



ABT-32

Scanning Electron Microscope



GATEWAY TO THE FASCINATING MICRO

Simple & Sp

EQUIPPED WITH FOREMOST AUTOMATED FUNCTIONS OF THE AGE, IN PURSUIT OF EASY OPERATION, THE ABT-32 ASSURES

ROCOSM!

easy

CLEAR IMAGE VIEWING AT SIMPLE KEY TOUCHES.



Operating ease and working efficiency are brought to new levels in the new ABT-32 SEM.

Microscope operation is performed using a very simple push button Control panel.

All operations, from sample insertion to image display, are performed automatically, and a clear sharp image is obtained at all times.

The ABT-32 ushers in a new era for SEM's.

The instrument is extremely compact, yet offers performance well suited for most laboratory and production applications, as well as teaching.

Little or no skills are required to operate the microscope.

■ How can one eliminate the complexity of SEM operation, while still maintaining high performance?

This goal has been realized in the ABT-32 by automating most operational adjustments. You need not be a skilled microscopist to use the instrument.

■ Mount the specimen you want to examine, and push a single button.....This is all that is required to obtain a clear sharp image.

The ABT-32 performs all vacuum system sequences automatically.

■ Operate in normally lit room.....bright TV image eliminates eye strain.

Continuous Auto-Focus and Dynamic ACB are new functions, which provide automatic image adjustment when moving around the sample. These features allow the operator to concentrate on the specimen, and eliminate the need for continuous adjustments.

■ Easy image recording.....simply press a button while viewing the image at any scan speed.

The ABT-32 auto contrast and brightness function (One shot ACB) assures correct exposure at all times.

■ FEATURES

- 5nm resolution.
- Bright clear TV image standard.
- Accelerating voltage : 2kV to 30kV(7 steps).
- Fully automatic operation, including evacuation, and column turn on at the push of a button.
- High-precision Automatic Gun Alignment and Auto-Stig functions.
- Two separate Auto-Contrast/Brightness functions : one for viewing, the other for photography.
- Two new Auto-Focus functions are standard : Continuous AF, and One-shot AF.
- Mag-Memory provides up to ten instant-recall mag settings.
- WET-SEM option allows examination of non-conducting samples with no preparation.
- Expansion capability (e.g.various signal detectors, including EDX for elemental analysis).

Scanning Electron Microscope

ABT-32

CLEAR IMAGE FOLLOWS SIMPLE KEY TOUCH

INSERT

WHAT YOU WANT TO EXAMINE!

AUTOMATIC EVACUATION

Operating vacuum is obtained in about 2 minutes. The vacuum level is indicated on an LED display.

AUTOMATIC HIGH VOLTAGE APPLICATION

AUTO-EMISSION

Once the operating vacuum level is reached, the filament current and accelerating voltage are applied automatically. Operational errors are avoided, and long filament life is assured.

AUTOMATIC GUN ALIGNMENT

A critically important adjustment in any SEM is the alignment of the electron gun relative to the lens system. This operation is performed automatically in the ABT-32 every time that a specimen is exchanged.

AUTO-FOCUS

The Auto-Focus is automatically initiated every time that a new sample is introduced. This results in the instant display of an in-focus image with no operator intervention.

SIMPLE KEY OPERATIONS FROM PUMPING TO IMAGING



After placing your specimen on the stage, push the AIR switch to start the automated sequence.



Push the switch



Automatic Evacuation

- Automatic Gun Alignment
- Auto-Emission
- Automatic High Voltage Application

SPECIMEN SETTING

Simple & Spe

SPECIMEN EXCHANGE



● Data Printout

● Photo-Scan

● One-Shot ACB

Push the switch



CAMERA SYSTEM

Polaroid camera and high resolution photo CRT are standard.



H.

Simple & Speedy

OBSERVATION CONVENIENCE : AUTOMATICALLY ADJUSTED TV IMAGE

SEARCH

FOR THE PART OF YOUR SPECIMEN YOU WANT TO EXAMINE!

When searching a sample in a SEM, it is normally required to continuously adjust focus, and contrast/brightness, due to changing surface elevation and signal levels. The ABT-32 performs these adjustments automatically, and allows the operator to concentrate on the sample rather than the SEM.



NEW Auto-Focus (AF)

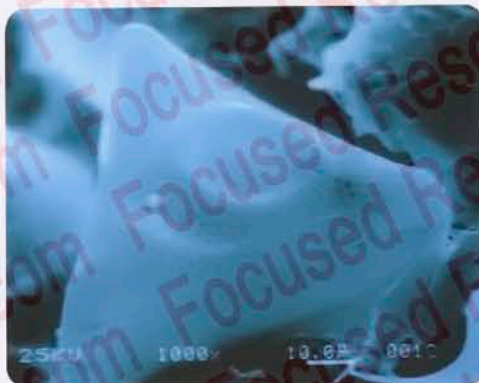
- **Continuous AF** : This system provides continuous focus adjustment without operator intervention.
- **One-shot AF** : This function is used at high magnification and provides accurate focus adjustment at the push of a button.

NEW Auto-Contrast/Brightness (ACB)

- **Dynamic ACB** : This function automatically adjusts the contrast and brightness when changing spot size, or moving around the sample.

NEW Auto-Stig

- Correcting astigmatism in a SEM is an adjustment that many operators have a problem with. This is performed automatically in the ABT-32 at the push of a button.



NEW TV Scan Mode

- Most image observation can be performed using the bright clear TV image. All auto adjustments such as Auto-focus, ACB etc function in the TV mode. Images are easily observed in a well lit room.

RECORD

THE IMAGE YOU HAVE JUST VIEWED!

To record an image on the TV screen simply press the PHOTO button. The correct contrast and brightness levels are adjusted automatically assuring a correctly exposed image at all times.

Automatic recording functions

- **One-shot ACB** : This function automatically sets brightness and contrast levels for photography.
- **Data print out** : Accelerating voltage, magnification, calibrated micron bar and film number are automatically printed on the micrograph.



Diatom

DIGITAL TOUCH — MULTI-FUNCTIONAL DIAL

OPERATION MODE INDICATOR

Indicates the present working condition of the evacuation system.

VACUUM/EMISSION INDICATOR

Indicates the vacuum level during evacuation. Automatically switched to emission indicator during the imaging process.

Display System

OPERATION MODE

START UP

R. P. PUMPING

SHUT DOWN

M. P. PUMPING

VACUUM

EMISS

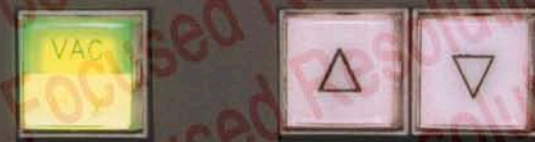
0 100

Operation System

1



2



3

1 IMAGE SIGNAL CONTROL

CH1/CH2: For selecting an input signal channel.

DET OFF: Provides backscattered electron image by switching OFF the detector high voltage.

ECP: Mode for viewing electron channeling pattern. A particular detector and other parts are necessary (options).

2 ACCELERATING VOLTAGE CONTROL

VAC/HV: For ON/OFF operations of the accelerating voltage. Automatic voltage application is normally employed.

▲, ▼: Employed for modifying the accelerating voltage.

SIMPLIFIES OPERATION.

■ HIGH VOLTAGE INDICATOR

Indicates the accelerating voltage applied. Automatically switched into applicable angle indicator while the D.F. (Dynamic Focus) is functioning.

■ MAGNIFICATION INDICATOR

Displays the magnification of the image displayed. Automatically switched into selected angle display while S.R. (Scan Rotation) or T.C. (Tilt Correction) is functioning.

■ VIEWING INDICATOR

Displays the scan mode selected for viewing.

■ WORKING DISTANCE INDICATOR

Displays the distance from the specimen surface viewed and the lens.

■ SPOT

For monospot illumination.



① AUTOMATIC FUNCTION SELECTOR BUTTONS

AG: Automatic Gun Alignment
AF: Auto-Focus
AS: Auto-Stig
ACB: Auto-Contrast/Brightness

② MULTI-FUNCTIONAL DIAL

This dial can be used in three different ways by switching its function over MAGNIFICATION, SPOT SIZE and FOCUS. MAG is changeable almost continuously. Employable side by side with MAG presetting function from the ten-key pad.

③ SCAN MODE SELECTOR BUTTONS

VIEW: For switching the mode for image viewing. The mode changes each time this button is pushed.
WFM: Waveform of the image signal is displayed on the screen.
PHOTO: Photographing switch.

④ SECOND FUNCTION

By jointly pushing this switch, a second function can be switched ON/OFF.



SPOT SIZE INDICATOR

For monitoring the size of the beam spot illuminating the specimen.

FILM NUMBER INDICATOR

Displays the serial number of film to be superimposed on the micrograph. The number is automatically augmented one by one starting from an initial number, which can be selected optionally.

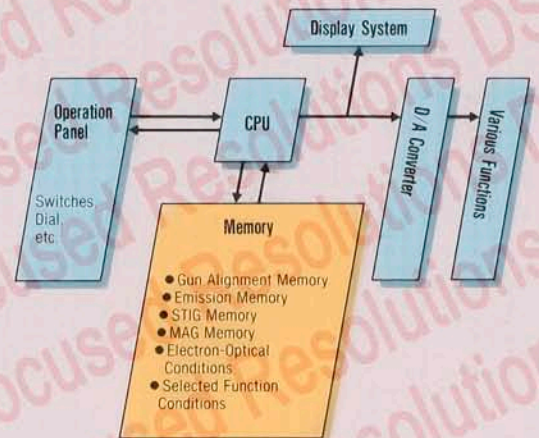


Microstructure of diatom

COMPUTER-CONTROL SYSTEM: ABT-32'S BRAIN

This is a CPU control system making full use of the memory function. New operators can freely control the instrument from the first day of use.

SEM FUNCTION



FUNCTION SWITCH

By pushing this switch and another function key, a second application function can be selected ON/OFF or selected.

MULTI-FUNCTIONAL KEYS

Once a function pair is selected by pushing one of these keys, the selected functions can be controlled by the two control knobs (UPPER, LOWER), respectively. These keys can also function as a "ten-key pad" for setting an initial film number or presetting ten-point mag values.

SIN FINE IMAGE, SIMPLE OPERATION

■ DATA DISPLAY ON SCREEN

Necessary values such as magnification, micron bar length and accelerating voltage are always superimposed on the image. The micron bar, with its length value, is very convenient for grasping the dimensions of the object of observation.

■ POWER SWITCH ONE-TOUCH START-UP

The start-up/shut-down sequences are fully automated. Just a single ON/OFF operation of the power switch is all you have to do.

■ AIR SWITCH ONE-PUSH OPERATION

After inserting the specimen, switch OFF the AIR pushbutton. Then the automatic sequence will start, and all operational steps from vacuum pumping to imaging will be operated automatically. For specimen exchange, just switch ON this button. All necessary steps will be completed and air will be introduced.

■ OPTIONALLY PLACEABLE TV UNIT

The TV unit for image display is optionally stationable for convenience sake. This unit can be placed at any position and in any direction convenient for watching.



■ EQUIPPED WITH A CONVENIENT TRAY

A handy tray for small articles is newly added in the bottom of the console table.

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A G

3 AUTOMATI

AG: Autom

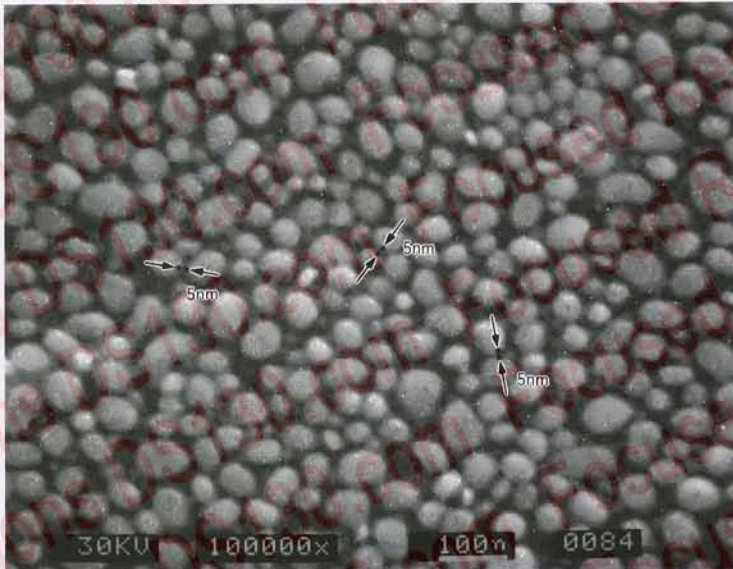
AF: Auto-F

AS: Auto-S

ACB: Auto-C

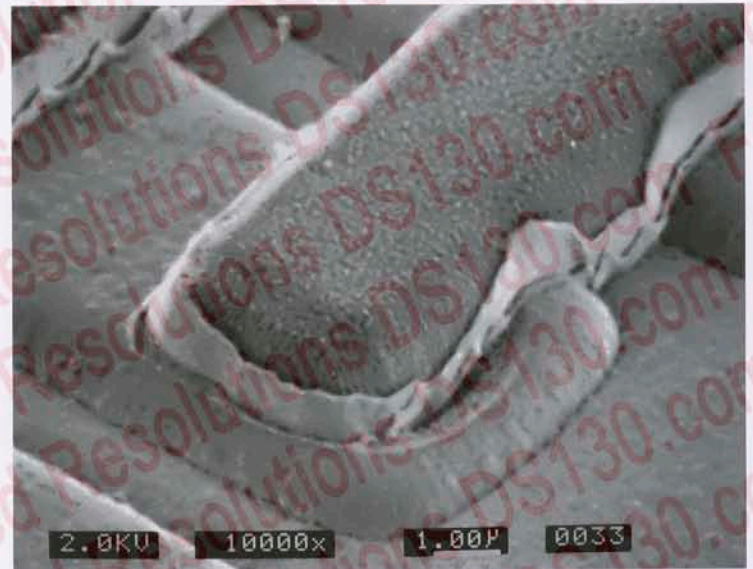
FLEXIBLE CONTROLS ALLOW THE EXAMINATION OF A WIDE RANGE OF SAMPLES.

■ HIGH-RESOLUTION OBSERVATION



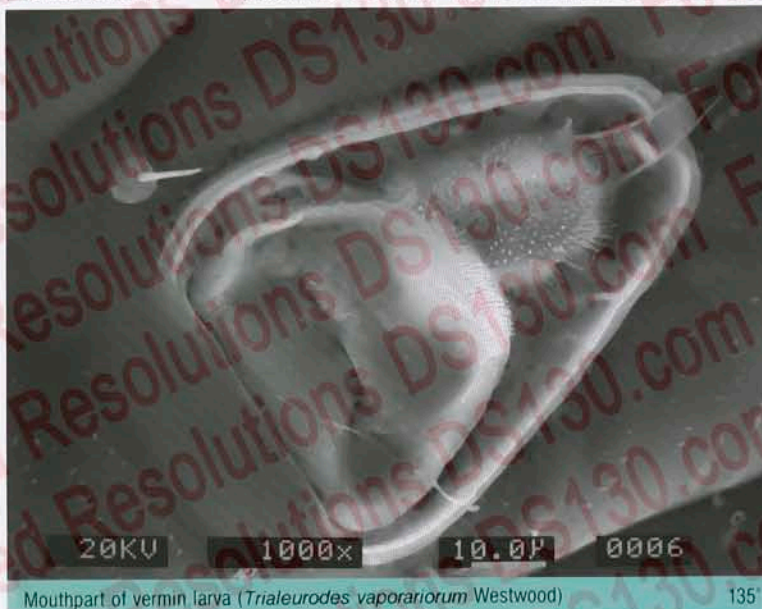
Evaporated gold particles

■ NO-COATING OBSERVATION AT LOW ACCELERATING VOLTAGE

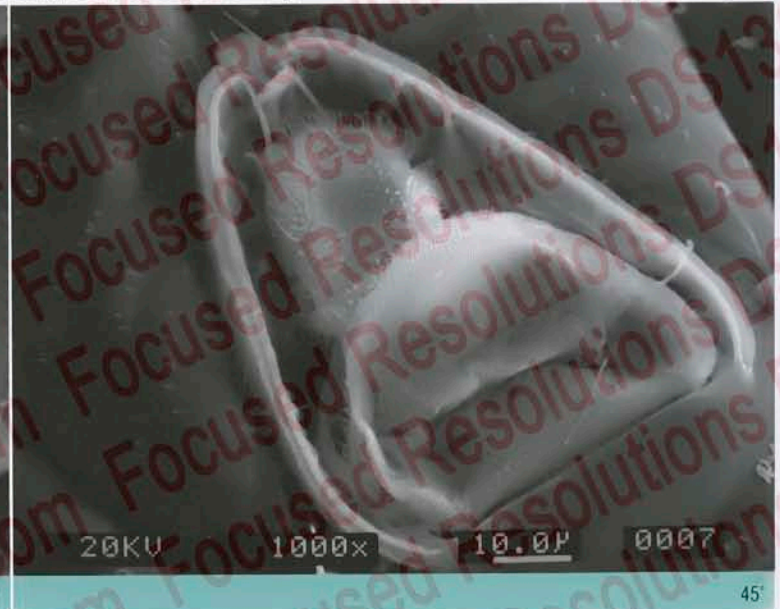


Uncoated IC surface

■ **SCAN ROTATION** — The scanning axis of the electron beam can be rotated electrically, so as to rotate the image. This function is convenient for image framing.



Mouthpart of vermin larva (*Trialeurodes vaporariorum* Westwood)



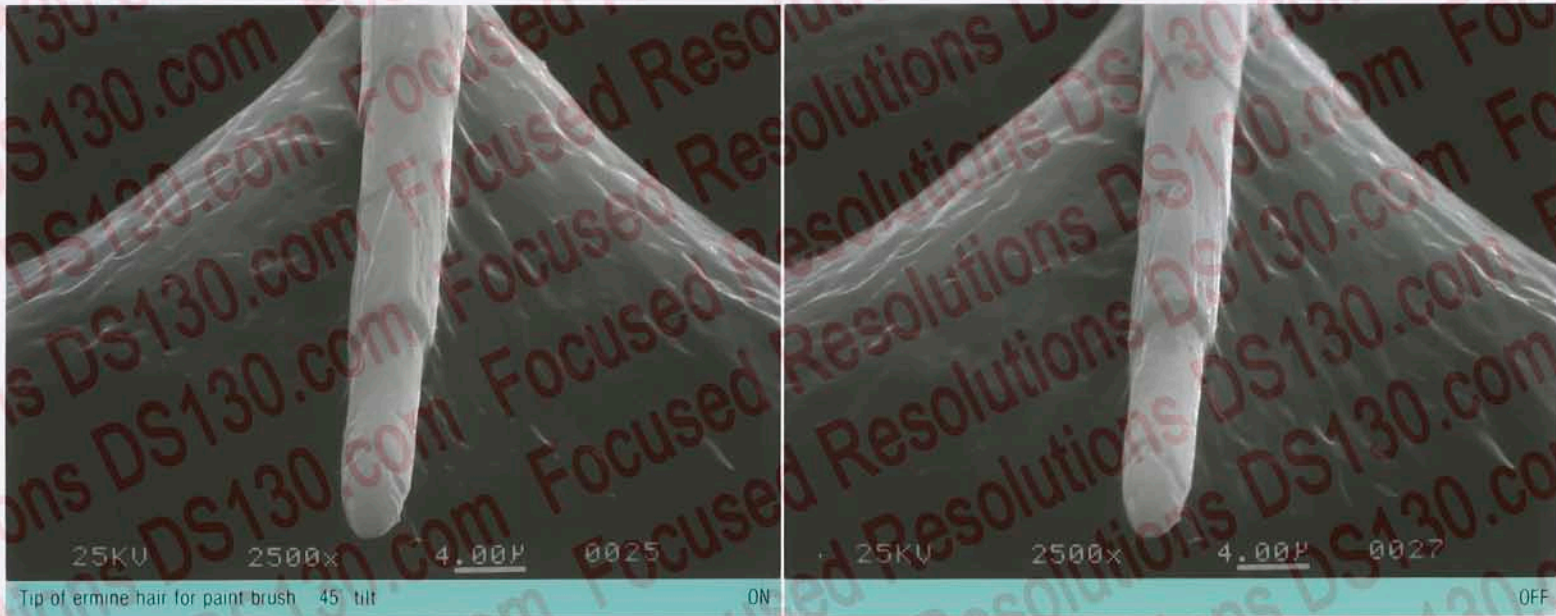
45°

■ WAVEFORM MONITOR



This function displays the image signal waveform. It is useful in determining the correct operating condition of the electro-optical column, and can be used as an aid in manually setting contrast and brightness. In situations of extreme brightness and contrast changes from one part of the sample to the other, manual adjustment can often produce a better micrograph.

■ **DYNAMIC FOCUS** — Corrects blurs resulting from specimen tilt.



■ **SELECTED AREA OBSERVATION**



The selected area observation function can be utilized in the RAPID scan mode. This displays a selected area of the image at its original magnification. The aspect ratio and position of the viewed area can be selected at will. This mode is particularly useful under high resolution imaging conditions, where a very small electron beam diameter is used. It is also useful when producing x-ray elemental maps. The display area can be varied from full screen to 3mm square.

■ **EXTENSION INTO X-RAY ELEMENTAL ANALYSIS SYSTEM (OPTION)**



By adding an Energy-Dispersive X-ray Elemental Analysis System (EDX), the ABT-32 can be used as an analytical SEM, allowing the identification of elemental composition, in addition to producing images. Various EDX analysis systems, such as KeveX, EDAX, PGT etc., can be adapted to the instrument.

ABT-32 WET-SEM CONFIGURATION

WET-SEM VERSION

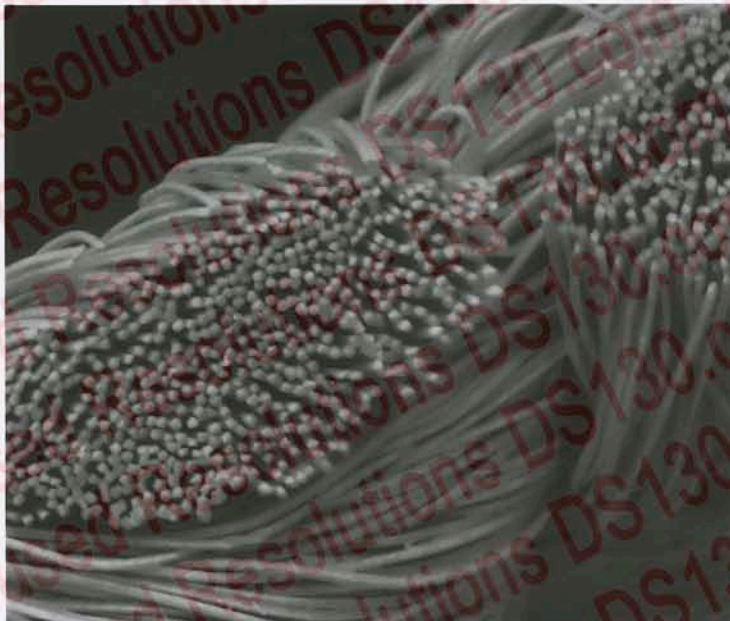


The WET-SEM ABT-32 configuration allows "the observation of moist samples in their natural state." This substantially extends the application of the instrument, and enables uncoated non-conducting samples to be examined directly, with no preparation. The WET-SEM is particularly useful in the investigation of samples such as foods, soils, rocks, fungi, textiles, paper, corrosion, pastes, grease, organisms, polymers, archeological objects, and various industrial products. It has also found application in the investigation of long term changes in materials, where sample coating cannot be tolerated.

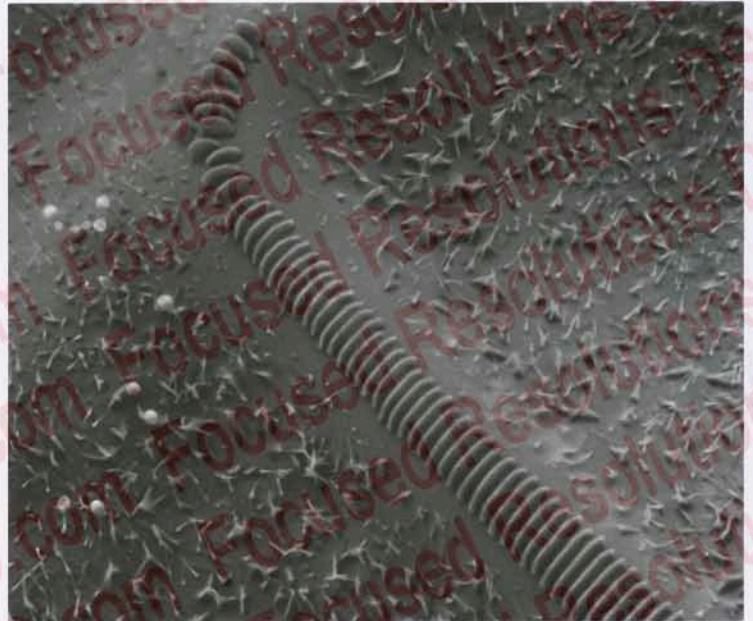
Note: The consumed power increases to 2.5kVA (100VAC) in this version.



Secretion on young spinach leaf 150x



Superextremely fine textile (eyeglass wiping cloth) 500X



Sounding file on the back of "Bell-ring" Cricket's wing 250X

SPECIFICATIONS

● PERFORMANCE AND SPECIFICATIONS

1) Performance

Resolution : 5nm(50Å) (30kV WD : 8mm, secondary electron image)

Magnification : 15× to 300,000×
Automatic magnification display
With mag memory

Imaging modes : Secondary electron image
Backscattered electron image

2) Electron-optical system

Accelerating voltages :

2, 5, 10, 15, 20, 25 and 30kV (7 steps)

Electron gun : Precentered cartridge exchanging system
Bias variable, with auto emission
With emission memory

Gun alignment : Computer-controlled automatic gun alignment incorporated, with gun alignment memory

Lens system : 3-step condensing system
Auto-Beam system incorporated

Aperture unit : Fixed aperture

Astigmatism correction :

Auto-Stigmator or manual correction, with stig memory

Focussing : Auto-Focussing system or manual operation

Dynamic focussing system incorporated

Image shift : X and Y ; ±20μm (WD ; 8mm)

3) Specimen stage

Stage : T-X-Y-R-Z eucentric stage

Maximum specimen size : 150mm dia.

Specimen traverse : X : 80mm, Y : 60mm

Specimen tilt : T : -10° to +90° continuous

Specimen rotation : R : 360° continuous

Working distance : Z : 8mm to 60mm continuous

Current measurement : BNC connector provided

Detector ports : 3

4) Display system

Scan modes : Full screen scan : SLOW—10sec/frame
RAPID—1sec/frame
With selected area and position shift functions incorporated

TV scan mode : NTSC or PAL type

Photographing scan : 40sec, 80sec/frame

ECP mode (detector, etc. optional)

Scan rotation

Tilt correction

Waveform monitor mode

Data display : Accelerating voltage, magnification, working distance, spot size factor and film number (4 digits) are displayed in a group on the central display panel.

CRT : 9-inch CRT for viewing. Free position type

8-inch high res. CRT for photography

5) Image photographing system

Image adjustment : Auto-Contrast/Brightness (ACB)
One-shot ACB : for photographing
Dynamic ACB : for image viewing

Optimum exposure monitor :
Waveform displayed

Return to scan mode : One-shot auto-return system

Data recording : Accelerating voltage, magnification, micron value, micron bar and film number are automatically superimposed on micrograph.

Film number : 4digits, optionally settable, automatically augmented

Camera : Polaroid

6) Evacuation system

System : Full-automatic evacuation
Start-up and shut-down sequences incorporated
With self-diagnosing system

Vacuum pumps : Oil diffusion pump : 400 liters/sec (with water-cooled baffle and reservoir)
Oil rotary pump : 160 liters/min

7) Safety interlocks

Provided with protective measures against suspensions of power, water and vacuum

8) Others

Column and console units separated

Air bag type antivibration system incorporated

With tray in the bottom of table

With casters for transportation

● INSTALLATION REQUIREMENTS

Power supply : 110V AC/220V AC, 50/60Hz, 2.0kVA

Grounding : Type 3

Cooling water supply : Flow rate : higher than 2 liters/min, 15° to 25°C

Pressure : 1.5 to 3kg/cm²

Faucet : 11mm outside dia.

Drain : 20mm or more inside dia.

Room temperature : 20° ± 5°C

Humidity : Below 60%

Stray magnetic field : AC : below 0.3μT (3mG)

Floor vibration : Below 0.15Gal
(Below 5Hz : within 3μm p-p)

● DIMENSIONS AND WEIGHT

Column unit : 600 (W) × 780 (D) × 1340 (H) mm, 170kg

Console and image viewing unit :

600 (W) × 870 (D) × 1130 (H) mm, 90kg

Photo CRT unit : 290 (W) × 300 (D) × 918 (H) mm, 23kg

Oil rotary pump : 440 × 260 × 330mm, 27kg

Note : Specifications subject to change without notice.

● MAJOR ACCESSORIES AVAILABLE

★GMA : Gamma Control Module

★YMM : Y-Modulation Module

★DEPN : Derivative/Signal Inversion Module

★DMAG : Dual MAG Module

●STV : Stationary Image Display Unit

★SSBSE-II : Solid-State Backscattered Electron Imaging Unit

●RBS : Robinson Backscattered Electron Imaging Unit*

●CL-I : Cathodoluminescence imaging Unit*

●AMS : Accessory Mode Select Unit

●OPB : Option Box

●KYB : Keyboard for generating Alphanumeric Character Data

●PC69 : 6 × 9 Roll Film Camera Hood

●PC35 : 35mm Roll Film Camera Hood

●EDX : Energy-Dispersive X-ray Analysis System

★XRM : Analysis Mode Unit

●SC : Specimen Current imaging Unit*

●EBIC : EBIC Imaging Unit*

●FES : Current Feedthrough

●WET-II : Low-Vacuum Viewing Unit

●IPS : Image Processor

●Sputter Coater

●CP-5A : Critical-Point Drying Apparatus

*Requires AMS.

★Mountable in an option space above the control panel.

For mounting all of these four accessories, an option box (separate type) should be used.

