REPORTS AND FORMS

When evaluating flight hardware or conducting in-process inspection of quality sensitive components, a data sheet shall be filled out with test results. This data shall be presented to Quality personnel for stamping. MSFC Quality may choose whether or not to be present for the sample analysis.

8. QUALITY RECORDS

Quality records shall be retained in accordance with Document EM50-OWI-003. Copies are to be maintained in EM50 for a period of not less than 2 years.

9. TOOLS, EQUIPMENT, MATERIALS

As required.

10. PERSONNEL TRAINING AND CERTIFICATION

The Group Leader of the Environmental Effects Group shall be responsible for ensuring that all personnel using the Personal SEM are trained. Operator training is accomplished by on-the-job training, conducted by a representative of the R. J. Lee Company or a certified operator. Records of personnel training shall be retained in the group office.