

## **SIMION 3D Version 7.0 Overview**

### ***Introduction***

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SIMION 7.0 is a native Win32 (*Windows 9x/NT*) ion optics simulation program that models ion optics problems with 2D symmetrical and/or 3D asymmetrical electrostatic and/or magnetic potential arrays. It incorporates an ion optics workbench strategy that allows you to size, orient, and position up to 200 instances (*3D images - or mirages*) of these potential arrays within a workbench volume of up to 8 cubic km. Complex systems or even entire instruments can be modeled. Ions can be flown singly or in groups, displayed as lines or flying dots, and automatically be re-flown to provide movie effects when needed. Other features include data recording, charge repulsion, user programs, and geometry files. The result is a program that can model a wide range of problems including: Ion source and detector optics, time-of-flight instruments, ion traps, quadrupoles, ICR cells, or what have you.

No program can be all things to all people. SIMION 3D 7.0 is intended to provide direct and highly interactive methods for simulating a wide variety of general ion optics problems. The program balances of ease-of-use, speed, and accuracy to enable it to support many real-world applications. For example: It has successfully simulated the Phi-Evans TRIFT instrument using voltages that are within a few percent of the as-built instrument. Even if you just use it as a scoping tool (*saving the hard-to-use heavy artillery for later*), it can provide useful insights into your problems and perhaps help speed you toward to your final goal.

### ***The Simulation Trap***

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*Any simulation is only as good as the understanding that goes into it (e.g. garbage in garbage out).* I have witnessed many distressing examples of SIMION being used in blind faith. Just because you manage to get a few ions through doesn't mean the design's OK. Are the ions truly representative? Are the fields modeled at all realistically? Do you really understand the physics of your problem? ***Just because a program is easy-to-use, DON'T assume it thinks for you!*** You may get excited about a new concept, but wait until the design is built and tested successfully before declaring victory! ***ALWAYS BE SUSPICIOUS!***

### ***Computer Requirements***

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The following summarizes the computer requirements for SIMION 3D 7.0. *Appendix A gives more details and recommendations. Appendix B provides installation instructions.*

This version of SIMION requires at a minimum: A **486 class PC with numerical coprocessor** (or above - e.g. **Pentium II recommended**), **16 megabytes of RAM** (64 or more recommended for large projects), and at least **200 megabytes of free hard disk drive** (or more). The program makes use of a **GUI** (*Graphics User Interface - developed by the author*) that runs as a native Win32 application in Windows 9x/NT, and makes full use Windows supported video and printers. Moreover, supplemental GUI printer/plotter drivers provide high floating point accuracy for the following printer languages: **PostScript (B/W and color), PCL5 (B/W and color), HPGL2, and HPGL.**

## Overview

### ***Warning to Users of Prior SIMION Versions***

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#### **Users of SIMION 6.0**

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Every attempt has been made to maintain logical continuity with SIMION 6.0. Version 7.0 is basically an enhanced Windows (*Win32*) based version of version 6.0. SIMION 7.0 maintains upward file compatibility with 6.0. The user interface is largely the same (*e.g. same GUI*) with a collection of refinements and enhancements. Appendix K has been provided to summarize the changes between 7.0 and 6.0. Moreover, vertical bars are used throughout this manual to highlight paragraphs that discuss these differences and new features (*see example bar to left*).

#### **Users of SIMION 2.0 – 5.0**

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However, for users of early SIMION versions (*2.0 – 5.0*), certain things have changed in the name of progress. *It is important that you take the time to scan the manual.* The following are only two examples of many significant differences between 7.0 and the early SIMION versions:

1. In **Modify**, clicking the **right** mouse button *zooms* the view *instead* of *filling* the marked area. *The <Ctrl> right mouse button is now equivalent to the old right mouse button.*
2. No early SIMION version file formats are compatible with SIMION 7.0. *The only file formats that SIMION converts are two types of potential array files (.PA and .PA#).*

***Remember: If All Else Fails, Read the Directions!***

### ***Structure of this Manual***

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Writing a manual to describe all the features of SIMION is a challenging task, because programs like SIMION tend to have a spatial organizational structure (*features are interrelated and cross-connected, much like the neurons in your brain*). *The problem is: Where to start, what path to take, and what to describe along the way?*

The selected approach uses logical topic areas and the interrelationships between these topic areas to set the manual's structure. Each chapter and appendix deals with one or more related topics. Early chapters (*e.g. Chapter 2 - SIMION Basics*) attempt to give you a foundation for understanding SIMION. Later chapters (*e.g. Chapter 5 - Defining and Editing Array Geometry*) address specific tasks in detail. Appendices are reserved for infrequently referenced material (*e.g. Appendix B - Installing SIMION*) or advanced features of the program (*e.g. Appendix I - User Programming*). *Take the time to thumb through the manual now to know where to look later.*

### ***How to Proceed***

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#### **Installing SIMION**

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*Read Appendix A first* to determine if your hardware is suitable. *Next, read Appendix B*, and follow the installation instructions for installing SIMION to run within the desired environment (*e.g. Windows NT*).

## Learning SIMION

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The best way to learn to use SIMION is to dive right in. First, read Appendix F - SIMION's GUI and scan Appendix G - Printing Options. Next, use Appendix C to guide you through a few SIMION sample runs. **Remember, if you have a question about something, point your cursor to it and click the F1 key** (*for specific help*).

At this point you should read Chapter 2 - SIMION Basics carefully to learn its structure and relationships. Chapter 3 acts as a signpost to the rest of the manual. Chapters 4-8 should now be scanned. They are organized as reference chapters for topics ranging from array creation to ion flying. ***Be sure to examine the many examples in the demo directories (below \SIM7).***

Chapter 9 contains some advanced strategies and tactics to help get the most out of SIMION. This chapter also introduces SIMION's advanced features of user programming and geometry files (*each have their own reference appendix*). ***This is where the real fun begins.***

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