

**SOLOMON DEMONSTRATION VERSION
SOFTWARE INSTALLATION GUIDE**

CONTENTS

- 1. Introduction**
- 2. System Requirements**
- 3. Overview of the Evaluation Version**
- 4. List of Materials**
- 5. The SOLOMON File Structure**
- 6. Installing the Evaluation Version**
- 7. Electronic Version of the Documentation**
- 8. Installing the Adobe Acrobat Reader**
- 9. Exploring the Tutorial Examples**
- 10. Exploring the Generic Plant Model**
- 11. Uninstalling the Evaluation Version**

27 January 2000

1. Introduction

The SOLOMON computer program has been developed by AEA Technology to solve the large Containment Event Trees necessary for a Level 2 Probabilistic Safety Analysis (PSA). The design intent was to enhance productivity in the Level 2 PSA process and provide a cost-effective means of risk evaluation for nuclear plants using the Containment Event Tree formalism.

SOLOMON employs a system of nodes, or control points, to represent top events. It is driven by a Graphical User Interface using a colour coded representation of the model to aid the user in navigating the event tree, and will run on an IBM compatible PC under Windows 3.1 (or later). Intuitive dialogs guide the user in constructing a Containment Event Tree, allowing rapid development of the complex event trees required in Level 2 PSAs using a powerful combination of text editing and hierarchical dialogs. Key features of the code include:

- physical models integrated into the tree
- prior path dependency
- multi-branching nodes
- pre-defined end categories
- supernodes to collapse complex trees into an easily readable format
- Latin Hypercube Sampling techniques for uncertainty and sensitivity analysis
- fast execution times

This guide provides details of the evaluation version of the product.

2. System Requirements

Before attempting to install the evaluation version of SOLOMON you should check the following:

2.1. Suitable PC

You need to install SOLOMON on a PC running Microsoft Windows 3.1 or later. As an indication SOLOMON has been developed using:

- IBM and Toshiba 486 PCs
- 12 Mb RAM

System performance is not an issue with this evaluation version, since the calculation engine has been disabled. However, if you are considering purchasing a license to use SOLOMON, you should be aware that user experience has shown the code to be memory intensive when running large models. The recommended minimum system for mission critical applications is a Pentium II (or equivalent) running at 350MHz (or faster) with 128Mb of RAM.

2.2. UNZIP utility

You need a copy of 'unzip.exe' to extract the files from the supplied zip file. A version has been included on the SOLOMON evaluation CD.

2.3. Location of Windows

The installation procedure assumes that your version of Microsoft Windows is installed in directory C:\WINDOWS - you might wish to check this.

Windows 3.11 and 95

If you are not sure where Windows is installed you may find it useful to open a DOS window, type 'SET', and then check the setting of 'COMSPEC'.

Windows NT

If you are not sure where Windows is installed you may find it useful to open a DOS window, type 'SET COMSPEC' or 'SET SystemRoot', and then check the settings.

2.4. Sufficient disc space

The supplied executables and related files (including documentation) occupy approximately 20 Mb. This space

requirement is likely to change as the product develops. Additional space (perhaps 1 - 2 Mb) should be available for user data files.

2.5. Alternative platforms

If your proposed platform differs widely from this specification, or you experience problems please contact us.

3. Overview of the Evaluation Version

The production version of SOLOMON requires the Microsoft Visual C++ compiler (Standard Edition - version 1.52). However, this evaluation version has been prepared with the calculation engine disabled, so that a compiler is not required. Sets of example input files and corresponding output have been supplied to give an appreciation of what SOLOMON does and how it works.

Because of the way the evaluation version has been configured some of the intermediate calculation executables have not been shipped with this version. This means that:

- You can load input files and see how they are presented within the GUI
- You may make changes to the input files (and save the files) but the changes will NOT result in any changes to the output files.
- When you make changes incorrectly to the input file you should also see the types of messages presented by the parser.
- You can inspect the resulting PDF/CDF files using the supplied PDF viewer
- You can inspect the resulting supernode tree files using the supplied supernode viewer
- The run times are not realistic - because the calculation steps are not performed.

4. List of Materials

The package for the evaluation version of the code contains a CD and this booklet. The information in this booklet has been prepared specifically for the evaluation version.

The CD contains:

- An evaluation version of SOLOMON. Some of the executables have not been supplied.
- Electronic versions of the User Guide, an introduction and tutorial guide and a poster
- A set of six example input files (together with their corresponding output files).
- A larger, more realistic model of a generic nuclear plant (together with the corresponding output files)
- A version of the Adobe Acrobat Reader

5. The SOLOMON File Structure

The files supplied on CD are as follows:

SOLOMON

SOLOMON\ACROBAT

SOLOMON\ACROBAT\SEARCH32

SOLOMON\BIN

SOLOMON\DOCS

SOLOMON\DOCS\DOC

SOLOMON\DOCS\PDF

SOLOMON\EXAMPLES

SOLOMON\EXAMPLES\EXAMPLE1

SOLOMON\EXAMPLES\EXAMPLE2

SOLOMON\EXAMPLES\EXAMPLE3

SOLOMON\EXAMPLES\EXAMPLE4

SOLOMON\EXAMPLES\EXAMPLE5

SOLOMON\EXAMPLES\EXAMPLE6

SOLOMON\EXAMPLES\MODEL

SOLOMON\MISC
SOLOMON\TEMP

6. Installing the Evaluation Version

Because SOLOMON was first ported to a Microsoft Windows 3.11 platform, that style of installation has been retained. The code is compatible with both Windows 95 and Windows NT, although features such as long file names are not supported. The installation procedure has not (yet) been modified to conform to the 95 or NT 'style'. You need to follow all the subsections for the version of Windows you are using.

6.1. Background

These installation notes assume that all supplied files will be placed in or below directory C:\SOLOMON. Whilst in use, SOLOMON recognises three directories:

bin All executable and related files are stored here. This installation uses C:\SOLOMON\BIN. If you use a different directory name you will need to modify the supplied files accordingly.

temp Intermediate files are placed in a temporary directory. This installation uses C:\SOLOMON\TEMP. If you use a different directory name you will need to modify the supplied files accordingly.

user data The user's SOLOMON input files and some results are placed in this directory, which is specified by the user at run time.

6.2. Unpacking the files (Windows 3.11/95/NT)

You now need to unpack the zip file. One way to do this (assuming the CD drive ID E:) is to:

```
Open a DOS Window and use the following commands
C:
cd \
unzip E:\solomon.zip
exit
```

After unpacking the files you should be able to see the subdirectories BIN, EXAMPLES, MISC and TEMP.

6.3. Set up Windows Group (Windows 3.11)

Create a new Windows Group for SOLOMON. This section assumes that Windows is installed in C:\WINDOWS - if this is not the case please change the path in this sequence of instructions.

One way to do this is to:

```
Select Program Manager | File | New
Click Program Group
Click OK
Type AEA Technology for the Description
Type C:\WINDOWS\SOLOMON.GRP for the Group File
Click OK
```

6.4. Set up windows program item entry (Windows 3.11)

Create a new Windows Program Item entry for SOLOMON.

One way to do this is to:

```
Select the Group from the previous section
Select Program Manager | File | New
Click Program Item
Click OK
Type Solomon Evaluation for the Description
```

Type C:\SOLOMON\BIN\SOLOMON.EXE for the Command Line
Type C:\SOLOMON\TEMP for the Working Directory
Leave None for the Shortcut Key
Leave None for the Run Minimised
Click OK

6.5. Set up a Shortcut (Windows 95/NT)

Create a new Windows Program Item entry for SOLOMON.

One way to do this is to:

Right click on the desktop
Select New | Shortcut
Type C:\SOLOMON\BIN\SOLOMON.EXE for the Command Line
Click Next
Type SOLOMON EVALUATION for the name of the shortcut.
Click Finish

6.6. COPY files to the Windows directory

a) Copy the file "C:\SOLOMON\MISC\SOLOMON.INI" to your Windows directory, where all the other PIF and INI files are.

If you already have copies of 'solomon.ini' you may wish to rename and save the old versions.

b) If necessary, edit the "SOLOMON.INI" file to reflect the locations on your machine. The first few lines of this file, where changes may need to be made, will look like:

```
[engine]
system=C:\SOLOMON\      (where you have installed the files)
temp=C:\SOLOMON\TEMP   (a working area of your choice)
```

6.7. SET UP A USER DATA Directory

Copy the attached SOLOMON input files from the TUTORIAL directory, into a new directory, for example, "C:\SOLOMON\WORK". Please see the accompanying User Guide for details on running the SOLOMON Graphical User Interface.

6.8. STARTING SOLOMON (WINDOWS 3.11)

To start SOLOMON double click the "SOLOMON Evaluation" icon in the "AEA Technology" Program Group. Refer to the SOLOMON User Guide for more detailed information on program use.

6.9. STARTING SOLOMON (WINDOWS 95/NT)

To start SOLOMON double click the "SOLOMON Evaluation" shortcut on the Desktop. More detailed information on program features and use are provided in the SOLOMON User Guide.

6.10. ERRORS/PROBLEMS

If you have problems please report them to AEA Technology using any of the methods described in this document.

7. Electronic Version of the Documentation

The CD contains a subdirectory 'DOCS' holding electronic versions of all appropriate SOLOMON documentation in Adobe Acrobat Reader format. The documentation includes:

USRGD.PDF	SOLOMON Containment Event Tree Program - A User Guide
SOLINTRO.PDF	An Introduction and Tutorial Guide to Using SOLOMON
POSTER.PDF	SOLOMON Poster

8. Installing the Adobe Acrobat Reader

PDF versions of most of the SOLOMON documentation have been supplied (in directory DOCS\PDF). If you do not already have an Adobe Acrobat Reader installed on your Windows 95/NT PC please refer to the file pdf2.doc in subdirectory ACROBAT. This file provides instructions for installing the Acrobat Reader and accessing the

appropriate versions of the SOLOMON documentation.

9. Exploring the Tutorial Examples

A number of simple examples of the use of SOLOMON are provided with this evaluation version. The user may either examine the files in example directory or copy a particular input file to temp directory and run the cases via the SOLOMON GUI. A detailed explanation of each example is provided in “An Introduction and Tutorial Guide to Using SOLOMON”, which can be used to explore the main features of the code using a step-by-step tutorial. To run a case, start SOLOMON by the method appropriate to your operating system.

Open an existing input file from the File | Open drop-down menu, or the open button on the toolbar. From the menu select Run | SOLOMON.

The resulting output can be viewed from one of three output viewers:

Run Supernode Tree Viewer	Allows the user to view supernode trees representing contracted views of the event tree.
Run PDF/CDF Viewer	Allows the user to view the probability density functions for pre-defined parameters.
Run Output Viewer	A simple text editor for viewing text output.

10. Exploring the Generic Plant Model

The final example provided with this evaluation version, gives the user an insight into the range of features typical of a more representative plant model. Since it is intended for evaluation purposes only, it is not based on a particular reactor design, although it contains many of the features typical of a PWR.

The model calculates the failure frequency for a simple containment with one compartment and includes a simple model to evaluate the probability of a hydrogen burn. Four Plant Damage States (PDSs) are analysed in series, covering large and small break loss of coolant accidents, station black-out and loss of feed-water. Engineered safeguards are represented in the definition of the PDS by the availability of containment sprays.

Each accident sequence is divided into four time-frames, each covering a period of the transient with broadly similar characteristics:

Time-frame 1: from accident initiation to the onset of core damage (defined by the start of core oxidation).

Time-frame 2: from the onset of core damage to core support plate failure.

Time-frame 3: from core support plate failure to failure of the lower head.

Time-frame 4: from failure of lower head to the end of accident sequence.

To give an indication of the flexibility of the supernode concept, supernode trees are provided for the full event tree, Time-Frame 4 only, key nodes and failure/survival of the containment. Two simple end-categories are defined for failure of the containment before (early) and after (late) lower head failure, with default representing survival of the containment.

This model is necessarily simplified, but could be extended in a number of ways. SOLOMON input is sufficiently flexible that the user could include several compartments in the containment, or the capability to model partial failures, e.g. at containment penetrations, which may result in a leak rather than catastrophic failure, with completely different source term characteristics. More time-frames could be included, to model the time development of accident sequences in more detail, and further accident sequences could be introduced. Additional physical models could be included such as, for example, core concrete interactions, Direct Containment Heating, steam explosions etc. The use of the functionality of the C programming language for constructing physical models means that their complexity is only limited by development time-scales and the current understanding of the phenomena involved.

To run the case, open the input file ‘baseuncr.in’ and select Run | SOLOMON from the drop-down menu.

The results of this run can be examined using the various viewers provided with the package, as described previously for the simple examples.

11. Uninstalling the Evaluation Version

These instructions make the same assumptions as the installation procedure.

- Delete the directory C:\SOLOMON
- Delete SOLOMON.INI from the C:\WINDOWS directory.

SOLOMON SOFTWARE SUPPORT

In the event of any queries during the installation of the program on your machine or if you have any suggestions for improving the SOLOMON release procedure, please contact the SOLOMON Support Service at Winfrith Technology Centre.

By Telephone : +44 (0)1305 202540

or +44 (0)1305 251888 extension 2540

By Fax : +44 (0)1305 202746

By e-mail : answers@aeat.co.uk

For the most effective response, you should direct your enquires, in the first instance, to one of the numbers shown below, according to the nature of your enquiry:

Technical Helpline : Brian Holmes on +44 (0)1305 203159

or e-mail Brian.Holmes@aeat.co.uk

Installation Helpline : Chris Maidment on +44 (0)1305 203409

or e-mail Chris.Maidment@aeat.co.uk

Contractual issues : Simon Aplin on +44 (0)1305 203634

or e-mail Simon.Aplin@aeat.co.uk