

# Static Discharge Spike Elimination

July, 2002

## 1. Problem

With Thermoluminescent Detector (TLD) readers, the glow measurement is often corrupted by the presence of static discharge spikes. Even though the spike duration is very short, its amplitude is very high; therefore, the presence of even a few spikes can cause the measurement of an average glow value to be high by a factor of 10! A method is required to eliminate the spikes in the glow curves caused by static discharge. Elimination of these spikes will improve the accuracy of the glow curve integral and allow the true shape of the curve to be observed in curve plots. The method must work over a wide range of radiation levels and TLD heating protocols.

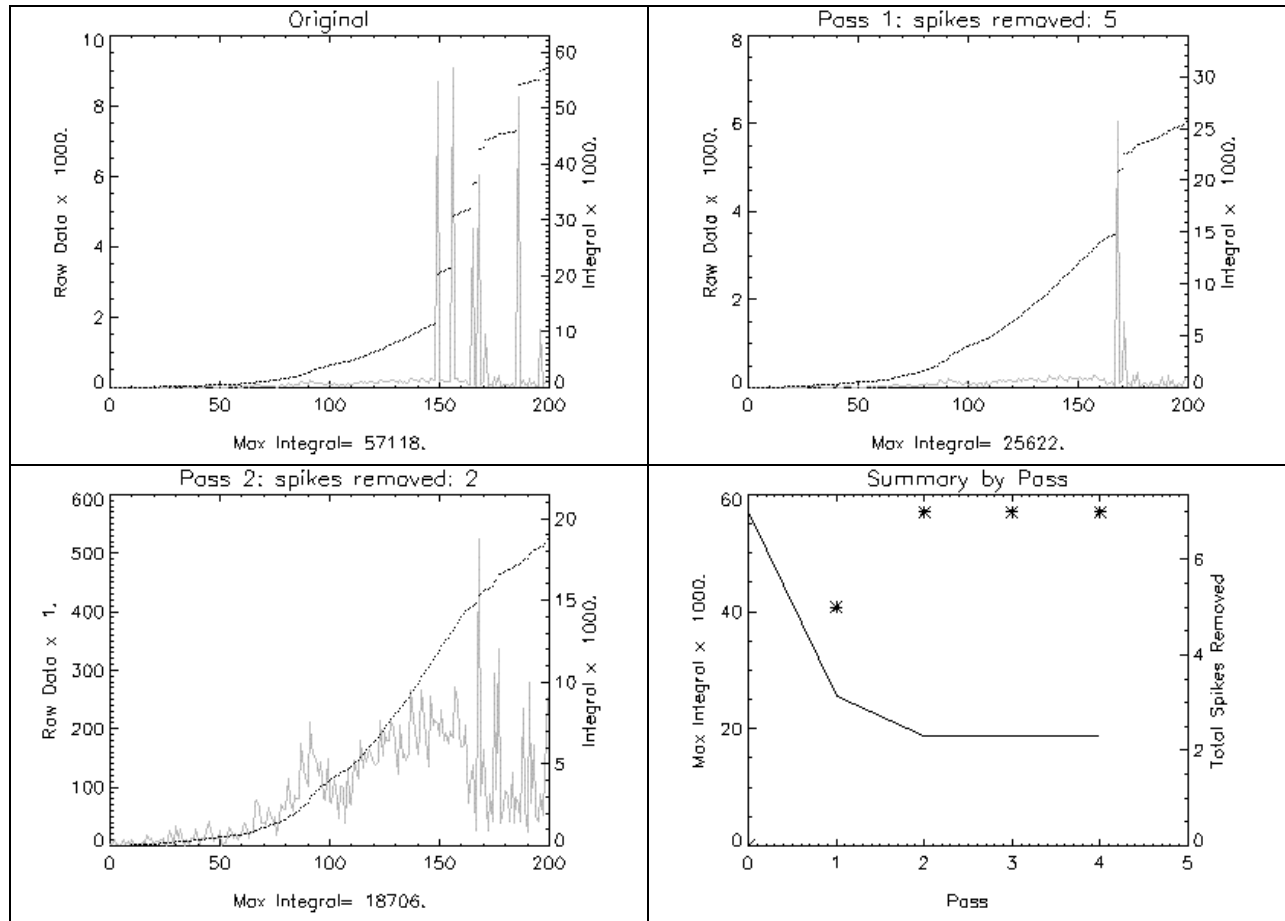
## 2. Solution

An algorithm has been developed to detect and eliminate the static discharge spikes. With this algorithm, accurate glow values are determined with or without the presence of spikes. The algorithm's accuracy is not degraded by the presence of quantum noise in the glow signal. And it can be configured for a wide variety of TLD devices. The algorithm eliminates all of the visible spikes; in the process, it eliminates only a few "noise spikes" and these have a negligible affect on the final integral.

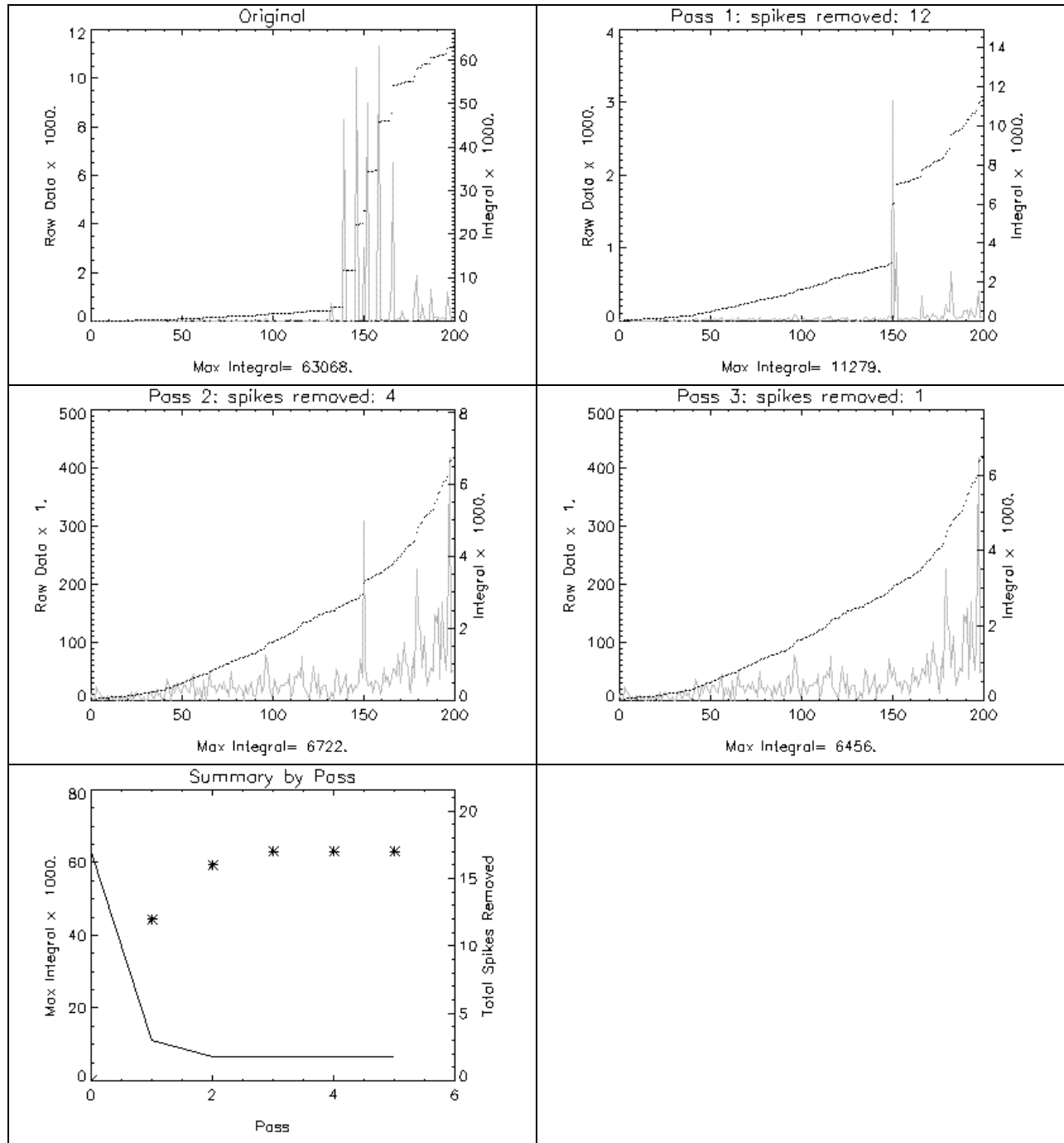
## 3. Results

Five representative glow curve experiments are presented here, derived from actual measurements. For each measurement, the original glow curve and its integral is shown first; then the new curve and its integral is shown after each pass (note that the y-axis scaling may change with each pass); finally, a plot is presented as a function of pass number that shows the method converging on the correct result and the aggregate number of spikes eliminated.

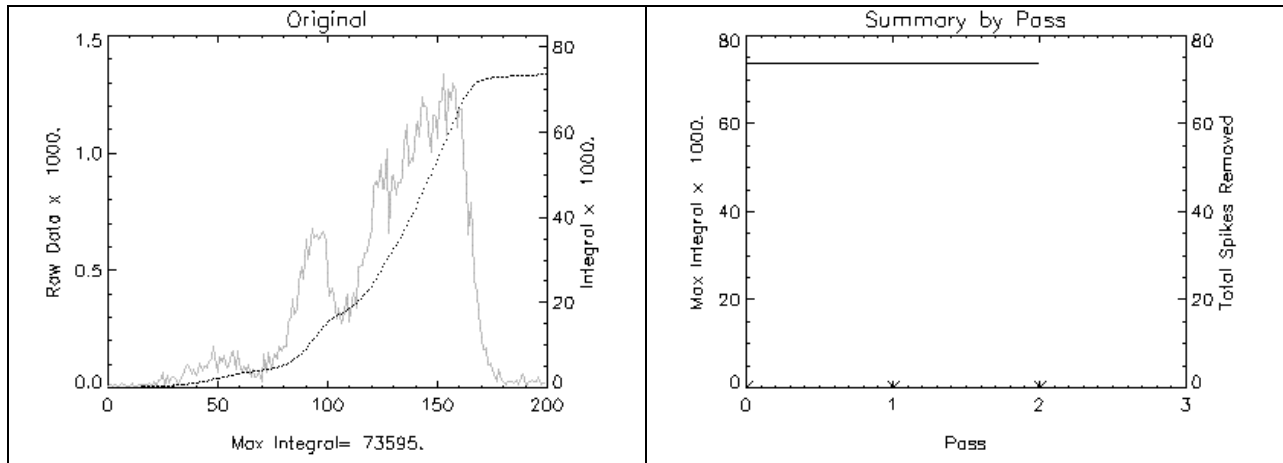
Experiment #	Description
1	Measurement with 7 spikes
2	Measurement with 17 spikes
3	Measurement with no static; no spikes detected
4	Measurement with no static; one spike detected
5	Measurement with spikes at beginning



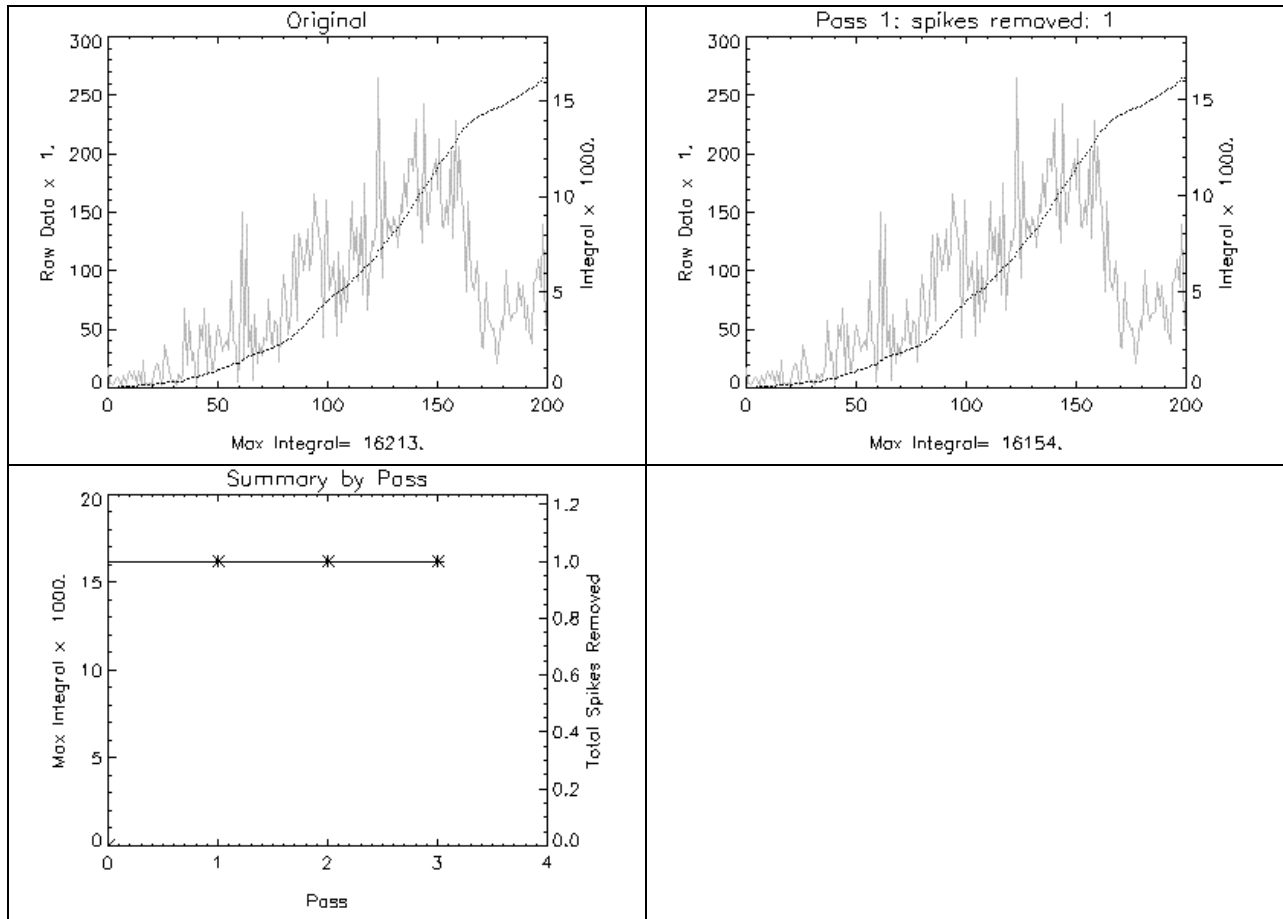
**Experiment 1**  
(note change in y-axis scaling)



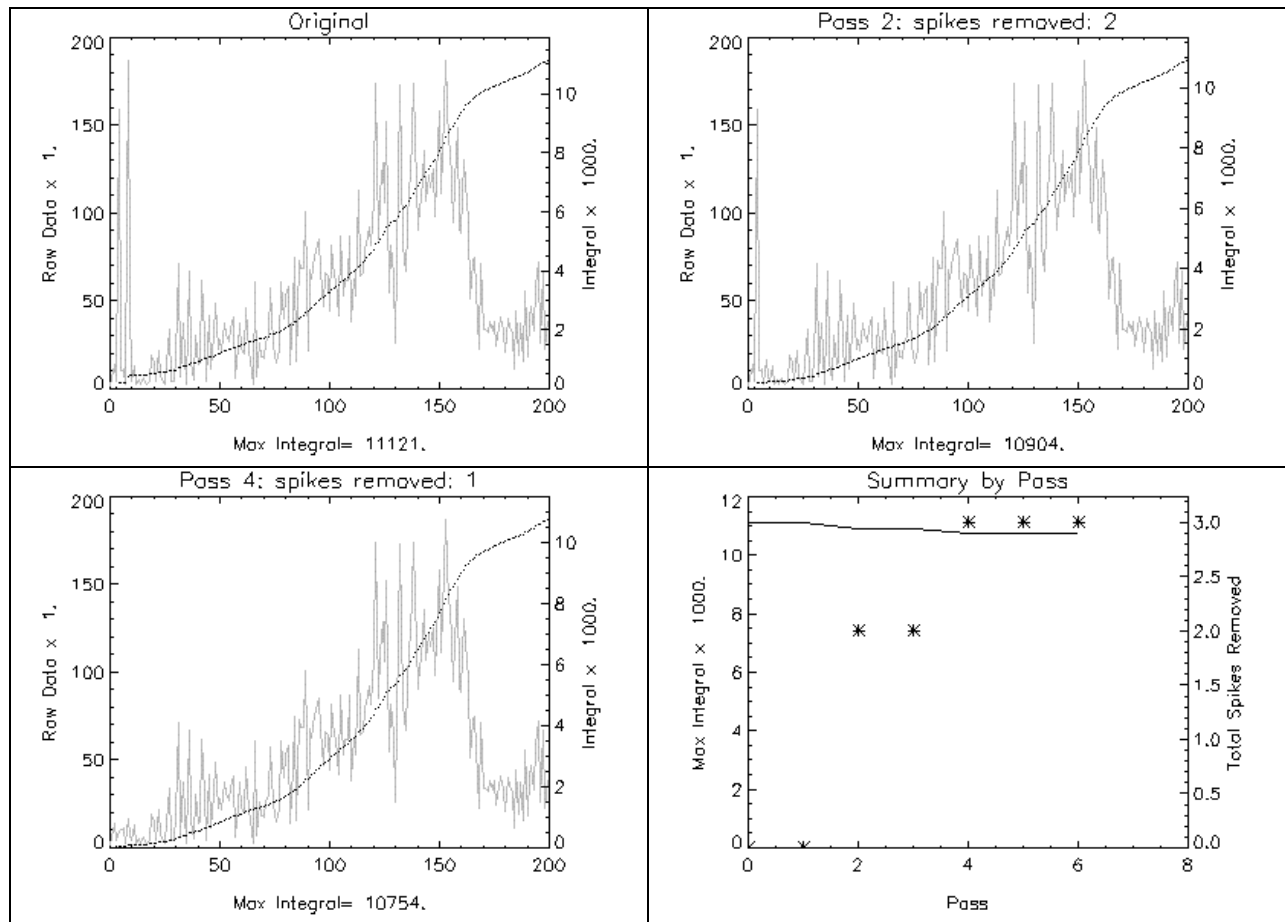
**Experiment 2**  
(note change in y-axis scaling)



Experiment 3



Experiment 4



**Experiment 5**

**About the author – David Rohler, Ph.D.**

*Dr. David Rohler is President and Founder of Plexar Associates, Inc. (started in 1987). David continues to spend the majority of his time designing products and solving technical problems for Plexar's customers. Rapid algorithm development is his forte. And he is very effective in finding and resolving impediments to project progress.*

**\*\*Confidential\*\***

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