dSspec — vertical sidebar

Digital Stage & Spectrometer Automation — vertical sidebar

dSspec7 – Digital Stage and Spectrometer
Automation for Electron Probe Microanalyzers

dSspec7 is a complete automation package for your JEOL electron probe microanalyzer (when combined with our dQant7 and dPict7 programs). With all the options it includes, digital imaging, stage control, energy and wavelength dispersive x-ray (WDS) data control, collection, and reduction in one tightly integrated package controlled by a single Personal Computer (PC).

Our state-of-the-art WDS pulse processing system (PPS) brings the latest technology to gas flow and sealed proportional counters. The PPS includes high voltage, preamplifier, amplifier, single channel analyzer, and a 32 bit counter in a small (6" x 10" x 2") package, which is connected to the computer via a high-speed serial connection. New for this application, the PPS has bi-polar pulse processing with gated amplification and a three level discriminator system to provide dead time correction (in hardware, not software) using true live time preset counting. This system effectively eliminates pulse shrinkage at high count rates (counter pulse time to peak is ½ μsec) and allows the counter voltage and gas gain to be adjusted so that the single channel analyzer can be setup in many combinations. The PPS allows bias voltages to 2,000V in 0.5V steps and has count integration from 0.01 to 65,000 seconds. Count rates over 100,000 cps are now a reality!

dSspec7 provides quiet and smooth micro-stepping motor control (DC motor like smoothness) primarily for the JEOL 8600, 733, 840 and 6000 series scanning electron microscopes and electron probe microanalyzers. Because of the simple design, it would not be difficult to adapt it to other instruments. Under joystick or keyboard control the sample is positioned in X, Y and Z. Software is written for latest versions of Windows.

The **dSspec7** motor control is housed in a single box (see photo on back), which is placed near the microscope's column. It has all the connections and power supplies for the stage and spectrometer motors, limit switches, crystal flipping logic and spectrometer lamp power. Connection to the computer is through a serial cable. This configuration dramatically reduces the number of cables and the installation time. Modifications of the basic instrument wiring or connectors are typically not required.

dSspec7 is an excellent replacement for almost all out-dated probe and stage automation systems. **With dSspec7 you will be adding many years of useful life to your instrument. The cost benefit of upgrading your automation or automating a manual instrument will be recovered many times that over a new installation.**
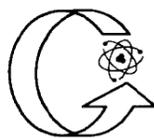
GELLER
MICROÅNALYTICAL
LABORATORY

dSspec7 Data Sheet:

Spectrometer Control:
- Five spectrometers are possible.
- Includes spectrometer limit protection, vacuum ready interlock, intelligent micro stepping motor drivers (to 1/256 step), crystal flipping power and logic, vacuum protection and inspection lamp supply.

Stage Control:
- Up to 4 axes (maximum of spectrometers and stage motors is 8). Controls GS, PSS, and LSS stages.
- Limit switch connections for JEOL equipped stages or **dSspec7** can provide protection for those stages (840 and 6000 series) without limit switches.
- Storage of points of interest in database (Access) format for subsequent recall.
- Joystick (X, Y and Z) with 4 user programmable buttons.

Pulse Processing System (PPS):
- One unit per spectrometer. Multiple units are daisy chained together and one RS-485 serial connection is made to the computer.
- Contains detector bias (2000V max in 0.5V steps), pre-amp, amp, single channel analyzer, 32 bit counter, 3 stage active pulse processing and dead time correction, and vacuum ready protection. >100,000 cps possible. See separate data sheet.

dQant7 (digital quantitative WDS/EDS program)
- Powerful management of all EPMA functions (spectrometer, stage positions, EDS, beam current, etc.).
- All results stored in TAB delimited text files which easily import into spreadsheets or word processors.
- Easily configurable in a multi user environment while maintaining individual parameter sets.
- Macros easily written to perform unattended analyses.
- Automatically optimizes x-ray measurement sequences to minimize data collection time.
- Analysis *Wizard* helps in providing an easy to follow check list for analysis set up and collection.

dSspec7 is housed in a 13" X 16" X 7" cabinet. Normally placed near the instrument's column, no rack mounting or further cabinetry is required. An emergency power off switch and power indication lamp is located on the front.

Digital Imaging (dPict7) (optional):
- Active scan generator (dwell times from 0.01msec to several seconds). Variable image size to 4K x 4K pixels.
- Records up to 21 signals simultaneously (SE, BE, multiple WDS and EDS windows).
- Output from computer to digital printers.
- 8 or 16-bit images in common formats (Tiff, JPG, BMP, etc.).
- Mosaic and Stage rastered mapping (x-ray and SEI/BEI) for low magnifications (limited by mechanical motion of stage).
- Maintains raw data in images for comparing x-ray maps.
- Colorizing functions are optional.

Energy Dispersive System (optional):
- Use your existing Si(Li) detector (or we can supply one).
- Connects to all major EDS detectors.
- Provides bias, pulse height analysis and qualitative or quantitative software. Three separate electronic circuits to optimize dead time and pulse shaping characteristics while maintaining maximum resolution.
- Optional integration with WDS measurements for combined analyses.
- RS-232 connection to the computer.

Software and Computer:
- Written in Microsoft Visual Basic Version 6.
- PC using Microsoft Windows XP or Vista.

Installation and Calibration:
- No modifications to JEOL connectors or circuitry are required. Estimated installation and training time is 4 days.
- Does not affect alignment or calibration of WDS spectrometers.
- **Continued training and troubleshooting can be accomplished using a remote internet connection**.
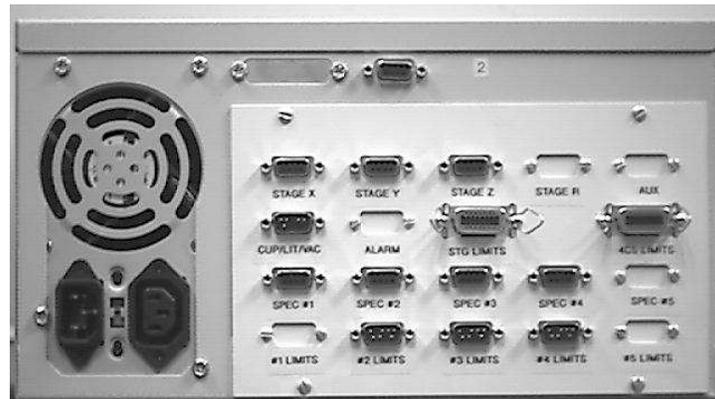
dSspec7's rear panel contains connections for all instrument controls (except the Keithley™ beam current monitor which is directly connected to the computer). The wiring bundle is a small fraction of previous systems. Included are:
- Motor and limit switch connections for the stage, spectrometer and crystal flipping
- Vacuum safety monitoring for the bias supply.
- Faraday cup control
- Spectrometer illumination

Configuration

Configuration | Crystals | Auto Focus

Axis
- ◉ X
- ○ Y
- ○ Z
- ○ 1
- ○ 2
- ○ 3
- ○ 4

Motor Positioning Parameters

Full Motor Steps per mm [1000]

Initial Speed (mm/sec) [0.1]

Slew Speed (mm/sec) [3]

Acceleration Ramp [20]

Deceleration Ramp [10]

Jog Size and Direction (mm) [0.1]

Resolution
- ○ Full
- ○ 1/2
- ◉ 1/4
- ○ 1/8
- ○ 1/16
- ○ 1/32
- ○ 1/64
- ○ 1/128
- ○ 1/256

Motor Current Settings

Run Current (%) [20]

Hold Current (%) [1]

Settling Time (sec) [1]

Decimal Places [4]

Home Position (mm) [0.7]

Limits (mm)

Lower [0]

Upper [80]

Save | Done | Restore

Motor and crystal parameters can be easily observed and modified. A variety of motor resolutions are available to optimize the motor performance.

Initialization

Stage Positions (mm)

X [18.0846]

Y [20.0405]

Z [11.0467]

Spectrometer Positions (mm)

1 [77.46]

2 [134.66]

3 [88.03]

4 [122.6]

Update | Cancel

The initialization form is used to synchronize dSspec with the current stage and spectrometer positions.

Joystick Options - Stage is Disabled

|	Button Commands		Speeds (% of Max)	Dead Zone Min%	Dead Zone Max%	Reading	Max Reading
Button #1	Cup Toggle	Speed #1 [2]	X-Axis [15]	[95]		[0]	[0]
Button #2	Speed1	Speed #2 [30]	Y Axis [15]	[95]		[0]	[0]
Button #3	Speed3	Speed #3 [50]	Z Axis [15]	[95]		[0]	[0]
Button #4	Macro Quant	Speed #4 [100]	Period (msec) [0]				

Response Exponent (1 to 15) [6]   ☑ Enabled

OK | Close | Joystick Control Panel

A three axis, four-button joystick is used to move the stage. The four buttons can be programmed to perform a variety of user-defined functions. The sensitivity and feel of the joystick can be easily modified to your taste.

dSpec window

Sp#	Crystal	Pos	Bias	Gain	Baseline	Window	CPS	Counts
1	PET	88.108	1800	4.00	8.01	100.00	25859	50425
2	PET	87.985	1800	4.00	5.01	100.00	40923	65886
3	LIF	191.100	1800	3.00	7.01	100.00	1062	1264

X	Y	Z		ABS	Cup	
18.526	18.962	11.510	HALT	16.64	24.51	nA

Joystick Disabled
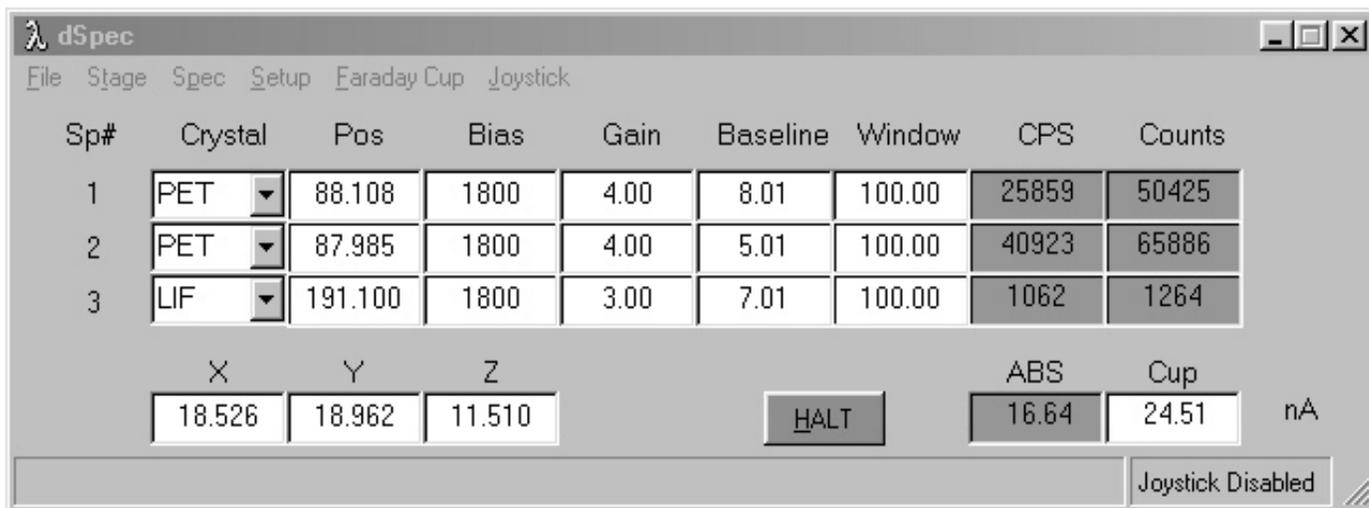
This is the main dSspec window. The data displayed is constantly updated during operation. The menu provides access to initialization of axis positions, configuration of all the motor parameters, running SCA scans (see below), viewing count rates on a strip chart recorder display for crystal alignment operations and other functions. The hardware parameters can be easily changed by typing directly into the display.

SCA Scans

Max 20387
Counts 2
Marker 32
Min 0
Current Pos 54
Dwell (sec/pt) 0.1 Window Width (%) 1 Start (%) 0
Spectrometers: ● 1 ○ 2 ○ 3
Start Close Print

StripChart Scans

Max 3740
Counts 3609
CPS 95
Min 114
Number Points 100 Dwell (sec/pt) 0.1 Spec Step (mm) 0.05
Spectrometers: ● 1 ○ 2 ○ 3
Start Close Print
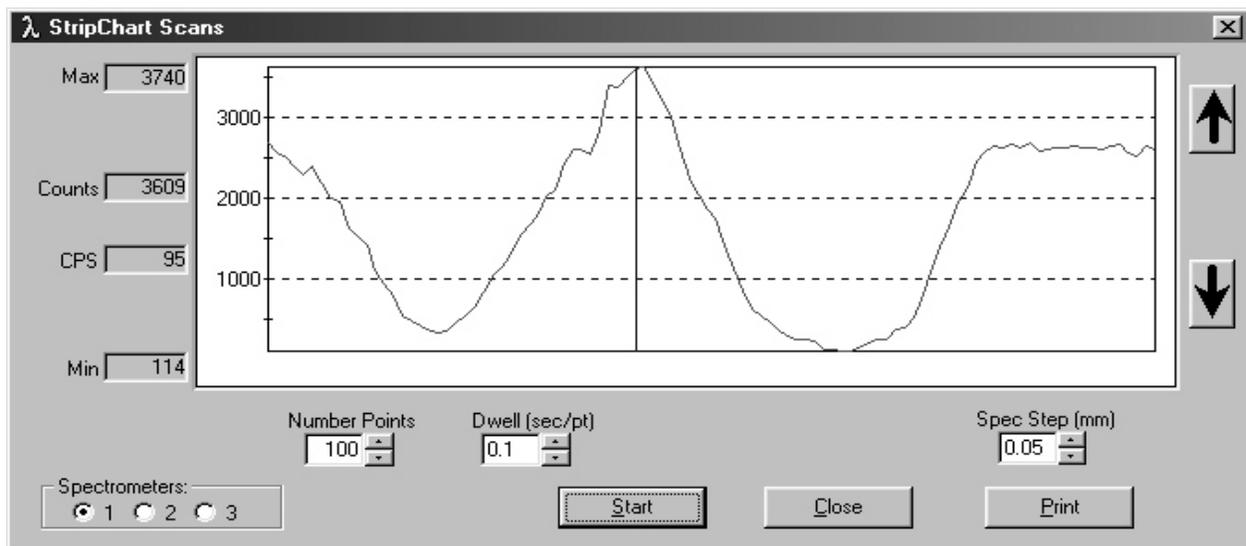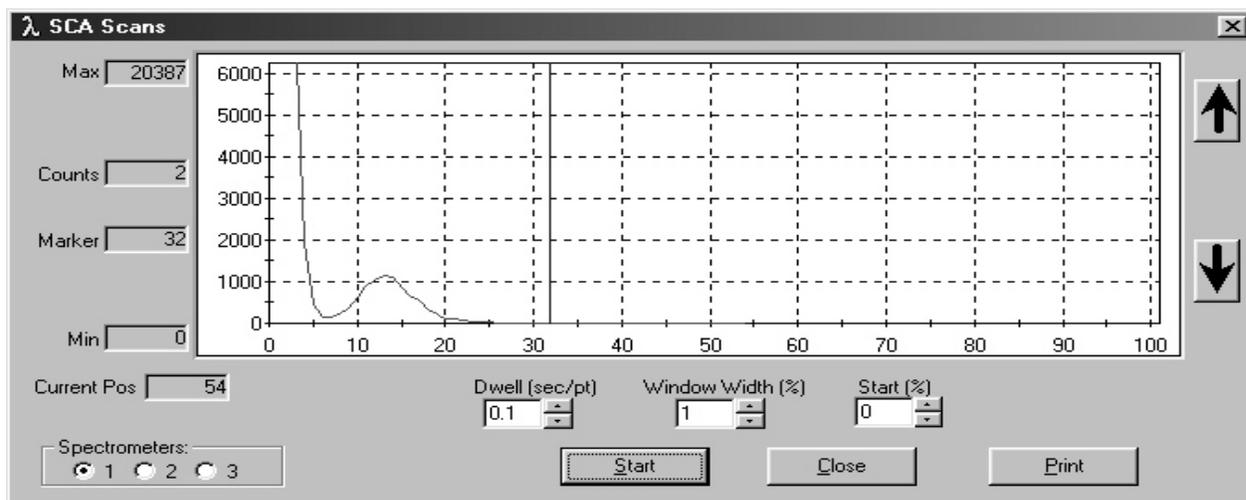
The SCA scan display shows the x-ray pulse height distribution as a function of voltage. This provides an easy method of optimizing the WDS counting electronics. Detector bias, baseline, window and gain are all computer controlled. The strip chart display gives immediate feedback, ideal for performing crystal alignments.